SECRETS OF A CITY:
PAPERS ON ALBUQUERQUE AREA ARCHAEOLOGY

In Honor of Richard A. Bice

Contributors

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William M. Sundt
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The Archaeological Society of New Mexico: 13

Edited by Anne V. Poore and John Montgomery
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PUBLICATIONS OF THE
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PAPERS

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Numbers 1-9 available from COAS Publishing, P.O. Box 3CP, Las Cruces, NM 88003. Numbers 10, 11, 12, and 13 through Ancient City Press, P.O. Box 5401, Santa Fe, NM 87502.

AWANYU
(This quarterly journal was discontinued December 1977. For back issues inquire of COAS Publishing and Research, P.O. Box 3CP, Las Cruces, NM 88003.)

Awanyu Newsletter
Distributed to members only. No back issues in print.
The papers in this book were presented at a conference on Albuquerque-area archaeology held October 12-13, 1986, in Albuquerque, New Mexico. The conference was in honor of Richard A. Bice, to whom this book is also dedicated. The Archaeological Society of New Mexico and the New Mexico Archaeological Council co-sponsored the conference. This, the 13th volume in the Archaeological Society of New Mexico's series of collected papers, is the first in the series to be jointly published for the society and another organization. John Montgomery, Ph.D., was the editor for the New Mexico Archaeological Council. Montgomery is with the Agency for Conservation Archaeology at Eastern New Mexico University in Portales, New Mexico. Anne Poore, M.A., is the current editor of the Archaeological Society of New Mexico's collected papers. Poore is on the society's board of trustees and is a technical writer at Sandia National Laboratories in Albuquerque. The editors of the series of collected papers donate their time to the society, believing the series contributes meaningfully to the field of archaeology and helps honor those who have given much to the field.
Photograph by Tracy Green.
Richard A. Bice: Biographical Notes

Margaret F. Bice

A true son of the West, the honoree of this volume of collected papers has never felt spiritually at home unless living within sight of a range of blue mountains.

Richard Avery "Dick" Bice, the fourth child in a family of seven children, was born on June 6, 1917, in Longmont, Colorado, where his father was the city engineer. When Dick was ten years old he suffered an attack of polio. Nevertheless, with the constant support of his family, he persevered and with the aid of crutches went on to conquer a number of the high peaks in the local Rockies, including the grand-daddy of them all -- 14,255 foot Long's Peak.

As important as the outdoor life was in Dick's formative years, another significant influence that fueled many of his adult interests was the family visits to the Denver Museum of Natural History, an institution blessed with a wealth of naturalist, archaeological, and paleontological exhibits.

Dick graduated from Longmont High School in 1935 and four years later received a degree in mechanical engineering at Colorado State Agricultural College (now Colorado State University). Three months after graduation he married Margaret Ruth Fite of Longmont. The couple settled in Fort Collins, where Dick was employed at the college on a project co-sponsored by the University of California and Colorado State. The new job related to the development of sugar beet planting and harvesting equipment -- a challenging program much in need of new technology.

Present on campus at the time was a professor from Dick's undergraduate years, Major Roy G. Coffin, one of the discoverers of the Lindenmeier Folsom site. It was Major Coffin who was instrumental in getting the Smithsonian to examine and excavate the site in 1934.

For Dick, Professor Coffin had been an inspiration as well as a role model, and through the stimulus of his Folsom activities, both Dick and Margaret began to develop a broad interest in things Indian, prompting them to spend many pleasant weekends along the Colorado-Wyoming border searching for tepee rings and traces of early man. This exciting part of the Paleo and Plains Indian world captured their imaginations and some years later led them to devote much of their spare time to the pursuit of archaeology.

Within less than two years after graduation, Dick accepted a position with Westinghouse Research Laboratories in Pittsburgh, Pennsylvania, where he also carried on his graduate education in engineering and physics at the University of Pittsburgh. Activities at the laboratories ranged from research on the lubrication of high-speed bearings for early jet engines to the elimination of chatter in the propeller bearings of submarines in order to reduce their susceptibility to detection by sub-chasers.

These were the early years of World War II when victory gardens were needed to support the home front. The Bices' participation in this group activity provided an unexpected outlet to their Indian interests. The garden plots were located on a 200-year-old farmstead that not only boasted a colonial history, but also contained evidence of Indian encampments. Many projectile points were unearthed in tilling the soil, a testimony to the presence of early Native Americans.

While living in Pittsburgh, the Bices' only child, Stephen, was born. He and his mother came home from the hospital on June 6, 1944 -- D-day of the Normandy landings as well as Dick's birthday.

Several months later, Dick was invited to join the secret laboratory in New Mexico with the address of P. O. Box 1663, Santa Fe. The small family arrived in Santa Fe by bus on a cold winter midnight, having lost their automobile to mechanical trouble on the way. Despite this misfortune, their arrival back in mountain country lifted their spirits. It was great to be back in the West again.

Dick joined the Los Alamos Laboratory at the time when major decisions
were being made concerning choices of the technologies to be pursued on the final designs of the atomic weapons. He participated in the development of the Fat Man plutonium bomb and contributed to the design of instrumentation for its testing at the Trinity Site.

On "The Hill," archaeology really came into focus for the Bices. With the extensive prehistory of the Pajarito Plateau at their doorstep, they studied the literature of the area and, as time would allow, explored the numerous archaeological sites to develop a first-hand knowledge of the region's lore.

Shortly after the end of World War II, in early 1946, Dick headed a Los Alamos field team to the Marshall Islands to work with the Navy in preparing Bikini, along with several nearby atolls, for "Operation Crossroads," the first peacetime atomic tests.

In the latter part of 1946, many of the engineering development functions were split off from Los Alamos and moved to a branch on Sandia Base. Dick brought the first contingent of this group to Albuquerque and soon headed the Engineering Department of the Sandia Branch of the Los Alamos Scientific Laboratory. After the termination of the Los Alamos affiliation, "Sandia" subsequently grew into the Sandia National Laboratories.

During the succeeding years of his association with the Laboratories, Dick was no stranger to field work, having headed the Field Testing Directorate for several years. Later he became a technical vice president, with Field Testing and various other organizations reporting to him. He retired from the Laboratories in 1978 after having served for 19 years as a vice president.

Following the move to Albuquerque, the next 15 years provided few opportunities to further archaeological interests. The accelerated growth and development of Sandia Laboratories and the eight years spent on the Albuquerque City Commission, at a time when the community was one of the fastest growing cities in the U.S., left little free time. But in 1962, after a second term on the commission had ended, Dick and Margaret began working with those capable mentors, Franklin and Joan Barnett, lending a hand on an excavation program at Tonque Pueblo. The Bices managed the Albuquerque Archaeological Society's publication of the Barnett's 1969 Tonque report, contributing as well a supplement on elements of their own excavation of 50 rooms.

The organization of the Albuquerque Archaeological Society in 1966 was a welcome addition to the archaeological community in the central part of the state. It provided an opportunity to work toward one of the goals that Dick shared with society members, that of helping to promote cooperation among the sometimes diverse amateur, avocational, and professional communities: the object being to record and preserve our Southwest historic and prehistoric heritage.

The Bices were charter members of the Albuquerque Society, with Dick becoming Chairman of the Field Committee in charge of the society's research projects. He held this position for many years and is now honored to share the co-chairmanship with Bill Sundt. In the early stages, both Margaret and Dick were deeply involved in field and laboratory work, but in later years, due to an arthritic condition, Margaret was forced to confine her contributions to the more passive side of the activities.

The first project undertaken by the society was AS-1, a Basketmaker campsite on the Rio Rancho development west of Albuquerque. The project was started at the suggestion of Ted Reinhardt, whose developing dissertation for the University of New Mexico dealt with Basketmaker phases in the middle Rio Grande Valley.

Catching the attention of others working in the area, the AS-1 endeavor led directly to the Folsom Campsite excavation (AS-2) under the leadership of UNM graduate student, Jerry Dawson. AS-1 also led to a close association
with Cynthia Irwin-Williams of the Anasazi Origins Project. The society's AS-3 Prieta Vista excavation and subsequent report became a supplement to her activities in the Rio Puerco Basin.

During its 22-year history, the society has undertaken nine major projects under the Bice or Bice-Sundt supervision, a number of which are still ongoing, particularly in the laboratory analysis phases. Early laboratory activities were organized by Francis Vernon and later on by Phyllis Davis. Today, Phyllis, together with Bettie Terry, play key roles in both laboratory and field work.

With few exceptions the society's projects have been encouraged or sponsored by one of the following agencies: the Bureau of Land Management, the Museum of Albuquerque, the U.S. Forest Service, Eastern New Mexico University, the state's Laboratory of Anthropology, the N.M. Highway Department, and the University of New Mexico.

Through its programs and projects, the society has provided a forum for the interchange of ideas and has developed activities that allow persons at all levels of experience, neophytes included, to participate in archaeology and to learn by doing. The diverse elements of the archaeological community, working together, have been able to carry out fully creditable work, thus furthering the common goals.

Soon after its organization, the Albuquerque Archaeological Society became affiliated with the Archaeological Society of New Mexico, and much effort began to flow in that direction. Under Harry Hadlock's able leadership, the first New Mexico Archaeological Society field school was organized at the Sterling site near Farmington in 1972. This school provided a statewide opportunity for hands-on archaeological work and led to the suggestion that the Archaeological Society of New Mexico should follow the example of Arkansas in establishing a certification program.

As a member of the society's Board of Trustees, Dick developed the certification program that subsequently was adopted by the board in 1973. Since then he has chaired the certification council, under whose cognizance opportunities have been provided for those who want to participate in technical seminars and gain field experience. Through the years the certification program has registered more than 180 persons and has granted about 200 individual achievement certificates.

More recently, as a member of the field school committee, Dick has helped guide the field and laboratory programs of the great kiva excavation at the Vidal Site near Gallup and has participated variously as crew chief, seminar leader, and acting field director during the field school sessions.

A sidelight to Dick's archaeological work with the Albuquerque and New Mexico societies has been the management of the publication, and, in many cases, the actual printing of material for both groups. The publications have included the Albuquerque Archaeological Society's project reports and newsletter, the state society's Awanyu Newsletter, Pottery Southwest, and eight volumes of the Collected Papers of the Archaeological Society of New Mexico.

In publication activities and in field work, Dick's inventive bent has been put to good use. The financial limitations of the two societies led him to develop such homemade items as a "poorman's" alidade with associated planetable and stadia rods and a collator for expediting the assembly of early reports. Then too, he built his own copy camera to make the half-tone negatives needed in the reproduction of photographs for the various publications. And speaking of publications, it has been jokingly suggested that it takes a Fellow of the American Society of Mechanical Engineers to keep the ancient offset press of the Albuquerque society in running order.

A final aspect to Dick's interest
in archaeology and related subjects has been his volunteer work over a period of 20 years on the development of two new major museums in Albuquerque. He was chairman of the Mayor's Museum Advisory Committee, the entity that brought the Museum of Albuquerque into being, and as Chairman of the Board of Trustees, he witnessed the growing maturity of the museum as it came of age with the move into the new museum building in Old Town. The charter of this museum covers art, history, and science. Within these parameters the museum staff developed the exciting Maya exhibit that received national recognition and praise when it toured the country in 1985-86.

The New Mexico Museum of Natural History became Dick's second major museum endeavor. He served on the Governor's early Paleontology Task Force and on its subsequent sibling committees, the groups that were largely responsible for the establishment of this museum under state sponsorship. He also served more than four years as the president of the museum foundation during the museum's formative years, its construction stages, and its establishment in a new building. He continues as an officer on the board and devotes many hours of volunteer time to the management needs of the foundation.

Asked what projects he has in mind for the future, Dick says, "With Margaret's research and editorial support, I look forward to helping reduce a backlog of reports for both the local and state societies, and to finishing a Tonque study that makes use of a body of data that I've gathered from a number of diverse sources."

If one trait could be said to characterize Dick Bice over the years, it would be his willingness to take on responsibilities and carry them out. And if family mottos were still in vogue, Dick's motto might well be "Somebody had to do it," a phrase that he has often used when called upon to serve.

Albuquerque, New Mexico

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Bice, Richard A. and Suzanne de Borhegyi, William M. Sundt
Archaeological Society, Albuquerque.

Bice, Richard A. and William M. Sundt

Bice, Richard A.

Bice, Richard A. and William M. Sundt

Bice, Richard A.

Bice, Richard A.

Sundt, William M., Bettie Terry, Beryl McWilliams, R. A. Bice
INTRODUCTION

The northward spread of the Spanish Empire in the 16th century has long been of interest. The Coronado Expedition of 1540-42 marked a high-water mark of the early spread of Spanish exploration in the northern reaches of New Spain. The section of the Rio Grande Valley above and below modern Albuquerque was an area of great importance in the Coronado Expedition. Here, in the province of the Southern Tiwa Pueblo Indians, the army was quartered and many events took place. Forty years later, the next Spaniards into the area visited many of the same Indian pueblos. Most of the pueblos persisted into the early years of Spanish settlement and at least four persisted until the Pueblo Revolt of 1680. Two of the pueblos remain to this day. The same valley was an early area of Spanish settlement and through the Spanish Colonial and Mexican Periods there were important haciendas and villages. The area is one of the most significant regions of the United States bringing to attention the themes of early European exploration and settlement. This paper summarizes the results of the Rio Medio Survey conducted by Michael Marshall and Henry Walt for the New Mexico Historic Preservation Division in order to prepare a thematic nomination for the National Register of Historic Places.

HISTORY OF THE AREA

The country of the Southern Tiwas had been a thriving region for several hundred years before the Spaniards first entered the Southwest, with extensive agricultural fields in the fertile bottom lands of the Rio Grande Valley and numerous well-built pueblos. Most of the villages encountered by the Spaniards in 1540 had been occupied for generations, many of them since around A.D. 1300, some 200 years before the Spaniards arrived. The tumultuous events upon the arrival of Coronado's army in the fall of 1540 have long captured the imagination of modern scholars (Bandelier 1891; Meacham 1926; Vivian 1932; Hewett and Bandelier 1937). When the second Spanish expedition appeared in the Tiguex Province in 1581 (Meacham 1926; Hammond and Rey 1966), it is likely that all of the major villages encountered by Coronado were still occupied. However, it is virtually impossible to correlate successfully the names of the Coronado documents with the names assigned by Gallegos, the chronicler for the 1581 Chamuscado-Rodriguez expedition (Meacham 1926; Bandelier 1892; Vivian 1932). Conditions described by Gallegos in 1581 and by Luxan and Espejo a year later (Hammond and Rey 1966) are very similar to those described by Coronado 40 years before. All accounts document a number of Tiwa villages, approximately a dozen to perhaps 20, depending on the accounts. There seems little question that the Tiwas extended to near the Piro province (Marshall and Walt 1984).

When Onate and his followers entered New Mexico as permanent colonists in the summer of 1598 they recorded a new list of names to apply to the Tiwa villages (Hammond and Rey 1953). At that time there were probably close to a dozen major villages, and they probably were distributed throughout the full Tiguex Province. By the time of Onate, this province can fairly well be located in space as extending from the mouth of the Jemez River on the north to about the junction of Abo Arroyo and the Rio Grande on the south (Mera 1940; Marshall and Walt 1984). This lower boundary would be approximately where the villages of Abeytas and Sabinal are located.

Apparently the southernmost Tiwa villages were abandoned early in the Spanish Colonial period, but by the time of Benevides' tenure (1626-1629), there were still between 15 and 16 pueblos in the Tiguex Province and the northernmost Piro pueblo (surely no farther south than Sevilleta Pueblo near La Joya) was only 7 leagues (about 18 miles) south of the southernmost Tiwa village. Benevides provided one of the first overviews of
the Southern Tiwa region, describing conditions between 1626 and 1629:

Seven leagues farther up this same river, there begins the nation of the Tioas, composed of fifteen or sixteen pueblos, in which there must be some seven thousand souls in a district of twelve or thirteen leagues. They are all baptized. There are two convents, that of San Francisco de Sandia, where lies the body of the saintly martyr, Fray Francisco Lopez, who, as has already been stated, was martyred by the people of this nation; and also the convent of San Antonio de la Isleta. These two churches and convents are very spacious and attractive. Fathers Fray Esteban de Perea and Fray Juan de Salas have worked a great deal in this province and nation, both in congregating these Indians in pueblos and in converting them to our holy Catholic faith, as they were great sorcerers, superstitious, and very bellicose. Today they have them very docile, all baptized and well instructed, not only in their living and all kinds of crafts but also in things spiritual. They have schools where they learn to read, write, and sing, thanks to the great devotion of the friars and the bodily risks which they have endured to bring them to this state of perfection, for the fathers are great ministers and masters of the languages of that nation. The Rio de Norte runs through the center of this province, which causes the friars much hardship in crossing the river each time their ministering demands it, since the river is very swift and subject to bad floods (Hodge, Hammond and Rey 1945:64-65).

THE RIO MEDIO SURVEY

In 1982 Dan Scurlock prepared an overview of the Tiwa province for the evaluation of the excavation of LA 677 in Bernalillo, New Mexico. Scurlock found that there has been incredible disagreement among scholars about the association of the names of the historic documents with the various archaeological sites through the region. His tabular summary of the range of opinions that have been expressed is included here (Table I). In only a few instances is an opinion advanced in the Rio Medio Survey on the naming of the various sites. Most of these are cases where fairly good associations can be made with the documents of 1680 and later. It is obvious that this is a major field for continued scholarly work combing both new archaeological survey and intensive historical research.

Scurlock summarized the salient historical events in the vicinity of Bernalillo after 1692. His summary gives a good idea of events in the northern Tiguex Province after the Pueblo Revolt:

De Vargas established a plaza de armas, or military post, near the confluence of the Jemez River and the Rio Grande in 1693. Under military protection settlers began to return to the Bernalillo area and several large grants were made to residents. By 1700, Bernalillo ranches were located for the most part on the west side of the Rio Grande and upstream from the present town site. Bernalillo by this time was a parish with its own church, friary, and cemetery. A flood destroyed this church (Nuestra Senora de Dolores) in 1735, and the river began to shift its channel westward. In response to this some Hispano residents moved to the east side of the river and subsequently southward. In the mid-eighteenth century there were approximately 100 persons living on the ranches that comprised Bernalillo (Snow 1976: 172-175).

... The late eighteenth century was a time of hardship for local populations. Comanche and Apache raiders decimated Sandia Pueblo and took the lives of sev-
Table I. Correlation of Archeological Sites With Possible Historic Pueblos

<table>
<thead>
<tr>
<th>Site #</th>
<th>Pueblo</th>
<th>Author</th>
</tr>
</thead>
<tbody>
<tr>
<td>LA-326</td>
<td>Puaray</td>
<td>Bandelier 1892, Fisher 1931, Vivian 1932, Dutton 1963, Tichy 1939</td>
</tr>
<tr>
<td>LA-326</td>
<td>Culiacan</td>
<td>Meacham 1926, Vivian 1932</td>
</tr>
<tr>
<td>LA-326</td>
<td>Santiago</td>
<td>Snow 1976</td>
</tr>
<tr>
<td>LA-326</td>
<td>Tiguex (Moho)</td>
<td>Hodge 1912</td>
</tr>
<tr>
<td>LA-326</td>
<td>Kuaua</td>
<td>Meacham 1926</td>
</tr>
<tr>
<td>LA-717</td>
<td>Puaray</td>
<td>Vivian 1932, Snow 1975</td>
</tr>
<tr>
<td>LA-716</td>
<td>Maigua</td>
<td>Snow 1975</td>
</tr>
<tr>
<td>LA-421</td>
<td>Alameda</td>
<td>Snow 1975, Hackett 1915, Bandelier 1892</td>
</tr>
<tr>
<td>LA-421</td>
<td>San Mattheo</td>
<td>Meacham 1926, Hammond &amp; Rey 1927</td>
</tr>
<tr>
<td>LA-290</td>
<td>Alameda</td>
<td>Vivian 1932, Hackett 1942, Fisher 1931</td>
</tr>
<tr>
<td>LA-290</td>
<td>Santa Catalina</td>
<td>Meacham 1926, Vivian 1932</td>
</tr>
<tr>
<td>LA-187</td>
<td>Los Guajolotes</td>
<td>Vivian 1932</td>
</tr>
<tr>
<td>LA-677</td>
<td>Puaray</td>
<td>Schroeder and Matson 1965</td>
</tr>
<tr>
<td>LA-677</td>
<td>Tiguex (Moho)</td>
<td>Bandelier 1892</td>
</tr>
<tr>
<td>LA-677</td>
<td>Nompe</td>
<td>Hammond &amp; Rey 1966, Meacham 1926, Vivian 1932, Fisher 1931</td>
</tr>
<tr>
<td>LA-677</td>
<td>Caceres</td>
<td>Meacham 1926, Reed 1943, Hammond and Rey 1966</td>
</tr>
<tr>
<td>LA-677</td>
<td>Old Sandia</td>
<td>Fisher 1931</td>
</tr>
</tbody>
</table>

(From Scurlock 1982, Table 55)
Table II. Sites Selected for the National Register Thematic Nomination

<table>
<thead>
<tr>
<th>SITE</th>
<th>TIME PERIOD</th>
<th>CULTURE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alameda School</td>
<td>1300s-1600s</td>
<td>Tiwa Pueblo</td>
<td>Adobe pueblo ruin</td>
</tr>
<tr>
<td>Be-Jui Tu-ay</td>
<td>1300s-1600s</td>
<td>Tiwa Pueblo</td>
<td>Adobe pueblo ruin</td>
</tr>
<tr>
<td>Cangelon Pueblo</td>
<td>Late 1600s</td>
<td>Tiwa or Keres</td>
<td>Masonry pueblo</td>
</tr>
<tr>
<td>Casa Acequia</td>
<td>Late 1600s</td>
<td>Hispanic</td>
<td>Rock/adobe roomblock</td>
</tr>
<tr>
<td>Casa Colorada</td>
<td>1900s</td>
<td>Hispanic</td>
<td>Adobe house foundations</td>
</tr>
<tr>
<td>Los Lentes Pueblo</td>
<td>1300s-1600s</td>
<td>Tiwa Pueblo</td>
<td>Adobe pueblo ruin</td>
</tr>
<tr>
<td>North Edith Casa-Corral</td>
<td>1900s</td>
<td>Hispanic</td>
<td>Adobe house ruin</td>
</tr>
<tr>
<td>Ojo Cuchilla</td>
<td>Late 1600s</td>
<td>Hispanic ?</td>
<td>Rock/adobe roomblock</td>
</tr>
<tr>
<td>LA 717</td>
<td>1300s-1600s</td>
<td>Tiwa Pueblo</td>
<td>Adobe pueblo ruin</td>
</tr>
<tr>
<td>Pueblo Casa Colorada</td>
<td>1300s-1500s</td>
<td>Tiwa Pueblo</td>
<td>Adobe pueblo ruin</td>
</tr>
<tr>
<td>Pueblo Corrales</td>
<td>1300s-1600s</td>
<td>Tiwa Pueblo</td>
<td>Adobe pueblo ruin</td>
</tr>
<tr>
<td>Pueblo Los Trujillos</td>
<td>1300s-1600s</td>
<td>Tiwa Pueblo</td>
<td>Adobe pueblo ruin</td>
</tr>
<tr>
<td>Pueblo Santiago</td>
<td>1300s-1600s</td>
<td>Tiwa Pueblo</td>
<td>Adobe pueblo ruin</td>
</tr>
<tr>
<td>Pur-e Tu-ay</td>
<td>Late 1600s</td>
<td>Tiwa Pueblo</td>
<td>Masonry pueblo ruin</td>
</tr>
<tr>
<td>San Jose de las Huertas</td>
<td>1700s-1800s</td>
<td>Hispanic</td>
<td>Adobe village ruin</td>
</tr>
<tr>
<td>Silva Site</td>
<td>1700s-1800s</td>
<td>Hispanic</td>
<td>Rock/adobe ruin</td>
</tr>
<tr>
<td>Tecolote Hill</td>
<td>Late 1600s</td>
<td>Hispanic ?</td>
<td>Rock house ruin</td>
</tr>
<tr>
<td>Valencia Pueblo</td>
<td>1300s-1600s</td>
<td>Tiwa Pueblo</td>
<td>Adobe pueblo ruin</td>
</tr>
</tbody>
</table>
eral Bernalillo ranchers. Crop production in the area also was sharply curtailed as a result of this raiding. The circumstances notwithstanding, the villagers prospered and the area became known for its extensive gardens and copious cultigens, especially grapes (1982:177-178).

The Rio Medio District, which includes the greater Albuquerque metropolitan area, is the most populated and developing region in the State of New Mexico. Commercial, residential, and agricultural development in the region is extensive and expanding. This has resulted and continues to result in substantial adverse impacts to the cultural resources of the region. The cultural antiquities of the region exist largely on private land holdings (with the exception of the Sandia and Isleta Indian Reservations) and therefore are not subject to protection under federal and state Antiquities Act legislation. Much of the Rio Grande Valley has been virtually resculpted by 20th century urban and rural development, and these land-development activities have had a devastating affect on the cultural antiquities of the region. This process of destruction continues at an alarming rate.

Despite the clear significance of these rapidly diminishing resources, archaeological investigations in the region have been extremely limited. Indeed, overview studies similar to the recent Rio Abajo Project were last conducted more than 50 years ago (Fisher 1931 and Mera 1940s). Many of the archaeological sites documented in these former surveys no longer exist or have been significantly altered. In the sample of 90 archaeological sites documented in the Rio Medio Survey Project less than one-third remain undisturbed and most of these are in areas beyond the margin of the valley floor. Indeed, most valley-floor properties that have been located have been adversely impacted, with only 10 percent of the valley-floor sample undisturbed. More important is the continued rate of destruction. Four percent of the documented site sample has been destroyed in the last year, and two additional sites have been significantly impacted. It is estimated that 40 percent of the documented cultural properties in the region are in danger of potential immediate impact. Clearly, the rate of cultural resource destruction is directly related to the area of altered or developed land surface, the proportions of which continue to be magnified by increasing urban and rural development.

