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A PLAN FOR DATA RECOVERY AT TWO ARCHAEOLOGICAL SITES ALONG NM 522 NEAR SAN CRISTOBAL, TAOS COUNTY, NEW MEXICO

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ARCHAEOLOGY NOTES

230

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ARCHAEOLOGY NOTES 230

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ADMINISTRATIVE SUMMARY

During an archaeological survey conducted by the New Mexico State Highway and Transportation Department (NMSHTD) along NM 522 in Taos County, New Mexico, sixteen archaeological sites and sixteen isolated occurrences were recorded. Of the sixteen sites, fifteen are scatters of chipped stone artifacts, including three basalt quarry sites. The sixteenth site is a historic Hispanic acequia. The NMSHTD proposes to reconstruct this portion of NM 522, including building shoulders and extending culverts.

Portions of two sites (LA 115550 [AR-03-02-07-528] and LA 115544 [AR-03-02-07-523]) extend into proposed project limits and cannot be avoided during construction activities. LA 115550 (AR-03-02-07-528) is a basalt chipped stone artifact scatter, while LA 115544 (AR-03-02-07-523) is a basalt quarry site. The NMSHTD has requested that the Museum of New Mexico's Office of Archaeological Studies prepare a plan for data recovery investigations at these two sites, which are on the Questa Ranger District of the Carson National Forest.

The primary focus of data recovery investigations at LA 115550 (AR-03-02-07-528) is to establish "base-line data" for the site. In so doing, information will be gathered that will add to that obtained from other chipped stone artifact scatters, most of which are on the western side of the Taos Valley. Base-line data include economic affiliation, chronology, and on-site activities. Similarly, the primary focus of data recovery investigations at LA 115544 (AR-03-02-07-523) is to establish base-line data for the site, which will include information on economic affiliation, chronology, and on-site activities. However, since at least some of the activities carried out at the site are known, the questions we will ask are somewhat different from those to be asked at LA 115550 (AR-03-02-07-528), focusing instead on the quarrying activities and on basalt material. In particular, proposed XRF (X-ray fluorescence) spectrometry of basalt from the quarry will provide the first attempt to identify and characterize the sources of the most commonly found chipped stone material in the Taos Valley.

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CONTENTS

Figures

INTRODUCTION

Between September 30 and November 8, 1997, the New Mexico State Highway and Transportation Department (NMSHTD) conducted an archaeological survey of 13.9 km (8.7 miles) along NM 522 in Taos County, New Mexico, between the communities of Arroyo Hondo and Lama (Levine 1997a). The NM 522 project area begins at Milepost [redacted] immediately north of Arroyo Hondo, in unplatted land in T27N, R12E (NMPM) within the Antoine Leroux Grant. After passing out of the grant, NM 522 passes through several sections within T27N and T28N, R12E. The project area ends at Milepost [redacted] north of the road to Lama (Fig. 1). The project area is on land administered by the Questa Ranger District, Carson National Forest, and on highway right-of-way acquired from private sources. The NMSHTD proposes to reconstruct this portion of NM 522, including building shoulders and extending culverts.

Sixteen archaeological sites and sixteen isolated occurrences (IOs) were recorded during the survey. Of the sixteen sites, fifteen are scatters of chipped stone artifacts, including three basalt quarry sites. One site also has micaceous sherds. The sixteenth site is the Atalaya Ditch, a historic Hispanic acequia. Portions of six sites (LA 68587 [AR-03-02-07-163], LA 115552, LA 115553, LA 115554 [AR-03-02-07-530], LA 115556 [AR-03-02-07-532], and LA 115558), while found within highway right-of-way, do not extend into the proposed project limits. Temporary fencing will be erected along proposed project limits around these sites prior to highway construction. Portions of five sites (LA 115543 [AR-03-02-07-522], LA 115545 [AR-03-02-07-524], LA 115547 [AR-03-02-07-526], LA 115549 [AR-03-02-07-527], and LA 115557 [AR-03-02-07-533]), while extending into proposed project limits, have limited data potential due to the small number of artifacts within project limits. Limited shovel test investigations were conducted at these five sites to determine the subsurface data potential of the sites. No subsurface artifacts or other cultural materials were recovered, and testing revealed that the sites and are not likely to yield additional information (Levine 1997a:2, 10). Temporary fencing will be erected through these sites along proposed project limits prior to construction to protect the portions of the sites outside proposed project limits. Two sites (LA 115546 [AR-03-02-07-525] and LA 115555 [AR-03-02-07-531]) are within highway right-of-way but are protected by their topographic locations. Operation of LA 115548, the Atalaya Ditch, will not be affected. No further investigations at any of these sites are recommended (Levine 1997a:1-2).

Portions of two sites (LA 115550 [AR-03-02-07-528] and LA 115544 [AR-03-02-07-523]) extend into proposed project limits and cannot be avoided during construction. The NMSHTD has requested that the Museum of New Mexico's Office of Archaeological Studies (OAS) prepare a plan for data recovery investigations at these two sites. The map in Appendix 1 shows the locations of the two sites on the USGS 7.5' quadrangle for Arroyo Hondo, New Mexico.

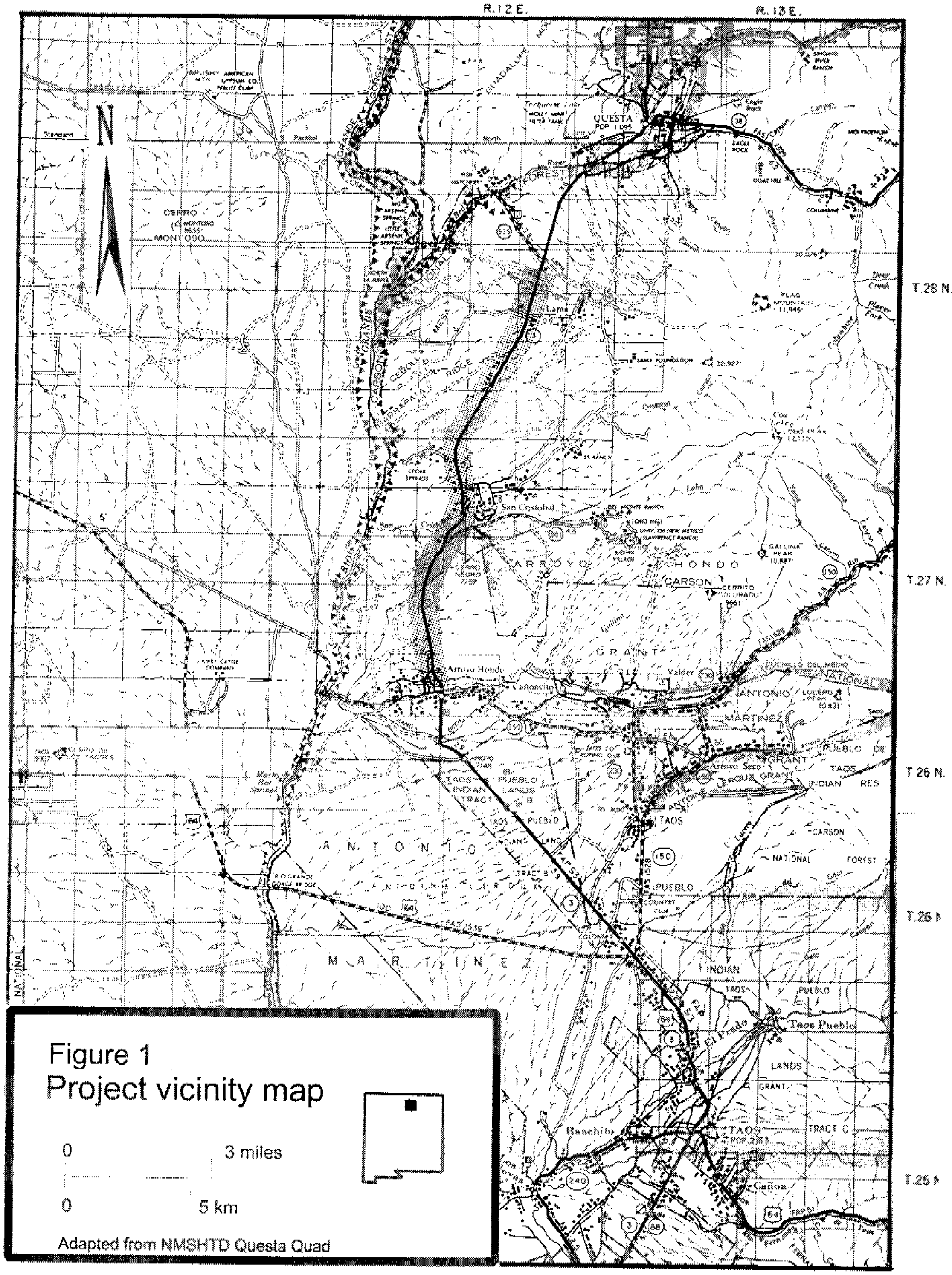

Figure 1
Project vicinity map

THE NATURAL ENVIRONMENT

The NM 522 project area is in the foothills of the Sangre de Cristo Mountains on the east side of the Taos Plateau between the communities of Arroyo Hondo and Lama. The Taos Plateau, which is within the Rio Grande Depression or Trough, is a broad region bounded on the west by the San Juan Uplift (the San Juan and Tusas Mountains) and on the east by the Sangre de Cristo Mountains. The plateau is formed by block-faulting along the Rio Grande Rift that resulted in a wide trough. Accumulation of volcanic and sedimentary materials in the trough resulted in the Santa Fe formation, consisting of a variety of gravels, sandstones, volcanic rocks, breccias, cherts, and clays. Much of the area is capped by volcanic rock, primarily basaltic flows, which are a major and obvious feature of the region (Heffern n.d.). In New Mexico, the plateau is known as the Taos Valley, while in Colorado it is called the San Luís Valley. The rolling terrain of the plateau is bisected by the Rio Grande, which has cut a gorge up to 198 m (650 ft) deep through the accumulated material. West of the gorge, the plateau is dotted by volcanoes. To the east, it is characterized by alluvial fans and terraces from the Sangre de Cristo Mountains, although volcanic features such as Ute Mountain, Guadalupe Mountain, the Questa caldera, Cerro Negro, and their associated basalt flows are present where they have not been covered by alluvial material.

The Sangre de Cristos are the southernmost extension of the southern Rocky Mountains and are made up largely of granites, schists, and quartzites. Ranging from about 2,133 m (7,000 ft) in elevation in the southern Taos Valley near Taos to 3,997 m (13,120 ft) at Wheeler Peak, the Sangre de Cristos in the vicinity of this project are the source of the Red River, the Rio San Cristobal, and the Rio Hondo. These rivers and numerous intermittent drainages such as Garrapata Creek and Alamo Creek, which cut the fans, are tributaries of the Rio Grande, which flows south through the central valley west of the project area. Subsequent to the vulcanism of the early Pleistocene, geologic processes in the region shifted to a period of extensive erosion during the late Pleistocene. The erosion resulted in the formation of the large alluvial fans extending into the valley along the margins of the mountains.

From the southern end of the project area near Arroyo Hondo to the Rio San Cristobal, NM 522 runs across ridges radiating southwest, west, and northwest from Cerro Negro, a small volcanic cone immediately north of upper Arroyo Hondo. From the Rio San Cristobal to Garrapata Ridge, NM 522 winds across and through sharply dissected ridges representing the remains of mountain foothills cut by Ojitos Canyon, Garrapata Canyon, and numerous unnamed drainages. Leaving Garrapata Canyon, NM 522 climbs Garrapata Ridge, the southern edge of a large alluvial fan bounded on the north by Lama Canyon and on the south by Garrapata Canyon. This fan, known as Cebolla Mesa, extends from the mountains just east of the community of Lama onto the Taos Plateau and is terminated at its western edge by the Rio Grande gorge.