The 18 sites selected for the National Register Thematic Nomination are those that best represent the diverse types of sites and time periods from those known within the Rio Medio District (Table II). Selection was guided by traditional importance when sites have been known for many years and have been noted by previous scholars; present integrity and potential for yielding important research materials; and diversity, both of cultural affiliation and functional type. The sites are intended to give a good cross-section of the kinds of sites within the area. It is to be expected that additional sites from the area and the time periods represented will be added to the National Register in the future.

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LAS IMAGINES EMERGING:  
CONCEPTUAL PLANS FOR A NEW NATIONAL MONUMENT  
ON ALBUQUERQUE'S WEST MESA  

ISAAC C. EASTVOLD

New information regarding both the environmental and economic values of the West Mesa is responsible for changing the way the area is being regarded. In February 1986, a comprehensive archaeological study titled *Las Imagines: The Archeology of Albuquerque's West Mesa Escarpment* (Schmader & Hays 1966) was completed for an area 50 meters either way from the 17-mile long escarpment edge. The survey documented at least 10,500 examples of prehistoric Indian and Hispanic rock art, making this outdoor art gallery the largest concentration of prehistoric art in the world near a major metropolitan area. The realization dawned that Albuquerque has a vast cultural resource of national, and even international, significance. The entire spectrum of escarpment rock art, together with 65 other associated archaeological sites, has been nominated to the National Register of Historic Places. Furthermore, in June 1986, the Albuquerque Convention and Visitors Bureau released the study, "Economic Impact Analysis for a Proposed Petroglyph National Monument." This important analysis estimated an initial visitation to the Monument of 400,000 persons per year directly spending $19,000,000 in the Albuquerque area which, in turn, would generate roughly a total economic impact of $38,000,000 with additional state and local tax revenues of $2.3 million.

As a result of these studies, the National Monument concept was revealed as a rare vehicle wherein economic and environmental values on the West Mesa can reinforce one another with long-term dividends. The need for New Mexico to diversify its economic base through increased tourism can be addressed simultaneously with the need to preserve and interpret the state's unique cultural heritage.

Senator Pete Domenici responded swiftly to this opportunity, allocating $50,000 for the National Park Service to study the volcanoes, mesa lands, escarpment and petroglyphs as a possible new National Monument. Park Service Director William Mott toured the southern tip of the escarpment with Senator Domenici on Labor Day weekend and later recommended creation of a "Masau Trail" linking the West Mesa, El Morro, Chaco Canyon, El Malpais, Zuni and Acoma Pueblos, and other areas in a regional tour concept. Meetings between Mayor Ken Schultz and Senator Domenici will sort out city and federal areas of responsibility in cooperative acquisition and management of the new National Monument. Legislation should be introduced in Congress in 1987.

Public hearings accompany the NPS study and Congressional legislation will serve to hammer out the final details of the National Monument concept within the following parameters:

- An area of 9-13,000 acres will be cooperatively acquired and managed by city, federal, and perhaps state governments. (Nearly 5,000 acres of this total is already in public ownership primarily in Volcano and La Boca Negra Parks.)
- A comprehensive plan with uniform management guidelines will control the approach of cooperating agencies within the new National Monument.
- The main visitor center will be located at the southern tip of the escarpment adjacent to Interstate 40. Approximately 2-3,000 acres of the southern escarpment will be acquired from the Westland Corporation to provide a major quality area accessible to the Interstate. The present Petroglyph State Park will be expanded as a secondary visitor destination. The Piedras Marcadas Arroyo petroglyph area acquisitions will constitute the third, northernmost visitor destination. The Zuris-Mann pueblo site at the base of Piedras Marcadas Arroyo will be studied for a field archeology site and/or museum.
- Geological history of the area will be interpreted along with the
Fig. 1. Map of proposed national monument.
Fig. 2. Detailed view of area.
cultural history. The monument will include all five volcanoes and three geological windows.

A trail system will link the southern, middle, and northern major use areas, and perhaps extend down Piedras Marcadas Arroyo to link with the Zuris-Mann site.

Although numerous other units of the National Park System possess fine displays of Indian rock art, the West Mesa will be the first unit to use rock art as its principal interpretive theme. Visitors will be educated here, and then directed to other units and sites on the "Masau Trail" for further study of Anasazi and Pueblo culture.

This emerging conceptual plan builds on the good work of many community groups and civic leaders who have worked to preserve the West Mesa volcanoes, escarpment, and petroglyphs over the years. Before a new National Monument can be realized, however, everyone's best thinking and support is needed. The archeological and Native American communities, environmental and preservation groups, land owners, governmental leaders, educational institutions, and the general public all need to become involved in creating a final concept.

Albuquerque, New Mexico
The Albuquerque area, as we are increasingly becoming aware, has a rich and important archaeological heritage. What we know about the human occupation of this area is a tribute to generations of scholars who have pieced together fragments of information, often at great personal effort. Dick Bice's work at such sites as Prieta Vista and Tonque has contributed much to this knowledge. When the history of Albuquerque archaeology is someday written, his name will certainly be in the top rank of those dedicated investigators.

The theme of this paper is the importance of Albuquerque-area archaeology. Certainly the prehistory of central New Mexico is worth knowing for its own sake. Understanding the evolution of native societies in this area is as important as any other aspect of New Mexico's past. Yet the prehistory of the native peoples here can also tell us things about human history in general. Albuquerque-area prehistory illustrates global processes that have repeatedly affected the human species and helped shape the modern world.

A number of archaeologists believe that our discipline can transcend antiquarian concerns and contribute in a major way to understanding human societies in general, including those of the past and the future (e.g., King 1981). Certainly one area in which archaeology has done this is in the study of how complex societies have developed. It is a well-known fact, but one worth repeating, that for over 99% of its history the human species has been organized into small, independent communities. Social complexity is rare in human history, and it may seem normal to those of us who have never experienced anything else, in fact the emergence of complexity is a process greatly in need of explanation.

Of perhaps even greater significance is understanding why complex societies disintegrate. Political collapse is a recurrent event in human history, and correspondingly one of the most significant problems of the social sciences. Complex societies, like the Harappans, the Mycenaeans, Teotihuacan, and the Southern Lowland Maya, have gone through periods of collapse that last nearly as long as they have existed. To understand why complex societies collapse is of importance of every member of one, and today that includes nearly the entire human population. Archaeology has much to contribute to this, indeed probably more than any other discipline.

What, one may readily ask, has this to do with prehistoric New Mexico? Simply this: not only empires and nations collapse. In fact, all kinds of societies do, from the simplest to the most complex (Tainter n.d.). The American Southwest is an ideal place to study this topic, for many of the most complex societies to develop here—such as the Chacoans, the Mimbres, and the Hohokam—did ultimately collapse. If we want to understand why societies collapse, we can learn much from Southwestern examples.

Yet, so far as we presently know, there was never a political collapse in the prehistoric Albuquerque area, or at least no collapse on the scale of what happened to Chacoan society around A.D. 1200. The main importance of central New Mexico lies in related matters—in understanding the relationship between a disintegrating complex society and simpler peoples on its periphery.

Northwestern New Mexico and the Central Rio Grande Valley experienced patterns of cultural evolution that contrast on one level, yet are complementary on another. It is useful to briefly characterize these patterns, starting with the San Juan Basin.

The trend toward complexity in the San Juan Basin began as early as the Basketmaker III and Pueblo I
periods. Great Kivas make their first appearance at this time in and around the region (Schelberg 1982: 11, 126-127, 144). From this early period on, Chaco Canyon populations maintained extensive trading relations with surrounding areas. By the 9th century A.D., Chaco Canyon supported a sizeable population of small, independent pueblos, characterized by irregular masonry and unstructured ground plans (Judge 1979: 901-902; Toll 1984).

Major changes began around A.D. 900. Three Canyon sites—Una Vida, Pueblo Bonito, and Penasco Blanco—began to develop the large rooms and multi-storied architecture that characterize later Great Houses (Judge et al. 1981: 81, 84). By early Pueblo III, at least 13 Great Houses were occupied in or near the Canyon. Several great Kivas were concurrently built, and a water-control system established (Vivian 1970). Sumptuary items were imported for use by the Great House elites, including turquoise, ocean shell, copper bells, macaws, and parrots (Mathien 1984).

Elsewhere in the San Juan Basin the period between A.D. 500 and 900 saw the establishment of agricultural communities in many areas that came later to support the dispersed Great Houses commonly known as Chacoan Outliers. Between 900 and 975, seven Chacoan structures were built along the southern and western edges of the Basin (Powers et al. 1983: 247), as political hierarchies evolved in response to local challenges, stresses, and opportunities (Tainter and Gillio 1980: 108-109). The South Road leading out of the Canyon dates to the same time as these early Outliers (Kincaid et al. 1983), indicating integration between Chaco and its southern periphery. Between 975 and 1050, construction began at another nine Chacoan structures. There was a florescence of construction during the next century when 19 Great Houses were built. Yet after this final flurry, construction dramatically declined. The last building date from a Great House is 1132 A.D. from Pueblo Alto overlooking Chaco Canyon (Powers et al. 1983: 247-253).

By the mid-to-late 12th, or early 13th, century the Chacoan system had collapsed. Population remnants hung on in the canyon and other basin areas, but Great House building was a thing of the past. Construction was either at village sites, or small village-sized rooms were abutted against existing Great Houses. Chaco Canyon was no longer the center of the economic universe. A late population in the region from 1225-1275 or 1300 may have had ties to the Mesa Verde region to the north. After A.D. 1300, the area was essentially abandoned by agricultural peoples (Powers et al. 1983: 345; Schelberg 1982: 129-130, 274; Lekson 1984: 66, 69).

Although the early agricultural period in the Albuquerque area is not nearly as well known as in the San Juan Basin, what we do know reveals a contrasting pattern. The Albuquerque area during the period between A.D. 500 and 1200 does not display the evolving complexity that is so noticeable in the San Juan Basin. Instead what we find are small pithouse villages dispersed along higher ground overlooking the Rio Grande and the Rio Jemez (Allen and McNutt 1955; Allen 1970; Frisbie 1967; Beckham 1954, 1957; Schorsch 1962; Skinner 1965). There are no indications of social differentiation or of inter-community hierarchies, such as characterized the early Chacoans.

This situation began to change in the 13th century. Surface architecture became increasingly prevalent, and there is evidence for an abrupt population increase. Throughout the Central and Upper Rio Grande Valley, there was a sharp increase in the number of sites, and in the density of settlement. This pattern continued and intensified in the Rio Grande.
Classic period, when large, aggregated communities such as Tijeras Pueblo were built and abandoned (Cordell 1979: 44-45). The Central and Northern Rio Grande tradition of large, aggregated pueblos has, of course, continued to this day.

Given these patterns of cultural evolution, it has been common to regard the early agricultural period of the Albuquerque area as uninteresting, and to characterize it by pejorative terms like "marginal." Such terms imply a value judgment, and rest on discredited 19th century notions of social "progress." Political and economic complexity, in fact, is a costly strategy, and throughout human history has developed as a response to stresses. These stresses typically arise from demographic pressures, resource insufficiencies, and interaction with other peoples.

It has been argued that complexity developed in the San Juan Basin as a response to the problems posed by a growing population between about A.D. 500 and 900. As the number of people increased in this arid environment, fluctuations in resource productivity became increasingly serious. Hierarchical, centralized, Basin-wide organization was a logical and efficient response to this problem (Tainter and Gillio 1980: 100-113). For at least 300 years, as far as we can tell, the Chacoan system operated satisfactorily. Eventually, though, it collapsed, and its disintegration had a profound effect on the Central Rio Grande Valley.

Prior to the Chacoan collapse the Rio Grande area had simply experienced few of the stresses that stimulate the development of social complexity. Around A.D. 1200, this area was occupied by a sparse population of dispersed agriculturalists. Yet after this date there is evidence for a dramatic rise in population—so dramatic that it has always seemed impossible to account for it by local, natural growth. Many archaeologists have accordingly suggested that this increase came from the migration of San Juan Basin peoples fleeing their homeland after the Chacoan collapse, and settling in what had formerly been fringe areas: the Hopi Mesas, the Zuni and Acoma areas, and the Rio Grande drainage (e.g., Wendorf 1954: 211; Wendorf and Reed 1955: 146-147; Collins 1975; and Dickson 1979).

The consequences of this immigration were profound, and exerted an irreversible influence on the Rio Grande region. Settlement patterns changed from dispersed to aggregated. Large communities formed, on a scale never before seen in this area. Social complexity grew in response to the problems posed by large aggregations of people. Irrigation systems were developed. And populations increasingly came to make use of fringe lands that previously had been underutilized (e.g., Tainter 1983). The world for the Rio Grande Anasazi had changed and would never again be the same.

It is in this context that the Albuquerque area becomes especially significant. Even a cursory knowledge of world history reveals the importance of what are called "core/periphery" relationships. The interaction between a dominant complex society and simpler societies on its fringes has—time and time again—strongly influenced world events. One can readily call to mind several well-known cases of this process, such as:

- the north China periphery, where the interaction between settled farmers and nomads has affected political evolution for millennia (Lattimore 1940);
- the Mesopotamian alluvium, where early dominant states in the Tigris and Euphrates valleys came later to be ruled by a peripheral northern hill people, the Persians (Yoffee 1982; Service 1975);
- the Egyptian Middle Kingdom, which in 1668 B.C. came to an end with the Hyksos invasions;
- the Hittites of Anatolia,
whose empire collapsed during a time of conflict with less complex peripheral peoples;—the interaction between central Mexican civilizations and northern barbarians, as recounted in Mesoamerican legends.

In some cases of core/periphery interaction, the collapse of the dominant center is followed by a regional dark age, typically lasting for centuries, with no power immediately gaining prominence. The Harappan, Hittite, and Mycenaean collapses are prime examples, as, closer to home, is the fall of Teotihuacan. In other cases, as the core declines, the evolution of complexity shifts to the periphery, so that new peoples rise to prominence. Two of the most famous examples are the evolution of complexity among the peoples of the Arabian peninsula, and somewhat later of northern Europe, following the decline of Roman power. Another case is the growth of the Puuc cities of northern Yucatan after the collapse of the southern Lowland Maya (Andrews and Sabloff 1986). It is among these latter cases that the Albuquerque area falls, for as we have seen, the development of complexity here followed the Chacoan collapse and was a consequence of it.

In each of these cases historical events were conditioned, not by any single polity or people, but by core/periphery interaction. In each area there was geographical discontinuity in the evolution of complexity—from the initially dominant core to the later-dominant periphery. Given the variety of areas of the world where this has happened, it is clear that core/periphery relations are intricately involved in the processes of collapse and evolution at the periphery. This surely is one of the major, repetitive processes of history.

The Albuquerque area, then, offers an archaeologist or a historian the opportunity to study some of the major trends of human social evolution. And the potential of the Albuquerque area in this regard is no less than that of the famous areas of the Old World of Mesoamerica. If one wants to study the development of peripheral societies after a center collapses, one could travel to what were once the fringes of the Roman Empire—or one could come to Albuquerque. If one wants to understand patterns of trade between core and peripheral peoples, one could go to Mesopotamia—or one could come to Albuquerque. If one wants to learn about expansion and contraction in spheres of influence between a dominant power and its fringes, one could go to North China—or come to Albuquerque. As historians of the calibre of Bandelier and Twitchell have long recognized, New Mexico has a history that rivals any other area.

Albuquerque has an archaeological heritage that is as rich and important as any in the world. We may lack the monuments of Rome or the written drama of the Middle East, but what we have to tell the human race about itself is no less than what can be learned in these more famous areas. The people of Albuquerque, or an archaeologist working here, need never feel that our cultural heritage is second to any. And as world political developments increasingly remove foreign areas from archaeological study, the importance of Albuquerque is enhanced.

That this archaeological heritage merits protection needs hardly to be emphasized. It is indeed fortunate that some farsighted developers have chosen to recognize this even without being legally required to do so. The time has come for city and county leaders to follow the initiative of private industry and the recommendations of the preservation community, and make certain that no more of this vital resource is irretrievably lost.

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THE FUTURE OF ALBUQUERQUE'S PAST

GORDON BRONITSKY

To paraphrase Karl Marx, a specter is haunting Albuquerque and the County of Bernalillo—the specter of ever-increasing destruction of the archaeological resource base through private land development and levelling, industrial expansion, and pot-hunting (cf. Kelly 1963; Clewlow et al. 1971; Davis 1972; and Clewlow 1973). However, as Dick Bice and many others have recognized, all is not yet lost.

All of us, as well as our environment and our civilization, are the products of history. By studying this history we can come to understand the forces that operate on and in us to make us what we are. Thus, knowledge of our past, like knowledge about our environment, is essential to our cultural well-being. Access to this knowledge can be viewed as a basic human right. Because it does belong to all, no individual or organization should deprive the public of essential segments of this knowledge, unless overriding public concerns demand it. Yet that is what happens when a prehistoric or historic site is destroyed without an adequate record having been made of the information contained within that site.

Some information on the past can be obtained from written records, but by no means enough. Written records of any kind extend back little more than 5,000 years; in New Mexico written records date back less than 450 years. To understand even the historical period, it is frequently necessary to call upon the archaeologist.

Archaeological research also yields important environmental data, for past ecological conditions often are reflected in archaeological sites. Man has had an important effect on the environment for centuries, and the records of this effect can help us predict the outcome of future actions.

The archaeological guidelines requested by the City of Albuquerque and the County of Bernalillo were based on the recognition that remembering the past and understanding it are important to all of us. If we are to cope with the problems of the future, we need access to the experience of past societies that have lived in the Albuquerque area. The record of this experience is "written" in the ground, and our only hope of reading this 10,000-year-old record is for archaeologists to study and interpret it.

Recognizing this need, the Albuquerque/Bernalillo County Archaeological Resources Planning Advisory Committee was created by the Albuquerque City Council and the Bernalillo County Commission to address the following concerns (taken from Council Bill No. R-174, City of Albuquerque):

1. Evaluation of known archaeological resources within the city and county and how this knowledge can be utilized for public benefit;

2. Identification of planning issues and needs and the formulation of goals for an archaeological management plan for Albuquerque/Bernalillo County;

3. Concerns of local Native American groups;

4. Requirements and adequacy of existing legislation and policies pertaining to local archaeological resources management and how these can be applied, expanded, revised; or strengthened by additional legislation;

5. Development of management alternatives, which include the following elements: planning and management processes, management criteria, the determination of site significance and authenticity, professional review requirements, quality control procedures and accountability; and

6. Identification of costs and financial responsibility.

In accord with its mandate, ARPAC produced a thorough and comprehensive report in 1986 outlining planning and management considerations, program development, program administration, staffing, and oversight, program phasing and implementation, and program costs and funding. This document is a part of program development as outlined for Year One, namely the employ-
ment of an archaeological consultant to begin implementation of Year One Program elements.

The elements of concern of this part of the Year One Plan were

1. Development of a phased public archaeology education program, which includes goals, objectives, organizational structure, coordination with other planning agencies, and implementation process;

2. Establishment of a comprehensive evaluation framework that is compatible with National Register criteria as defined in 36 CFR 60 for determining site significance;

3. Establishment of guidelines and procedures that are compatible with existing state and federal reporting requirements for conducting archaeological compliance surveys and include standards for compliance surveys, reporting procedures, and environmental review process;

4. Establishment of preliminary ranking of outstanding archaeological sites suitable for preservation and public interpretation; and

5. Verbal consultation of a centralized data base of existing archaeological site information.

The ultimate goal of planning for the protection of archaeological resources is the development of a comprehensive management process that will identify and organize information about the resources of the City of Albuquerque/County of Bernalillo region into a form and process that is readily usable for producing high reliability decisions, recommendations, and/or advice about the identification, evaluation, and protection of these resources. Such planning should make archaeological decision-making a normal function or element of land use decisions rather than an exceptional one.

A key step in making decisions about archaeological resources is evaluation. Evaluation is the process of determining whether resources meet defined criteria of significance. Meaningful evaluation of the significance of archaeological sites requires an understanding of the information that can be gained from them. In the past, too many land-modifying projects have proceeded without taking the nonrenewable archaeological resources into account. This has resulted not only in serious loss of information about the past but has on occasion in other areas resulted in work stoppages, court injunctions and other time-consuming and costly conflicts between developers and persons (including the general public) concerned with archaeological resources. This is to the advantage of neither archaeology, project personnel, the public, nor the City of Albuquerque/County of Bernalillo and is to be avoided whenever possible.

To meet the general goal of a comprehensive, systematic, and objective approach to archaeological resource management, procedures are needed that will insure efficient, appropriate, and meaningful management of the resource base. Procedures need to be both flexible and comprehensive. The concept of flexibility is important in management because as pressures on the resources change and as new information about the resources is gained, the ways in which the resources are managed and preserved should change. This should be reflected in different goals and priorities for resource identification, evaluation, and preservation. Mechanisms for review and refinement are crucial elements in this process. A comprehensive approach to archaeological resource management is equally important because all physical remains of past human activity should be taken into account, not just standing buildings or large Pueblo ruins.

The process should also include consideration of resource evaluation and mitigation alternatives. It is not practical or even desirable to preserve every historic structure or archaeological site that has been identified. Therefore, decisions need to be made about which resources merit further study and preservation, and how they should be preserved. These
decisions are made on the basis of resource evaluation (as discussed above).

Development of a meaningful capability for management of archaeological resources requires, at a minimum, the centralization of authority and responsibility. At present, public decisions involving land use, planning, development, review and resource preservation that affect archaeological resources are normally made by several different city and county departments, commissions, boards, and elected officials. This creates confusion and time delays, to the benefit of no one.

Surface disturbance ranges from such major land-altering activities as building construction, strip mining (including gravel extraction), and road construction down to trenching and vegetation removal. Opening an area for apparent non-disturbing activities such as hiking can also result in damage to sites through vandalism, non-permitted use of off-road vehicles, etc. However, archaeological site inventories and impact assessment for city, county, and private projects have not routinely been included in the planning and development process. Development of a comprehensive framework should be initiated to evaluate archaeological resources, predict impacts and their effect on the resources, and manage them for the benefit of all.

However, avoiding problems requires incorporation of a study of archaeological resources into the planning stages. Just as a project planner needs to know about geological or soil conditions or the present population in a project area before beginning work, so too should he or she ascertain the archaeological resources present that might affect or be affected by the project. Such planning involves the systematic identification of archaeological resources, evaluation of these resources, and formulation (as well as implementation) of means for their protection, relocation, or their scientific study before unavoidable disturbance. It is exactly this sort of planning that was envisioned by the ARPAC report.

Archaeological assessment and research take time. It is difficult to generalize because of differing geographical, cultural, and archaeological conditions, but the reconnaissance of an area of any size, such as a large development site, is more often the work of months than of days or weeks, and proper excavation cannot be done rapidly. For this reason, as well as because of the effect the data gathered can have on the planning itself, it is essential that development of archaeological resource data be initiated early in the planning process.

It should be noted too that in nearly every instance the field research itself constitutes no more than 20-25% of the total research time required to make an adequate assessment. Review of available information, analysis of field data, and report preparation take up the major portion of the total time required. At the very earliest planning stage, a general evaluation of the known or potential effects of each possible alternative on archaeological resources should be considered. What needs to be developed as soon as possible is a professional assessment—or "best guess"—based on known sites, general archaeological knowledge, environmental factors, vegetation, soils and other information as to the probable presence, intensity, and significance of cultural resources that might be expected to occur in the particular area to be affected.

Later in the planning process, it is appropriate to begin a preliminary on-the-ground archaeological reconnaissance of general areas that are being considered. This level of investigation is appropriate, for example, during the corridor selection process by a highway department, where several possibilities are being considered. What is called for at this stage is a preliminary on-the-ground reconnaissance adequate to provide an assessment of major cultural resources.
determined to be present and a reasonable estimate of what an intensive reconnaissance might reveal. On the basis of this preliminary reconnaissance, a generalized evaluation should be possible, to the extent that the various alternatives being considered can be rated with respect to the potential impact on the archaeological resources and the general cost of reducing that impact to an acceptable level can be estimated.

Once the area of impact has been narrowed down to a few alternatives, an intensive archaeological reconnaissance or survey is called for. On the basis of an intensive survey, the archaeologist should be able to determine the number of sites present (always allowing for buried sites), the approximate time span(s) of the occupation(s), and enough about the inhabitants to evaluate each site's significance. If a land alteration project is being considered, the archaeologist, after such an intensive survey, should be able to indicate which sites are particularly worthy of preservation and/or investigation, suggest areas where caution should be exercised because of possible buried sites, and provide an estimate of the cost of protecting or salvaging an adequate amount of information from the area to be affected. Thus the impact of the project on the archaeological resources present is mitigated insofar as possible. This type of investigation is appropriate before specific right-of-way selection by a highway department, or alternative site selection for a shopping center development, for example.

There is another possible complication. Sites easily and frequently become lost to view under mud, sand, dense vegetation, or because of construction activity. Therefore, agencies should be aware that even after an intensive survey, sites may be encountered during construction. If this should occur, the City of Albuquerque and County of Bernalillo should be prepared to plan for the effective investigation of such sites by professional archaeologists.

The "area to be affected" should be interpreted to mean not only the precise limits of the project area but all surrounding lands on which the project may have a reasonably direct (and indirect) impact by modifying land-use patterns or by opening up areas for public use (and therefore potential vandalism).

This problem of the exposure of sites to increased vandalism complicates the planning process. Archaeologists are keenly aware of the vital necessity of making site locations available to planners or others involved in land alterations during their decision-making process. However, they are nonetheless hesitant to make detailed information about these locations generally available, for this may subject the very sites they are trying to protect to increased vandalism. Satisfactory resolution of this complication will require understanding and cooperation among all concerned.

Education of the public is one way to develop awareness of the rich heritage of the region. Amateur and professional archaeologists alike have called again and again for more public education. The need for such education has become acute as the destruction of sites has accelerated. All too often, however, public education has been seen by professional archaeologists as a secondary focus of concern to individual research interests. A well-planned program of public education would be an effective tool in the creation of a public ethic of conservation (cf. Nickerson 1963 for a discussion of the failure of laws in the absence of such an ethic).

The Archaeological Resource Centre developed by the Toronto (Canada) Board of Education could be considered as a possible model for public school involvement. This center was set up in existing school facilities and is funded by the Board of Education for its long-term operation. The Archaeological Resource Centre consists of three elements: (1) the center itself,
providing classroom, laboratory, artifact storage, public display, teaching resource material and office space; (2) the on-site Public Interpretive Unit, a refitted trailer containing displays of artifacts and information panels; and (3) an itinerant display system for use in schools and public buildings (communication from Karolyn Smardz, Manager, Archaeological Resource Centre, Board of Education, City of Toronto). Education here is carried out as an integral component of excavations carried out under the aegis of the center.

Another possibility is the sponsorship of on-going excavations at a site linked to a City of Albuquerque/County of Bernalillo facility. Such a site could serve as an archaeological center, along the lines of the Rio Grande Nature Center. It could provide a focus for single-day involvement for the general public, both resident and visitor, along lines of the archaeological center in Jerusalem, in which the public, tourists and any others can register for a program of half-day lectures about area archaeology, conservation ethics, and field techniques, followed by a half-day of excavation under close professional supervision. Such a program would provide education for the entire family and would be unique in this country.

Archaeological resources are similar to an endangered species—even more endangered—for no matter how hard we work to protect them they cannot reproduce or increase. Like geological resources they are finite in quantity. However, although oil is oil or diamonds are diamonds, varying only in grades of quality, each archaeological site has a unique message to tell us. It is possible that in an archaeologist’s best judgment, one site is enough like another that an attempt should be made to investigate only one, but we can never be sure how correct that judgment actually is.

There has never been, nor will there be, an opportunity or the resources in time, money, or personnel to excavate every site. But it is essential that trained and knowledgeable persons be given the opportunity and resources to determine what data are present in an area, and on that basis to determine with scientific acumen which sites to preserve and which to investigate. Further, they must be provided the opportunity and resources to carry out the necessary investigations.

If appropriate frameworks are established between those whose activities alter the land and the archaeologist, and consideration of archaeological resources becomes a normal feature of the planning process, the results will be highly desirable for all involved. Essential information will have been preserved for the public good, and those altering the land will be in position to achieve their particular aims on schedule. Implementation of the approaches discussed in this document and the ARPAC report will benefit everyone, both now and in the future.

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Albuquerque, New Mexico

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COPING WITH THE RIVER: SETTLEMENTS IN ALBUQUERQUE'S NORTH VALLEY

KATHRYN SARGEANT

It is a pleasure to have the opportunity to present a paper honoring Dick Bice. Few people have contributed so much energy to promoting public interest in the rich archeological resources of the Albuquerque area as well as those of New Mexico in general. Through the years he has earned the respect of all of us who care about archeology. I would like to join in thanking him for his efforts.

Much of my work has been focused on Los Ranchos de Albuquerque, a seven square mile incorporated village lying on the east side of the present river channel (Figs. 1, 2). Because the river is the principal geographic feature of the valley, it is important to attempt to understand the characteristics of the Rio Grande; that is, whatever benefits and/or problems it may present to people who choose to live near it. As we shall see, it has had the capacity to be both benefactor and destroyer.

BACKGROUND

Work in Los Ranchos commenced in 1979 when I began investigating a large Indian village site buried under the property my husband and I own and live on in the North Valley. What began as a simple salvage project planned to last for two or three weeks before constructing a house addition became a major excavation lasting 2-1/2 years. This project was jointly sponsored by the Village of Los Ranchos and the Maxwell Museum of Anthropology (University of New Mexico).

Excavation of the Chamisal Site revealed eight occupation levels of a series of adobe villages dating to the Classic Pueblo IV Period (A.D. 1300 to 1650). Below the initial Pueblo occupation, an Archaic site was discovered that was radiocarbon dated to 1670 ± 60 BP/720 B.C. (Dicarb #2522, 1982). The most prominent feature of the site is a large mound 900 m/1952.7 ft in size which rises 2 m/6.3 ft above the present level of the valley floor. The excavation exposed only a small core area of the site, 117 m/383.8 ft altogether, with part of the excava-

tion carried to 3.5 m/11.4 ft deep. Boundaries of the site were tentatively established through survey and soil bores at 6.5 acres. The excavation yielded 150,000 pottery sherds, 15,000 animal bones and 25,000 lithics. Historic pottery was also found that may indicate a possible Spanish occupation during the last 300 years.

Because of the impressive information available from the Chamisal Site, Los Ranchos village trustees became interested in sponsoring a survey to determine what other archeological resources might be found within the village boundaries. A grant was made available from the village with matching funds from the New Mexico State Historic Preservation Division to conduct an intensive pedestrian survey in 1982. I directed this project, and with a crew of five other archeologists, recorded evidence of 11 prehistoric sites and 30 historic sites in the 7 square mile area. In my opinion, this represents perhaps half of the possible sites in the area. Leveling and grading for modern agriculture in the 1930s, plus urban development since World War II, have undoubtedly obliterated surface evidence of many sites.

In 1983, Mary Davis (architectural historian for the Historic Landmarks Survey in Albuquerque) and I organized an oral history project in the North Valley. Again, Los Ranchos supported the project with funding, this time matched by funds from the Albuquerque Museum of Fine Arts and Sciences. More than 80 long-time residents of the North Valley were interviewed and from them we collected more than 900 pages of transcribed material relating stories and memories of life in the Valley in the early years of this century, and even earlier times by means of stories passed on from grandparents and great grandparents.

Archival research for these various projects, which often described the effects of river floods, together with observations of valley archeological sites demonstrating flood damage, and the first-hand reports of
Fig. 1. Location of the survey area.
Fig. 2. Village of Los Ranchos de Albuquerque.
people who lived in the Valley who remembered flood events, indicated that coping with the river's activities was a very real problem for people living on the floodplain of the Rio Grande.

In modern times we seldom think of the river as a threat. The dams located on the tributaries north of Albuquerque and Cochiti Dam on the Rio Grande itself have kept us safe from severe flooding since the 1950s. Not until 1885, when the first dike was constructed at Alameda north of Los Ranchos, were efforts made to control the river. The early Spanish colonists had no more sophisticated technology nor materials to protect themselves from the floods than did the native Indians who preceeded them in the valley.

The accounts of floods a hundred years ago by oral history informants tell of a river very different from the one we know today (Davis and Sargeant 1986:104-108):

In the Callabacitos arroyo on the West Mesa, when it rained so heavy, the water came down and dammed the river with the sand it brought down, so the river had to come this way [across the valley]. People lost a lot of stuff. My mother said the water was full of pigs, and all kinds of animals. The pigs were rolling, she said, and the sheep and goats and the barrels of wine were rolling in the water. People lost everything. After a month when things dried out, some people returned and built again on the same spot - they didn't have any place else to go. My mother said that during the flood, when she was expecting my older brother, she got on top of the table. She said, "I was taking the curtains down and you could feel the walls moving" (Informant Primitivo Lucero).

Another valley resident also recalls tales of the river rising:

When we talk about floods I would like to remember this.

Before they started putting all the dikes, dams, and things like this on the Rio Grande, my grandmother said, "I hope it [the water] doesn't come in because," she said, "the river would overflow and everyone would flee - they went away from their homes - all the way to Edith and Candelaria"....Then I remember one flood I did get to see when I was still a child, probably eight or nine years old. The river overflowed all the way to Rio Grande Boulevard. My aunt's house was under water. At night you could hear [it]. That water was something to be afraid of. It was a very scary, hollow hum doing its damages and rolling down south (Informant Edwin Chavez).

HISTORY AND ENVIRONMENT

The Rio Grande rises in the high peaks of the San Juan Mountains in southern Colorado, then flows generally southward 1,640 miles to the Gulf of Mexico, draining a watershed of approximately a quarter of a million square miles of land. Like an oasis in the desert, the big river offers water and fertile lands in the vast, arid expanse of central New Mexico. It is the only major river valley for 300 miles to the west and 100 miles to the east. On either side of the river valley, mesas slope upward to high mountain ranges, some over 10,000 feet high. The river follows a great rift caused during Tertiary times by subsidence of the earth's crust while, concurrently, the Sandia and Manzano mountains were pushed upward in an easterly tilted fault range. The rift filled with gravels, sands, clays, and volcanic deposits, known as the Santa Fe Formation, and over this plain the Rio Grande meandered until sometime before 20,000 years ago, when it began a down-cutting episode forming the present valley. After this the river began filling its own valley again by depositing silts in its channel, overflowing its banks, shifting its chan-
nel to lower ground and meandering over its floodplain to even and spread out the surface (Kelley 1974:10-13).

Before the river in the Albuquerque area was confined to its present channel in 1957, the Rio Grande was a meandering braided stream with oxbows, riparian woodland, and numerous marshlands. From time to time, as the aggrading river filled its bed with sediment, it overflowed its banks, and shifted to a new channel with new levees or sand banks higher than the outlying alluvial flats. The low areas on the flats, called yazoo, were filled with water from the arroyos on the east and west mesas. Water was prevented from flowing into the river by the levees and, because of the high water table related to the aggrading riverbed, was not easily absorbed by the saturated ground. Swamps formed where the water did not evaporate. Kelley's map shows the areas of the North Valley where yazoo existed in the past (Fig. 3.).

**RIO GRANDE FLOODS**

Floods have always been a major problem to habitation on the valley floor. With the exception of severely dry years, the river could be expected to flood to some extent annually, with years of large flow and others of less flow. The amount of water and therefore the destructiveness of the flood depended on the accumulation of snowpack in the mountains and how rapidly it melted (Murphy 1905:34). Highly destructive floods wiping out vegetation and human communities occurred at least several times each century.

Although most large river floods occurred from mid-April to mid-June, the late summer-to-fall floods resulting from thunderstorms that filled the arroyos could be equally destructive. The effects of heavy grazing by cattle and sheep on the mesa grasslands in the 18th and 19th centuries, combined with timber cutting in the mountains, resulted in reduced plant cover on the hillsides. This, in turn, produced headwater erosion, or gullying, with accelerated runoff and soil erosion.
In historic times, flood records for the Albuquerque area were not officially kept until after 1870. Danger potential is considered present when the flow rises above 5,000 cubic feet a second. Kelley (1974:16-17) notes that in 66 of the years preceding 1974 this flow had been reached. The flow of 1884, the worst year of record, is thought to have exceeded 100,000 feet a second.

Human alteration of the natural environment through overgrazing and timber cutting are thought to have contributed to the truly immense floods of 1874, 1884, 1903 and 1904. The flood of 1903, flowing at a rate of 19,300 cfs broke through the dike in a low area, flooded the valley and demolished the town of Alameda. In October of the following year yet another flood, flowing at 17,900 cfs, again broke through the dike. The water was contained by the high berm of the railroad bed on the east side of the valley and the berms of the Griegos and Gallegos ditches on the west and south. The Griegos berm had to be cut through in order to release the waters back into the river; however, the lake that formed in the vicinity of the Plaza de Senor San Jose de Los Ranchos, occupied from about the middle of the 18th century until the flood, remained for almost a month, according to a long-time resident, and the adobe walls of the church, the houses, and other structures in the village softened and collapsed. The buried remains of the plaza were discovered during the Los Ranchos survey in 1982 (Sargeant 1985: 7:64-101). Yet another site tentatively identified as the Plaza de San Antonio de Los Poblanos, possibly destroyed by a flood in the middle 1800s, was also recorded on the survey.

**BENEFITS OF THE FLOODS**

Floods in the Rio Grande Valley, although destructive, are also beneficial in the way that the Nile River benefits the floodplain of Egypt. Hackett quotes one New Mexican who described the river deposits in 1773:

The water brings with it a thick mud which serves as manure for the land, leaving on top of the irrigated earth a glutinous scum resembling lard (Hackett quoted in Simmons 1982:96).

Loren P. Potter (Ph.D., Dept. of Biology, University of New Mexico, personal communication 1982) says that a big flushing by a major flood every 10 to 25 years is necessary for the existence of natural vegetation on the floodplain and for productive farming. Salts are leached and soils replenished, enabling plants to flourish and reproduce. Cottonwoods, for instance, need the fresh silt deposited by the floodwaters as a seedbed. In normal circumstances, the spring floods saturate the soils on the alluvial flats, then drain away, leaving moisture to tide the plant and animal communities over the dry period of May, June and part of July. August thunderstorms flood the arroyos, bringing needed water to the bottomlands and filling the yazoos.

The U.S. Geological Survey described the crop loss in the Rio Grande Valley between White Rock Canyon and San Marcial during the 1904 flood as follows:

...almost the entire harvest of corn, wheat, and oats was destroyed and the orchards and vineyard to a large extent. The soil, however, was enriched by the sediment and benefited by the washing of the alkalai from the land (Murphy 1905:149).

**ARCHEOLOGY OF THE NORTH VALLEY**

Early surveys of the valley floor in the Albuquerque area recorded sites dating to the late Pueblo III and IV periods (A.D. 1250-1650) (Fisher 1930, 1931; Vivian 1932; Mera 1940). However, there still remains an assumption that prehistoric populations would have opted to live on the higher ground of the terraces bordering the floodplain rather than to live on the valley floor. An example of this assumption can be found in a 1979 Corps of Engineers' report:
While occupation of the Rio Grande Valley is evidenced by an abundance of archeological and historical remains, little of this evidence can be found within the floodplain itself. The lower areas of the floodplain were not extensively occupied until the coming of the Spanish since earlier people generally preferred to farm the floodplain and live on the adjacent bluffs and terraces. Hence, only historical sites resulting from the later Spanish culture still exist within the limits of the floodplain (U.S. Corps of Engineers 1979:A-14).

I would like to suggest that the bias of sites away from the floodplain exists because so little is known of prehistoric settlement on the floodplain. Both non-cultural and cultural forces have influenced the integrity of the archeological record in the valley. Sites are buried under the alluvium deposited by past floods. Within the last 50 years, low areas have been filled and the bottomlands generally leveled for agriculture and irrigation. Mounds that once marked the sites of adobe villages have been flattened. Examples include LA 417 located in present-day Alameda, where a large village mound was dragged in the 1930s to make way for the construction of a school and playground, and the Pueblo village site (LA 677) located upriver at Bernalillo, which was "entirely obliterated" by the construction of the Catholic church and school (Fisher 1931). Buried site remains are encountered during urban expansion when trenches are dug for utility lines, and excavations occur for house foundations, septic tanks, and swimming pools.

Recent survey and excavation have shown that prehistoric and historic sites often are buried only a few centimeters under the surface of the ground; others exist at greater depths. The Archaic period campsite excavated at the Chamisal Site in Los Ranchos was found at a depth of 3.5 m/11.4 ft below the surface of the Pueblo IV village mound that covered it. Usually, surface evidence of buried sites exists as only a few scattered sherds and lithics, whereas surface evidence of many sites has, no doubt, been completely erased. Because of the problem of the low site visibility, site density has been underestimated. Settlement patterns on the floodplain and consequently for the area can easily be misinterpreted.

Archaeologist Adolph Bandelier observed the 1884 flood while traveling on a train through the Middle Rio Grande Valley. His thoughts are pertinent to the problems of human habitation on the valley floor:

[This flood] is exceedingly interesting for the past history of the country and explains many of the features connected with the occupation and abandonment of the valley. It shows that the Rio Grande bottom, perfectly habitable and safe during long periods of time, may suddenly be swept by a flood obliterating human habitation and burrowing new channels, thus permanently changing the distribution of arable plots and sites for pueblos. Such floods as this one now are not frequent, but have occurred before (Lange and Riley 1966:331). Because archaeological sites are found on the valley floor, it is apparent that early people came to terms with the vagaries of life near the river; however, the real question is: given the propensity of the Rio Grande to flood regularly, why settle on the floodplain at all? Why not, as has been suggested by the Corps of Engineers report, live on the high terraces above the floodplain and farm the valley bottomlands? Numerous Early Man, Basketmaker, and Pueblo sites have been recorded along the terraces, so obviously these locations were a viable option.

PROBLEMS WITH IDENTIFICATION OF TAEA PUEBLOS
There are other interesting problems related to the Rio Grande that were brought to our attention in searching out background information for the archaeological survey of Los Ranchos and for the North Valley Oral History Project. One problem concerns the attempts by archaeologists to identify archaeological remains found in the Albuquerque area with the Tiwa pueblos recorded by the Spanish expeditions in the 16th century (Vivian 1932; Snow 1975; Schroeder 1979:242-243). The Tiwa province, existing along the river between Isleta on the south and perhaps Bernalillo or Algodones on the north, contained, according to Spanish reports, 12 to 16 large villages. We, like the above scholars, also hoped to identify Pueblo IV sites found in Los Ranchos with the Spanish recorded sites.

The Spanish explorers recorded the observed villages by their Tiwa names, or else gave them new names usually honoring favorite saints. For convenience, the locations of the villages were referenced to the east or west bank of the river and the distance from one to another might be measured in Spanish leagues, which could vary, or as "a day's walk" or perhaps "a day's ride on horseback," all of which lack a certain desirable preciseness. Since the river shifted its channel about the valley floor, it is possible that a village might at one time lie on the east bank and at another, following a major channel shift, be positioned on the west bank.

That this, in fact, occurs can be confirmed by examining maps of the last few hundred years. A good example is the pueblo of Alameda lying between Bernalillo and Los Ranchos. A map made by provincial governor Diego de Penalosa in 1675 (Weber 1968:54), Fig. 4, and another by Nicholas de Fer in 1695 (Weber 1968:69) Fig. 5, both show Alameda pueblo on the west side of the river. Unlike most maps of the period, they were based on first-hand knowledge of New Mexico. Furthermore, the 1710 map showing the lands of the Alameda land grant given to Francisco
Fig. 5. Map by de Fer (1720) based on Fray Kino's 1695-96 map showing Alameda location on the west bank of the Rio Grande.

Vigil confirms that at that time the Rio Grande was the eastern boundary for the grant, with the pueblo on the west side of the river. However, a 1769 map drawn by Joseph Urrutia (Weber 1968:108), Fig. 6, who accompanied the inspection tour of the frontiers of New Spain in 1766-68, shows the Spanish Plaza de Alameda (known from archeological and historical evidence to lie just west of the abandoned pueblo) on the east side of the river. It appears that between 1710 and 1769 the river changed into the west-side channel where it runs today in the Alameda area. In another example, a major flood is known to have occurred about 1735 when the river moved west of the town of Bernalillo, according to testimony given at a hearing on the Bernalillo Land Grant in the 1890s.

As a consequence of the shifting river channels, it becomes difficult to accurately identify the ruins of pueblos from Spanish descriptions.

LAND GRANT DISPUTES

A third interesting problem relating to the position of the river through time concerns the disputes that developed in the late 19th century regarding the boundaries of the Spanish land grants given in the late 1600s and early 1700s. In a number of cases the Rio Grande provided a boundary for the grant. The Elena Gallegos grant, for instance, which includes the lands of Los Ranchos village, was given to Diego Montoya in 1694. Its western boundary was the river and its eastern boundary the crest of the Sandia mountains. Land speculators attempted to prove that the Rio Grande at the time the grant was made was flowing on the east side of the valley, with the implication that the rich and irrigable flatlands of the valley bottom thus were excluded from the land grant. They charged that the river had shifted its channel from the east side to the west side of the valley sometime after 1694 and therefore the bottomlands were illegally claimed by later grant heirs. An 1878 plat
Fig. 6. Map by Urrutia (1769) showing Alameda location on the east bank of the Rio Grande.

Fig. 7. Detail of the 1878 plat map of the Elena Gallegos Grant showing the "old bed of the Rio Grande."
The map of the Elena Gallegos Grant used at the grant boundary confirmation hearings shows the "Old Bed of Rio Grande" sketched in on the east side of the valley (Catron Papers, CPLC case 51), Fig. 7.

The testimony and written documents from the hearings on the land grant confirmation underline the problems of identifying even the historic river channels.

PALEOCHANNEL PROJECTS

A study to identify paleochannels of the Rio Grande was planned for several reasons. First, we wanted to explain the prehistoric settlement patterns in the floodplain. Second, we wanted to correlate any prehistoric site found on the survey with those described by Spanish explorers. And finally, we needed to determine the western boundary of the Elena Gallegos land grant because Los Ranchos was presumably located within its territory. This was an ambitious undertaking, and we were able to make only a beginning on the research.

The basis for our paleochannel investigation was a project undertaken in 1981 by David Staley, then a student at the University of New Mexico, who produced an unpublished report on paleochannels of the Rio Grande. Staley used historical accounts, historic land grant maps, a 1920 topographic map of the floodplain, and a 1967 set of aerial photographs as the basis for his study. Staley found it difficult to put together reliable information about the river's history:

Problems with all sources became apparent. Historic accounts, especially from newspapers, tended to be spectacular. The land grant maps are often sketch maps made without the aid of accurate surveying tools. The map of the floodplain has problems in that the indications [of paleochannels] are often obscured by overbank sediments or by other post-channel deposits. Urbanization, besides the problems previously mentioned, confounded the observations of the river scars on the air photos (Staley 1981:18).

Nevertheless, Staley's use of the topographic map, and to some extent, the aerial photography, were productive. Several paleochannels were observed from a plan view of the topographic map of the floodplain. There are scars of two channels in the area west of Rio Grande Blvd. and one that follows roughly the course of Second Street (Fig. 8).

Kelley (1974:14) suggests that the river took its course on the west side of the valley within the last one to two thousand years, having shifted from an earlier channel on the east side. Scars of this old channel, which became a yazoo and at times a flood chute according to Kelley, can be seen as the same one Staley identified as following the present course of Second Street (Refer to Fig. 3).

Staley was unable to do the necessary field investigations to prove his map and aerial photograph observations. He recommended that a project be undertaken to core the floodplain to confirm the location of paleochannel features. As a special project under the Los Ranchos Archeological Project, Gregory Martinez, a graduate student in geology at the University of New Mexico, began field testing the floodplain in the summer of 1982.

Martinez's method of investigation involved taking a series of bores with a hand-turned soil augur and 6-inch bucket. The bores were located in east-west transects across the valley at 450 to 600 m intervals. The total depth capability of the augur with an extension was 270 cm. Ten centimeter increments of soil were brought to the surface, examined and recorded. Thirty-two bores were taken across the valley in transects aligned with Los Ranchos.

It would have been useful to have taken many more bore samples of the deposits in the transects, but time and money did not allow this luxury. Despite the insufficiency of data and the problems of interbedding of depos-
its on the valley floor, some useful information was gleaned from the field study. They are applicable to questions raised in this paper, especially to that of settlement patterns.

The river appears to change its channel either in abrupt switches from one side of the valley floor to the other during flood times, or by building up its own bed to a certain point, then crossing its own banks and cutting a new channel parallel to the old one and, at times, adjacent to it. This last type of channel change is called "migration" and can be seen in the scars of old channels along the valley's west side. Martinez found that there is no evidence now existing in the valley deposits within the study area of a migration type of channel change occurring from one side of the valley to the other. In other words, if the chute or old yazoo readily identifiable along Second Street was at one time the main channel of the river one to two thousand years ago, then the river did not move
Martinez agrees with Kelley that the Second Street chute probably was not a real channel for the river in the last thousand years because the clays found in bores near the chute indicate very low energy environments. Not until cores were taken much further west did he encounter the kind of sands and gravels that would indicate flowing stream action. The amount of calcium carbonate buildup in the deposits on the east side is yet another factor indicating that the river probably has not flowed in a channel there for a long period of time (Martinez, in Sargeant 1985:4. 25-32).

The implication of this study is that the Rio Grande has flowed on the west side of the North Valley between
Alameda and Albuquerque at least from the time of early Pueblo period settlements to modern times. Staley's aerial photography studies indicate channel scars west of what is now Rio Grande Boulevard. From this evidence it may be possible to infer that the central part of the floodplain, in effect, was an island of relatively high land between the river on the west and the chute-yazoo area on the east.

SITE PLACEMENT

William Turnbaugh's (1978:593-607) study of damage caused to 226 aboriginal sites located on a river floodplain near Williamsport, Pennsylvania is of interest to floodplain settlement study in the Rio Grande area. His findings indicate that over half (57.1%) received flood damage ranging from 25% to 100%. Not surprisingly, sites located on terraces received the least damage, an important factor in the consideration of differential site preservation. Turnbaugh considered terrace sites most secure for settlement. Of 67 recorded cases of floodplain settlement, 73.1% (49) were located on the high point of an active floodplain. However, even they did not escape the impact of the unusual magnitude of the 1972 flood investigated by Turnbaugh. He concluded that sites are not randomly situated in a river valley, but rather carefully chosen with regard to an understanding of the river's activity.