The major geomorphological features of the region--the Santa Fe formation, the volcanoes, and their basalt flows--are important culturally because they have provided raw lithic materials for the region's prehistoric and historic inhabitants. Of specific importance are sandstone, chert, and quartzite from the Santa Fe formation gravels, and basalt and obsidian from the volcanic features. The basalt flows from Cerro Negro and other cones were important sources of basalt (e.g., Rule 1973), while No Agua Mountain on the western side of the valley provided a poor-quality obsidian (Michels 1985). However, while studies have been conducted of the obsidians found and used in the Taos Valley (e.g., Findlow and Bolognese 1982; Winter 1983; Michels 1985; Newman and Nielsen 1985; Stevenson and McCurry 1990; Ridings 1991), no similar study of Taos Valley basalt materials and sources (on the order of Latham et al. 1992) has been performed, despite the fact that basalt is the most commonly recovered chipped stone material in the valley.

Terrestrial Ecosystem Survey Units

LA 115544 (AR-03-02-07-523) is in Terrestrial Ecosystem Survey (TES) Unit 145. Soils in Unit 145 are fine, mixed loams formed in alluvium derived from various sources. In this case, the parent material is probably largely basalt bedrock, since the site is on the western slope of Cerro Negro, a small volcanic cone. These loams are found on nearly level elevated plains and slopes. Mean annual precipitation in the unit is 350 to 450 mm (14 to 18 in), about 60 percent coming from winter snows. Mean annual air temperature ranges from 7 to 9 degrees C (45 to 48 degrees F). The freeze-free season averages 130 days. These conditions support a forest community with an overstory of one-seed juniper and piñon and an understory of big sagebrush, blue grama, and sideoats grama (Edwards et al. 1987:116-117).

LA 115550 (AR-03-02-07-528) is in TES Unit 159. Soils in Unit 159 are very gravelly sandy loams formed in residuum derived from conglomerate and sandstone. These loams are found on the complex slopes of hills and slopes. Although the soils in Unit 159 differ from those in Unit 145, climatic conditions are identical, as is the resulting juniper-piñon forest community (Edwards et al. 1987:132-133).

THE CULTURAL ENVIRONMENT: ARCHAEOLOGICAL BACKGROUND

The north-central portion of the Taos Valley is one of the most poorly known regions, archaeologically, in New Mexico. Most of the archaeological work in the Taos Valley has centered on an area about 16 km (10 miles) in diameter with the town of Taos at its approximate center. The following discussion provides a general background to the prehistory and history of the region and the results of archaeological projects in the vicinity of the project area. Cordell (1978), Stuart and Gauthier (1981), and Young and Lawrence (1988) provide more detailed regional syntheses.

Between 1941 and 1946, E. B. Renaud undertook an extensive survey of the upper Rio Grande valley in New Mexico and Colorado (Renaud 1942, 1946). His work in this area focused on nonceramic sites, from which he defined a cultural tradition called the "Upper Rio Grande Culture." The borders of the culture area were defined as the Sangre de Cristo Mountains on the east, the Rio San Antonio on the west, and the highway between Tres Piedras and Arroyo Hondo (now U.S. Highway 64) on the south (thus including this project area). The northern boundary was unclear to Renaud, except that occasional sites were found in the region of Del Norte, Monte Vista, Alamosa, and the Great Sand Dunes in Colorado (Renaud 1946:29). He also found sites along the Rio San Antonio, between Monte Vista and La Jara Creek, in the Dry Lake area, and from La Sauces to the state line (Renaud 1946:29-30).

Sites of the Upper Rio Grande Culture were recognized by the presence of a diagnostic series of projectile points and the almost exclusive use of basalt and obsidian for chipped stone tools. A site excavated in 1942 established clearly that the Upper Rio Grande Culture preceded Puebloan occupation or use of the area (Renaud 1942:31-34; 1946:30). Renaud also noted four kinds of sites: campsites, which could be divided into large, dense sites (near drainages) and "scattered finds" (small, sparse sites some distance from a river or creek); workshops, where basalt outcrops are obviously quarried and tools are produced (often near campsites); lookouts on exposed mesas, benches, or outcrops, where a wide view was available; and rock shelters, such as the one which, when excavated, revealed the relative antiquity of the culture (Renaud 1946:30-33).

Renaud's findings indicated to him that there was a distinct correlation between site location and water, especially extant rivers and creeks or sizable arroyos that might have run in the past (Renaud 1946:33). This conclusion may actually reveal a bias in his survey strategy, which was often to drive along dirt roads looking for likely spots on or near mesas, small hills, or rivers. Thus, for instance, he surveyed the west side of San Antonio Mountain, where the road is near the Rio San Antonio, but not the east side of the mountain, where there are no large drainages.

More recent research on the Archaic period in northern New Mexico, particularly that of Irwin-Williams (1973) in the Rio Puerco region, indicates that Renaud's Rio Grande points are fairly typical Archaic points dating from the three earliest Archaic phases: Jay, Bajada, and San Jose (ca. 6000-1800 B.C.). This places the Archaic in the Taos area within the Oshara Tradition. Examination of the drawings of Renaud's points (1942:Plate 1) shows the "typical" Rio Grande points to be Bajada and San Jose points, while Jay points make up his "Subtype 1," and another subtype consists of other points of uncertain type.

Arroyo Hondo-San Cristobal Area

Several projects have recorded archaeological sites in the Arroyo Hondo Valley. In 1961, the New Mexico State Highway and Transportation Department conducted a series of cultural inventory surveys in Taos County, including a survey along NM 3 (now NM 522) from the New Mexico-Colorado border through Questa to Taos. In Arroyo Hondo, the survey recorded one site, LA 5869, a probable pithouse at the edge of the first terrace above the Rio Hondo floodplain.

In 1977, Schaafsma (1980) collected surface artifacts from LA 58977, a Valdez phase site immediately west of upper Arroyo Hondo. He suspected that a pithouse was present, although no evidence of one was seen. Like LA 5869, this site is at the edge of the first terrace above the Rio Hondo floodplain.

In 1987, McCrary (1987) conducted an inventory survey of Kit Carson Electric Cooperative's Arroyo Hondo-Des Montes transmission line. The line runs across the Arroyo Hondo Valley from NM 522 southeast toward upper Arroyo Hondo before climbing onto the Des Montes Plain. McCrary recorded eight sites. Four sites are probable Valdez phase artifact scatters. One has a cobble ring, and two have cobble piles and historic structural components. All are in fields currently or recently under cultivation, and no evidence of prehistoric structures was observed, although McCrary suspected their presence. Another artifact scatter with cobble piles and a historic component may date from the Pot Creek phase. It, too, is in a cultivated field, and no evidence of structures was noted. LA 61186, a lithic scatter with hearths near NM 522, may be an Anasazi site because of the presence of an arrow point fragment, slab metate fragments, and a two-hand mano. A large petroglyph site, LA 61185, was also found on the north side of the valley near NM 522.

In 1988, Rayl (1988) recorded the Acequia Madre del Llano (LA 68219). The acequia, which is fed by the Rio Hondo, serves 260 ha (650 acres) of irrigated land on the first terrace on the south side of the Arroyo Hondo Valley. The age of this ditch is not known, but Baxter (1990:24) asserts that a date of 1815 is reasonable.

In 1974, Loose (1974) reported on excavations of eight sites along and near Lobo Creek by the University of New Mexico archaeological field school. Excavations were conducted in 1965 and 1967. Seven of these sites included pithouses, five also had surface structures, and the eighth is described as having only surface rooms. The sites all date to the Valdez phase of the Anasazi occupation of the Taos Valley, ca. A.D. 1050 to 1225. Several of these sites are included in a project intended to obtain chronometric dates from excavated Valdez phase sites (Boyer 1997).

An extensive survey of a revegetation project area was conducted in 1979 (Abbott 1979). The 152 ha (376 acre) area was between Cerro Negro, Lobo Creek, and the road leading from NM 522 to the D. H. Lawrence Ranch. Within the area, eight sites and many isolated artifacts were recorded. Three sites are small lithic artifact scatters with less than 100 artifacts, mostly basalt flakes. Three others have assemblages larger than 200 artifacts in which, again, basalt was the dominant material. Utilized flakes make up an estimated 10-50 percent of the assemblages. Two sites are sherd and lithic artifact scatters. One has 10 basalt flakes and the sherds from a single large, white ware bowl. The second has about 600 flakes and the sherds from a single large, plain ware bowl. Isolated artifacts consist of basalt flakes and obsidian flakes and tools.

In 1983, Koczan (1983) surveyed the length of what was, at that time, NM 561, the road leading from NM 3 (now NM 522) to the D. H. Lawrence Ranch. NM 561 has since been given to Taos County and is numbered County Road B-009. During the survey, Koczan recorded site LA 45733, a very large site running the length of the road. A continuous scatter of chipped stone artifacts and nine "localities" that may represent specific activity areas were observed. Three localities were defined by sherd concentrations. Others are defined by chipped stone tools or soil depressions thought to represent pithouse locations, although some of the latter may have been created by a backhoe during earlier road construction. This description largely mirrors Abbott's descriptions of the sites and general artifact scatter in the revegetation area bordering Koczan's area on the south. In 1996, Boyer (1996) re-recorded and conducted limited testing at Koczan's Locality 9, which included sherds from a single plain, gray vessel.

Also in 1983, a transmission line corridor was surveyed between the Taos Substation and Questa (Viklund 1983). The corridor runs from southwest to northeast about 2.4 km (1.5 miles) west of San Cristobal. Six sites were recorded on USDA Forest Service land, four near San Cristobal. All are basalt lithic artifact scatters, one with a chert En Medio projectile point. Also recorded were several isolated basalt artifacts, including small concentrations of flakes.

In 1986, Koczan (1986) inspected the locations of three borrow areas along NM 522 between County Road B-009 and Garrapata Ridge. No cultural resources were recorded.

In 1993, Leven (1993) inspected one acre for the proposed location of the Arroyo Hondo transfer station west of NM 522. Three isolated occurrences were recorded. They included two basalt flakes, two condensed milk cans and a crown-top beer can, and three Fiesta-ware sherds with a piece of blue bottle glass.

In 1996, Kriebel (1996) surveyed a corridor for an electric transmission line along the southern boundary of the Questa Ranger District, Carson National Forest. He recorded two archaeological sites. LA 114186 is a scatter of Taos Gray incised sherds, probably from a single vessel, 22 basalt flakes, three obsidian flakes, one rhyolite flake, and two projectile points, one basalt and the other rhyolite. LA 114187 is a scatter of 28 basalt flakes and one obsidian flake. He also recorded eight isolated occurrences, all of which were basalt flakes. His survey area crossed NM 522 near, but not within, the site recorded during the NMSHTD's NM 522 survey (Levine 1997a) as LA 115545 (AR-03-02-07-524).

Cebolla Mesa

Cebolla Mesa has been the location of several projects that have provided information on human use of the region. The first of these is Valerie Hume's research on Garrapata Ridge. Her survey involved the western end of the ridge below NM 522 and revealed 32 concentrations of artifacts in an area approximately 6.4 km long by 0.4 km wide (Hume 1973:Fig. 1) Hume's research was never completed, and only preliminary data are available (Hume 1973, 1974a, 1974b). Nonetheless, her work is critical to research in the immediate area and the Taos Valley, because she documented Archaic sites on the ridge and showed that Renaud's (1942, 1946) Rio Grande Culture was an Archaic tradition and probably fit within Irwin-Williams's (1973) Oshara Tradition.

Archaeological surveys on Cebolla Mesa have focused on the northern and southern sides of the mesa. On the south, surveys have encompassed most of Garrapata Ridge west of NM 522, duplicating and expanding Hume's research area. A total of 160.7 ha (397 acres) have been surveyed for green fuelwood sales (McGraw 1991, 1993; Leven 1994, 1995a, 1995b). Sixty-six sites have been recorded, for an average site density of 0.4 site/ha (0.17 sites/acre). Density ranges from 0.08 to 0.71 sites/ha (0.03 to 0.29 sites/acre). Higher densities were found to the west and lower densities to the east in the more broken terrain nearer the mountains. Sixty-three sites are scatters of chipped stone artifacts. The most common material observed is basalt, and obsidian from the Polvadera and Jemez sources make up much smaller parts of the assemblages. Many site assemblages include projectile points, but descriptions and illustrations of the points are not available. Ten sites are identified as possibly "Late Archaic" based on projectile points (McGraw 1991), although point styles are not discussed. One of these "Late Archaic" sites has sherds from a single Taos Gray Incised vessel, and another has an "arrow point," pointing out the potential problems of assigning site dates based on surface artifacts. Several sites also have ground stone artifacts, particularly manos (Leven 1994, 1995a, 1995b). Again, descriptions and illustrations are not provided in the reports.

Three sites are scatters of late historic, twentieth-century Euroamerican artifacts that seem to point to both trash disposal and temporary campsites. Isolated occurrences consist primarily of basalt flakes and flake scatters and basalt tools. There are fewer obsidian flakes and tools and Euroamerican artifacts.

East of NM 522, Boyer (1990a, 1990b) recorded a small chipped stone artifact scatter site on a narrow point overlooking Garrapata Canyon. No temporally diagnostic artifacts were observed, but biface thinning flakes were present. Since biface reduction is sometimes seen as diagnostic of hunter-gatherers, these artifacts may indicate that the site was occupied by hunter-gatherers rather than Anasazi horticulturalists on a hunting or gathering trip.

To the north, most surveys have focused on a ridge west of NM 522 between Alamo and Lama Canyons. Some 155 ha (375 acres) have been surveyed, also for green fuelwood sales (McCrary 1988a; Westbury 1989; Hobbs 1989; Leven 1996). Seventy-three sites have been recorded, resulting in an estimated density of 0.5 sites/ha (0.19 sites/acre), a figure consistent with those from Garrapata Ridge. Temporally diagnostic artifacts suggest that the region saw its highest use from the middle to the end of the Archaic Period (ca. 2000 B.C.–A.D. 500). Only five sites have probable arrow projectile points, and one has a single sherd. Interestingly, two sites have late Plains-type points--one metal, pointing to an Apachean presence in the area. This is supported by McCrary's (1988b) discovery of a site with a metal projectile point and a shell button from his survey for road closures in the area. This survey, which was unlike the fuelwood area surveys in not being a block survey, instead following existing roads, also supports the impression of the predominance of Archaic use of the area. Of 18 sites recorded, 13 had Archaic dart points or point fragments. Only four had Anasazi pottery, and three had arrow points.

Survey in the more broken terrain north of Cebolla Mesa indicates that this area was not as extensively used as the mesa itself. For instance, McCrary (1988c) surveyed 59 ha (145 acres) north of Lama Canyon for a prescribed burn. He recorded only three sites: one chipped stone artifact scatter, one post-1900 homestead, and a possible sawmill site with a chipped stone component. Similarly, McCrary's (1988d) survey of 4 ha (10 acres) in five parcels for stock tanks in the same area recorded only one site, a large chipped stone artifact scatter.

A PLAN FOR DATA RECOVERY

The results of archaeological investigations in the vicinity of the NM 522 project area point out different patterns of site types and densities on Cebolla Mesa and in the Arroyo Hondo–San Cristobal area. Archaeological surveys on Cebolla Mesa lead us to expect that sites will consist primarily of basalt chipped stone artifacts. No prehistoric sedentary habitation sites are expected on the mesa, and the archaeology appears to reflect extensive but short-term use of the area.

Temporally diagnostic artifacts suggest that Cebolla Mesa was most intensively used by Archaic hunter-gatherers, and less by later Anasazi occupants of the region. However, this interpretation is based on the presence of large projectile points thought to have been used on darts rather than arrows, which are, in turn, linked to "earlier" (i.e., Archaic) hunter-gatherers rather than "later" (i.e., Anasazi) horticulturalists on hunting and gathering trips. The accuracy and the exclusivity of associations between projectile point types and groups of people thought to have occupied the region at different times and to have had essentially different economies have not been clearly demonstrated, at least in this region. Further, the presence of arrow points and Anasazi pottery on sites with "Archaic" dart points shows the problems associated with dating sites using surface artifacts. At least three possibilities present themselves: the sites have multiple temporal components because of reoccupation through time; the earlier artifacts were collected by later people traveling through the region and were secondarily (re)deposited at these sites; the site occupants used both darts and arrows in their hunting activities and had pottery. The last situation, which is not unreasonable when we consider that groups as different as nineteenth-century Plains tribes and Mbuti pygmies used both bows and darts or spears, suggests that point types may be temporally diagnostic only in a very general sense (i.e., bows and arrows appeared later than darts or spears) and should not be used to identify cultural groups unless otherwise substantiated. We expect that the same concern can be applied to the use of biface flakes and the implication of biface reduction rather than core-flake reduction to distinguish between hunter-gatherers and horticulturalists at these kinds of sites (see Schutt 1980; Moore 1994).

In contrast, archaeological activities undertaken in the foothills of the Sangre de Cristo Mountains between Arroyo Hondo and Cebolla Mesa (Garrapata Ridge) suggest that those foothills were used by prehistoric Anasazi occupants of the region both for habitation and short-term economic activities. In this sense, the area resembles the Taos area to the south more than the Cebolla Mesa area to the north. This may have to do with the presence of permanent or semipermanent water sources in the foothills south of Cebolla Mesa, in contrast with the absence of permanent water sources on Cebolla Mesa. This is most clearly seen in the locations of Anasazi habitation sites, which have been found near permanent and semipermanent water sources: the Rio Hondo (Schaafsma 1980; McCrary 1987; Boyer and Mick-O'Hara 1991); Lobo Creek (Loose 1974; Boyer 1997); and, perhaps, the Rio San Cristobal (Jack Boyer, personal communication, 1988), Koczan's (1983) possible pithouse (or backhoe) depressions.

Temporally diagnostic artifacts reported from artifact-scatter sites thought not to represent habitation locations include a possible Basketmaker (En Medio) point and both plain and painted ceramics from 300 years of Anasazi occupation of the region. The presence of Anasazi artifacts at these sites may be explained as evidence of wild food resource exploitation in the foothill ridges and valleys by otherwise horticultural Anasazi. However, the meaning of the presence of ceramics is not clear. For example, among the western Apache (Buskirk 1949; cited in Vierra 1984:32), pottery was not carried by the men on hunting or other similarly mobile excursions since it was too much of an encumbrance. If this is so, one must wonder why ceramics are present on artifact scatter sites. Traditionally, artifact scatters with ceramics are assigned to the culture of the ceramic producers. However, the concept of pottery as an encumbrance might indicate that those sites were not occupied by ceramic producers but by foragers who obtained the pottery in trade. If so, then the sites could represent forager base camps. In this regard, we should remember that two metal projectile points thought to point to Apachean presence were found on Cebolla Mesa and that one site recorded during the survey for this project has micaceous sherds, also it is thought to represent an Apachean component (Levine 1997a).

The large size of sites in many cases precludes accurate assessment of the temporal components represented, at least at the survey level of investigation. The behavioral significance of variability in site size undoubtedly has to do with site functions and on-site activities in association with resources being exploited at the sites. Intensive investigation of sites will be required to assess differences in site function and on-site activities and define reasons for differing intensities of regional land use as reflected by differing site densities in the region.

LA 115550 (AR-03-02-07-528): A Chipped Stone Artifact Scatter

LA 115550 (AR-03-02-07-528) is a chipped stone artifact scatter on both sides of NM 522 on a narrow ridge between the Rio San Cristobal Valley and County Road B-009 (Appendix 1). According to Levine (1997b),

> It appears to have been one continuous site before construction of the highway. The portion of the site on the west side of NM 522 is on the top and slopes of a steep ridge. The portion on the east side is across from this scatter and continues downslope. LA 115550 probably represents a short term camp where locally occurring lithic raw material was reduced. Expedient flake tools may have been used in animal kill processing. The assemblage consists of cortical and non-cortical core flakes, shatter, and expended cores of local basalt. The site has a few very large core flakes. Edge damage on a few flakes suggests use as expedient tools.

The site is about 83 m long by 48 m wide (Fig. 2). Shovel testing was not conducted. Testing at LA 115547 (AR-03-02-07-526), a similar site nearby in a similar location, revealed very shallow topsoil (5 to 12 cm thick) over caliche and gravels, with no subsurface artifacts or other materials (Levine 1997a:10). This suggests that LA 115550 (AR-03-02-07-528) has little significant subsurface data potential. About 50 artifacts were observed at the site, although Levine does not provide counts for the two sides of the site. No temporally diagnostic artifacts were observed during the survey.

Research Perspective

The bias of archaeological research in north-central New Mexico toward "sedentary" habitation sites dating after A.D. 1050 has been observed by several researchers (Hume 1973; Cordell 1978; Seaman 1983; Boyer 1985, 1986, 1988; and others). This bias is evident both in the kinds of sites recorded and studied and in characterizations or descriptions of the prehistory of the region. For instance, in the Taos Valley, the most well-known studies are those of pithouse sites (Blumenschein 1956, 1958, 1963; Peckham and Reed 1963; Luebben 1968; Loose 1974; Green 1976; Boyer et al. 1994), small "unit-type" pueblos (Blumenschein 1956, 1958; Jeançon 1929; Wetherington 1968;

Vickery 1969), and large pueblos (Wetheringon 1968; Dick 1965; Ellis and Brody 1964; Crown 1991). Sequential phase designations rely on changes in artifacts and architecture at habitation sites. Wendorf and Reed's (1955) classification, still the most commonly used in the Rio Grande region, describes the Developmental, Coalition, and Classic Pueblo periods, and the Taos Valley phase sequence (Wetherington 1968) describes the Valdez (late Developmental Pueblo), Pot Creek (early Coalition Pueblo), and Talpa (late Coalition Pueblo) phases, relying on changes in ceramic styles and architecture. Thus, it is clear that archaeologists have assumed that adaptive strategies characterized by the development of increasingly complex social conditions manifested archaeologically by larger and larger habitation sites and more diverse artifactual assemblages indicating extensive exchange relationships were the normal and, perhaps, only strategies at work and were characteristic of the occupation of the region during their respective time periods.