Both the prehistoric and historic sites recorded for the Los Ranchos survey follow a north-south line paralleling the old channels of the river (Fig. 9). If the central section of the floodplain were higher than either the east or west sides, then this area would seem somewhat favorable for site placement and site preservation, and, as Turnbaugh has notes, one would expect to find sites located there. Following this model, sites could be situated along the east side of the river taking the risk of major floods, but somewhat safer from minor seasonal flooding than the lowlands left by old channels of the river on the west, between the foot of the terrace and the active channel of the river, and certainly preferable to the yazoo area on the east.

ADVANTAGES TO LOCATIONS ON THE FLOODPLAIN

Despite a certain advantage to living on higher ground to avoid at least some of the Rio Grande floods, why would groups of people choose to live on the floodplain at all when communities could and were situated on the terrace above the river in comparative safety?

Population pressure is a possible explanation. It may be that village sites on the terrace were preferable to sites on the floodplain, but with the enormously increased population in the Middle Rio Grande area at the end of the 13th century and beginning of the 14th century (early Pueblo IV period) competition for arable land may have been intense. Living close to the community's farmlands and crops would allow maximum opportunity for surveillance and protection. Evidence of burning at the Chamisal site and a nearby site on the south, LA 46633, both partially excavated Pueblo IV sites in Los Ranchos, may indicate raiding and warfare were frequent occurrences during times of population and subsistence stress.

Early Spanish settlements appear to have followed the same pattern as the Indian communities that preceded them. The villa of Albuquerque was established on the present site of Old Town in 1706 on a slight rise of ground near the river; however, the farms belonging to the inhabitants were situated along the river and the populace tended to move out to the farms (Simmons 1982:82). The six small plazas like Los Ranchos that were formed for defense against the raiding Apaches and Comanches in the middle 1700s north of Old Town lie, as do the Indian sites, in a line parallel to the river (Fig. 10). In fact all prehistoric sites recorded on the Los Ranchos Survey also show evidence
Simmons explains the reasons for the form of the Spanish settlements:

The farming folk, from a purely practical point of view, desired to live close to their fields both to save time which would have been lost had they daily traveled to town and to be on hand to guard their crops from thieves and predators (Simmons 1982:92).

Following the ravages of the river's floods, the Spanish returned again and again to rebuild, as did the Indians who lived in the valley before them. It was not the replaceable adobe structures that were important, rather it was the land made productive by the presence of the river and the abundant crops which could be grown there.

CONCLUSIONS

The conclusions regarding the problems presented in this paper are as follows:

1. Paleochannel studies indicate that although the Rio Grande floodplain was a high risk environment, a somewhat elevated area of land between the eastside yauzo and the channels of the river on the west provided an area for village and farm locations.

2. Criteria for site selection may have been similar for both the Pueblo IV farmers and the Spanish colonists in the Middle Rio Grande Valley. Proximity to arable land and water was essential. Threat of raiding and predation made it necessary to live close to farmlands. Sites were placed to avoid seasonal flooding but risks had to be taken with regard to the larger floods.

3. Because of the changing location of the river channels in times past, an attempt to identify the Tiwa pueblos described by the Spanish explorers as they relate to the east or west banks of the river is impossible unless paleo-channels of the river can somehow
Our study confirms Kelley's findings to the effect that the Rio Grande does appear to have maintained its channel on the west side of the valley floor for at least the last thousand years, consequently the claim of the heirs to the Elena Gallegos Land Grant was assuredly valid at the grant confirmation hearings in the late 19th century.

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TEST EXCAVATIONS AT SAN ANTONIO DE LOS POBLANOS
A SPANISH COLONIAL COMMUNITY ON THE MIDDLE RIO GRANDE

CHRISTINE A. RUDECOFF AND CHARLES CARRILLO

In January of 1986 the Research Section of the Laboratory of Anthropology conducted test excavations at LA 46635 at the request of the New Mexico State Highway Department. The project area is located in the North Valley of Albuquerque between Montano and Chavez Roads. Test excavations were restricted to the proposed right-of-way realignment of State Road 194 (Rio Grande Boulevard) in an area popularly known as Buffalo Curve (Figure 1). LA 46635 is better known as the Plaza of San Antonio de Los Poblanos, or Los Poblanos.

The only cultural feature discovered in the 1.9 hectare (5.5 acre) area that we tested was a trash pit 0.80 m (2.6 ft) below the present ground surface. The saucer-shaped pit measured 3.0 by 4.75 m (9.8 by 15.6 ft), and extended to 1.1 m (3.6 ft) below the present ground surface. The 0.30 m (0.9 ft) deep pit-fill contained burned wood, ceramics, faunal bone, and a small number of lithic artifacts in a marbled clay and sand matrix. Radiocarbon dates and the ceramics indicate that the cultural material was deposited between A.D. 1710 and 1830.

Kelley (1974:2) believes that before 1930, when water control programs were initiated along the Rio Grande, the project area was a yazoo near a broad, braided stream channel. Yazoons are low areas in a river floodplain that are subject to flooding and subsequent swamp formation. The marbled sands and mottled sand and clay strata revealed in the excavations are typical deposits in areas near slow moving water (David Borens, personal communication 1986) and provide support for Kelley's thesis.

Although the test excavations at Los Poblanos did not reveal architectural features, an archival study verified the association of the trash deposit with the village of Los Poblanos. The archival study also provided information on the founding, naming, and character of the community. Analysis of the artifacts from the deposit has raised questions concerning the classification of Spanish Colonial period Pueblo and Hispanic ceramics, provided information on trade networks in which the Hispanic communities operated, and corroborated archival information on subsistence and economic practices at Los Poblanos.

ARCHIVAL RESEARCH

Previous archaeological and archival studies have shown that a number of Spanish Colonial through Territorial period occupations were once located along the Middle Rio Grande (Sargeant 1985). Our project area is within the boundaries of Sargeant's proposed location for the plaza of San Antonio de Los Poblanos. This village, or plaza, was established around 1750 and abandoned by 1860 (Davis 1985). The population of Los Poblanos probably never exceeded 65 to 70 individuals. Based on historic documents and our interviews with older residents of the community, Los Poblanos was bounded on the north by the Los Poblanos Ranch, on the east by the Griegos Drain, and on the west by the Rio Grande (Mirabal 1980). The trash deposit we discovered in the test excavations was apparently on the northern edge of Los Poblanos.

We were unable to find specific information in the archival documents as to why Los Poblanos was abandoned. However, we do know that before river control projects began in the 1930s, flooding was a constant problem along the Middle Rio Grande (Carter 1953). It is likely that recurrent floods, which would have destroyed homes and water-logged croplands, may have forced the residents to abandon Los Poblanos and perhaps move into nearby communities.

The term "plaza" generally refers to a tight cluster of houses around a central open area. In Spanish Colonial New Mexico, this settlement pattern was mandated by colonial authorities in an attempt to create communities that could be more easily defended against the constant raids by nomadic Indians (Simmons 1979:107; Swadesh 1974:23-24). In 1772, the regular
military force in New Mexico totaled 80 men (Swadesh 1974:134) and the colony's store of firearms amounted to no more than 600 muskets and 150 pairs of pistols (Kenner 1969:38,48). Establishing mandatory settlement forms was one of the few options colonial authorities had for protecting settlers under their dominion.

Nonetheless, New Mexican settlers were more likely to establish dispersed communities; that is, a scatter of households or ranchos that maintained a communal identity (Swadesh 1974:134). This allowed settlers to disperse their cattle and sheep and remain close to their croplands, and reduce losses during Indian raids (Swadesh 1974:135). Despite the plaza designation, San Antonio de Los Poblanos was most likely a dispersed community rather than the prescribed plaza settlement form.

The first documented reference to Los Poblanos was made in 1783 by Fray Gabriel de Lago, who listed Joaquin Montano as a resident of Los Poblanos. One of the last documented references to the community came 99 years later in 1882, when Juan M. Armijo willed his ranch in Los Poblanos to an Italian family that had been renting the property. The ranch is described as extending from the Gallegos to the bridge of Ranchos.

Although most of the plazas north of Albuquerque were named for resident families, such as Los Griegos, Los Gallegos, and Los Garças, the plaza of Los Poblanos was not. In fact, the most common family name associated with Los Poblanos in colonial documents is that of the Ortegas. The Ortega brothers, Juan, Antonio, and J. Andres, who lived in Los Poblanos, were all born in Puebla, Mexico. As young men they traveled to New Mexico, took New Mexican wives, and settled in the area that became the Plaza of San Antonio de Los Poblanos. "Poblanos" means "people from Puebla" and Dreesen (1973) has suggested that the plaza was named for the birthplace of the Ortegas.

Many residents of Los Poblanos probably participated in a cottage industry centering on textile production. Baxter (1985:A.1) notes that almost 40 percent of the heads of households in the four northern plazas of Albuquerque indicated that their principal employment was in some aspect of textile production. In the 1790 census, two carders, one weaver, and one sheepherder were listed as residing in Los Poblanos.

Ricardo and Juan Bazan, master weavers who played a prominent role in the New Mexico textile industry, were among the artisans brought from Puebla, Mexico to assist New Mexican colonists (Bloom 1927:231). It may be sheer coincidence that a daughter of Ricardo, Maria de la Luz, married into the Ortega family of Los Poblanos in 1849. Both families were involved with textile production and both families had roots in Puebla.

A LOS POBLANOS TRASH PIT - THE ARCHAEOLOGICAL REMAINS: CERAMIC DATA

Seven areas of manufacture are represented in the 1,003 sherds from the trash deposit. These areas relate to specific ethnic groups and include, from most to least common wares in the assemblage, local Hispanic, Tewa, Pueblo, Acoma-Laguna, miscellaneous Pueblo, Mexican, and Euro-American. The ceramic types with their temporal ranges associated with each of these areas are listed in Table I.

The classification of local Hispanic versus Pueblo-made wares is debatable in two of the wares. Pumice-tempered, polished black ware would, in traditional typologies, indicate manufacture in the Tewa area. However, research in the Cochiti area (Warren 1979) documents pumice-tempered wares from 18th and 19th century sites in the Albuquerque Basin. It is also noteworthy that a piece of pumice was found in the Los Poblanos trash pit.

Pumice from the Jemez volcanic area often washes down the Rio Grande and can be found floating in pools along the river bank (Kudo, personal...
Fig. 1. Project area.
communication 1986). A highly vesicular pumice with quartzite inclusions occurs in river terraces in the North Valley (Helene Warren, personal communication 1986). Much of the material classified as Kapo Black in this analysis may, in fact, have been produced locally or in the Cochiti area. A more in-depth analysis of temper and paste would be required to answer this question.

The other problematic classification is that of Ranchitos Polychrome. In a previous analysis of wares from the Los Ranchos area, Warren (1985) tentatively identified a ware as Los Ranchos Polychrome. During the analysis of the Los Poblanos trash deposit materials, this same ware was classified as a variant of Ranchitos Polychrome. Both wares have sand and/or sandstone temper. Harlow (1973:56) states that Ranchitos Polychrome was manufactured at Santa Ana Pueblo. Carrillo, however, believes that the Los Poblanos Ranchitos Polychrome wares were manufactured locally and that we are clearly seeing the same ceramic type as Los Ranchos Polychrome. The Ranchitos-Los Ranchos Polychrome was probably made for local use, perhaps by Native Americans living in Spanish households. A number of sherds display a design layout similar to wares from Santa Ana, whereas others are less detailed and may represent a localized variant of Santa Ana wares.

A detailed petrographic analysis is required to resolve this question. For ease of reference to published materials, we have retained the Ranchitos Polychrome classification, although we agree with Warren (1985) that this was a locally produced ware. Locally produced Hispanic wares dominate the trash pit assemblage and account for 74.8 percent of the sherds. Among the locally made wares, Ranchitos Polychrome and Carnue Plain are the most common, and Casitas Red-on-brown is rare. Although the locally made wares include a full array of vessel forms, water jars are particularly rare and plates, flanged bowls, and medium-sized bowls each account for less than 6 percent of the locally made forms. Ollas account for 84.8 percent of the Ranchitos Polychrome sherds and 89.1 percent of all olla sherds in the assemblage. Almost all of the trash pit assemblage food preparation and serving vessels consist of locally produced wares. Carnue Plain, like Ranchitos Polychrome, seems to be a specialized ware because 89.7 percent of the Carnue sherds are from cooking ollas, and these account for 99.3 percent of all cooking olla sherds in the assemblage. Hemispherical bowls are typically Manzano Black, both within the locally made group of ceramic types and for the overall assemblage.

Tewa wares, the next most common group, account for 13.0 percent of the assemblage. These wares were produced at the pueblos of Santa Clara, San Juan, Nambe, and San Ildefonso, some 110+ km (68.2 mi) to the north of Los Poblanos. Kapo Black is the predominant Tewa ware, with hemispherical bowls being the most common form. Powhoge Polychrome, the only other Tewa ware identified in the assemblage, includes a diverse array of forms dominated by medium-sized bowls. Tewa wares include 75 percent of the water jar sherds in the overall assemblage. Apparently Tewa pueblos were a primary source for these large vessels.

Ceramic containers produced in the Puname area and the Acoma-Laguna province account for only 3.1 and 1.8 percent, respectively, of the assemblage. A limited array of forms are represented by these types, with ollas dominating the Puname wares and medium-sized bowls dominating the Acoma-Laguna wares.

Imported wares from central Mexico and ironstone, possibly imported from the eastern United States, together account for less than 2 percent of the assemblage. Green Glaze wares are the most common Mexican type. Unfortunately, vessel forms could not be distinguished in either the Mexican or ironstone wares.
The ceramic type frequencies in the Los Poblanos trash pit assemblage indicate a particularly strong ceramic trade between the Spanish Colonial settlers and the Tewa Pueblos. Trade with Piname Pueblos seems to have been weaker, and interactions with Keres Pueblos appear to have been minimal. The low frequency of imported Mexican wares in the assemblage supports the frequent portrayal of the New Mexican colony as having only minimal contact with the center of the Spanish empire in central Mexico.

FAUNAL REMAINS

The 726 faunal bones from the Los Poblanos trash deposit provide some insight on economic and subsistence patterns. Domestic species dominate the assemblage and include sheep or goat, cow, pig, chicken, and turkey. The only wild species identified in the assemblage is mule deer. Roughly 59 percent of the faunal remains could not be classified into species categories and were classified as unidentifiable birds, large mammals, medium mammals, large rodents, and mammals.

A minimum number of individual calculations show that sheep or goat are the predominant species, accounting for 23.1 percent of the faunal remains (Table II). Cows are the next most common species, represented by five individuals or 11.5 percent of the remains. All other domesticated species, pigs, chickens, and turkeys, account for less than 10 percent of the assemblage. Mule deer are represented by two individuals or 7.7 percent of the assemblage.

Immature individuals are present in the sheep or goat and cow groups, and compose 20.0 and 33.3 percent, respectively, of the individuals in these categories. Overall, immature individuals account for only 19.2 percent of the faunal remains recovered from the trash deposit.

Bone modification patterns related to butchering or meat preparation that were observed in the assemblage include burned, cut marks, chop marks, broken with no apparent tool marks, crushed, and greenbone fracture. Broken bone with no apparent tool marks dominates the modified bone for both the overall assemblage and the individual species. This form of modification is visible on 71.8 percent of the bone in the assemblage and accounts for at least half of the modified bones noted within each species.

All other types of modification account for under 10 percent of the modified bone, with the exception of greenbone fracture. Greenbone fractures, usually associated with the extraction of bone marrow, are present on 15.4 percent of the faunal remains. Within species groups, greenbone fracture is particularly common on small unidentifiable mammal, mule deer, cow, and unidentifiable large mammal bones. This evidence suggests that bone marrow processing was practiced on a wide array of species.

Chop and cut marks occur on only 9.9 percent of the bones. Bones that had been butchered by chopping are more common (9.4 percent) than bones that had been cut (3.9 percent). Species with a particularly high incidence of chop marks include cow and unidentifiable large mammals. The prevalence of chop marks within the larger mammal group is not surprising, given the need to produce manageable cuts of meat from these larger animals.

The faunal remains from the Los Poblanos trash pit indicate a heavy reliance on domesticated species, particularly sheep or goat. The predominancy of sheep in the assemblage corroborates information in the archival sources, which indicate that the residents of Los Poblanos were heavily involved in the wool and textile industry. A dependence on sheep may imply that the shepherding members of the community moved seasonally between pasture areas and did not live year-round in the community. The articulation of shepherders with the textile producers in the community is an issue that has not been addressed in studies of early Spanish Colonial communities.

The only documented faunal assem-
A much smaller faunal assemblage, only 270 bones, was recovered from LA 16769. It resembles the Los Poblanos material in the predominance of domesticated species. However, cow bone is more common than sheep or goat bone at LA 16769. These differences between the LA 16769 and Los Poblanos faunal assemblages may indicate differences in the economies of these two colonial settlements. It appears that the residents of LA 16769 relied less upon sheep in their subsistence and economic routines.

The faunal assemblage from LA 16769 is further distinguished from the Los Poblanos faunal remains by including a wider array of wild species. Deer, rabbit, and possibly bison and antelope are present in the LA 16769 assemblage. At Los Poblanos, mule deer was the only wild species identified in the assemblage. Although the overall percentages of wild species in the LA 16769 and Los Poblanos assemblages are not much different, the wider range of species at LA 16769 suggests differences in hunting strategies used by these two Spanish Colonial communities.

CONCLUSIONS

Archival studies have supported the notion that the trash deposit revealed in the test excavations on Rio Grande Boulevard is situated in the area believed to have been the location of the plaza of San Antonio de Los Poblanos. Radiocarbon and ceramic dates indicate that the cultural material was deposited in the trash pit between 1710 and 1830, well within the period of occupation at Los Poblanos.

The analysis of the ceramics from the trash deposit reveals strong trade ties between the Hispanic community and the Tewa Pueblos. However, the classification of Kapo Black and Ranchitos Polychrome in the assemblage as of Pueblo rather than local Hispanic manufacture is questioned. The mechanisms of the trade network are also poorly understood.

Examination of the faunal remains corroborated the participation of the community in the New Mexico textile industry mentioned in the archival sources. The extent of community participation in the textile industry and coordination of community specialists in wool and textile production are both issues that require further study.

University of California
Table I. Ceramic Types and Associated Dates

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<th>Type</th>
<th>Temporal Range</th>
<th>Date</th>
<th>Reference</th>
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<tr>
<td>Ranchitos Polychrome</td>
<td>1760–1810</td>
<td></td>
<td>Harlow 1973</td>
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<tr>
<td>Manzano Black</td>
<td>1700–1900</td>
<td></td>
<td>Dick 1968(?)</td>
</tr>
<tr>
<td>Carnue Plain</td>
<td>1700–1895</td>
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<td>Dick 1968</td>
</tr>
<tr>
<td>Casitas Red-on-Brown</td>
<td>1692–1890</td>
<td></td>
<td>Dick 1968</td>
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<td></td>
<td></td>
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<tr>
<td>Kapo Black</td>
<td>1700–Present</td>
<td></td>
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</tr>
<tr>
<td>Powhoge Polychrome</td>
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<tr>
<td>San Pablo Polychrome</td>
<td>1740–1800</td>
<td></td>
<td>Harlow 1973</td>
</tr>
<tr>
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<td>1800–1850</td>
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<td>Harlow 1973</td>
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<td>Kidder and Sheppard 1936</td>
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Table II. Faunal Remains

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Sargeant, Kathryn
Simmons, Marc

Swadesh, Frances L.

Warren, A. Helene

Warren, A. Helene; M. Schmader; K. Sargeant; and N. Draper
INTRODUCTION

For various reasons, late 19th to mid-20th century archaeological remains in Albuquerque have generally been ignored. Perhaps the primary reason is that most local archaeologists are more interested in local Indian and early Spanish sites than they are in the foundations of 1880 to 1940 houses, stores, and outhouses. The presence of written records and other documents for the latter era also reduces the importance of the recent archaeological remains, and, as shown by the destruction of the Alvarado and Franciscan hotels, public officials and taxpayers alike generally have very little appreciation for historic buildings and recent archaeological remains, especially when short-term economic interests are involved.

This does not mean, however, that recent archaeological remains are of little value, or that the interest of the public cannot be aroused. Indeed, as shown by the Albuquerque Urban Archaeology Project (AUAP) which was sponsored by The Albuquerque Conservation Association (TACA) with generous volunteer support provided by the Albuquerque Archaeology Society, there is a tremendous potential for public interest in, and support of, urban archaeology in Albuquerque, as long as the projects are designed realistically and handled properly (1). The AUAP involved a multidiscipline study of the 200 block on the south side of Central Avenue between Second and Third streets, which was being demolished for a parking lot (Fig. 1). Since the property is privately owned and there was no federal involvement, federal cultural resource legislation was not relevant.

However, due to the interest of TACA, limited funds were obtained from the New Mexico Humanities Council, the National Trust for Historic Preservation, and the Keleher family (which owns the property) to design the project and to present a symposium on March 9, 1986 at the Albuquerque Museum. The Albuquerque Museum also donated personnel time, and a number of historians and architects at the University of New Mexico, TACA, and elsewhere also donated time for various aspects of the study, such as architectural studies of the buildings before they were demolished. Finally, the archaeological investigations of the area behind several of the buildings were conducted primarily by volunteers from the Albuquerque Archaeology Society, under my supervision. Among the latter was Dick Bice, so it is only appropriate that this volume be dedicated to him, especially because of his service to the archaeological community, not only directly, but also through the organization he has helped lead.

HISTORICAL PERSPECTIVE

Before describing the project, a brief overview of the evolution of the 200 block is necessary in order to place it in historical perspective. In the spring of 1880 (three years before the map in Fig. 2 was prepared) the valley to the east of the little plaza of Albuquerque was a flat, swampy plain, broken only by a wagon road that climbed the yellow sandhills several miles southeast of town and headed toward the village of Carnue (2). Then the railroad arrived, and almost overnight a shantytown of canvas-walled saloons, false-fronted stores, and single-story houses grew up around the intersection of the gleaming rails and the wagon road two miles west of the Albuquerque plaza (Fig. 3). The town became known as New Town, and the road became Railroad Avenue (later changed to Central Avenue, the future location of Route 66).

It all began with a parade. On April 22, 1880, a gala procession marched down the wagon road from the plaza to the tracks of the Atlantic and Pacific Railroad. Franz Huning was the president of the day and the Ninth Cavalry out of Santa Fe provided...
the music. The next day, the first makeshift building appeared — Shorty Parker's open air saloon, near the intersection of the tracks and Railroad Avenue. Another saloon came next, and within days more saloons and flimsy buildings followed suit. Soon streets were laid out, with First through Sixteenth running north-south between the tracks and the Old Town Plaza, and Copper, Gold, Silver, Lead, and Coal paralleling Railroad to the north and south. To the east were Broadway, Arno, Edith, Walter, and High streets (see Fig. 2).

In the center of it all was the block formed by Railroad and First. The first real building was Putney's Store, which was brought in by rail from Las Vegas and erected at the northeast corner of First. Later, more substantial wood, stone, brick, and adobe buildings were built, such as the elegant Armijo House, a huge hotel erected in 1881 at the southwest corner of Third, just across from our project block.

Other early structures along Railroad Avenue included the New York Clothing Store, the City Restaurant, and a few other false-fronted structures between First and Second. Albuquerque's finest — the White Elephant Saloon — was built in 1881 at the southeast corner of Second. By the end of that first year, Railroad also had the Street Railway Company — three miles of narrow track with eight mule-drawn street cars that ran between the railroad tracks and the Old Town Plaza (see Fig. 3 for photo of construction of tracks).

Within a few years the shantytown became a thriving regional center, with Railroad Avenue its lifeline. Hundreds of buildings were erected along Railroad Avenue over the next 20 years, including a number of adobe structures in the project block. Several of the buildings in the block date to the 1880s, and others were constructed in the 1890s. By 1900, Railroad Avenue was a broad street lined by a solid row of two-story structures, such as Hope's European Hotel and Restaurant, a large wooden building at the southwest corner of First (Fig. 4). The Metropolitan Hotel was at the northwest corner of Second, the Barnett Building was at the southwest corner of Second (in the project block), and the San Jose Market was at 211 W. Railroad, just across from our block. Lesser and Lewinson's Clothing and Dry Goods Store was located in the block (Fig. 5).

In 1904, electric streetcars replaced the mule-drawn cars, and in 1912 the name of Railroad Avenue was changed to Central Avenue. By then Albuquerque had a population of over 7,500, and by 1920 it had more than 15,000, with 60 gas stations and other auto-related businesses. With the autos came paved streets, Indian Detour Bus Tours, service stations, and traffic jams. And with change came new buildings and the demolition of the old. The nine-story First National Bank was constructed across the street from the project block at the corner of Central and Third. The Sunshine Theatre was erected at the southeast corner of Second, where the old White Elephant Saloon formerly stood. The Kimo Theatre was built at the northeast corner of Fifth. The electric trolleys were replaced by buses. And in 1926, Route 66 came to town. At first, it ran down Fourth Street from Santa Fe, but then in 1937 the new '66 came to town — a true interstate highway running down Central Avenue past the block.

For 20 years the downtown flourished as Route 66 brought tourists through Albuquerque, but then in the 1960s it declined, as the freeways were routed around downtown Albuquerque, and as shopping centers and suburbs spread out onto the East and West mesas. Efforts at urban renewal have brought revitalization and economic stimulation to the downtown at the expense of many of the older buildings, such as those along the south side of the 200 block, which have all been demolished.

For over a century, downtown Albu-
Fig. 1. Location of 200 block on south side of Central Avenue in Albuquerque.
Fig. 2. 1883 map of Albuquerque.