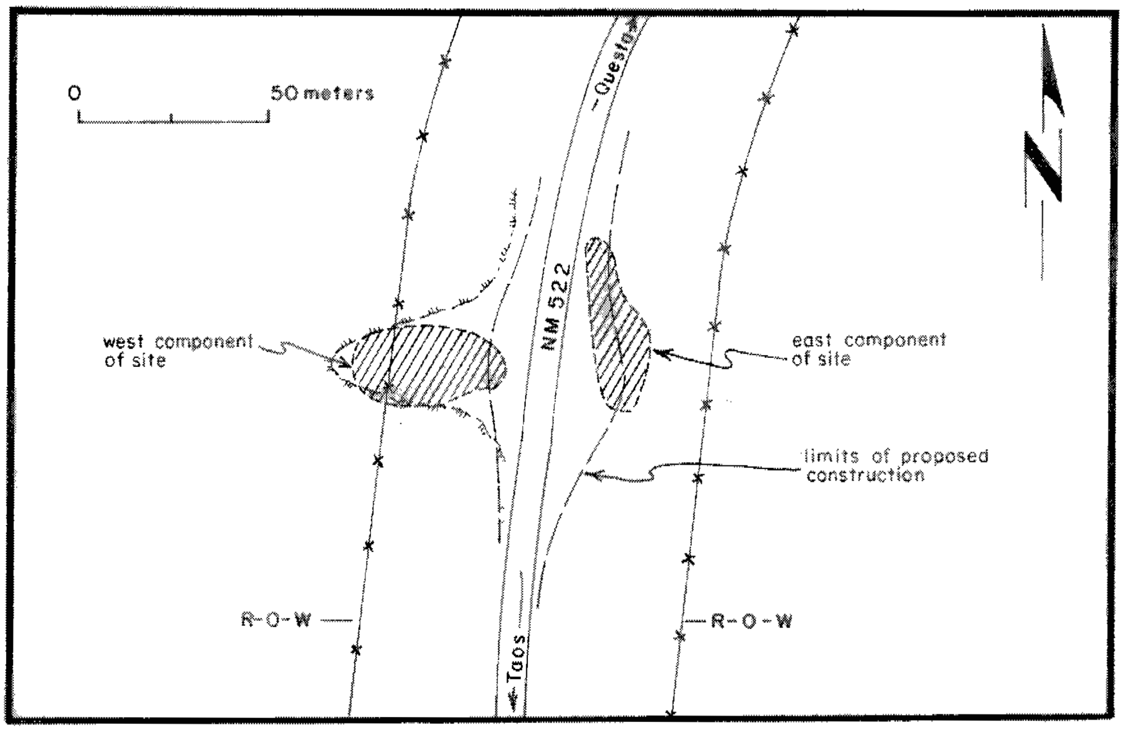

Figure 2. LA 115550 (AR-03-02-07-528) site map.

An obvious problem with describing archaeological developments in a region solely in terms of the remains of cultural systems that were involved in increasing complexity (what Stuart and Gauthier [1981] call a "power drive") is what to do with sites that were or may have been occupied contemporaneously with the increasingly complex systems but do not, in themselves, exhibit the same evidence of artifactual and architectural complexity. Such sites are, however, ubiquitous in the region and most often described as lithic (read "chipped stone") or sherd and lithic artifact scatters. These sites lack architectural features usually associated with habitation sites, such as pithouses or pueblos, and often have very different artifact assemblages. Because of the lack of obviously "sedentary" architecture, they are presumed to represent temporarily occupied locations.

It is the place(s) of these types of sites within larger sociocultural (and archaeological) contexts that is perhaps their most confusing aspect. The initial problem is proper identification. If, during the course of recording such a site, a projectile point is found that has been otherwise identified as dating to one of the Archaic (i.e., pre-Puebloan) time periods, the site is usually recorded as an Archaic site. This is also true of artifact scatters that include sherds. In this case, the site will often be recorded as occupied during the period(s) during which the pottery types present were produced. It will then be assumed to have been occupied by pottery-producers who otherwise lived in permanent structures (i.e., pithouses or pueblos), making the artifact scatter a "limited activity site" associated with a sedentary habitation site somewhere else.

This issue is further confused by those artifact scatters that do not have readily identifiable, temporally diagnostic artifacts. How is one to classify a site that has no artifacts linking it to a well-known cultural tradition? The result of this situation is a growing number of "unknown lithic scatters" in site files. Sometimes, in what is a profound reliance on normative "power drive" classification schemes, such sites are classified as Archaic because they obviously represent a nonsedentary strategy and, so, most have been occupied before the rise of later sedentary cultures. Equally confusing are those sites with artifacts dating from different time periods.

The point of this discussion is not to question the recording techniques or decisions of archaeologists who find artifact scatter sites. Rather, the point is to make clear the ambiguity inherent in such sites, particularly when the archaeologist is relying on concepts of regional developments involving increasing sociocultural and archaeological complexity. Clearly, some of the prehistoric occupants of north-central New Mexico did live in situations of increasing complexity. Their pithouses and pueblos are common and well-known features of the archaeological landscape. However, there are a great many sites in the region that do not display the characteristics that identify sedentary habitation sites. In the case of chipped stone artifact scatters, these sites may be preceramic (Paleoindian or Archaic) sites or nonceramic sites from later time periods. Examples of the former are four artifact scatters at Red Hill, northwest of this project area, on the west side of the Taos Valley. Obsidian hydration dates from the sites point to occupations between 3600 and 1100 B.C. (Condie and Smith 1989). Examples of the latter are three artifact scatters at San Antonio Mountain, also northwest of this project area. Obsidian hydration dates indicate that the sites were occupied around A.D. 800, too late to place them in Paleoindian or Archaic periods as traditionally defined (Boyer 1985). Similarly, obsidian hydration dates from five chipped stone artifact scatter sites in the southern Taos Valley and the Rio Ojo Caliente drainage point to occupations between A.D. 700 and 1500. Two of the sites were identified as possible hunter/gatherer residential base camps. The three remaining sites were tentatively identified as logistical sites (Boyer 1986). This interpretation may be ill-conceived (see Vierra and Doleman 1984; Vierra 1985a), since such sites will normally be archaeologically invisible. However, the presence of nonsedentary occupants of the region, both early and relatively late in time, seems clear. The issue thus becomes whether the sites represent the activities of hunter/gatherers or of otherwise "sedentary" horticulturalists. If the former is the case, then there is evidence for hunter/gatherers occupying the regions contemporaneously with horticulturalists. If it is the latter, the question arises as to whether the sites represent normal economic activities for the horticulturalists or alternative economic activities, for instance, during a period of horticultural stress. In either case, the normative "power drive" scheme for the region is challenged. The challenge is greater when we see that some chipped stone artifact scatter sites were apparently occupied during the historic period (Condie and Smith 1992a, 1992b).

Research Issues

The primary focus of data recovery investigations at LA 115550 (AR-03-02-07-528) is to establish "base-line data" (Boyer 1985, 1986, 1988) for the site. In so doing, information will be gathered that will add to that obtained from other chipped stone artifact scatters, most of which are on the western side of the Taos Valley. Base-line data include economic affiliation, chronology, and on-site activities. We want to know who stayed there, when they stayed there, and what they did there.

Economic affiliation. An important issue raised by the review of archaeological surveys in the vicinity of this project and of similar artifact scatter studies in the region is distinguishing between sites produced by hunter/gatherers and by otherwise "sedentary" horticulturalists. Differentiating between such similar sites rests on the assumption that the sites, their features, and their artifactual assemblages will have different characteristics reflecting their different origins (Binford 1980; Vierra 1985b; Schutt 1980; Moore 1994). The basis of this assumption is the concept that the economic and mobility (land-use) patterns of mobile hunter/gatherers and sedentary horticulturalists are different. For instance, hunter/gatherers may be expected to occupy residential and logistical campsites, the latter being used by segments of the larger band who are on task-specific excursions. The two types of sites may resemble each other at first, but their features and artifact assemblages should differ, reflecting their different functions (Binford 1980). The residential sites of horticulturalists, on the other hand, are their villages (pithouses or pueblos, in this region). Consequently, artifact scatters associated with horticulturalists may be expected to be logistical (task-specific) in nature. The archaeological issue thus becomes, firstly, distinguishing between artifact scatter sites that reflect residential and logistical activities and, secondly, distinguishing between logistical sites used by hunter/gatherers and horticulturalists. More specifically, we want to know whether LA 115550 (AR-03-02-07-528) represents a hunter/gatherer residential or logistical site or a horticultural logistical site.

As noted earlier, limited testing was not conducted at LA 115550 (AR-03-02-07-528). However, testing at a similar site in a similar topographic location (on top of a narrow ridge) suggests that LA 115550 (AR-03-02-07-528) possesses little significant subsurface data potential. Therefore, we do not expect to find features such as hearths or structures, an expectation strengthened by the lack of surface evidence of features. We will conduct exploratory excavations to search for buried features or deposits and are prepared to investigate them if found. However, we will focus our attention on collecting and analyzing artifacts from the site.

Several studies point to archaeological expectations for distinguishing hunter/gatherer and horticultural chipped stone assemblages:

1. Raw material selection: Vierra (1985b:6) suggests that we look for nonlocal chipped stone materials as an indicator of hunter-gatherers: "Several researchers have observed higher percentages of these materials in Archaic rather than Anasazi assemblages," apparently because hunter/gatherers collect raw materials and produce, use, and discard tools and their byproducts during their seasonal rounds, often in locations far removed from the sources of the raw materials. Although we are only investigating one chipped stone scatter site in this project, comparable data available from similar sites in other nearby project areas will allow us to examine the frequencies of local and nonlocal materials.

In addition to nonlocal materials, we will conduct trace-element analyses of basalt artifacts collected from LA 115550 (AR-03-02-07-528). As discussed in detail in the following section on investigations at LA 115544 (AR-03-02-07-523), we are concerned with identifying the sources of basalt materials found on artifact scatter sites (and other prehistoric sites) in the region. Analyses of trace elements in the basalt artifacts from LA 115550 (AR-03-02-07-528) will begin the process of examining basalt artifacts with an eye toward data on mobility, raw material selection, and differential raw material use.

2. Material reduction and tool production: Schutt (1980:393, 394) states that among the U.I.I. sites in the northern San Juan Basin, "Archaic lithic assemblages consistently exhibited higher ratios of flakes to small angular debris in all but one case," and "Chi square values indicate that in four out of five Archaic assemblages, flake to small angular debris ratios are significantly different from those found in the Anasazi lithic assemblages." This reduction/production issue is related to Moore's (1994:287) contention that

> two basic strategies of chipped stone reduction have been defined in the Southwest. Curated strategies entailed the manufacture of bifaces that served both as unspecialized tools and cores, while expedient strategies were based on the removal of flakes from cores for use as informal tools. Technology was at least partially related to lifestyle. Curated strategies were associated with a high degree of residential mobility, while expedient strategies were associated with sedentism. In theory, bifacial reduction strategies were similar to the blade technologies of Mesoamerica and western Europe in that they focused on efficient reduction with little waste. Curated strategies allow flintknappers to produce the maximum length of usable flake edge per core. By maximizing the return from cores, they were able to reduce the amount of raw material required for production of informal tools. This helped lower the amount of weight that had to be transported from camp to camp. Material waste and transport costs were not important considerations in expedient strategies. Flakes were simply struck from cores when needed.

Combining Schutt's and Moore's observations, we may argue that curated or bifacial reduction strategies produce more biface flakes and less angular debris than expedient or core reduction strategies, while expedient or core strategies produce more debris, large flakes, and expediently used, informal flake tools. These are expectations that we can use to examine the chipped stone assemblage at LA 115550 (AR-03-02-07-528). Again, although we are only studying one chipped stone scatter site in this project, we will make use of data on reduction and production from other sites in the region, both similar artifact scatters and more formal habitation sites, to aid in defining the economic strategies at work at LA 115550 (AR-03-02-07-528).