(Courtesy of Albuquerque Museum)

Fig. 3. Looking east from around Second Street along the south side of Railroad Avenue, ca. 1881.
Albuquerque has served as a barometer of the economic vitality of Albuquerque, as it changed from swamp to adobe structures in the 1880s, to commercial establishments and Route 66 in the 1930s, to demolition in the 1980s. The physical remains of this 100-year-long history are reflected in the artifacts and other small things forgotten and the foundations and structural remains that lie buried beneath the soil, providing a tangible link between the past, the present, and the future.

DESCRIPTION OF THE PROJECT

The first phase of the project began in October 1985, when an L-shaped backhoe trench was excavated behind the buildings at 218-220 West Central to determine if any subsurface features were present (Fig. 6). The trench measured 18 m long N/S and 11 m E/W and was approximately .8 m wide. The N/S axis ran from immediately behind 218 West Central to an E/W running alleyway; the E/W axis ran from a concrete slab behind 222 W. Central to a slab behind 216 W. Central. The concrete slabs, paved alley, asphalt parking areas, and the shapes of the other buildings precluded our testing behind other structures in the block. All of the buildings also had cellars or deep crawl spaces and thick granite and/or concrete foundations, so we realized that excavations beneath the buildings after they had been demolished would not be productive, and we concentrated our efforts behind the 218-220 portion. Also a review of 1891-1950 Sanborn Insurance maps (Fig. 7) indicated that several water closets (outhouses) and other structures might be found in the area of our trenches, and we hoped to find evidence of them.

The backhoe trench revealed that the area behind the buildings was indeed very rich in historic artifacts and structural features, and that further excavations were in order. The north half of Trench 1, for example, revealed a .75-1.5 m thick layer of coal, ash, broken china and glass, pieces of metal, decomposing wood, and other late 19th-to mid-20th-century materials that probably represent trash deposited behind the buildings. Several brick walls and wooden floors were uncovered in the south half of Trench 1 and all along Trench 2, so the trenches were immediately filled in to protect the features during the demolition of the nearby buildings.

The second phase of the project began in November, as James Caufield and other architects and historians associated with the project began a study of the buildings in the 200 block. The results of their studies (and of others in the project) were reported in the March 1986 seminar at the Albuquerque Museum (Lazzell 1986; Johnson 1986; Biebel 1986; Winter 1986; Vaughn 1986; Caufield 1986; Price 1986). The third phase began immediately afterward, in December and January 1985-1986, as the demolition began and as the architects and other scholars documented various structural features exposed during the demolition (e.g., earlier walls covered by later facades). I was also present at various stages of the demolition to observe any undocumented, buried features that might be uncovered. None were discovered, although the main Albuquerque acequia that passed under 210 West Central was uncovered, as expected. This massive brick and concrete structure was studied by Richard Vaughn, an engineer associated with the project (Vaughn 1986).

The final phase began after the buildings had been demolished, and the basements and crawl spaces filled in. Our L-shaped test trench was reopened by a backhoe, and excavations with hand tools commenced (Figs. 6 and 8). Because we were working with an all-volunteer crew, we decided to concentrate our efforts on the structural features revealed in the bottom and north face of Test Trench 2, with only minimal attention paid to Test Trench 1. The latter effort consisted of
Fig. 4. Looking west along the south side of Railroad Avenue from the corner of First Street, ca. 1885. Note project block in the background. (Courtesy Albuquerque Museum)

Fig. 5. Louis Lesser and Seymore Lewinson's clothing and dry goods store at 204 W. Railroad Avenue, ca. 1900. (Courtesy Albuquerque Museum)
Fig. 6. Location of test trenches and excavation area behind 218-220 West Central Avenue.
Map compiled from Sanborn insurance plats dated 1891, 1893, 1898, 1902, 1908, 1913, 1924, 1931, 1942, and 1950. Beginning and end dates for walls and structures based on Sanborn plats.

222 West Railroad (Central) Avenue 1891-1985
220 West Railroad (Central) Avenue 1891-1985
218 West Railroad (Central) Avenue 1891-1985
216 West Railroad (Central) Avenue 1891-1985

218 addition (1902-1913)

222 addition (1891-1931)

"Water closet" (1919-1942, remodeled after 1931?)

Fig. 7. Composite map of structures behind 216-222 West Railroad Avenue based on Sanborn Insurance maps.
collecting artifacts uncovered during the backhoe testing, and facing off and profiling a large masonry wall (Wall #2) exposed in both faces of the trench. This wall probably represents the south wall of the 1902-1913 addition to 218 West Central (see Fig. 7). The wall had been cut through by our trench, and it consisted of two courses of white bricks and mortar, sitting on a reddish tan level that might represent a floor. The bottom of the wall and possible floor began at 40 cm below present ground surface, and there was an additional 35 cm of charcoal and artifact-laden layers beneath them.

The excavations along Test Trench 2 consisted of 10 1x1 m contiguous units (1-6A on Figs. 6 and 8) and 2 1x.5 m units (1A-1B). Depths varied from 1.25 m deep in the footer trench around Wall #1, to only 20 cm deep in Unit 1B. Over 10 strata consisting of gravels, clays, silts and artifact-laden fills were uncovered, along with three main features. From oldest to youngest, they consisted of the following (see Fig. 8).

1. Plank Floor — A wooden plank floor consisting of juniper and/or pine planks ran across much of the 2x6.5 m excavation area. The planks averaged 15 cm in width and 2-3 cm thick, and they were nailed to upright planks with square nails. We were unable to determine the exact length or width of the floor they represented, but it obviously went beyond the excavation area, and was quite substantial. It is much too large for the water closet (outhouse) that first shows up on the 1898 Sanborn map (Fig. 7) because they are too far west, but they could be earlier versions of the 1919-1942 water closet. The soil in them was dark and trash filled (several intact bottles were recovered), and there was adobe or adobe-like soil around the pit area. The adobe area and pit began at about .75 m below present ground surface, and about .75 m above the plank floor that was cut through.

2. Privy Pit(s) — The remains of one or more privy pits that appeared to cut down through the plank floor were uncovered toward the east end of the excavation area. They do not appear to represent the water closet. The soil in them was dark and trash filled (several intact bottles were recovered), and there was adobe or adobe-like soil around the pit area. The adobe area and pit began at about .75 m below present ground surface, and about .75 m above the plank floor that was cut through.

3. Wall #2 — A substantial red brick and mortar wall was uncovered at the extreme eastern end of the excavation area, running north and east into unexcavated areas. It was 10 bricks high and set into a footer trench cut down through the plank floor. Its exact relation with the privy pit was unclear, but it seemed to be later, and in fact Bud Hanna remembers it from 1935, when Hanna & Hanna Photography Shop moved into 218 West Central from 214 West Central. Bud remembers it as being about 6x6 feet across, with a dirt floor, and a hookup to the city sewer.

This brick privy also probably represents that shown on the 1919-1942 Sanborn maps. However, as shown by the earlier plank floor, not all historic structures in the block are necessarily shown on the maps.

A relatively rich collection of artifacts was recovered from the test trenches and excavation units, including thousands of pieces of broken glass, china, crockery, and metal, and a number of whole bottles and other intact items. The materials have yet to be catalogued or analyzed, though a preliminary inspection revealed late 19th-to mid-20th-century beer, pop, and medicine bottles; 1885-1925 beads; an 1884 Liberty Head nickel; early 1880s Chinese porcelain; a 1924 promotional calendar from Everitt's Jewelry; and a piece of Pueblo glaze ware. All of these artifacts can be explained by the history of use of the buildings in 216-220 West Central, as shown by the following list of establishments:

216 — 1881-1894 furniture; 1898-
Fig. 8. Detail of features in excavation area.


CONCLUSIONS

Urban archaeological projects dealing with the recent past and with the unfolding present have considerable value, not the least of which is the information they provide about historic land use, changing economic patterns, and so on. However, the value of the study of recent structures and artifacts goes far beyond the measurements they provide and the theories and models they help develop,
for unlike prehistoric archaeological projects, they provide a direct and tangible link between the past and the present, and between the people who created the past and those who create the present.

There are two aspects to this value. First, the people carrying out the research can receive tremendous personal gratification when they are involved in a project that investigates their own city and roots, or at least the roots of their own culture in a particular city. The variety of people participating in the Albuquerque Urban Archaeology Project certainly illustrates this value, for they represented many ages, backgrounds, and occupations, and although most were members of the Albuquerque Archaeology Society, others came from TACA, UNM, and the Albuquerque Museum. Even relatives and friends of people from the above categories showed up, along with a number of people who simply walked in off the street. They all illustrate the potential that urban archaeology projects have, dealing as they do with structures and materials that are directly relevant to our lives and are much more personally relevant than 2,000 year old sites made by different cultures and ethnic groups.

The second, though related, value is that urban archaeology projects can help investigate the histories and backgrounds of particular living families, and these families can take an active participation in the project. The Hanna family, for example, has been associated with the project area for nearly 80 years. Hanna & Hanna Photography Shop started in the 100 block near the White Elephant Saloon in 1914, then in the late 1920s it moved into the 200 block and remained there until 1984.

Bud Hanna took an active part in the project, identifying certain of the features we uncovered and providing valuable contexts for the local history. He remembers, for example, his father telling him how his older sister once sat on the bar in the White Elephant Saloon drinking a glass of milk. She was probably the only person in the history of the saloon, Bud believed, who ever drank milk there. He also has many other interesting stories about the block and general area, such as how in the early years a man could lose $100,000 in the gambling halls without even crossing a street.

And there are other people in Albuquerque whose families and relationships with the block go back even farther, such as the Keleher family, which owns the block and whose prominent member -- Will Keleher -- was an important lawyer and local historian. Ralph J. Keleher also had a clothing store at 216 West Central from 1924 to 1934. Or Franz Huning, who started New Town in 1880, and whose nephew, Jack Huning, still lives in town and has businesses in Los Lunas. And of course there are the Hispanic residents of Old Town and Martinez Town, and the Pueblo Indian residents of Sandia and Isleta, whose personal interests in the area go back even farther.

In my opinion, history and archaeology can be most meaningful when they provide a background and a context for the living people whose families created that history and its archaeological sites, whose families continue to create them. We -- all of us, all of our families -- are part of that history. We create it, it does not exist without us, and we are responsible for it. For better or for worse, we are responsible for the buildings, the traditions, the beliefs and the customs that make up our towns and cities and cultures. And it does not end with us, or with the 100-year-old sites -- it goes on into the future, when our children and grandchildren and grandnieces and great grandnephews will inherit what we've created and create their own, just as the children and nephews and other relatives of Franz Huning and N. T. Armijo and the Hannas helped create the present. So if there is any lesson to be learned from the wooden floor and broken
glass and privy pits of the 200 block on the south side of Central, it has to do with people and families and the cities and environments we all create. Hopefully our environment an city will be as healthy and as pleasant to live in as possible, with a history that is worth perpetuating and inheriting. Certainly Dick Bice and the Albuquerque Archaeology Society have done their share to bring this about.

Albuquerque, New Mexico

NOTES

1. Numerous individuals made this project possible. I am particularly indebted to Carleen Lazzell, Ed Boles, Barent Groth and Liz Calhoon of the Albuquerque Conservation Association; Tom Keleher of Keleher Realty, Inc.; Mary David, Victoria Prinz, and Susan Dewitt of the City of Albuquerque; Byron Johnson and Bob Dauner of the Albuquerque Museum; Dale Whale of Coronado Wrecking and Salvage Co.; Dick Bice, Bill Sundt, Phyl Davis, Ann Carson, Laura Bernd, Joan Wilkes, Betty Garrett, Mary Belle Hockett, and Tracy Green of the Albuquerque Archaeological Society; Bud Hanna of Hanna & Hanna Photography Shop; Jim Caufield, Historic Preservation Consultant; and a number of volunteers, including Beth O'Leary, Joseph Winter Sr., Sue Miller, Kelly Carmean, and Dave Sandoval.

2. The historic information in this paper is taken from Marc Simmons' Albuquerque A Narrative History (UNM Press 1982) and Byron Johnson and Bob Dauner's Early Albuquerque A Photographic History 1879-1918 (The Albuquerque Journal and The Albuquerque Museum 1981). Figure 2 is from Simmons' book, and Figure 3 is from Johnson and Dauner. Permission to use these figures was obtained from UNM Press and the Albuquerque Museum.
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Caufield, Jim

Johnson, Byron

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INTRODUCTION

The Classic period in the Middle Rio Grande lasted from about A.D. 1325-1600 (Cordell 1979:45; Wendorf and Reed 1955). For the Anasazi it was a time for coping with major changes in climate, resource structure, and demography. The early Classic period during the 1300s witnessed a shift and reorganization of the Anasazi system. Anschuetz (1984:93-94) characterizes this as a widening and maintenance of alliance ties with populations on the Colorado Plateau, allowing them the option of moving into areas not affected by agricultural productive shortfalls. This was initiated by a decrease in rainfall during the 1200s (Dean et al. 1985) and then manifested in the Rio Grande Valley by the presence of glazeware ceramics and larger pueblos (Wendorf and Reed 1955). Then in the late 1400s and early 1500s there was another shift in the middle Rio Grande system. With new increases in moisture and subsequent grassland production during the Little Ice Age, bison populations began to increase along the western Plains (Reher 1977). The Plains now became an important source for buffalo products, with the pueblos interacting with Plains-based hunter-gatherers (Snow 1981:362; Spielman 1982).

The late 1500s witnessed the Spanish entradas. When Coronado arrived in 1540, the Tiguex Province included about 12 pueblos located on both sides of the river in the area of modern Bernalillo and Albuquerque (Winship 1896). These pueblos faced the greatest impact from the expeditions; however, this problem was overcome with no major modifications to the economy. The Anasazi abandoned (and later re-occupied) specific pueblos and dispersed their population over the local area (Snow 1981:366). It was during the Spanish Colonial period of the early 1600s that the middle Rio Grande Anasazi system faced its greatest challenge and disruption. As pointed out by Snow (1981:366-367), this was due to several factors, including crop reductions as a result of insufficient local rainfall, taxation, forced population redistribution, the repartitioning of pueblo lands, land grants to Spanish colonists and the severing of trading ties with the Plains. By 1680 there were only four pueblos left in the area, including Sandia, Puaray, Alameda, and Isleta (Vivian 1932).

The Classic period was a turbulent one for the Anasazi of the middle Rio Grande. It is yet poorly understood by archaeologists, especially the era after 1540 and the early colonial 1600s. Several sites of this period were excavated during the early 1900s and are yet to be fully described. Two of these are Kuaua (LA 187) and Santiago, also known as Bandelier's Puaray (LA 326). The focus of this paper is to summarize the available information from these two sites, in the hope that the data might be used to help clarify this most important period.

KUAUA PUEBLO

Kuaua Pueblo (LA 187) is located on the west side of the Rio Grande just north of Bernalillo at Coronado State Monument (Figure 1). It was excavated in 1934-36 by a group from the School of American Research and the University of New Mexico, under the direction of E. L. Hewett, with Reginald Fisher (assistant director), Gordon Vivian (field director) and Marjorie (Lambert) Tichy (laboratory director). Although Charles Lummis had done some excavation in the southern part of the pueblo around the turn of the century, one of the reasons the site was excavated was to determine if it may have been where Coronado stayed during the winters of 1540 and 1541. Kuaua has more than 1200 rooms, three plazas and six kivas (Figure 2). Its walls were constructed of puddled adobe and probably rose to a height of several stories. Ceramics recovered from the site range from Glaze A-F, indicating an occupation span from the
Fig. 1. Location of Kuaua and Santiago Pueblos.
1300s to the early 1600s.

The construction sequence at the site follows a south-to-north pattern, with the earliest occupied rooms lying in the southern wing (Sinclair 1951). The southern room block (also known as the Lummis section), appears to have burned during the 14th century (Glaze A). Several of these room floors were found to have been built over a fill consisting of a fallen roof and burned corn (Kelley 1936; Dutton 1962:22). As related by Kelley (1936), this section was originally constructed as a one story roomblock. Later at least a second story must have been added, because of the large wall widths and the amount of rubble removed from the rooms. Once the second story was added some of the bottom floor rooms were abandoned, with doorways and ventilators being sealed and the rooms then being used as graneries. It was in these rooms that the burned corn was found. After the rooms had burned, new floors were placed over the fill. Eventually two existing rooms were modified into kiva-like chambers. Kelley (ibid.) notes that the Lummis section was also probably the last area to be occupied in the pueblo.

Rooms 4, 6, and 7 all contained Spanish porcelain (majolica), with room 4 also having a hammerred copper bar. Both Puebla Polychrome and Abo Polychrome, which date to the 17th century, were identified from Kuaua (Goggin 1968:84; Plowden 1958; Snow 1965). Recent test excavations conducted by the author just east of the Lummis section also recovered some Puebla Polychrome sherds. Other Spanish occupations at Kuau left behind a possible torreon, found by Fisher (1931) and a church found by Cordell (1979: 45). However, no evidence for either of these structures was found during the excavation of the pueblo (Lambert personal communication 1986).

As already noted, six kivas were excavated at Kuau, five of which were described by Tichy (1938). They provide some information on the occupational history of the pueblo. Kivas 2, 4, and 5 appear to be the oldest. They are all situated in the south plaza, and were probably used and abandoned during the 14th and early 15th centuries. Kiva 2 was circular in shape, being about 4.6 m (15 ft) in diameter. It had a rectangular adobe deflector and hearth, located in the eastern side of the structure. Parallel to each other but situated on opposite sides of the deflector/hearth were two sets of seven loom holes. After Kiva 2 was abandoned it was filled with trash, but no burials were found. Of the glaze bowl rim sherds from the fill, 84 percent consisted of Agua Fria G/r (Glaze A), 15 percent Glaze B, and only 1 percent Glaze C. Kiva 5 was a square kiva whose greatest length was about 7 m (23 ft). A burned roof was found lying on the floor of the structure, hence indicating why it was abandoned. However, it is difficult to determine whether the burning of Kiva 5 was associated with the burned southern roomblock. The deflector/hearth was situated on the east side of the floor. Kiva 5 had also been filled with trash, including five stratigraphic levels. Glazes A and B dominated all the levels, with some C being present in the lower levels and very little D-F in the upper layers. Kiva 4 was also located in the southern plaza. It was a round kiva about 9 m (30 ft) in diameter, with a ground plan identical to Kiva 2. The trash fill of Kiva 4 could be divided into five levels, mostly characterized by Glaze D ceramics with slightly less Glaze A. Very little Glaze C or F was present, with Glaze E only in the upper two levels. Dendrochronological dates of A.D. 1335p-1397r and 1333p-1397rb from the roof of the kiva indicate that the structure was built during the 14th century (Archeological Site Records 1936).

Kiva 1 was located in the north plaza. It was the largest of all the kivas, being rectangular in shape with an overall length of about 9.4 m (31 ft). It represents two distinct kivas, one inside the other. The older outside kiva had an entrance in its
Fig. 2. Kuaua Pueblo.
eastern wall. This entrance was then used as a ventilator shaft for the remodeled inside kiva. The inside kiva had a new doorway in the south wall. However, when excavated, this doorway had already been sealed. Tichy (1938: 74) speculates that the kiva was eventually entered through the roof, or the entrance was sealed once the kiva was abandoned. It had an adobe floor with a large hearth and adobe deflector on its east side. After the structure was abandoned it was filled with aeolian sand. Most of the pottery recovered from the kiva was found in a 90 cm (3 ft) level of ashy sandy soil lying on the floor. Of the decorated glaze bowl rim sherds, 36 percent were Glaze E, with 28 percent Glaze D, 21 percent Glaze F and 15 percent Glaze A-C. Kiva 1 was probably abandoned during the late 1500s or early 1600s. This would explain the presence of the late Glaze E and F in the shallow fill and the deposition of blow sand and not trash, since the pueblo was abandoned in the early 1600s. Kiva 6 was square and situated in the east plaza. It was about 7.3 x 8.2 m (24 x 27 ft) in size and was similar to Kiva 5 in the south plaza. Kiva 6 had an entrance at the southern end of the west wall. A rectangular hearth with deflector was located on the east side of the room, and opened into a ventilator in the east wall. Four adobe floors and six roof support posts were identified. Portions of murals were observed on the north wall and deflector (Archeological Site Records 1936).

Tichy (1938) also mentions three rooms with kiva features situated within roomblocks. Two of them were large rooms (5 m [17 ft] long) created by removing the subdividing walls of two smaller existing rooms within the south roomblock. Both contained adobe floors with hearths and deflectors, one on the east side and the other on its southern side. Loom holes were also present in the rooms, with two and four sets, respectively. Glaze D pottery was found in both rooms. Kel-ley (1936) considers that these kivas
may have been used during the 17th century occupation of the pueblo, because pressure from Spanish priests may have forced the Indians to move their kivas and religious ceremonies into the more secluded sections of a roomblock. The third kiva or "ceremonial room" was located in the north roomblock. It also had a hearth and deflector, which were situated to the south, two sets of loom holes, and an antechamber. What little pottery was recovered from the room was mainly Glaze E.

Kuaua is best known for the frescoes painted on the walls of Kiva 3 located in the south plaza (Dutton 1963). Kiva 3 is square—about 5.5 m (18 ft) in diameter—and 2.4 m (8 ft) deep. It, like Kiva 1, appears to have been a larger kiva that was remodeled into a smaller kiva and subsequently had a new east wall built to support this deteriorated section of the structure. Three rows of loom holes were found on the east side of the room (Vivian 1935). The hearth was rectangular in shape with rounded corners. The deflector was constructed of four upright posts interwoven with flat reed-like fibers. This framework was then covered with a mixture of adobe, which contained five Glaze F and two Glaze E sherds. Ladder holes were also present near the hearth, indicating that access to the kiva was through the roof (Dutton 1963). The fill from the kiva was dominated by Glaze F with some soup plate sherds also being recovered. The kiva appears to have been built around 1600 and then abandoned during the early 1600s. Vivian (1935) states that 29 layers of plaster, 5 cm (2 in) thick were found on the older inside walls of the kiva. The new east wall contained no wall plaster or murals, in contrast to all the other walls, which exhibited murals. Of the 29 layers, only seven to twelve of the inside 25 had murals. Murals were also found on the deflector inside the kiva. The frescoes are generally of masked figures with pueblo dance costumes, in black, white, red, yellow, and brown. All are about 1.4 m (4.5 ft) high, with full face being shown. Sinclair (1951) notes that 364 individuals were depicted.

Jones (1936) analyzed some macrobotanical and textile samples from Kuaua. They included some corn kernels and cobs, bottle gourd seeds and fragments, pumpkin seeds and fragments, cottonweed seeds, cottonwood charcoal, cotton textiles, and yucca/bear grass textiles.

About 600 burials were removed from the site (Dutton 1963; Sinclair 1951). Luhrs and Ely (1939) note that 100 burials were removed from the ground floor of the north plaza roomblock. Of these, 83 percent were located in rooms, 16 percent in refuse, and one in the kiva. A high infant mortality rate is evidenced by the presence of 47 adult burials, 45 infant/children burials, 7 adolescent burials and 2 embryo burials. Forty-nine percent of the individuals were laid to rest with pottery, 9 with matting, and 2 with food. About 250 individuals are curated at the Physical Anthropology Laboratory of the University of New Mexico.

SANTIAGO PUEBLO

Santiago Pueblo (LA 326) is situated on a terrace overlooking the Rio Grande floodplain to the west of Bernalillo and about 3.3 km (2 mi) southwest of Kuaua (Figure 1). It was excavated in 1934-35 by the same group and at the same time as Kuaua. There has been some confusion and disagreement about how LA 326 relates to the pueblos described by chronicles of the entradas (e.g., see Scurlock 1982). Bandelier (1892) originally identified the site as Puaray, lying on the west side of the Rio Grande opposite present-day Bernalillo. LA 326 was subsequently referred to as "Bandelier's Puaray." Following this, several researchers argued that Puaray was actually located on the east side of the river, northeast of Alameda and south of Sandia (Hackett 1915; Scholes 1937; Snow 1975; Vivian 1932). Both Vivian and Snow denote Puaray as being Fisher's site #13 (Fisher 1931), which is
LA 717. Schroeder and Matson (1965; see also Schroeder 1979) disagree, considering Fisher's site #9 (LA 677) as being Puaray. The former view is generally accepted today, with Puaray Pueblo being located about 5.6 km (3.5 mi) south of Sandia.

LA 326 was recorded by Fisher as site #17. Vivian (1932:67) considered that this site may have been Alcanfor, where Coronado stayed in the winters of 1540 and 1541. As pointed out by Riley (1981:205), Coofer (Alcanfor) was the first pueblo reached by the expedition coming from Zuni. Therefore, it must have been on the west side of the river. However, it was Snow (1976) who identified LA 326 as being Santiago Pueblo, based on historical documents dating from 1602 to 1768. As he points out, Bandelier may have referred to the site as Puaray, but "almost in the same breath, he said this village is also called Pueblo de Santiago," (Snow 1976:166). It is by this name that LA 326 will be referred to in this study.

The following description of Santiago Pueblo is summarized from Tichy (1936, 1939), Vivian (1934) and notes on file Archeological Site Records, Laboratory of Anthropology (1935). The pueblo was roughly square in shape, with an enclosed central plaza. The four surrounding roomblock wings were about 91 m (300 ft) in length and were separated by passageways. Approximately 450 ground-floor rooms were excavated. Figure 3 provides a schematic map of Santiago Pueblo, based on a sketch found in the Archeological Site Records file (1935) and Lambert (personal communication 1986). A site map was reportedly made for Santiago Pueblo, but none was present in the files at the Laboratory of Anthropology or at the Maxwell Museum. Tichy (1939:146) reports that only a single story was present at the time of excavation; however she considered that the west and south wings were probably two stories tall. Ceramics on the site indicate an occupation span from the 1400s to the 1600s. It is difficult to determine the occu-
Fig. 5. Kiva at Santiago Pueblo.
pational history of the pueblo. However, at the time of abandonment the northern wing consisted mostly of trash-filled rooms; the west wing exhibited extensive burning; the south wing was mainly occupied; and the nature of the east wing is undetermined (Lambert personal communication 1986). Many of the ground-floor rooms of the west wing were graneries, several of which contained burned corn.

The rooms were generally square, some rectangular, ranging in size from 2.7-3 m (9-10 ft) x 1.5-2 m (5-7 ft). The largest rooms in the pueblo were situated in the south end of the west wing, where lengths exceeded 4.6 m (15 ft). Adobe walls about 30 cm (1 ft) high were still standing, consisting of two courses about 23-30 cm (9-12 in) thick. The floors were situated roughly 60 cm (2 ft) below the present ground surface. Room walls were plastered, and the floors were prepared with adobe. Some rooms contained multiple floors. Hearths were present in most of the rooms and consisted of rectangular pits lined with adobe, sandstone slabs or sometimes river cobbles. Often the hearts were situated near a wall. Other floor features included adobe bins set at right angles to a room corner. Figure 4 illustrates the internal features of a room. Circular pits about 45-60 cm (1.5-2 ft) in diameter and 13-15 cm (5-6 in) deep were also present in some rooms, but were usually located in plaza areas adjoining rooms. They were lined with adobe and contained no evidence of burning. A location where pottery was presumably fired was in the plaza. It consisted of a large surficial burned area with some rocks. They were partially covered with the remnants of Glaze F paint, that is, a light brown or greenish glaze (Lambert personal communication). Many of the abandoned rooms were filled with trash, although most of the site refuse was situated to the immediate east and south of the pueblo. Rooms in the southern wing appear to have been reoccupied by Spanish colonists. However, no evidence of remodeling within the rooms was observed. The site was completely excavated except for some refuse deposits in the central area of the plaza. Most of the northern area of the pueblo was destroyed by a gravel pit in the early 1970s.

A circular kiva was excavated in the northwest portion of the plaza (Kelley 1935). It consisted of a pit 9.8 m (32 ft) in diameter and 2.4-2.7 m (8-9 ft) deep that had been lined with puddled adobe. The floor was a prepared adobe surface, including several layers. A rectangular hearth and adobe block deflector were slightly offset toward the east side of the room, and the hearth was filled with a white ash (Figure 5). A 2.5 cm (1 in) deep pit was situated between the deflector and the wall, which dropped down into a 15 cm (6 in) hole at the base of the wall. The hole was covered with six juniper poles and adobe, with a Glaze F jar having been left in the pit where it met the ventilator. The ventilator was 1.2 m (4 ft) long, 30 cm (1 ft) wide and 15 cm (6 in) deep, opening into a vertical shaft. Three river cobbles were present in the floor to the immediate south of the hearth, and a set of seven loom holes was situated northeast of the hearth against the wall. The roof was supported by four or possibly six main upright beams. The remnants of two burned cottonwood beams about 25-30 cm (10-12 in) in diameter were still present. One of them was 1 m (3.5 ft) tall. The post holes were 7.5-10 cm (3-4 in) deep and filled with ash, charcoal, and Glaze E and F pottery. One post hole exhibited some damage, which probably occurred as a result of the post being removed. A couple of other holes 30-90 cm (1-3 ft) deep were present on the floor. They were similar to other pits that had probably contained cooking pots found within the roomblock. The entrance to the kiva was located on the west wall. It consisted of a 96 cm (3 ft 2 in) high, 86 cm (2 ft 10 in) wide hole situated 1.07 m (3 ft 6 in) above the floor. It opened up into an ante-
chamber 90 cm (3 ft) wide and 1.20 m (4 ft) high, which was covered with a set of five poles and adobe. Ladder rung sockets were present on the site of the chamber. A possible sipapu 20 cm (8 in) in diameter and 23 cm (9 in) deep was situated on the floor below the entrance to the antechamber.

Test Trench I had been placed through the center of the kiva (Figure 5). It was excavated in 30 cm (1 ft) arbitrary levels, which exposed stratified deposits. A 3 x 3 m (10 x 10 ft) area adjacent to this trench was then excavated within six natural stratigraphic units. Most of the pottery included Glaze F, with lesser amounts of E and very little C and D. Twenty soup bowl sherds were identified, consisting of Glaze F designs and fifteen plainware. Spanish porcelain (majolica) was also present, being recovered from the bottom 1.20 cm (4 ft) of fill. A piece of gold leaf was found about 76 cm (2.5 ft) above the floor. Tichy (1939:162) notes that a dendrochronologically derived date of A.D. 1630+ was obtained from a piece of charcoal in the fill. However, Stallings (1939) corrected this error by stating that this date probably came from Quarai not Bandelier's Puaray. He did collect a few pieces of charcoal from the site that could not be dated. Animal bone present within the refuse deposits included bison/cow, bear, deer, antelope, domestic dog, lynx, domestic sheep, squirrel, beaver, jack rabbit, cottontail, and turkey.

Figure 6 shows the distribution of Glaze C-F sherds by stratigraphic unit for the kiva, with one at the top and six on the bottom (Kelley 1935). As can be seen, the youngest Glaze F sherds dominate the lower levels and the older Glaze C-E sherds dominate the upper levels. This stratigraphy is reversed from that which would normally have occurred through the natural process of refuse accumulation. That is, the older sherds should be on the bottom and the younger sherds on top. Besides the Glaze F sherds being on the bottom, we also find the most
recent Spanish majolica near the bottom of the deposits. One explanation for this reversed stratigraphy is that the kiva was intentionally filled with trash from nearby rooms and the plaza. This would account for the reversed profile. As already noted, two of the roof support beams and presumably part of the roof had already been removed before the trash was deposited within the kiva. The other two remaining roof supports were burned. This may have been the result of the Spanish missionaries' attempt to suppress Pueblo religion and to consolidate the local Pueblo population into a fewer number of communities. That is, the kiva was probably dismantled, burned, and then filled with trash sometime during the early 1600s.

A separate Spanish structure to the southeast of the pueblo was also excavated. The building was 15.8 m (52 ft) long and 11.6 m (38 ft) wide, with the remaining adobe/cobble and adobe block walls ranging from 30-90 cm (1-3 ft) in width and about 15 cm (6 in) in height. There were no wall foundations, the walls simply having been set into the ground about 4 cm (1.5 in) below the surface. The structure was subdivided into five rooms and three smaller chambers (Figure 7). The southeast corner of the building may have supported a porch and possibly the main entrance. The inside of the building was filled with 8-10 cm (3-4 in) of sand, from which Spanish porcelain (majolica) and copper was recovered. Most of the Spanish pottery and metal found at the site was obtained from the trash-filled rooms and exterior refuse deposits. It would appear that the pueblo was occupied from the 15th to 17th centuries. Spanish porcelain was found in the pueblo, in the kiva, in a trash dump to the immediate east of the Spanish structure, as well as the area around the building and within the structure. Plowden (1958) analyzed 121 pieces of majolica recovered from the site. He reports the presence of Fig Springs Polychrome, Castillo Polychrome, Puebla Polychrome, Ancilla Polychrome, Abo Polychrome, Puaray Polychrome, San Luis Blue-on-white, Puebla Blue-on-white, Huetzotzingo Blue Banded, and Aranama Polychrome. Most of these types date to the 17th century and compose 51 percent of the sample, whereas Puebla Blue-on-white, Huetzotzingo Blue Banded and Aranama Polychrome make up 49 percent of the sample and date to the 18th century. Snow (1965:33) does not report the presence of Huetzotzingo Blue Banded or Aranama Polychrome at Bandelier's Puaray, although Plowden's sample only included one sherd from each type. Goggin (1968:83-84) identified Puebla Polychrome, Puaray Polychrome, Abo Polychrome, Ancilla Polychrome, and Pueblo Blue-and-white (n=37). Puebloan imitations of Spanish vessel forms were also recovered, in-
The lithic assemblage included manos, metates, axes, mauls, hoes, hammerstones, projectile points (arrow and spear), scrapers, drills, griddles, arrow shaft straighteners, abraders, fetishes, lightning stones, mortars and pestles. Most of these artifacts were manufactured from materials locally available in river gravels.

Botanical remains recovered from the site included charred corn kernels and cobs, cotton, yucca, bear grass, cottonwood, chenopodium, bur-reed, two varieties of beans, and apocynum. Large amounts of burned corn were found at the pueblo and presumably came from the west wing. A peach seed was associated with the Spanish structure.

Faunal remains identified from the site included domestic dog, bison or cow, bear, rocky mountain sheep, domestic sheep, antelope, deer, lynx, beaver, jack rabbit, cottontail, squirrel, gopher, turkey, ferruginous rough-legged hawk, little brown crane, turtle, and fish. The domesticated sheep bones came from the kiva, two rooms in the south wing, and the Spanish structure. Ornaments made of conus, olivella, and abalone shell were also recovered from the site.

Metal artifacts, including copper tubing, a copper knife blade, pen-points (projectile points?), sheet scrapes, iron spikes, part of a hatchet, iron meshing, and iron chain, were found in the middle and southern sections of the west wing, south wing, and southern end of the east wing and the area around the Spanish structure. Collections at the Laboratory of Anthropology contain an axe, an iron pitcher handle, a plow share, a cinch ring, a sheep shear blade, a blade fragment, a nail and some metal fragments from Bandelier's Puaray. Of these, the axe, cinch ring, sheep shear blade, and blade fragment were found in the south wing of the pueblo. However, the pitcher handle and plow share blade were associated with the Spanish structure (Lambert personal communication 1986). A piece of gold leaf was recovered from the fill of the kiva. It is interesting to note that the southern roomblocks from both Kuaua and Santiago contain evidence of Spanish Colonial use. Local colonists presumably were reoccupying the more favorable southern exposed portions of the pueblos after they were abandoned by the original Indian inhabitants. Ellis (1957) described six crossbow boltheads that reportedly were recovered from the site. One of these boltheads was located in the chest of a skeleton found lying on the floor of a room in the south wing of the pueblo. The individual presumably died from the wound. The skeleton was covered with a little trash, but mostly aeolian sand. A second crossbow bolthead was recovered from an adjacent room (Lambert personal communication 1986). Crossbows were used during the Coronado expedition, but are not listed in the inventories of the Onate expedition (Hammond and Rey 1940, 1953). Five of these boltheads were curated in the collections of the Palace of the Governors, Museum of New Mexico. The "D" bolthead as described by Ellis (1957) is not presently in the collections. Dutton (1963:20) also noted that a piece of Spanish armor was recovered from Bandelier's Puaray. Lambert (personal communications 1986) states that Dutton was probably referring to some pieces of chainmail that were found in the southern roomblock at the site.

Four hundred burials were excavated at Santiago Pueblo, including about 150 adults and 254 small infants and children. These figures reflect a high infant mortality rate. Of the burials, 279 were situated below the room floors, about 75 in abandoned room fill, and 30 within the plaza. As many as six burials were found within a room. The graves were generally shallow, unlined pits 30-60 cm (1-2 ft) deep. Roughly 40 percent of the individuals were wrapped in matted, with a whole or partial vessel sometimes being placed with them. Schaafsma (1968a and b) excavated an
Fig. 7. Spanish structure.
isolated set of 15 graves (also known as LA 728) that were situated in an extensive sheet sand deposit about 200 m north of the pueblo (Figure 1). The features had been covered by about 20–30 cm of sandy overburden. Once uncovered, the individuals were found to have been placed in pits, many with a vessel or large sherd. A white meal, presumed to be corn meal, was found in some of these containers. Most of the pottery included Espinosa and San Lazaro G-P, which date circa A.D. 1425–1515 (Glaze C and D). Some Glaze A and E was also present. Schaafsma does remark that the isolated location of these burials away from the pueblo may be "in accordance with Spanish Catholic ideas about camposantos," (Schaafsma 1968b:41). However, most of the graves appear to date to the precontact period. Since all of the area was not excavated, Schaafsma states that there may still be other graves and possibly structures buried beneath the surface. The presence of Glaze A ceramics indicates a 14th century occupation of the area not documented at Santiago Pueblo. Collections at the University of New Mexico’s Physical Anthropology Laboratory contain about 70 individuals from Bandelier's Puaray and from Schaafsma's excavations.

Recent excavations conducted by the author revealed the presence of 15 shallow dugouts and an associated ceramic scatter (LA 54147) located about 400 m west of Santiago Pueblo (Figure 1). These features ranged in size from 2-5 m (6-16 ft) in diameter, were about 10 cm (4 in) deep, with most having simple hearths on the floor. A consistent set of post holes was found only around one dugout, indicating the presence of some kind of superstructure. Although the size and shape of the dugouts varied, the internal fill was quite similar. It consisted of a charcoal-stained soil mixed with broken pieces of pottery, burned corn kernels, burned beans, a few lithic artifacts, some bone, and occasionally some metal artifacts. The fill was deposited directly onto the floors of the dugouts soon after they were abandoned. The pottery consists mainly of Puaray G-P, which dates circa the late 1500s. Seven of the 15 dugouts contained the metal artifacts. About 20 pieces were recovered, including 11 nails, a clothing hook to a hook and eye, a clothing pin, a Brigantine plate, a piece of metal plate and about eight metal fragments. Most of the bone from the site was burned and very fragmented. Domesticated sheep, deer, antelope, cottontail, and turkey were identified. The sheep bone was present in three different dugouts.

LA 54147 appears to represent a series of temporary Spanish campsites that were occupied during the late 1500s. This date is derived from several sources. First of all, the metal artifacts do indicate a post-1540 occupation. Second, two samples of burned corn kernels from separate dugouts were submitted for radiocarbon analysis. They provided dates of A.D. 1559±70 (Beta-17471) and A.D. 1570±80 (Beta 17472). Both of these dates have been corrected for the more accurate half-life of 5730 years. Last, the presence of Puaray G-P (Glaze E) ceramics, in conjunction with the absence of Galze F, majolica and soup plates also support a late 1500s, and not early 1600s, date. That the site represents a Spanish campsite is also supported by several sources of information. First, metal artifacts and domesticated sheep were brought from Mexico by the early Spanish expeditions and were not readily available to the local pueblos during the late 16th century (Hammond and Rey 1940, 1953, 1966; Simmons and Turley 1980). Second, very few lithic artifacts were recovered, reflecting that the occupants rarely used or maintained stone tools there. Last, there were large numbers of broken jars, with some burned corn kernels and burned beans present in the fill of the dugouts. The presence of individual corn kernels and beans with the jar sherds probably indicates that these were stored foods. Documents show that the early Spanish expeditions did obtain
food stores from the local Indian populations (Hammond and Rey 1949, 1966). Analysis and research on this site is currently in progress.

SUMMARY

As pointed out in the introduction of this paper, the Classic and Spanish Colonial Periods for the middle Rio Grande Anasazi were a time of cultural readjustment. The pueblos of Kuaua and Santiago contain critical information concerning these periods. However, much of the specific information necessary for answering current research questions may be lacking. Kuaua was a large pueblo with multiple construction and occupation dating from the 1300s until the 1600s. They are partially reflected in the six kivas that are present on the site.

Santiago Pueblo appears not to have been built until the 1400s. It was smaller and probably did not have the complex occupational history found at Kuaua. However, the construction at both pueblos is poorly understood. By the early 1600s, both Kuaua and Santiago pueblos were abandoned, presumably the result of Spanish colonial pressures.

The paper has provided some summary information on Kuaua and Santiago Pueblos. What we need now are detailed site reports based on the data that was still available.

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INTRODUCTION

A number of fairly prominent, but intermittent streams in the Southwest bear the Spanish name, "Rio Puerco." Although "puerco," as a noun ("pig") might have been intended in some instances, as an adjective ("dirty"), it seems more appropriate. The Rio Puerco flows infrequently but carries more sediment (dirt) than any other tributary of the Rio Grande. Sometimes the Rio Puerco has been referred to as the "Rio Puerco of the East" to distinguish it from the "Rio Puerco of the West" which flows westward past Gallup, New Mexico into the Little Colorado River. A useful distinction was proposed by the U.S. Geological Survey's Board of Names—not always noted for its consistency or sensitivity to cultural heritage—which designated the latter Rio Puerco as the "Puerco River." Thus, "Rio Puerco" as used in this paper refers only to the large western tributary of the Rio Grande.

As the sun rises, the great black basalt eminence, Mesa Prieta (dark mesa) casts its shadow on many prehistoric settlements along the middle part of the Rio Puerco 40 mi (62 km) northwest of Albuquerque.

The archaeological importance of the Middle Puerco Valley was suspected almost from the beginnings of Southwestern archaeology when early archaeologists surmised that the prehistoric inhabitants of Chaco Canyon and the cliff-dwellings of Mesa Verde migrated to the Rio Grande area and became the Pueblo Indians as we know them today. If such were the case, the Middle Puerco was almost at the mid-point of a straight line between Chaco Canyon and Albuquerque and would have been traversed, if not settled, by those migrants.

Another research problem that would ultimately involve the Middle Rio Puerco developed when A. V. Kidder and a group of fellow archaeologists met at the ruins of Pecos Pueblo and proposed the famous Pecos Classification of the evolution of the Pueblo Indian culture. Their scheme began with a hypothetical, pre-agricultural period, Basket Maker I, the evidence of which would elude archaeologists for more than a generation.

As early as January 1931, during the first month of his formal position as Curator of the Laboratory of Anthropology's archaeological survey project, Dr. Harry P. Mera recorded and collected potsherds from two ruins (LA 528 and LA 529) that were part of a conspicuous site cluster on the Rio Puerco, near Guadalupe, New Mexico, northwest of Mesa Prieta. It was many years before another archaeologist seriously considered the Middle Puerco area for study.

In 1967, Cynthia Irwin-Williams, then of Eastern New Mexico University, organized her Anasazi Origins Project to trace the beginnings of Pueblo Indian culture and to demonstrate its continuity extended back in time and culture to the early Archaic Period almost 7,000 years ago (Irwin-Williams 1967, 1968). The project succeeded convincingly in its primary goal, but its other contributions included the systematic archaeological survey of an immense area that recorded in detail the cluster of ruins that Mera visited in 1931 (Washburn 1972). The same group of ruins is now recognized as a "Chaco Outlier" community (Powers, Gillespie, Lekson, et al. 1983:225-229).

Mera also surveyed settlements in the Arroyo Cuervo area near the southeastern limits of Mesa Prieta (Figure 1), and these, too, were more intensively surveyed in 1969 by Richard A. Bice, as the Albuquerque Archaeological Society offered its support to the Anasazi Origins Project. One of those sites, Prieta Vista (LA 9608), was excavated by members of the society (Bice and Sundt 1972) as part of the Anasazi Origins Project, and provided the first excavated data concerning the settlement of the Middle Rio Puerco by apparent 13th century migrants from the San Juan Basin.

Although the Anasazi Origins Project surveys covered much of the Middle Rio Puerco and its tributary
drainages, they did not extend southward onto the old Bernabe M. Montano Grant, originally established in 1762 and currently owned by the Pueblo of Laguna.

In 1970, the Continental Oil Company (CONOCO) contracted with the Museum of New Mexico to locate and evaluate archaeological sites that might be jeopardized during the course of its core-drilling explorations for uranium on Tracts 8, 9, and 10 of the Montano Grant. The work was conducted under permits from the Council of the Pueblo of Laguna and from the Southern Pueblos Agency, Bureau of Indian Affairs, U.S. Department of the Interior.*

Fieldwork was carried out in November–December 1970 and January 1971 by the author and Barbara A. Peckham. At the time, no funds were available for more than preparation of a brief report and a map to assist CONOCO in avoiding archaeological sites—not an entirely successful approach. Both survey data and collections remained largely unstudied until 1986. The observations presented here—by no means a finished report—take advantage of the wealth of archaeological information gathered by Dick Bice, members of the Albuquerque Archaeological Society, the Anasazi Origins Project, and many others who saw the Middle Rio Puerco drainage for its importance in understanding not only the early development of Pueblo culture but also for its role in helping the Anasazi of the 13th and 14th centuries to begin to adapt to the "foreign lands" of the Rio Grande region.

THE AREA

The Montano Grant straddles the meandering Rio Puerco and has more open prairie and less relief than much of the area of the Anasazi Origins Project to the north. It extends southward from the southern end of Mesa Prieta, with the survey area covering a strip of land 16 km (10 mi) long and somewhat over 8 km (5 mi) wide. Along the Rio Puerco the land descends from 1712 m (5618 ft) at the northwest corner of the grant, to about 1645 m (5400 ft) at the south-east corner of the survey area. Although the proximity of Mesa Prieta gives the impression that the northern part of the grant is higher, the high-point of the survey area is 1817 m (5960 ft) at the highest point near the southwestern corner.

Local elevation differences rarely exceed 100 ft (30 m), except in the northern areas where some mesas rise 200 to 300 ft (60 to 90 m) above nearby valley bottoms. Aside from the broad, flat bottomland of the Rio Puerco, the topography consists primarily of cuestas, extensive, low, tilted sandstone and shale mesas having largely southern or southeastern exposures and abrupt drop-offs on their northern faces. These uplands are separated by intermittent drainages that enter the Rio Puerco from both east and west. Except for the Rio Salado, which joins the Rio Puerco at the northwestern corner of the survey area, most of these intermittent streams drain small watersheds, usually heading within 6-10 km (5-6 mi) of the Rio Puerco, in areas that receive little precipitation. In contrast, the Rio Salado has an immense watershed of over 26,000 ha (100+ mi²), with its headwaters at elevations above 2590 m (8500 ft), where orographic precipitation could have contributed substantial run-off for prehistoric agricultural settlements downstream.

Near the northern part of the CONOCO survey area, the Rio Puerco is only moderately incised, with multiple terraces visible. Near the south end of the survey area, the Rio Puerco has an entrenched channel as much as 15 m (50 ft) deep. At one point in this latter area, lateral erosion of the channel has exposed three inaccessible, probably Archaic hearths 6.8 m (22 ft) above the channel bottom. Not only does this indicate how much valley fill has accumulated since the Archaic period because of valley-wide floods, it also illustrates how the impact of both headward and lateral cutting of the channel could have af-
fected prehistoric use of the valley bottom. Even moderate channelization of the Rio Puerco has contributed to an especially destructive erosion process called "piping". Rain falling on the dry, deeply jointed valley-fill drains rapidly downward and then follows and enlarges these fractures into cavernous tunnels. Further weakened by lateral erosion, great blocks of valley-fill collapse into the channel to be carried away by the next flood. Geologic formations in the survey area are primarily of southwest-to-northeast trending Mancos Shale, Gallup Sandstone, and Morrison Formation. Some mesas and valley terraces are topped by Quaternary gravels, including silicified wood, chert, and quartzites. These were the principal materials used for chipped stone artifacts by both prehistoric and historic occupants of the area.

Many upland areas west of the Rio Puerco are open prairies; elsewhere stabilized to semistabilized dunes, weathered shale, or barren sandstone outcroppings form the modern surface. For the most part, both prehistoric and historic sites were situated on well-drained dune deposits capping the tilted strata of the upland cuestas. The gravel-topped terraces were settled on occasionally; the shale seems to have been purposefully shunned (when wet, it has a slippery quality, like grease).

Today, water is extremely scarce in the survey area. Only one spring supplies potable water, although it is likely that seeps at the bases of bedrock exposures, and waterholes in the bedrock bottoms of incised arroyos were developed and used by past occupants. In addition, water potability, by today's standards, may not have been an option available to the early inhabitants of the area. A small but conspicuous playa or ephemeral lake occupies an upland location west of the Rio Puerco. It could have attracted wild game.

Historical documents (19th century) contain descriptions of the Rio Puerco as having a channel only a meter or two deep, and during the rainy season it often overflowed its banks, flooding the entire valley bottom. During more stable environmental conditions, such flooding would have brought in rejuvenating sediments and nutrients that would have abetted prehistoric farming of the bottomlands. Conceivably, these same sediments may have eventually buried some settlements and lithic resource areas. An abbreviated (1940-1970) precipitation record for the area shows an annual average of 7.5 in.—about three-quarters of an inch less than at Albuquerque. More than half of the precipitation total comes in summer with less than 10 percent during January through March. While temperature records are not available, they probably would be close to those for Albuquerque.

Although variations in elevation, exposure, substrata, and surface soils are reflected in the vegetation of the area, most genera and species of plants, except for conifers, are found throughout the area. Much of the Rio Puerco valley bottom has a grassland cover, although large stands of salt bush predominate in some places. Hummocky, open grassy areas also prevail on many of the upland dune-covered localities. Slopes, mesa tops, and other areas with shallow soil are habitats of somewhat stunted juniper in varying densities. If not within these woodland areas, most prehistoric sites are generally close to them.