Chronology. Moore's statements are important because they remove hunter/gatherer strategies from the realm of the temporally loaded term "Archaic." As noted earlier, there is considerable evidence that hunter/gatherers occupied the Taos Valley both before and contemporaneously with horticultural Anasazi and even during the early historic periods. We must be careful not to assume that mobile hunter/gatherer sites are necessarily older than Anasazi sites. Establishment of chronological control is, therefore, vital for defining the occupation of LA 115550 (AR-03-02-07-528) and understanding the significance of the site in regional economic strategies. Rather than assume that, if the site is a hunter/gatherer site, it is older than Anasazi sites, we will strive to collect chronometric data from the site. Since we do not anticipate the presence of features that could yield chronometric materials (archaeomagnetic, radiocarbon, tree-ring), we will likely have to rely on hydration dating of obsidian artifacts, if any are found. The research of Ridings (1991) and Boyer (1997) shows that hydration dating of artifacts found on or near the modern ground surface may provide dates that are suspicious at best, while the need to have site-specific data on ground temperature and humidity is apparently critical when determining hydration dates. The small size of this project precludes obtaining ground temperature and humidity, as does the probable shallowness of the on-site soil. However, hydration data are available from several other artifact scatter sites, largely derived from artifacts collected from surface or shallow subsurface contexts. In one case where a substantial sherd collection was also available, hydration dates from surface artifacts fit well within the time frame suggested by ceramic cross-dating (Boyer 1986). While this is not a defense of hydration analysis in contexts that are probably questionable, there is a body of hydration dates for the occupations of artifact scatter sites.

Although we would prefer to rely on chronometric data, problems with obsidian hydration dating may make such data unreliable in this case. Further, we cannot assume that all temporal components will be represented by obsidian artifacts. Consequently, we will pay particular attention to artifacts considered temporally diagnostic, primarily projectile points. As discussed earlier, the nature of the sites in the vicinity of the project area suggests that assumptions regarding the temporal sequencing of different types of points may be untenable. Nonetheless, they may be able to provide us with approximations of the timing of site occupation(s).

On-site activities. Different types of sites are classified according to the activities that took place there. The definition of artifact assemblages that reflect different activities is essential in recognizing site types. For instance, when Renaud (1942, 1946) began surveying artifact scatter sites in the northern Rio Grande Valley, he defined four kinds of sites that indicated to him that there was a distinct correlation between site size and location, especially proximity to water (Renaud 1946:33), which, as discussed earlier, may reveal a bias in his survey strategy.

A similar if more rigorous approach was taken by Reher and Witter (1977), who argued that local vegetative diversity was a prime consideration in the selection of occupational site locations by Archaic hunter/gatherers in the northern San Juan Basin. After measuring plant diversity in an area surrounding the densest concentration of Archaic sites in the project area, they concluded that the area of highest site density was also characterized by the highest plant diversity. However, as Miller (1980:442) points out, correlation does not imply causation and diversity and site location may both be conditioned by some other factor(s).

The same point is made by Chapman (1979), who found that vegetative diversity was not strongly correlated with Archaic site locations in the Cochiti Reservoir area, a region he describes as "one of the most vegetatively diverse areas on the North American continent." The implication, then, is that in such areas other factors must be conditioning site locations and that site locations alone do not define on-site activities.

Following Binford (1980), Vierra (1985a; see also Vierra and Doleman 1984) has surveyed the diversity of hunter/gatherer settlement and mobility in the western United States with an eye toward proposing an ethnographic model for subsistence, settlement, and mobility. After reviewing ethnographic accounts of hunter/gatherer subsistence and settlement in California, the Great Basin, and the Southwest, Vierra (1985a:35) concludes that the organization of hunter/gatherer subsistence/settlement systems in the western United States followed a forager strategy in the warm months (spring through fall) and a collector strategy in the winter (see Binford [1980] for definitions). Vierra and Doleman's (1984) study of Archaic sites in the San Juan Basin suggests that most such sites are likely to be residential base camps. Vierra (1985a) points out that forager logistical sites are likely to be virtually invisible archaeologically because of their "search and encounter" nature. Collector logistical sites may be more easily distinguished by their redundant nature, which should produce a specifiable artifactual assemblage, an argument that he tests and confirms using site structural analyses.

The point is that the approach used by Renaud, Reher and Witter, and others, which focuses on deriving explanatory statements without the aid of ethnographic data (Binford's "middle-range theory"), will likely result in models of behavior that are more project-specific than adaptive-specific. A more appropriate approach takes site size (see Vierra 1985a) and location into account and includes information on intrasite and intersite organization, and assemblage size and composition (Vierra and Doleman 1984).

We will approach the issue of on-site activities through analyses of artifacts collected and site structure. Patterns of material selection and reduction, tool production, and tool use will be combined with spatial patterns in artifact location (site structure) to examine the range of activities carried out at LA 115550 (AR-03-02-07-528). Questions investigated with the analytical and structural data may include:

1. What raw chipped stone materials were used on the site?
2. What kinds of reduction processes were used to produce tools, and did those processes differ according to material?
3. What kinds of tools were produced (i.e., expedient and/or bifacial), and what do the characteristics of the tools tell us about tool use? Is there diversity or similarity in the tool assemblage or in portions of the tool assemblage (i.e., tools from different materials)?
4. Are there features present in the forms of reduction and/or tool-use areas? Does the site possess recognizable structure in terms of feature locations and patterning of artifacts?

The answers to these questions should be comparable to data obtained from other artifact scatter sites in the region and should, therefore, allow us to look at LA 115550 (AR-03-02-07-528) within the context of similar sites in the Taos Valley.

LA 115544 (AR-03-02-07-523): A Basalt Quarry

LA 115544 (AR-03-02-07-523) is a chipped stone artifact scatter on a low ridge on the northwest slope of Cerro Negro (Appendix 1). The site is described as

> a lithic procurement area which corresponds to an outcrop of basalt located on a low wide ridge. A major portion of the site is within the right of way and within the proposed construction zone. Quarrying of basalt appears to have been the main activity occurring at the site. This is indicated by primary reduction of on-site basalt cobbles, with cores, core flakes, and shatter of local basalt in direct association. Clusters of broken cobbles and the associated debris occur throughout the site. Since basalt is ubiquitous on sites in the Taos Valley, this site has the potential to yield information on material sourcing and exploitation throughout the region. (Levine 1997b)

In other words, LA 115544 (AR-03-02-07-523) is a basalt quarry. The site, which measures about 50 by 40 m, is located on the east side of NM 522 (Fig. 3). Shovel testing was not conducted at the site, primarily because there is very little soil depth over most of the portion of the site within right-of-way. Instead, basalt outcrops and rocks are present on much of the site surface. Over 100 artifacts were counted on the surface within the right-of-way. No temporally diagnostic artifacts were observed during the survey.

Research Perspective

Even a quick review of the archaeological literature from the Taos Valley reveals that basalt is the chipped stone material most commonly found on prehistoric archaeological sites in the area. This is true whether the site is a large pueblo (Wetherington 1968), a pithouse site (see, for instance, Boyer et al. 1994), or an artifact scatter (see, for instance, Hume 1973, 1974a, 1974b; Boyer 1985, 1986; Seaman 1983, 1987; Condie and Smith 1989, 1992a, 1992b; and most survey reports from the region). Given the ubiquity of basalt artifacts, it is remarkable that basalt quarry locations are, until the survey for this project (Levine 1997a), almost unreported. LA 115544 (AR-03-02-07-523), therefore, presents an unprecedented opportunity to investigate a basalt quarry.

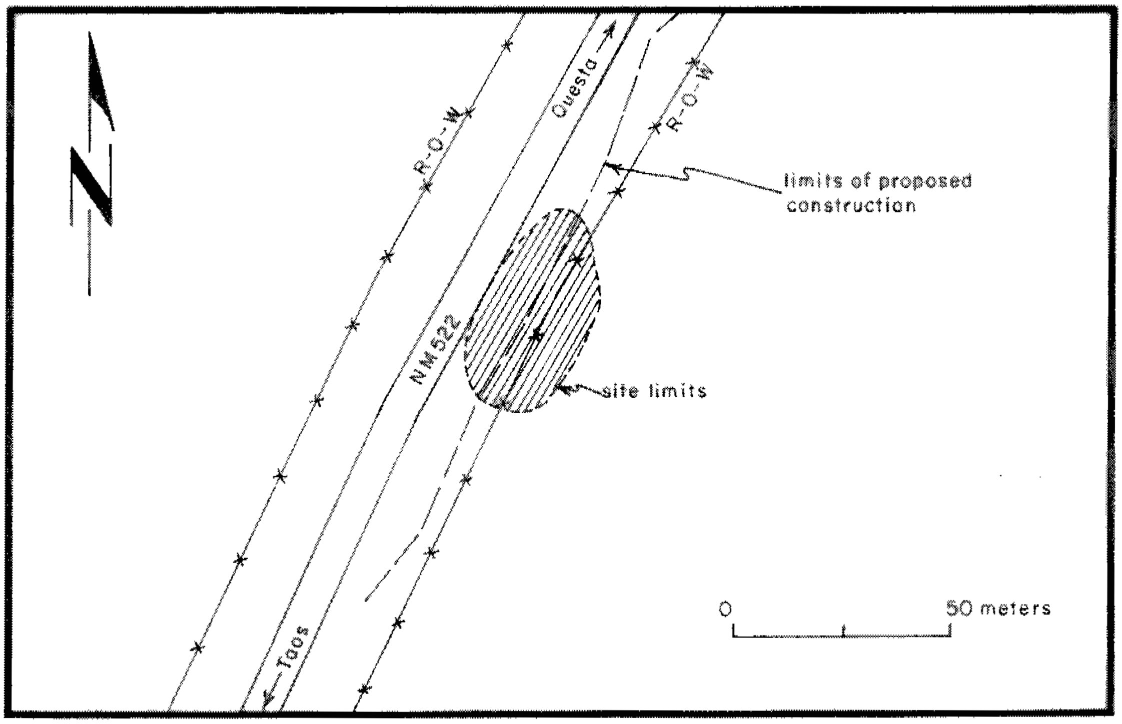

Figure 3. LA 115544 (AR-03-02-07-523) site map.

The exception to the statement that basalt quarries are unreported is Rule's (1973) report of investigations at Site 54. Site 54 received its number during Hume's survey of sites north of the Rio Hondo, which later focused on Garrapata Ridge at the southern edge of Cebolla Mesa (Hume 1973). Site 54 was about 1.6 km (1 mile) west of the community of Valdez on the north rim of the Rio Hondo Valley. Although Rule does not mention its geomorphological location, the site was on the southeastern edge of the base of Cerro Negro, the same volcanic cone on whose northwestern flank the sites in this project are found. The basalt flow exploited by the occupants of Site 54 is largely covered by alluvium from the nearby Sangre de Cristo Mountains except near the valley rim. Rule (1973:5) describes the site as follows:

> The major workshop concentration mirrored those areas of the outcrop where materials extruded the furthest from the surface and occurred in the most concentrated masses. The basalt at Site 54 occurrs [sic] as both a thick, uniform mass, and in the form of cobbles and boulders. Both the massed basalt layer and the larger boulders frequently show quarrying scars, particularly at the detatched [sic] western segment of the site. There a large exactly

split boulder and numerous large, amorphous basalt fragments also suggest the use of a shatter technique in the quarrying and initial subdivision of raw materials at 54.

The following section on research issues refers often to Rule's work at Site 54, primarily because it is the only basalt quarry studied in the region and because her work addresses questions we will ask of LA 115544 (AR-03-02-07-523).

Limited testing was not conducted at LA 115544 (AR-03-02-07-523) because the bedrock outcrops on the site surface, and very little soil accumulation is apparent. This suggests that LA 115544 (AR-03-02-07-523) possesses little significant subsurface data potential. Therefore, we do not expect to find features such as hearths or structures, an expectation strengthened by the lack of surface evidence of features. We will conduct exploratory excavations to search for buried features or deposits and are prepared to investigate them if found. However, we will focus our attention on collecting and analyzing artifacts from the site.

Research Issues

Like LA 115550 (AR-03-02-07-528), the primary focus of data recovery investigations at LA 115544 (AR-03-02-07-523) is to establish "base-line data" for the site, including information on economic affiliation, chronology, and on-site activities. However, since we know at least some of the activities carried out at the site, the questions we will ask are somewhat different from those at LA 115550 (AR-03-02-07-528). Like LA 115550 (AR-03-02-07-528), however, the research issues are all interrelated.

Economic affiliation. Earlier we noted that several studies point to archaeological expectations for distinguishing hunter/gatherer and horticultural chipped stone assemblages. They include raw material selection and reduction/production strategies. Those same issues can be addressed at LA 115544 (AR-03-02-07-523).

1. Raw material selection: Although LA 115544 (AR-03-02-07-523) is a basalt quarry site, we might expect that some nonlocal materials will also be present. This would be particularly true if the primary users of the quarry were hunter/gatherers, because they might have brought those materials to the site when they came to obtain basalt. We would not expect nonlocal materials to be present if the site were used solely by Anasazi who lived nearby and came to the site only to obtain basalt. Although nonlocal materials should not occur in high frequencies at the site, their presence might be an indicator of hunter/gatherer use of the site.

Further indication of the presence of hunter/gatherers might be found in the condition of nonlocal material artifacts at the site. For instance, are nonlocal material artifacts found in the forms of discarded, worn-out tools? This could suggest that the quarry was a location for replenishing tools, rather than simply a source for cores. We would expect the former situation to reflect hunter/gatherers and the latter to reflect an Anasazi logistical site. This is also a reduction/production issue, since, as Schutt (1980) and Moore (1994) point out, there are reduction/production differences between hunter/gatherer and Anasazi chipped stone assemblages. Alternatively, nonlocal material artifacts could be in the form of usable tools, suggesting that the site was more than just a quarry and that other activities took place there. This possibility is also an on-site activity issue. We will deal with these issues again later.

Of primary concern at LA 115544 (AR-03-02-07-523) is analysis of the basalt material itself.

As noted earlier, a number of studies have been conducted of obsidians found and used in the Taos Valley. These include chemical characterization and hydration rate development studies (Michels 1985; Newman and Nielsen 1985; Stevenson and McCurry 1990), procurement, trade, and distribution studies (Findlow and Bolognese 1982; Winter 1983), and studies of hydration dating (Ridings 1991; see also Boyer 1997). Although not all obsidian artifacts found on sites in the valley can be identified by source (Condie and Smith 1989), we are able to identify most obsidians found in the valley. In distinct contrast, although basalt is the most common chipped stone material found on sites in the valley, we are not able to definitively identify basalt artifacts by their source because analyses of basalt materials have not been conducted. This includes artifacts and materials from quarry locations. In large measure, this is because quarry locations have not been reported or studied. Rule's (1973) Site 54 is the exception. Her research did not include chemical analyses of the two materials found at Site 54: basalt and what may be a consolidated ash. This project provides a unique and critical opportunity to begin to rectify this situation by contributing basalt materials from a quarry source for chemical study.

The impetus for this research is a study by Latham et al. (1992), in which they subjected 56 basaltic and andesitic artifacts and samples from 68 lava flows from the Truckee area of California to X-ray fluorescence (XRF) spectrometry to define trace-element fingerprints of the materials:

> Because trace element concentrations can vary over a wider range than do major element concentrations, the concentrations of trace elements in lava flows of basaltic or andesitic composition can provide a unique fingerprint of individual flows even where many flows with similar major element chemistry are present. Thus, trace element fingerprinting of basalts and andesites could be used to answer archaeological questions relating to the provenance and transport of these raw materials, in the same way that analyses of obsidian are now used. (Latham et al. 1992:82)

They summarize their approach as follows:

> What we have shown is that for irregularly-shaped rock fragments, the ratios of the intensities of the characteristic X-rays of heavy elements in a light element matrix are proportional to the ratios of the concentrations of those elements. This observation formed the basis for a rapid, inexpensive, and nondestructive method for making accurate determinations of the trace element ratios of volcanic rocks or artifacts of basaltic or andesitic composition. In order to compare sets of ratios for different samples in a population, we used a vector whose components are the number of standard deviations by which a given ratio differs from the population mean. The vector formed in this way takes into account much of the inherent variability between ratios of different trace elements. The Euclidian distance between two vectors serves as a convenient metric for measuring the differences between samples. (Latham et al. 1992:98)

Finally, they summarize their results:

> The artifacts could be classified as (1) nonvolcanic, (2) volcanic but from a source outside of the study area, and (3) volcanic and from the study area. Artifacts in the third category could be divided into those that were apparently derived from flows in the database and those which came from closely related flows. Furthermore, it was possible to determine whether or not two artifacts came from the same source, even though the source was not in the database. This information enabled us to determine how many different sources were

represented in the suite of artifacts. (Latham et al. 1992:99)

However, there is one major prerequisite for the successful use of the method to study basalt artifacts. Because "a basaltic or andesitic volcanic province is likely to contain a large number of lava flows," "a large geochemical data base must be obtained before provenance studies can be undertaken" (Latham et al. 1992:82). This database should contain trace-element geochemical information on most or all of the lava flows in a study area (Latham et al. 1992:99). In their case, these data were available because Latham had previously conducted a mapping survey and geochemical study of the lava flows in their study area. Although we know of no similar extensive survey of basalt flows in the Taos Valley, the study of Dungan et al. (1984) involves major-element and trace-element analyses of basaltic rocks exposed in the central Rio Grande gorge, including several flows from Cerro Negro. These analyses can provide a starting point for the compilation of a regional basalt geochemical database. Proposed investigations at LA 115544 (AR-03-02-07-523) can add to these data, since we will be analyzing basaltic material from a Cerro Negro flow on the mountain itself and from a known basalt quarry location (see Latham et al. 1992:95). Additionally, we propose to collect basalt materials (*not* artifacts) from the other quarry sites recorded by Levine (1997a)--LA 115543 (AR-03-02-07-522) and LA 115545 (AR-03-02-07-524)--for trace-element analyses. Although these sites are near LA 115544 (AR-03-02-07-523), the cautionary note by Latham et al. (1992:82) concerning significant variation in trace-elements between related flows suggests that we should not assume that basalt from the three quarry sites is identical or that we cannot distinguish artifacts made from basalt from the three quarries. We will also conduct trace-element analyses of basalt artifacts, particularly tools, collected from LA 115544 (AR-03-02-07-523) to determine whether they were made from on-site materials or materials from some other source. This will aid in understanding the actual activities that took place at the site.

2. Material reduction and tool production: Having addressed matters of raw material selection at LA 115544 (AR-03-02-07-523), we will address issues of material reduction and tool production. Although the primary activity at LA 115544 (AR-03-02-07-523) was apparently quarrying basalt, a number of questions can be asked about the techniques by which basalt raw material was obtained and processed:

A. How large is the quarry area relative to the size of the site? This is also an on-site activity issue, because it may indicate whether the site was more than just a quarry site.

B. Were different quarrying techniques used at the site? Were these techniques related to the form(s) in which basalt occurs at the site? For instance, Rule (1973:8) states, "Basalt occurs on Site 54 as both a thickly layered outcrop and in the form of cobbles and boulders, allowing for wide variation in the selection of raw material form." She also states, "Both the massed basalt layer and the larger boulders frequently show quarrying scars, particularly at the detatched [sic] western segment of the site. There a large exactly split boulder and numerous large, amorphous basalt fragments also suggest the use of a shatter technique in the quarrying and initial subdivision of raw materials at 54" (Rule 1973:5).

C. Perhaps related to the questions concerning different quarrying techniques are these: Were different reduction techniques used at the site? Were these techniques related to different materials? For instance, Rule (1973:9-10, 30) elaborates on quarrying and reduction at Site 54 by observing that reduction techniques at the site differ according to the nature of the material:

Site 54 basalt is extremely homogenous in composition and reflects this intrinsic value in its fracture, although the varied nature of the assemblage would initially seem to argue otherwise. Characteristically, fracture is of three widely different types: 1) a highly convex fracture yielding a nearly semi-circular fragment; 2) a sheer fracture producing a flat fracture surface; 3) a highly irregular fracture reflecting numerous surface distortions. The two former of these distinctive fractures appear to be a function of the manner in which the material was worked and . . . either of these fracture surfaces could be produced at will by the manufacturer. The latter, however, the tendency of a homogenous substance to distort fracture in a mirror image of an uneven surface, was apparently uncompensated for by craftsmen and has resulted in the presence of numerous irregular flakes, chips, and chunks on the site. . . . The distorted fracture of basalt is largely responsible for the frequent occurrence [sic] of highly angled bulbs at the site, as well as for flakes exhibiting a wide range of dorsal deformations.

Cortical surfaces on Site 54 basalt are deceptively thin and overlie the usual fine grained basalt with no transitional layer. When, as on several artifacts, the cortical surface has been removed with no further modification of the area, the cortex was detatched in such a way that the surface of the artifact appears to have been "peared." The underlying surface is exposed, but the flake scar by which decortification was accomplished is almost undecernable [sic], having no negative bulb, and virtually no depth. Exactly how this was accomplished is not understood by this analysis, but decortification of this type can be considered a technological attribute of Site 54. . . .

It appears likely that chips and chunks at 54 represent two different technological phenomena. The chips possessing weights considerably under five grams are probably correctly identified and may primarily represent bulbar scar fragments and platform shatter. Some retouch flakes may be among them, however these were looked for and not found. The larger chunks present somewhat more of a problem. While I am confident that the majority are indeed chunks, the possibility that some, particularly the larger ones, are instead irregular flakes does exist.

Concerning the material identified as consolidated ash found at Site 54, Rule (1973:10-11) states:

The ash at 54 occurs in fairly large masses, and in the collection area is amorphous or basically cuboidal in format. In color, it is light gray with numerous inclusions of black and white particles of variable size. The nature of the surface, both cortical and fracture, is abrasive. Site 54 ash can be flaked, but produces a blocky, irregular, usually transverse flake. Characteristic of the fracture is a diffuse but recognizable bulbar surface. The platform dimensions are usually large as compared to similarly sized basalt flakes, and may indicate extensive use of an anvil technique in flake removal.

D. To what stage were materials from LA 115544 (AR-03-02-07-523) reduced before being removed from the site? Clearly, besides being a reduction/production issue, this question is also related to questions of economic affiliation, mobility, and differing chipped stone reduction/production processes. Hunter/gatherer use of the site should be seen in the presence of artifacts reflecting production of basalt bifaces, particularly a range from cortex-removal to biface-shaping flakes. Further, if the basalt was being used to replace worn-out tools, we would also expect to find evidence of production of formal tools. Conversely, Anasazi use of the site should largely be seen by evidence of the production of large cores that could be transported back to habitation locations, primarily tested cobbles and large cortex-removal flakes.