THE SURVEY

Two hundred and eleven sites were recorded in detail during the survey, with about one-third having more than one component. Cultural and chronological units represented by these sites were numerous:

1. PALEOINDIAN—Cody;
2. ARCHAIC (Oshara Tradition)—a. Bajada Phase; b. San Jose Phase; c. Armijo Phase; d. En Medio Phase; e. undifferentiated (probably late);
Fig. 1. Map of survey area.
I; d. Pueblo II(?); e. Pueblo III; f. Late Pueblo III—Early Pueblo IV; g. undifferentiated Pueblo I—III;

4. HISTORIC PUEBLO (not demonstrably permanent)—a. Eastern Keres (mainly Zia); b. Western Keres (mainly Laguna);

5. ATHABASKAN (Navajo)—a. 18th century; b. 19th-20th century;

6. HISPANIC—a. 18th century; b. 19th-20th century.

Sites are concentrated in three major localities (Table I)—Cuervo (north), Ojito (middle), and Coot Ridge (south). Those generally coincide with wooded uplands and dune areas and their adjacent flanks and terrace remnants. Analysis of data and collections is still in progress, but enough has been studied to provide the basis for some observations:

PALEOINDIAN PERIOD

No specific sites of this period were found, though the base of an Eden point and two possible Cody knives were recovered from three Archaic sites in the Coot Ridge Locality.

ARCHAIC PERIOD

In practically all respects, pre-ceramic sites recorded on the CONOCO survey reflect the range of cultural developments of the Oshara Tradition as defined by Irwin-Williams (1973) for the Anasazi Origins Project area just to the north of the Montano Grant. Most Archaic sites are found on juniper-covered dune ridges that overlie the tilted sandstone uplands bordering the tributary valleys. One cluster of sites in the Cuervo Locality formed an arc around the head of a small canyon, overlooking several seeps and rock shelters. Two sites in this same cluster had short alignments of upright and fallen sandstone slabs marking the locations of incipient storage structures—two slabs had been decorated with red hematite paint. Such structures appear in the En Medip and Trujillo phases (800 B.C.—A.D. 400 and A.D. 400—600), respectively, and begin the long development of Pueblo architecture. Closer to the Rio Puerco, Archaic sites were often found where Quaternary gravels cap low river terraces and sandstone bluffs. One lithic manufacturing site overlooks a broad playa, approximately 1 ha in area, in the Ojito Locality.

Aside from lithic debris and occasional one-hand manos and basin millingstones, hearths occurring singly or in groups are the most common features of Archaic sites in Coot Ridge and Cuervo localities, with more occurring per site in the latter. Though not as frequent as one-hand manos made from sandstone, a distinctive artifact associated with 14 Archaic sites is a mano-like stone, tentatively referred to as a "shredder." Made from scoria (usually reddish brown, though black ones also occur), these implements measure a centimeter or two larger in all dimensions than sandstone one-hand manos. Though larger in mass, they weigh considerably less than manos. Obviously selected for open texture, sharpness of pore edges, and general durability, these tools may have functioned in ways similar to modern kitchen shredders, i.e., breaking up relatively solid plant materials (roots, leaves, pads, stems, or bark) or removing hair and tissue from hides.

Almost all archaeological sites surveyed are in habitats where fuel wood is available today and probably was in the past—though intensive prehistoric wood-cutting might have rendered these areas temporarily denuded.

Concentrations of fire-cracked rock, apparently discarded from roasting pits, occur on a number of sites in these same localities, though in greater number on Coot Ridge sites. Although observations may be flawed, it is interesting to note that fire-cracked rock occurs less frequently on Basker Maker III sites and ceases to be seen on later Anasazi sites. Absence of fire-cracked rock on later sites may reflect a significant change in food preparation, perhaps as the result of the introduction of pottery. However, the absence of fire-cracked
rock could also be indicative of non-habitation sites.

Investigation of Archaic sites has been largely a recent phenomenon. Although appearing to yield limited data, Archaic sites have great potential for answering questions about Southwestern hunter-gatherer populations that have only begun to be raised—or perhaps answers are buried in uncirculated theses and dissertations. Some of these questions include:

--Where sites cluster, are such groupings contemporary?
--Were they occupied by the same individuals using the same hearths season after season?
--Does frequency of hearths indicate the numbers of families within a "microband"?
--Did Archaic people camp on the same spot that they or others had used previously, or would they establish a new "clean" camp each time they moved into an area?
--Did they really choose a camp location that would guarantee them the maximum amount of benefit for the minimum amount of effort?
--How far afield would an Archaic group move before establishing another base camp?
--Does the presence or absence of hearths and fire-cracked rocks indicate the season when a site was occupied, whether or not food was cooked, whether or not lithic materials were heat-treated, or some other different function of the site?
--Are lithic materials good indicators of site function—are they the only ones?
--How long did it take for specific lithic categories to accumulate on a site?
--How many people, seasons, generations, etc. did it take to produce the materials and data the archaeologist recovers from an Archaic site?
--Given the 6,000 years of the Oshara Tradition, how many campsites might have been occupied at any one time?
--What new data recovery techniques would make some of these questions answerable?

These are not just the rantings of a skeptic who believes that only potsherds and architecture provide all the answers. The Archaic period continues to be and will remain one of the most interesting and challenging periods to be studied by coming generations of archaeologists. Learning what went on that long ago cannot be accomplished simply by laboratory replication of lithic technologies, analogies to hunting and gathering groups around the world, and repetition of time-worn analytical and statistical approaches. Description is essential; dating precision and accuracy are essential; and much was gained from these approaches when a dozen archaeologists and fewer institutions were responsible for most archaeological research in the Southwest. However, testing hypotheses is also essential. Even old-timers have come to realize that while rote performance of tried-and-true methods may provide newcomers with excellent training, it often produces little more than a great many newly invented wheels, as well as mountains of data available only in limited edition multi-volume site reports, if at all. New questions must be asked, and new techniques for recovering meaningful information must be developed.

Extractive and analytical techniques applicable to archaeology already exist in many physical sciences that go far beyond the most frequently used techniques: radiocarbon dating, archaeomagnetic dating, tree-ring dating, palynology, and faunal and floral identification. Petrographic analysis of ceramics has been applied in relatively few instances and by even fewer individuals. X-ray fluorescence microscopy holds great promise, but its value to archaeologists has been largely overlooked. Soil analyses also have generally been neglected. Much data may be lost because archaeologists are ignorant of the analytical techniques that would help them, where such analyses can be accomplished, and where advice can be obtained concern-
ing the previously ignored materials that should be collected and how to collect them.

THE ANASAZI

Basket Maker III

Sites of this period were most numerous in the Cuervo Locality, both on river terraces and the uplands. Only one site of this period was found in the Ojito Locality and seven in Coot Ridge. Sites of from one to ten pit houses, usually without associated surface rooms, were most common; some sites with no visible pit house depressions may have had surface structures or very shallow pit houses of the sort discussed by Bice (1970) at the Control Site downstream from the Montano Grant.

Ceramics of this period have prompted much discussion in recent years (Frisbie 1984:103; Warren 1982:151-152; 1985:1-3; Marshall 1980:181-182; Ferg 1983:49-54), and it appears that everyone is discussing the same type, but its associations remain to be clarified. When H. P. Mera named and described the type (1935), it was on the basis of its occurrence along the Rio Grande south of Socorro where small amounts of it were associated primarily with Mogollon-derived brownware and minor amounts of the Anasazi Basket Maker III type, Lino Gray. In the Albuquerque area, Frisbie (1967) found significant amounts of San Marcial Black-on-white associated with Lino Gray and minor amounts of brownware—what one would expect if predominant types reflect the Anasazi (grayware) tradition.

Some writers, mainly from Arizona, have noted the similarity of San Marcial Black-on-white to White Mound Black-on-white, of the Chaco Branch, sometimes lumping them together under the latter name. Like Frisbie, Warren, Marshall, and Ferg, I generally have no difficulty in distinguishing the two types. The problems may lie in two generally unfulfilled needs: the need to have adequate samples of each type, and related preceding and succeeding types, for comparison; and the need for uniform, scientifically accurate descriptions of the types and where they are known or thought to occur. The latter need is one for which Warren has orated persuasively and at great length. Each investigator picks attributes that to her or him are the diagnostic ones, the result being generally inconsistent description and inadequate communication. Virtually all archaeologists learn pottery classification through self-training, this writer included. Thus, as has often happened in the geological profession as well—where rock formations change names at the state line—a similar situation often prevails where Southwestern pottery is concerned, even when dealing with pottery from different areas within the state of New Mexico.

How one perceives San Marcial Black-on-white also depends on where one was trained, what publications one read, what sherds one saw at what magnification, and so on, and one soon becomes preoccupied with description rather than understanding. The same situation can be applied to innumerable other pottery types, many of which also occur in quantity in the Middle Rio Puerco area. We and future generations of archaeologists will continue to deal with San Marcial Black-on-white, its "Classic Variant," and its "Silted Variant"—whatever they are (I think I understand what was intended descriptively), but what do they mean? As far as the Montano Grant Basket Maker III pottery is concerned, "all of the above" occur in some quantity, and all are distinctive enough to warrant much attention in the Albuquerque area, where the days are numbered for many Basket Maker III sites because of urban growth. It is probably time to have two ceramic conferences, one to deal with and date San Marcial Black-on-white, the other to discuss the ubiquitous, fairly straightforward type, Lino Gray.

PUEBLO I

Though fewer and more dispersed
than Basket Maker III sites in the CONOCO survey area, sites yielding Red Mesa Black-on-white (Middle Rio Puerco Variant?) and neckbanded gray (not really the same as the old standby, Kana'a Gray, and graywares are no longer "Silted") are most common in the Cuervo Locality. Their occurrence in the CONOCO survey area may represent a southern extension of the Guadalupe Community, which seems to have begun at this time. The spread of the Red Mesa Style (there probably should be a Red Mesa Style Ceramic Conference, too) seems to go hand-in-hand with the growth of so many other Pueblo I communities—including those at Chaco Canyon and a few in the Rio Grande Province.

**PUEBLO II**

Significantly, Pueblo I in the CONOCO survey area is not followed by Pueblo II. What seems to have followed was an abandonment of the area as the Red Mesa folk found that their kin at Guadalupe were in the limelight as the "Chaco Outlier" there attracted settlers from miles around. Whether for religious purposes or to be on-hand at Guadalupe when the "redistribution man" came to call, or because the gathering throng at Guadalupe let too little water flow down the Rio Puerco to the Cuervo Locality—or for some entirely different factors—no one seems to have stayed that far south after about A.D. 950 or 1000—perhaps earlier.

Though often predominant on sites in the outlier cluster at Guadalupe, the western pottery types, including Gallup Black-on-white, Escavada Black-on-white, and Chaco Black-on-white, as well as the Rio Grande type, Kwah'e Black-on-white (Washburn 1972), are almost absent in the CONOCO survey collections. This suggests that whatever Pueblo I settlement survived into Pueblo II on the Montano Grant was small and short-lived.

**PUEBLO III**

The next settlement in the CONOCO survey area may not have been established until after the Chaco Collapse, and therein lie two more topics for ceramic conferences—Socorro Black-on-white, and particularly "Chaco-McElmo Black-on-white."

In the survey area, it is unclear whether or not Socorro Black-on-white was made as far north as the Coot Ridge Locality, where the type is quite common. Pure Socorro Black-on-white sites occur at least as far north as Interstate 40, about 25 km (15 mi) south of the Montano Grant. In the survey area, however, Socorro Black-on-white is typically associated with larger quantities of Chaco-McElmo Black-on-white, or its local variant, and occasionally with St. Johns Polychrome.

Subsequently, presumably in the late 1100s or early 1200s, the source of the Socorro Black-on-white shifted, and the type does not occur on the latest sites in the CONOCO area. Apparently, the groups along the Middle Puerco continued to produce the local McElmo Black-on-white until the late 1200s, when they abandoned Middle Puerco and moved into the Rio Grande region.

The trail of McElmo Black-on-white was destined to be obscured from the outset. Its misfortune lies in the fact that archaeologists (the "lumpers") have taken the easy way out in labelling as "McElmo" anything that remotely resembles the type as it was first described for the Mesa Verde area. Pueblo III was a time when potters almost everywhere chose to follow the latest vogue—thicker vessel walls, thicker slips, increasingly well-polished surfaces, squarish bowl rims, decoration in carbon paint using a style that is best known in the Mesa Verde region. So-called "Chaco-McElmo Black-on-white" is a good example of this development. With local variations in slip color and pigment, this trend can even be seen in the White Mountain Redwares (Wingate Black-on-red and St. Johns Polychrome); the variations on Tularosa Black-on-white in west-central New Mexico and adjacent Arizona, and even south to the
Table I. CONOCO survey, number of site components by period and locality.

<table>
<thead>
<tr>
<th>PERIOD</th>
<th>Cuervo Locality</th>
<th>Ojito Locality</th>
<th>Coot Ridge Locality</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>PUEBLO III</td>
<td>26</td>
<td>16</td>
<td>17</td>
<td>59</td>
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<tr>
<td>PUEBLO II</td>
<td>6</td>
<td>0</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>PUEBLO I</td>
<td>17</td>
<td>8</td>
<td>2</td>
<td>27</td>
</tr>
<tr>
<td>BASKETMAKET III</td>
<td>27</td>
<td>1</td>
<td>7</td>
<td>35</td>
</tr>
<tr>
<td>ARCHAIC</td>
<td>43</td>
<td>22</td>
<td>48</td>
<td>113</td>
</tr>
<tr>
<td>PALEO–INDIAN</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>119</strong></td>
<td><strong>47</strong></td>
<td><strong>78</strong></td>
<td><strong>244</strong></td>
</tr>
</tbody>
</table>

Mimbres area. Thus, to use "McElmo" as a name for Pueblo III—anything Black-on-white in northern New Mexico is very incomplete and should be rectified by more precision in pottery description, new names not referring to "McElmo," and subsequent reclassification.

The name "McElmo," hyphenated or not, implies Mesa Verde affiliation, and one might expect a type that includes "McElmo" in its name to be succeeded by a type that bears close resemblance to Mesa Verde Black-on-white—if the latter type were always the last in the sequence of Mesa Verde Whiteware and its cognates. However, this does not seem to have happened in the Middle Puerco and eastward into the Rio Grande. As elsewhere, there is no super-slipped, super-slick pottery with well-drafted carbon paint decoration on both surfaces of bowls, suggesting that the technological and aesthetic qualities of Mesa Verde Black-on-white had gained much favor beyond the San Juan Basin.

Settlements in the Middle Rio Puerco area, including the little community in the Arroyo Cuervo drainage described by Bice and Sundt (1972)—only 5 km (3 mi) from the CONOCO survey's Cuervo Locality—show little sign that much other than the McElmo style survived to be carried eastward as the San Juan Basin was abandoned. Not to be discounted is the possibil-
ity that bearers of the Mesa Verde style went elsewhere, possibly at a later date. Whatever the case, what was left behind was forgotten—possibly exorcised in the manner of the Acoma origin myth (Stirling 1942:74-79).

What lay ahead involved even more drastic changes: adaptation of the Anasazi migrants to a new environment and its unfamiliar resources; competition for land and water; fragmentation (at first) of communities followed by the eventual concentration of population (alliances?) into large villages; disappearance of the pilastered kivas of the Four Corners area (sometimes no kiva at all, as at Prieta Vista); the apparent advent of the Katsina Cult; and the rise in importance of formalized warfare.

Some of these changes were already in progress along the Middle Rio Puer-

co by the 1200s. Surveys and excavations in that area have raised numerous questions that pertain to the directions of Pueblo development both before and after A.D. 1300. However, until the 12th and 13th century settlements in the Middle Rio Puerco Valley are more intensively investigated, the real relationships of developments in the Rio Grande region to those in the San Juan Basin will continue to remain in limbo.

Museum of New Mexico, Santa Fe

*B Special acknowledgement must be given to the Laguna Cattlemen’s Association, not only for their vigilence in protecting the archaeological sites of the project area, but also for their skillful management of the rangelands of the Montano Grant.

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Washburn, Dorothy Koster
During the fall of 1981, this researcher conducted an archaeological survey for the U.S. Forest Service of a 43 km (16.4 mi) tract, which was under consideration as part of the Elena Gallegos Land Exchange. This tract (hereafter referred to as the "study area") is located approximately 50 km (30 mi) northeast of Albuquerque and south and east of the Santo Domingo and San Felipe Pueblo Land Grants, respectively. Geographically, the study area lies within the western upland terrace region of the Ortiz Mountains. This region is dissected by innumerable minor drainages that empty into northern-flowing major washes which, in turn, ultimately empty into the Rio Grande. Three such washes traverse the study area and a fourth, Arroyo Tonque, comes to within 4 km of the former’s southwestern boundary (Figure 1). As discussed later, these hydrologic features are of paramount significance to the understanding of the Puebloan archaeological record in the study area.

Within historic times, and probably in late prehistoric times as well, the study area supported a grassland-juniper association which merges upslope, as one heads south and east, with a pinyon-juniper woodland. With an annual precipitation of less than 12 inches, water (or its lack) has been a deciding factor in delimiting human efforts here: No permanent flowing springs are known to exist now and, as already stated, all of the streams are intermittent.

The 8-week, 100% sample survey resulted in recording 136 sites and 454 isolated cultural occurrences. Some of the sites are nondiagnostic lithic scatters; however, the majority are assignable to the Middle Archaic Period (B.C. 3000-1800); the Puebloan Classic Period of the Upper Rio Grande cultural region (A.D. 1300-1610); and the Historic Period (A.D. 1610-Present). A majority of the sites (114) date to the Classic Period and, as an inevitable consequence, this report centers around this particular cultural manifestation. However, a brief discourse follows concerning the Archaic and Historic sites, if only for the emphasis they present as to the marginal qualities the study area possesses in regard to human habitation.

The most notable aspect of the two Middle Archaic sites is that they are both located on the broad crest of the only ridge that bisects the entire length of the study area. In addition, this ridge is the location for the two Early Archaic projectile points that were found during the survey. Also of note is the fact that most of the lithic debris found on these Archaic sites is of Jemez obsidian—the local, abundant basaltic materials represent a smaller percentage of lithic debris on these sites. It would appear, then, that the major resource that the study area had to offer Archaic peoples was the ridge that allowed them to traverse it with relative ease.

The three Historic sites date from the mid-19th to the mid-20th centuries and, like the Archaic sites, reflect the marginal or peripheral offerings of the study area: One is a boundary marker for the Ortiz Gold Mine Grant; another is a probable ca. 1900 cowboy camp; and one is a ca. 1940 arroyo erosion control device (which ultimately failed).

The Classic Period sites are all small agricultural and hunting/gathering activity areas (Figure 2). Such sites are prevalent within the Upper Rio Grande cultural region, as demonstrated by the several major archaeological surveys that have been conducted within a 50 km (30 mi) radius of the study area (Schwartz 1972, Lang 19077, Bieella and Chapman 1977, Bugle 1981, Marshall 1986). In general, these limited activity sites represent an intensive, albeit short-lived, exploitation of marginal lands by Puebloan peoples from approximately A.D. 1350 to 1425. The pertinent literature for this region indicates that the agricultural exploitation strategies for these marginal lands were quite varied, as a direct response to the agricultural limitations peculiar
Fig. 1. Map of the study area.
AD 1350-1450 PUEBLOAN SITES

- Farmstead/Fieldhouse
- Lithic and Ceramic Scatter

Fig. 2. Sites from the classic period.
to each geomorphologically defined subregion. Furthermore, the Puebloan response to these limitations was concomitant with each subregion's microclimatic fluctuations through time. The following portrait of the study area, then, should be considered both as a microcosm of what was occurring within the Northern Rio Grande cultural region during the Classic Period and as a unique, localized Puebloan response to a less-than-optimal environment.

The study area is a land of broad, level uplands that are intensively dissected by narrow ravines and occasional major washes (Figure 3). A typical square mile contains a series of northwesterly running, narrow-to-broad finger ridges whose soils on the crests are loamy clays. The ridges have 10-25% slopes of sandy clay loams that are primarily gravelled with basalts, sandstones, and granites, as well as some chert and chalcedonies. The slopes are dissected by minor channels that vary widely in length, width, and depth. These channels empty into ravines whose bottom margins are bounded by narrow terraces of sandy loams. Small alluvial fans consisting of fine silty sands have formed where two or more channels have a confluence into a ravine. Where a ravine empties into a major wash, even larger alluvial fans have formed. In addition, these washes are bordered by relatively broad, low terraces of sandy or sandy clay loams. These fans and terraces are especially prevalent within the northeastern portion of the study area, where the topography begins the transition from a series of ridges to a lower elevation, nearly level plain.

The term "marginality" has been applied by this researcher to this geomorphology, insofar as human needs are concerned. For the purpose of this report, marginality is measured by slope, aspect, soil type, and the susceptibility of a given soil to suffer salt buildup.

A large body of research by soils scientists, ethnologists, and archeo-
Fig. 4. Typical alluvial fan garden plot with associated fieldhouse (fieldhouse is within circle). Note the fieldhouse is on a 5-10% slope and adjacent to confluence. Looking SSW.

logists (e.g., Hill 1938, Hack 1942, Fosberg 1977) has emphasized the fact that soils with high clay content are highly vulnerable to salt buildup, and therefore, are least desirable as agricultural land. Sandy soils having minimal clay content, however, provide optimal conditions for dry farming because there is adequate porosity for drainage. It is not surprising, then, to find that virtually all of the small agricultural sites within the study are adjacent to, or within 100 m of, the alluvial fans and sandy loam terraces.

The majority of agricultural sites are situated within the narrow confines of the ravines. The structures are usually situated on the rocky bench of a ravine slope itself (Figure 4). Very rarely are they situated on the more fertile terraces. This strategy of structural placement on nonarable land was apparently required to maximize the size of the agricultural plots, several of which are estimated to be less than 200 m. Curiously, over 65% of all of the structures are located on the northern or northeast-facing side of a drainage. This apparent preference may be explained by soils studies designed to evaluate microclimatic variances in soil temperature and effective moisture (Aikman 1940, Cooper 1960; In Fosberg:154). These studies demonstrate that: 1) northern aspects have the least chance for experiencing severe fluctuations of heat and cold, which are detrimental to crops in the early spring; 2) for the same reason, eastern aspects are superior to western or southern ones; and 3) northern and northeastern aspects have significantly greater effective moisture than all the others. If this is correct, it follows that the Pueblo farmers tended to place their habitation sites on the same side of a ravine or wash as their garden plots were, evidently for the convenience that the juxtaposition would provide.

Furthermore, the greatest density of agricultural sites occurs where ravine drainages empty into one of the
major washes, forming relatively larger alluvial fans and broader terraces. As a group, these sites are areally larger than the average, as defined by the extent of the midden scatter. Similarly, most of the structures that contain three or more rooms are situated along the margins of major washes, in addition to their placement near a confluence. It is probable that these multiroom structures represent longer than one-season occupation; perhaps they were occupied year-round. Following established terminology, the larger structures showing evidence of prolonged occupation are called "farmsteads"; the smaller, seasonally occupied structures are "fieldhouses."

Several rock-mulch garden plots and rock alignments, the latter apparently water catchments, were also recorded. These agricultural features are on the more gentle ridge slopes or the broad, low terraces that border the major washes. Significantly, virtually all of these features are in the immediate vicinity of alluvial fans. It is argued here that these fans were the primary agricultural plots, because the structural sites are placed near confluences. The rock-mulch gardens and water catchments, however, would have only provided supplemental arable land of secondary importance; the investment of labor they require was made practical only when constructed conveniently near the primary agricultural plots.

Most of the nonstructural lithic and ceramic scatter sites are on the slopes and crests of the ridges. All but two were apparently occupied during the same period as the limited activity agricultural sites i.e., between A.D.1350-1450. (The remaining two sites date to ca. A.D. 1500 and ca. 1700). These nonstructural sites are assumed to represent hunting and pinyon nut-gathering campsites. Given the risky nature of the agricultural attempts along the drainages, such hunting and gathering may have been essential to a mixed subsistence strategy.

The ceramic analysis by Helene Warren has provided the essential data for assigning a date range of Puebloan occupancy within the study area. Taken as a whole, these dated sites suggest that the study area was void of Puebloan habitation until around A.D. 1350. Not coincidentally, the mid-14th century was also a time of major demographic increase in the nearby Galisteo Basin, in conjunction with the introduction of glaze redwares to this basin from the west (Lang 1972: 25). We suggest that the study area, as part of the then unexploited uplands to the south of Galisteo Basin, was required then to provide some additional arable lands for the excess populations.

The survey record cannot establish the probable population density within the area during this period. However, it is doubtful that all of the limited activity sites were utilized at the same time. Rather, it is likely that initial exploitation of arable plots was done by a few individuals or family groups at the farmstead locations along the major washes. These farmsteads are situated where the potential garden plots are areally large and contiguous, thus allowing longer occupancy in one place even after several garden plots became exhausted. We hypothesize that, as this relatively choice land became totally exhausted and/or not available to latecomers, it would have been necessary for the Puebloan farmers to move further upstream to the areally smaller, non-contiguous, and therefore less desirable potential garden plots within the ravines.

Because it is likely that most, if not all, of the limited activity sites were occupied on a seasonal basis, this raises the question as to the village and/or subregional affiliation(s) of these dispersed peoples. (We assume that the predominant pottery type found on a given site is a direct reflection of the socio-economic connections of the site's occupants.) Not surprisingly, the immediate vicinities of Tonque Pueblo and
Espinoso Ridge Pueblo, each located only a few km from the study area, are the apparent sources of more than 40% of the pottery that was analyzed. Warren's temper analysis also discloses some correlation between pottery source and site provenience within the study area: The limited activity sites that are closest to Tonque Pueblo have pottery that was predominantly manufactured from this district, some 8 km (5 mi) to the south of the study area; the same pattern holds true for the sites closest to Espinoso Ridge Pueblo. Interestingly, the sites found within the northern third of the study area have a significant increase in pottery types that originated from the Galisteo basin to the north (e.g., San Marcos Pueblo, Galisteo Pueblo), with a decline in pottery from the vicinity of Tonque Pueblo (Warren, unpublished ms.; personal communication).