Concerning this issue, Rule (1973:28-29) observes in the Site 54 assemblage:

> As Site 54 was apparently solely a lithic workshop, tools recovered from the site should logically fall into one of three categories: 1) tools which were manufactured on the site and were intended to be removed from it, but were broken, lost, or otherwise discarded before they could be carried off; 2) implements not native to the site, but lost or discarded on the site during site utilization; or 3) implements manufactured on the site to aid in the manufacture of other implements, and then discarded. Explanation number one probably accounts for the presence of the two diagnostic artifacts on the site [one projectile point or knife fragment, one drill]. Explanation two would also explain their appearance, but is generally likely and is rendered even less probable by the presence of many tools on the site which seem to be in fulfillment of explanation three. In fact, the collected area of Site 54 produced a total of 37 implements whose probable utilization was in the creation of other implements. The working angles of 25 edges recorded for tools of this apparent variety yields a mean value of 78.92°--an angle suitable for the working of wood or bone. In the general context of Site 54, it is likely that these tools were utilized in the hafting process of such artifacts as the point and the drill, and that their presence is further evidence that all stages of implement manufacture are represented among the debitage littering Site 54.

Rule's conclusions rely on her assumption that Site 54 was "solely a lithic workshop," a logistical site at which raw materials were obtained and reduced and some tools were apparently replenished. On the other hand, the presence of tool-manufacturing debris, including other tools, could be indicative of a variety of other activities at the site not directly associated with quarrying and raw material reduction.

Chronology. Establishment of chronological control is obviously vital for defining the occupation of LA 115544 (AR-03-02-07-523) and understanding the significance of the site in regional economic strategies. Consequently, we will strive to collect chronometric data from the site. Since we do not anticipate the presence of features that could yield chronometric materials (archaeomagnetic, radiocarbon, tree-ring), we will likely have to rely on hydration dating of obsidian artifacts if such are found.

Although we would prefer to rely on chronometric data, problems with obsidian hydration dating may make such data unreliable in this case. Further, we cannot assume that all temporal components will be represented by obsidian artifacts. Consequently, we will pay particular attention to artifacts considered temporally diagnostic, primarily projectile points. The nature of the sites in the vicinity of the project area suggests that assumptions regarding the temporal sequencing of different types of points may be untenable. Nonetheless, they may be able to provide us with approximations of the timing of site occupation(s).

Additional relative temporal information may be obtained from examination of patination of the basalt. Rule (1973:11-12) found,

> At 54, patination provides evidence of site reuse over time. Although on most sites differential patination of artifacts would be a fairly risky approach to temporally dividing

artifact collections, Hume has commented that "patination . . . may have a relative temporal value for mixed archaeological assemblages if the factor of material is controlled." At 54, where variation in material can be discounted and where all artifacts were recovered in a similar stage of exposure, differential patination of artifacts is inferred to indicate a minimum of two temporally distinct utilizations of the outcrop as a workshop.

Differential patination of Site 54 artifacts is of three types:

1) artifacts displaying patination on all fracture surfaces
2) artifacts with "double patination," the result of the refracture of a patinated surface and producing artifacts with both fresh and stained flake scars [in Honea's estimation, double patination demonstrates "a clear lapse of time between fracture and refracture"]
3) artifacts displaying little or no patination on fracture surfaces.

She goes on to state, "The strongest evidence of the multiple and temporally distinct utilization of the Site 54 workshop is offerred [sic] by the differential patination on recovered polyhedral cores" (Rule 1973:20). Further, "The cores chosen for re-use were the larger polyhedrals abandoned on the site, and, prior to their re-use, had had comparatively few flakes removed from them." She concludes, "Since the degree of patination exhibited upon the stained cores is advanced while the fresh scars are pristine, this should indicate, under the tenets expressed earlier in the paper, a distinct and possible lengthy lapse of time between core utilizations" (Rule 1973:21).

Rule's observations can be used and tested at LA 115544 (AR-03-02-07-523) as a means of defining multiple components at the site since, as at Site 54, we should be able to control for material and degree of exposure. This method provides even less chronological control than does the use of temporally diagnostic artifacts, but may be useful for estimating the overall length of site use and the presence of distinct temporal components.

On-site activities. As discussed earlier, Vierra and Doleman's (1984) study of Archaic sites in the San Juan Basin suggests that most such sites are likely to be residential base camps. Vierra (1985a) points out that forager logistical sites are likely to be virtually invisible archaeologically because of their "search and encounter" nature. Collector logistical sites may be more easily distinguished from their redundant nature, which should produce a specifiable artifactual assemblage.

We will approach the issue of on-site activities at LA 115544 (AR-03-02-07-523) through analyses of artifacts collected and of site structure. Patterns of material selection and reduction, tool production, and tool use will be combined with spatial patterns in artifact location (site structure) to examine the range of activities carried out at LA 115544 (AR-03-02-07-523). In particular, we are concerned with these questions: Are there features present in the forms of reduction and/or tool use areas? Does the site possess recognizable structure in terms of feature locations and patterning of artifacts? We will attempt to define specific quarrying and reduction/chipping areas and, if possible, specific quarrying and reduction episodes, using the distributions of artifact types relative to quarry locations. Rule's (1973:24, 29) analyses from Site 54 indicate that, although this was not a focus of her work, "specialized activity areas" are present at the site, based on the distributions of both flakes and retouched tools.

With regard to this issue, we are also concerned with the possibility that activities other than quarrying were also conducted at LA 115544 (AR-03-02-07-523). As noted earlier, the presence of tool-manufacturing debris, including other tools, could be indicative of a variety of other activities at the site not directly associated with quarrying and raw material reduction. It is possible that, in addition to the quarrying activities, LA 115544 (AR-03-02-07-523) also has a short-term residential component or a logistical component focused on some other resource. Analyses will also focus on searching for and defining such activities through study of reduction, production, and use of artifacts and of their distributions.

Field Methods

James L. Moore and Jeffrey L. Boyer

The same general methods will be used to examine each site, but since all sites have unique characteristics, it will be necessary to tailor our investigative techniques to individual cases. This may include deciding why certain areas are selected for excavation, how zones around features are treated, and whether or not mechanical equipment is used. The biggest difference in treatment will be in the intensity of data recovery efforts. However, it is not anticipated that the mechanics of excavation will vary to any large degree from site to site.

This discussion is structured in three sections: general excavation procedures at the site level, excavation procedures for more specific situations, and special situations.

General Excavation Procedures

Horizontal proveniencing: The grid system. The first step in excavation will be to establish a Cartesian grid system. A main site datum will be used to reference all horizontal measurements. All surface collection and excavation units will be linked to the Cartesian grid system. These units will be provenienced according to the grid lines that intersect at their southwest corners. For example, a grid unit which has the 110N and 115E grid lines crossing at its southwest corner would be labeled 110N/115E.

Under certain circumstances, grid units may not be used for surface collection or excavation. When surface artifacts occur in densities of one or more per square meter, it is usually practical to collect them by grid units. However, when artifact densities fall below that level it is often more efficient to collect by point provenience, using a transit and tape to measure artifact locations. These locations can later be translated to Cartesian coordinates and grid designations assigned.

Similarly, excavation in grid units is not always the most efficient way to proceed. It must be remembered that grids are artificially imposed over sites. They are simply a construct used to provenience cultural materials and features so that their original relationship can be preserved for later study. Rarely do features conform to a grid system. When they are very large it may be desirable to excavate by grid unit to provide detailed information on the placement of materials within them. However, excavation in grid units is often awkward in small features, particularly when only small parts extend into one or more units. Thus, features, rather than the units in which they occur, will usually be treated as independent excavation units.

Vertical proveniencing: Strata and levels. Just as grid systems will be tied to main datums, so will all vertical measurements. The main site datum will serve both purposes in most cases. All measurements will be made in meters below datum to avoid the problems encountered when dealing with both positive and negative measurements. The preferred method of accounting for variation in surface measurements, and the one that will be used whenever possible, is to assign an arbitrary depth to the main datum. In this case it does not matter whether there are higher elevations, and all measurements can be made consistent.

Since it is often difficult to use one datum to provide vertical control for an entire site, subdatums will be established. Horizontal coordinates will be measured for each subdatum so that its location relative to the main datum can be plotted. The elevation of each subdatum will also be measured from the main datum. Thus, if the main datum is arbitrarily assigned an elevation of 10.00 m below datum, a subdatum that is 1.50 m lower will have an elevation of 11.50 m below datum.

The vertical treatment of deposits will vary according to their nature. Cultural deposits will be carefully excavated to preserve as much of the vertical relationship between materials as possible, particularly between artifacts discarded at different times. Such care will not be taken with noncultural deposits, since the relationship between artifacts in deposits that built up naturally is rarely meaningful. Noncultural deposits tend to be jumbled, and the relationship between artifacts is almost always obscured because they were moved from their original context and redeposited.

Thus, accurate vertical controls may be unnecessary in some cases. While we will always attempt to excavate cultural deposits by stratum, that level of control will only be attempted in noncultural strata if it appears that it will provide information of potential importance to site interpretation. Excavation by strata is considered optimal in cultural deposits because soil layers tend to represent specific depositional episodes.

Before it is possible to delimit the extent and nature of soil strata, it is usually necessary to examine them in cross section. This requires the excavation of exploratory units, which will consist of 1 by 1 m grids dug in arbitrary 10 cm vertical levels. Outside exploratory grids, soil strata will be used as the main units of vertical excavation. Exceptions may include noncultural deposits and cultural strata that are very thick and need to be subdivided to make excavation easier.

Two methods will be used to track vertical excavation units: strata and levels. Soil strata will be assigned unique numeric designations as they are encountered, and descriptions of each will be recorded on stratum description forms. Since the surface represents an arbitrary stratum with no thickness, it will be designated Stratum 0 at each site. In order to track the sequence of strata from one area to another, each vertical excavation unit will also be assigned a level number, beginning with the surface. Again, since the surface is an arbitrary level with no thickness, it will be designated Level 0. The first vertical excavation unit to be dug will be labeled Level 1, the second Level 2, and so on. Since stratum and level numbers represent two completely different series, stratum numbers may not be in sequence as excavation proceeds downward, but level numbers will always be in order.

Augering. Soil augers can be effectively used to examine areas at depth with a minimum of effort. Thus, we may make use of this technique to examine portions of sites to determine whether features or deposits are present. Soil removed from auger holes will be screened to determine whether cultural materials are present. Each auger test will be recorded using an auger record form. In particular, augers may be used to examine parts of sites which exhibit no surficial signs of deposits or features. When subsurface deposits or features are encountered, more intensive excavational techniques can then be applied to investigate them.

Recording excavation units. A plan of each site will be prepared, illustrating the locations of excavation areas and features.

The excavation of a grid or other unit will begin by filling out a form for the surface that provides initial depths and other pertinent data. Ending depths for each succeeding level will be recorded on relevant forms, providing a record of all excavations. Two forms will be used to record general excavation units. The grid excavation form will be used for 1 m by 1 m grid units, while units other than grids will be recorded on nongrid excavation forms. These forms are designed to collect the same types of data. They differ only in the method of recording provenience information. One or the other will be completed for each level excavated, including the surface, and will describe soils and sediments and inventory cultural materials (if any) that were recovered. They will also provide other observations considered important by the excavator or site supervisor, including depths, stratum, and level. A description of soil matrix will also be provided and should include information on cultural and noncultural inclusions, color variation, evidence of displacement of cultural materials, and how artifacts are distributed if variations are noticed.

Recovery of cultural materials. Most artifacts will be recovered in two ways: visual inspection of levels as they are excavated, and screening though hardware cloth with variably sized mesh. Other materials may be collected in bulk samples that can be processed in the laboratory rather than the field. Regardless of how cultural materials are collected, they will all be inventoried and recorded in the same way. Collected materials will be recorded on a field specimen form, which logs the nature of materials collected, the excavational unit in which they were found, and their count. A field specimen (FS) number will be assigned to all collected materials and will be noted on any related excavation forms. This will allow us to maintain the relationship between recovered materials and where they were found. All materials collected from an excavation unit will receive the same FS number. For instance, when chipped stone, ceramic, and bone artifacts are recovered from the same level in a certain grid unit, they are all designated by the same FS number. Any botanical samples taken from that level will also receive the same number. Architectural or chronometric samples that are not associated with specific excavation units will receive unique FS numbers.

Most artifacts will be recovered by systematically screening soil strata. All sediments from exploratory grids and features will be passed through screens, as will at least a sample from both cultural and noncultural strata in features, as detailed later. Two sizes of screen will be used. Most fill will be passed through 1/4 inch mesh hardware cloth, but 1/8 inch mesh hardware cloth will be used in certain circumstances. While most artifacts are usually large enough to be recovered by 1/4 inch mesh hardware cloth, some that are too small to be retrieved by that size screen can also provide important clues about the activities that occurred at a site. Among these are debris from the manufacture of small bifacial tools like projectile points and ornaments such as beads. However, there is a trade-off in gaining this additional information. As the size of mesh decreases, the amount of time required to process soil and recover artifacts increases. Sampling is a way to balance these concerns; thus, smaller mesh will only be used under certain circumstances. As a minimum, all soil in certain types of features (such as hearths) should be screened through 1/8 inch mesh, as should soil at living surface contacts. Other potential applications of this recovery method include culturally deposited strata and activity areas.

Surface artifacts will be recovered by visual inspection. This method will also be used to retrieve cultural materials from certain excavation units. As is discussed in more detail later, only a sample of soil from noncultural strata will be screened to recover cultural materials. Rather than simply ignore artifacts from parts of noncultural strata that are not screened, cultural materials noted during excavation will be collected for analysis. While this will not be a statistically valid sample, it will increase the number of artifacts recovered and can provide more detailed data.

Other cultural materials, primarily botanical in nature, will be recovered from bulk soil samples. In general, sediments for flotation analysis will be collected from culturally deposited strata and features, and should contain at least 2 liters of soil, if possible. Pollen samples will be obtained from living surfaces and unburned features and should contain at least 250 ml (approximately one cup) of soil. Macrobotanical materials like corncobs and piñon shells will be collected as individual samples whenever found. All botanical samples will be recorded in a sample log, which contains information on sample type and provenience.

Specific Excavation Methods

The excavation of various parts of a site will be approached in different ways, even though the mechanics of excavation will be the same. Most excavation will be accomplished using hand tools. However, in some cases it may be preferable to use mechanical equipment to expedite the removal of noncultural deposits. Methods of excavation will vary depending upon whether the nature of the feature or deposit being examined.

Exploratory excavation areas. Some portions of most sites do not provide surface evidence of features or cultural deposits. This statement may apply, in fact, to the surfaces of entire sites. In order to determine whether subsurface features or deposits are present, therefore, exploratory excavation must be conducted. Exploratory excavation will be performed by hand in 1 m by 1 m units within the grid system established across a site. As discussed above, elevations within 1 m by 1 m excavation units will be linked to the elevation of the main site datum. Within each 1 m by 1 m excavation unit, excavation will proceed in 10 cm vertical levels until "sterile" soil (devoid of cultural materials) or bedrock is reached. In the interest of safety, however, excavation units should not exceed 1 m in depth before an adjacent unit is also excavated. Each level, including the surface (Level 0), will be recorded on a grid excavation form. Soil encountered during these investigations will be screened through 1/4 inch mesh hardware cloth. The horizontal extent (i.e., the number and locations of contiguous 1 m by 1 m excavation units) of this sort of excavation will be determined by the site supervisor based on the apparent extent of cultural materials on the surface and the presence, frequency, and context of materials recovered from excavation units.

Features. Features will constitute individual units of excavation. As they are encountered at a site, features will be assigned a unique number and logged on a feature designation form. Soil removed from features will be screened through 1/8 inch mesh hardware cloth. Small features (less than 2 m in diameter) may be excavated differently than large features (greater than 2 m in diameter). After defining the horizontal extent of small features like hearths and ash pits, they will be divided in half. One half will be excavated in 10 cm arbitrary levels to define internal stratigraphy, and a profile will be drawn. The second half will then be removed by strata. Each unit of excavation will be recorded on an nongrid excavation form. Plans showing the locations and sizes of excavation units should also be drawn. A second cross section illustrating its vertical form perpendicular to the profile will be drawn, and a plan of the feature and a feature form describing and detailing its shape and contents will be completed.

Larger features may be excavated by grid unit and recorded on grid excavation forms. The number of exploratory units will be kept to a minimum, and as much of the feature as possible will be excavated by soil strata. At least two perpendicular profiles will be drawn, and feature forms and plans that describe and detail their shape and contents will be completed. Large features that are not treated in this way will be excavated using the same methods applied to small features. The method of excavation selected for a particular feature will be left to the discretion of the site supervisor. All features will be photographed using 35 mm black-and-white film before and after excavation, when possible. Other photographs showing construction or excavational details may be taken at the discretion of the excavator. All photographs will be logged onto a photo data sheet.

Extramural excavation areas. Areas around extramural features like hearths or chipping locations were often used as work areas. Thus, certain zones may be examined to determine whether work areas can be defined. Excavation in these zones will proceed by grid units, and will be documented on grid excavation forms. Most soil encountered during these investigations will be screened through 1/4 inch mesh hardware cloth, though a smaller-sized mesh may be used to sample certain areas. Plans of each extramural area investigated will be drawn, detailing the grid units investigated and any features that are encountered.

Certain areas are more likely to contain evidence of cultural activities than others. Extramural hearths often served as the focus of cultural activities, and the zones around these features will be examined for evidence of work areas.

Special Situations

Sensitive materials. This category pertains to the discovery of culturally sensitive materials or objects of religious importance. At this time, the only special situations we can foresee are human burials, although we do not anticipate finding human remains on the sites in question, based on Levine's (1997a, 1997b) site descriptions. However, if encountered, human remains will be excavated using standard archaeological techniques after consultations with appropriate review authorities and interested groups. The techniques include definition of the burial pit, use of hand tools to expose skeletal materials, mapping and photographing of the position of the skeleton and any grave goods, and retrieval of soil for pollen analysis. Information on human remains will be recorded using *Standards for Data Collection from Human Skeletal Remains* (Buikstra and Ubelaker 1994).

Field treatment of human remains and other sensitive cultural discoveries will be based on laws and regulations covering such finds in New Mexico, as well as the Museum of New Mexico policy, "Collection and Display of Sensitive Materials" (Appendix). If human remains or other sensitive materials are uncovered, no person will be allowed to handle or photograph them except as part of data recovery efforts. Data recovery related photographs of sensitive materials will not be released to the media or general public. Should human remains be encountered, local law enforcement officers and the Historic Preservation Division will be notified, and necessary consultations will be completed before the remains are excavated. Interested parties will be informed and consulted concerning disposition of the remains and grave goods.

Unexpected discoveries. There is always a risk of finding unexpected deposits or features during an archaeological excavation, and the project outlined in this plan is no exception. The procedure that will be followed in the event of an unexpected discovery will vary with the nature and extent of the find. Small features or cultural deposits that were not noted during survey will be excavated according to the procedures outlined above. On the other hand, finds that have the potential to significantly alter the scope and intent of this plan will require consultation with the

NMSHTD, Carson National Forest, and the Historic Preservation Division.

Summary

This section details the techniques that will be used to recover and record information from sites along NM 522. Many approaches and sampling methods must be tailored to the specifics of a site, which will only become known as excavation proceeds. In general, however, we do not feel that there will be much deviation from the methods outlined here unless we encounter types of deposits or features that were not known when excavation began. The data these methods are designed to collect are considered the minimum needed to provide a comprehensive record of site contents and the relationship between features and deposits. Excavators will be encouraged to provide additional plans, profiles, and descriptions whenever it seems desirable.

Chipped Stone Analytic Methods

James L. Moore

Chipped stone artifacts from both sites will be subjected to rigorous analysis. While a different array of questions will ultimately be asked of these assemblages, analysis is also aimed at producing a suite of baseline information concerning certain aspects of chipped stone artifacts, no matter what their cultural affinity or date. In particular, we are interested in procurement strategies, reduction technologies, and tool functions. In other words, we want to know where they got the rocks, how they broke them, and what they used them for.

Analysis will be completed using the OAS's standardized methodology (OAS 1994). This will provide complementarity with assemblages from other excavations in the Taos Valley that were studied using the same methods. Certain attributes will be examined on all chipped stone artifacts, while other attributes will only be recorded for specific types. We will examine each artifact, using a binocular microscope to aid in defining certain characteristics. The level of magnification will vary between 10x and 80x. Higher magnification will be used to examine wear patterns and identify platform modifications. Utilized and modified edge angles will be measured with a goniometer; other dimensions will be measured with a sliding caliper. Results will be entered into a computerized data base that will allow us to study the assemblages for patterning.

Material type and texture will provide data on selection and source. In order to strengthen this aspect of the analysis, samples of locally available materials will be obtained, and artifacts will be matched to sources when possible. This is a critical part of our research at the sites, particularly at the quarry site, LA 115550 (AR-03-02-07-528). As discussed above, basalt artifacts and nonartifactual material will be submitted for XRF spectrometry to begin gathering data on different basalt sources in the Taos Valley. This should enhance our ability to distinguish local from nonlocal materials and define patterns of logistical and residential mobility. The type of cortex present will also serve as an indicator of material origin. Nonwaterworn cortex suggests that a material was obtained at or very near its source, while waterworn cortex indicates procurement from secondary deposits. In conjunction with other studies, these data will also provide information on mobility and ties with other regions.

All chipped stone artifacts will be classified by morphology and presumed function, which provide a basic categorization of the activities employing these materials as well as a basis for more intensive analyses. They will also be examined for evidence of thermal alteration to enhance "flakeability," a process that is tied to reduction strategy and the suitability of materials for reduction. The flakeability of some materials can be improved by heating, and this can be an important aid in strategies aimed at formal tool production while it is less important in those based on informal tools.

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

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

Formal tools will be identified by morphology and wear patterns. Informal tools possess marginal retouch or use-wear scars along one or more edges. All evidence of edge modification will be recorded for informal tools, while evidence of use or modification unrelated to production will be recorded for formal tools. These attributes will provide information on activities employing chipped stone tools.

Research Results

The results of field data recovery and laboratory analyses will be used to address the research issues and questions raised in this data recovery plan. The final data recovery and analysis report, published in the Office of Archaeological Study's Archaeology Notes series, will present the excavation, analytical, and interpretive results. Included will be photographs, site and feature plans, and data summaries. Field notes, maps, analytic notes and forms, and photographs will be deposited with the State Historic Preservation Division's Archaeological Records Management Section at the Laboratory of Anthropology in Santa Fe. Artifacts will be curated at the Museum of New Mexico's archaeological repository.

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