What is inferred from these general pottery distributions is the phenomenon that both local villages, and non-local Galisteo Basin communities, rapidly established marginal use areas within the western uplands of the Ortiz Mountains, as represented by the study area. A large body of archeological and ethnographic research (e.g., Hack 1942, Bradfield 1971, Schwartz 1972, Biella and Chapman 1977, Buge 1981, Acklen et al. 1984) has consistently recognized the pattern that each pueblo established its own use areas. Unfortunately, the Upper Rio Grande glazewares as a whole have a wide chronological range. As a result, one cannot establish with certainty whether these probable village use areas within the study area were developed more-or-less coevally during the latter half of the 1300s, or whether several decades passed before a new use area within the study area was established by another village or village district.

At some point during the first half of the 15th century, the intensive agricultural endeavors within the study area ceased, and only an occasional garden plot site and hunting/gathering encampment indicate some later human activities here. The abandonment may be attributed in part to nutrient exhaustion and salt buildup within the garden plots. Soil changes resulting from prehistoric gardening practices are documented in several studies (e.g., Hack 1942; Sandor et al. 1986). Analysis of prehistoric Puebloan terrace garden plots indicates they contain significantly low levels of phosphorus, nitrogen, and organic matter. Also, severe soil compaction exists within the analyzed gardens, a condition that perhaps results from intensive utilization of a limited area. Soil compaction will lead to poor water absorption and could inhibit the natural renewal of exhausted nutrients. Furthermore, there is evidence indicating that once a soil reaches this state of exhaustion, it will remain so for hundreds of years (Sandor et al.:166-180). This longevity would obviously preclude a strategy of periodically following the garden plots by the Puebloan farmers within the study area.

Undoubtedly this deteriorating situation would have been exacerbated by a major drought whose effects began to be felt during the 1420s throughout the Upper Rio Grande region. Within the Galisteo Basin, over 80% of the farmstead and fieldhouse sites were abandoned by 1425, as were several major villages (Lang 1977). This reduction in the human carrying capacity of marginal areas resulted in an influx of farmers into the more favored districts. Such districts retained a sufficient amount of water for the increased population by emphasizing irrigation agriculture, instead of the now-failed practice of dry-farming garden plots over a vast area (Dickson 1975:169).

Apparently, then, the remaining inhabitants of the study area were abandoning their dispersed farmsteads and fieldhouses by around 1425 and, like their neighbors to the north, moved to the more favorable villages. Tree-ring dates from Tonque Pueblo do, in fact, indicate major expansion of
this village beginning in 1428 (Barnett 1969:12), undoubtedly the result of an influx of dispersed peoples to a pueblo that possessed a permanent spring and nearby arable lands.

After A.D. 1450 there is virtually no evidence that the settlement pattern of widely dispersed agricultural plots was ever resumed in the Upper Rio Grande cultural region. The consolidated populations apparently remained town-oriented, with agriculture dependent upon ditch irrigation up into the Historic Period. The survey data described in this report indicate that this exodus holds true for the Ortiz Mountain uplands as well.

In conclusion, our archeological survey has increased the data base for investigating variability among the kinds of seasonally occupied Puebloan sites. Researchers now recognize that such sites within marginal lands cannot be dismissed as simply just so many fieldhouses and encampments, peripheral to the more impressive aggregated population centers. Rather, recognizing the specific placement of these sites aids in defining a major aspect of Classic Puebloan production and procurement strategies within a restricted ecological context.

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PRELIMINARY DESCRIPTIONS AND FIELD OBSERVATIONS
OF THE BELEN BRIDGE SITE EXCAVATIONS

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INTRODUCTION

Archaeological excavations in the Rio Abajo region of central New Mexico are a comparatively rare event. One of those rare occasions took place recently when the Museum of New Mexico, in conjunction with the New Mexico State Highway Department, excavated at the Belen Bridge Site (LA 53662), a Pueblo III pithouse village immediately east of Belen (Figure 1). This brief paper outlines the results of the field work and presents the observations made during the excavations. The various analyses are just now getting started, and a full report is expected to be available some time in 1988. The observations and impressions presented below, then, can only be considered preliminary and subject to revision in the final report.

PHYSICAL AND CULTURAL SETTING

The site is situated on alluvial deposits 200 m east of the Rio Grande Valley margin and 300 m west of the first prominent gravel terraces. The approximate elevation is 4830 ft. a.m. s.l. The soils in the immediate vicinity are the mixed, thermic, coarse-loamy Pajarito Series (Pease 1975). Today, the vegetation is a scrub-grassland, which Kuchler postulates to have been a saltbush-greasewood association in the past. The terrain to the east probably supported a grama-galeta steppe. The Rio Grande Valley would have supported a variety of riparian species. Available fauna would have included a variety of rabbits, ground squirrels, prairie dogs, gophers, and skunks as well as some of the larger mammals such as antelope, coyote, wolf, and bear (Findley et al. 1975). The Rio Grande would have provided a variety of fish as well as a large array of migratory waterfowl species (Koster 1957; Ligon 1967). The climate of the area is characterized by mild winters and warm summers with a frost-free season of about 200 days (Tuan et al. 1973). Precipitation is probably the most critical limiting factor for agriculturists in the area, for it averages only 7.5 to 8 in. per year (Gabin & Lesperance 1977).

Man's use of the Belen region spans at least 10,000 years. It began with the Paleoindian and Archaic cultures and progressed through a variety of ceramic-producing, essentially sedentary phases that extended into the historic period (Marshall & Walt 1984). Even though the Belen Bridge Site is located several miles to the north of the survey area upon which the Marshall & Walt sequence is based, their work is both the most comprehensive and the most pertinent to central New Mexico archaeology, and it will be used here. The efficacy of this application must await further evaluation, for a few differences between Marshall & Walt's expectations and the preliminary findings of the Belen Bridge Site work have been noted.

Rather than describing the entire ceramic-period cultural sequence for the Rio Abajo here, the reader is referred to Marshall & Walt (1984). Because the Belen Bridge Site ceramic assemblage most closely resembles that of the Late Elmendorf Phase, the characteristics of that phase are summarized here. According to Marshall & Walt (1984:95-98), the Late Elmendorf Phase is a continuation of several preceding trends, especially the continued nucleation of the peoples into ever-larger villages and a predilection for situating them in defensible locations. Pueblo-style jacal and masonry architecture is preeminent, with sites averaging a few dozen rooms. Kivas and even pithouses are present at several sites, but no criteria are given to tell the reader how, from surface evidence alone, the two types of subterranean structures are differentiated. The authors do state that the pithouses are most often circular depressions measuring 4 to 8 meters in diameter. Trash at most of the sites is sparse, suggesting to Marshall & Walt that the Late Elmendorf Phase was nothing more than a "short, fortified interlude between
nucleated village development and the coalescence of the populace into the larger, formal pueblos of the Glaze A era," (p.97). Very small structural sites or "isolated hamlets" of pueblo-style construction can be found but are few in number. The same is true with regard to the use of open or non-defensible site locations. The ceramic assemblage of Late Elmendorf Phase sites is characterized by brown wares, especially the textured varieties of the Pitoche series, and white wares of the inadequately described Elmendorf B/w type. Other painted types such as Chupadero B/w and Socorro B/w and the brown ware, Los Lunas Smudged, are regarded as intrusives. Perhaps the singly most important pottery type present is St. Johns Polychrome (and occasionally one of the earlier or later White Mountain Red Wares), which Marshall & Walt consider to be diagnostic for the phase (p. 95). It is clear that Marshall & Walt consider the Late Elmendorf and the preceding phases to be of the Mogollon Culture and to date to the period A.D. 1100-1300.

RESEARCH CONSIDERATIONS

The Marshall & Walt survey and report (1984) provide an outline of culture history and change through the discovery and interpretation of sites from surficial remains. But of course, studies of this sort can only provide a starting point, and more intensive studies, especially excavations, must be undertaken to learn more of the details and to set the stage for more sophisticated studies. Before the Belen Bridge Project, only a few sites in the Belen area had been tested or excavated, and these cursory undertakings have only begun the process of information accumulation. One was the examination of a single rectangular pithouse located a mile or so south of the Belen Bridge Site (Ferdon & Reed 1950). The other was the excavation in several rooms of a pueblo of unknown size located somewhere (presumably) to the east or southeast in the Rio Communities (formerly Rio Grande Estates) subdivision of Belen (Switzer 1968). Both of these projects were essentially one-day forays of an emergency nature, and only the Switzer effort is reported in any detail. A little further afield to the south, excavations have been conducted at Sevilleta Shelter, a small site bearing primarily Pueblo II period remains (Winter 1980). Not far away, six lithic-and-sherd and lithic scatters were tested (Hogan & Winter 1981), but no structural remains were observed or encountered. To the northwest of Belen, two sites were excavated in conjunction with the El Paso Natural Gas Pipeline Project; these excavations represent the largest efforts in regional sites that are approximately contemporary with the Belen Bridge Site (Fenenga 1956; Fenenga & Cummings 1956). Although brief but fairly detailed descriptive data are given in the reports, the discussion sections are quite limited and do little to illuminate the situation. And finally, several summers' excavations were conducted in Pottery Mound Pueblo (located in the same area as the two previous sites). This extremely important trading center post-dates the Belen Bridge Site occupation (Hibben 1955 and 1975). Full publication of the results has not yet been realized.

Thus, the Belen Bridge Project is one of the first reasonably substantive excavations to be undertaken within a 30 mile radius of Belen. Consequently, the project is necessarily exploratory in nature, and the emphasis is being placed upon the documentation and interpretation of the remains, comparison of the findings with the appropriate expectations derived by Marshall & Walt for the Rio Abajo, and the follow-up on any problems raised by the site data that can be realistically pursued within the time and funding constraints of the project. Two such problems have already been identified in the large quantities of St. Johns Polychrome recovered and the differential selection
of Jemez and Mount Taylor obsidians. More will be said about them below.

SITE DESCRIPTION (LA 53662) AND FIELD OBSERVATIONS

Without exception, all who saw the Belen Bridge Site before the excavation never guessed the magnitude of the remains. In fact, in decades past, it is highly doubtful whether the site would have been recorded, let alone excavated. The surface indications were a sparse sherd-and-lithic scatter in the bottom of the northern bar ditch of the Manzano Expressway and an even sparser scatter on the presumed undisturbed surface lying immediately to the north. There was absolutely no sign of structures, of burning, or any other clues to what was later found. Consequently, the testing and excavations became a continuous process of discovery over a period of three months from mid-April to mid-July 1986.

Initial exploration of the site was made by excavating two one-meter wide strip trenches in the bottom of the bar ditch. It was anticipated that if structures, especially a pueblo, were present, the construction of the bar ditch would probably have removed most of it down to nearly the level of the floors. Successive stripping of shallow layers failed to reveal any definite remains, though it did reveal the presence of charcoal-stained fill in one place and a shallow, basin-shaped hearth in another. Emboldened by this essential lack of success, a series of eight backhoe trenches was dug for a combined total distance of 214 meters. Only two of the trenches encountered subsurface cultural remains. By the time these clues were followed out, five pit-houses and 45 extramural firepits and pits had been uncovered (Figure 2). The location of some of these features on the shoulders of the Manzano Expressway makes it clear that the site continues for an unknown distance to the south, under the road and perhaps beyond. The northern limit of the
Fig. 2. Belen Bridge Site (LA 53662).
site was determined to lie just south of a small arroyo, which runs along that side of the site. The damage inflicted by the road and its bar ditch preclude our learning whether pueblo-style architecture was also present on the site. Similarly, it is obvious that an unknown number of extramural hearths and the smaller pits were removed by the construction, because the shallowest features were found within 20 cm of the surface of the undisturbed portion of the site.

The pithouses are all quite small, ranging in size from 1.82 x 1.42 m to 2.46 x 2.10 m. All but one had well-plastered floors and walls, hearths either in a corner or against the center of a wall, and ventilators in a corner or the eastern wall. The one exception, and the only structure that could conceivably qualify as a kiva, falls in the same size range of the others, but instead of being rectangular, it was more nearly square, with generously rounded corners, two hearths, two ventilators, and several other floor and wall features. One of the hearths and ventilators saw little use and had been abandoned in favor of the other set. The roof of this structure was supported by four posts rather than two, like the other structures (the smallest pithouse lacked post holes entirely). The fill of the pithouses ranged from well-stratified and trashy (1 structure) to stratified with some trash (3 cases) to non-stratified, non-trashy (1 case). Judging by this, at least three abandonment periods (or separate occupations?) are indicated.

Two extramural hearths and pits displayed a wide variety of sizes and shapes. Hearth sizes, depths, and shapes were more consistent than the pits and usually consisted of unprepared, shallow or deep basins into sterile soil. Only one, the only adobe-lined extramural hearth on the site, was well burned. Few of the extramural hearth fills were darkly charcoal-stained, and several showed only slight staining. The extramural pits ranged in size and shape from small, shallow basins less than 1 m across and a few centimeters deep to nearly 1-1/2 m in diameter and 1 m deep. Shapes varied from circular to race-track oval, and one of the largest had a key-shaped opening for an otherwise oval, bell-shaped pit. The function(s) of most of the pits can only be guessed, as none showed obvious signs of burning or other clues to their uses. Several, especially the larger ones, most likely served for the storage of foodstuffs.

Artifactual remains, considering the amount of dirt moved and screened, were rather sparse and consisted mainly of sherds, animal bone, and lithics. Formal artifacts were comparatively rare but included classes such as projectile points, projectile point preforms, mano and metate fragments, bone awls, bone tubes, beads, pendants/earbobs, large bifaces, and a miniature dipper made from pumice. The paucity of artifacts, especially the manos and metates, which occurred only as small fragments, is striking. In the case of the grinding stones, their fragmentary nature may simply reflect the fact that suitable materials for their manufacture were not locally available. We are probably seeing an extreme example of tool conservation through careful curation and transport from site to site rather than the emplacement of manos and metates as "site furniture."

The ceramics are dominated by brown wares and include such types as Corona Corrugated, Pitoche Rubbed-ribbed, and Los Lunas Smudged. Decorated types include Socorro B/w, Chupadero B/w, Elmdorf B/w, Tularosa B/w and St. Johns Polychrome, among others. Of special note is the fact that the St. Johns Polychrome was found in quantity and is currently estimated to constitute a double-figure percentage of the painted wares. These sherds were recovered throughout the site, from site limit to site limit and from surface to bottom of all major features. Obviously, a number of vessels are represented.
The major point of interest with respect to the chipped lithic material types is that though obsidian is a relatively minor type, it has one intriguing aspect at Belen Bridge. That is, even though the site lies within the Rio Grande drainage, the flakes of presumed Jemez Mountains obsidians (though now presumably available in the local gravels) constituted less than half of the obsidian pieces found. Those flakes thought to be from the Mount Taylor source are evidently in the majority, a factor of some note considering that they occur naturally no closer than 6-8 miles to the valley of the Rio Peurco to the east. The Mount Taylor obsidian and St. Johns Polychrome may or may not be tandem indicators of exchange relationships to the west, but their presence must be investigated in some detail. The answers are especially important in light of the fact that Pottery Mound Pueblo, a major 14th century trade nexus, is located only 13 miles (20 km) to the northwest of the Belen Bridge Site. Did the trade routes/relationships give Pottery Mound such prominence in existence and operation a century earlier? If so, this fact will have far-reaching effects on the way archaeologists view and interpret their findings from other sites over a vast region of central and probably southeastern New Mexico. It is hoped that a study of the distribution of St. John Polychrome will help elucidate the directions, intensities, and reasons for these exchange activities, thereby giving us an idea as to the role of the Belen Bridge Site inhabitants in the network.

Both floral and faunal materials were fairly common at the site, though they (especially the bones) are not particularly well preserved. Nevertheless, corn, beans, rabbits, fish, turkey (one complete articulated skeleton, individual bones, and eggshell fragments scattered throughout the site), and deer/antelope have been tentatively identified. Other species both of plants and animals will doubtless be found during the analyses of the numerous flotation samples and other collections. Clearly, the Belen Bridge Site occupants subsisted on a variety of wild and domestic species. A reasonably reliable reconstruction of the subsistence system should be possible.

Materials for deriving absolute dates were generally plentiful. Unfortunately, only one dendro specimen was obtained, and it appears to be from a complacent reee. However, apparently satisfactory archaeomagnetic samples were obtained from all five pithouses and the one adobe-lined extramural fire pit. Large quantities of small pieces of charcoal, much of it from twigs and brush, were recovered and will be processed for approximately a dozen radiocarbon dates. Though a number of pieces of obsidian were recovered, they will not be submitted for hydration studies at this time because of the uncertain status of this technique for dating purposes. A primary factor in this decision is that, although two or more occupations are suspected at the Belen Bridge Site, they all appear to have taken place within a relatively short period of time (probably no more than 100 years), thereby placing the hydration dating technique at a potentially strong disadvantage.

SUMMARY

The excavations at the Belen Bridge Site recovered data on a pit-house village dating to the Late Elmendorf Phase of the Rio Abajo sequence as defined by Marshall & Walt (1984). The ubiquitous nature of St. Johns Polychrome at the site strongly indicates occupation during the last half of that phase or sometime within the 13th century. Several short, separate occupations rather than one longer one may be represented. Though pithouses are recorded for sites of this phase further south, the more common site type is a large pueblo-style structure, which more often than not is situated on a defendable emi-
nance. The Belen Bridge Site is situated on the expansive alluvial slopes just east of the Rio Grande floodplain. The paucity of trash suggests either short or seasonal (or both) occupations, a point which is in agreement with observations at other Late Elmendorf Phase sites (see section on cultural environment above). A variety of plant and animal remains indicate horticulture, (probably) domestic turkeys, hunting, fishing, and (presumably) wild plant gathering were all important to the diet. At least two other aspects of the economy that will be more thoroughly investigated are the ubiquity of St. Johns Polychrome and the seeming "preference" for Mount Taylor obsidian over Jemez obsidian. The St. Johns Polychrome and possibly the Mount Taylor obsidian are probably tied into a regional exchange network that preceded (or formed the basis for) the all important 14th century network of which Pottery Mound, with its elaborate kiva murals and wide-ranging ceramic contacts, was a major nexus. These and other aspects will serve as a major focus of the forthcoming analyses of the Belen Bridge materials.

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1975 Soil Survey of Valencia County, New Mexico, Eastern Part. U.S.D.A. Soil Conservation Service and U.S.D.I. Bureau of Indian Affairs in cooperation with the New Mexico Agricultural Experiment Station, Las Cruces.

Switzer, Ronald

Tuan, Yi-Fu, Cyril E. Everard, Jerold G. Widdison, and Iven Bennett

Wendorf, Fred, Nancy Fox, and Orian L. Lewis (editors)

Winter, Joseph C.
INTRODUCTION

The beginning of formal pottery typology in the Southwest occurred in 1930 with the publication of a brief paper by Winifred and Harold S. Gladwin of Gila Pueblo, Globe, Arizona. Titled *A Method For Designation of Southwestern Pottery Types*, it reported the general principles of a uniform system of naming pottery types that was the result of discussions started in 1927 at the first Pecos Conference and completed at the 1930 conference held in Globe. In these discussions, Harry P. Mera represented the Laboratory of Anthropology (Santa Fe), Harold S. Colton and Lyndon L. Hargrave the Museum of Northern Arizona (Flagstaff), E. B. Renaud the University of Denver, Colorado, and Harold S. Gladwin the Gila Pueblo. The general principles were patterned somewhat after those used in the biological sciences and were formally codified by Colton and Hargrave (1937) and republished by Colton (1953). Briefly, they required a binomial type name consisting of a geographical term and a color-combination or surface-treatment term, deposition of labeled type specimens in a museum (there to be available for reference), and publication of a detailed type description not in conflict with other type descriptions.

A period of transition followed, with publication of reports already in progress using old type names, and new type names being given in new reports. The latter tended to be rather skimpy at first, whereas the former tended to be more detailed.

In 1930, the Gladwins started their series on newly named types with the publication of *Some Southwestern Pottery Types*, a series of five papers that appeared in the Medallion Papers of Gila Pueblo. In 1931, Harry P. Mera started his and W. S. Stalling's series on the pottery types of New Mexico, with the Laboratory of Anthropology's Technical Series, Bulletins One, Two and Three all appearing in 1931 in which they described Chupadero Black-on-white, Lincoln Black-on-red, Three Rivers Red-on-terracotta, and El Paso Polychrome.

Meanwhile, Alfred Vincent Kidder's monumental work at Pecos Pueblo continued to produce noteworthy reports, but not in the latest nomenclature. Kidder's work, from the New Mexico pottery point of view, started in 1915 with his report *Pottery of the Pajarito Plateau and Some Adjacent Regions in New Mexico*. This was followed in 1917 by *Notes on the Pottery of Pecos*, co-authored with M. A. Kidder, and then in 1931 by *The Pottery of Pecos, Volume I: The Dull-Paint Wares*. Charles Avery Amsden wrote the first section on the Black-on-white wares; A. V. Kidder wrote the rest. Unfortunately, this volume was composed without the benefit of Anna O. Shepard's technological studies (later to appear in Volume II), and Amsden's weak or erroneous descriptions of paste composition were those quoted by others, notably Mera (1935) when he assigned proper names to Amsden's pottery types. But both Amsden's and Kidder's descriptions of surface and design characteristics were very good...and their work is still used as a reference.

This incident illustrates the evolving quality of pottery type definitions and descriptions, and the importance of carefully curating type specimens. As analytic skills improve, pottery sorting quality can, should, and usually does improve. However, if prior work is to be used in regional studies, reexamination of the existing type specimens is a necessary step to test for changes in understanding what constitutes the type.

Let us return to the 1930 era for another important development. Actually, it took place in the closing years of the 1920s and culminated in 1929 with the announcement that the tree-ring chronology being developed by A. E. Douglass and his associates had been extended all the way back to A.D. 700. Until this time, pottery type seriation could only yield rela-
tive dates. Now, with the advent of dendrochronology, the possibility was opened of dating pottery types and then obtaining calendrical age of deposits lacking tree-ring specimens by means of ceramic cross-dating.

It was an exciting time. In New Mexico, Mera was busy with his surface surveys and pottery type descriptions (1932, 1933, 1934a, 1934b, 1935, 1940, 1943). Stallings was digging for tree-ring samples, and he and Stubbs were excavating Pindi. Their work resulted later in two important reports, one by Smiley, Stubbs and Banister (1953) giving dates and pottery types for many New Mexico pueblos, and the other by Stubbs and Stallings (1953) giving intensive dendro and ceramic data from Pindi pueblo.

Anna Shepard's technological studies of all the Pecos pottery types, together with Kidder's study of the glaze and utility ware types, were completed and published in 1936 in the monumental book *The Pottery of Pecos*, Volume II. Long out of print, as are all the other reports of this era, this book remains the only one with a really comprehensive analysis of glaze-paint decorated pottery from a large and important, albeit peripheral, pueblo. Al Hayes' recent reports on the excavation of Mound 7 at Gran Quivira are the only ones that come close. And Anna Shepard's technological studies opened, or should have, the eyes of all who, with understandably paternalistic feelings toward the pottery of their site, assumed it produced all its own pottery save only the most exotic pieces of "trade wares." Kidder had such feelings, but wisely recognized them and had this to say in his Introduction:

...Two years ago I had written, for inclusion in the present volume, a discussion of the development of the local decorative arts based on the supposition that all the pottery found at Pecos, with the exception of a few patently imported pieces, had been made there. I realized, of course, that certain artistic stimuli had come from exterior sources; but I believed that in general the ceramic history of the pueblo could be worked out, so to speak, on the ground. But Miss Shepard has now demonstrated that several very important types of pottery contain ingredients which could not possibly have been procured in the valley. It is her opinion that the thousands of vessels concerned were brought to the pueblo in manufactured form.

If this was actually the case, we are faced by the necessity for a drastic rearrangement of ideas regarding the status of the ceramic industry, not only at Pecos, but throughout the Southwest. It has always been assumed that potting was one of the regular household tasks of every Pueblo woman; that each town was in this regard self-sufficient. But if whole classes of pottery, such as Glaze I and Biscuit, were imported, we must postulate an extraordinary volume of trade and allow for a compensating outward flow of other commodities. Furthermore, we must believe that the production of vessels at the source of supply was much greater than was needed for home consumption, in other words, that rudimentary commercial manufacturing was practiced. And if this took place in the Rio Grande it may have occurred in other areas. ...

Enough has been said to show what a bombshell Miss Shepard's findings have thrown into the research; and it will be obvious how disastrously they have wrecked the complacent conclusions I was on the point of issuing (Kidder 1936).

A. V. Kidder was a very perceptive man. Not only was he quick to recog-
nize error in his own ways, gracious enough to acknowledge it, and wise enough to correct it, he was also able to make perceptive observations about the state of affairs generally. His 1936 Introduction makes good sense today, particularly as regards typology and the scientific method. Concerning the new system of typology he had this to say:

The new system was designed to bring order into the rather chaotic situation obtaining in earlier ceramic literature. But it has resulted in a taxonomic debauch. ... Our adolescent discipline (I do not venture to call it a science) is merely suffering from growing pains: ... in justice to the surveyors and namers it should be stated that they have never allowed themselves to lose sight of the historical implications of their work, ... In certain ways, however, the methodology of all these investigators is open to serious criticism. ...

Ceramic types, however, cannot satisfactorily be established on the basis of surface sherds, because these are almost always so small as to prevent proper study of vessel shape and particularly of design; and also because one can never be certain that groups of specimens from above-ground constitute unmixed chronological samples. Hence no final determinations, either typological or developmental, should be made from survey material alone. The surveyors will, of course, aver that they are not making final determinations and that their conclusions are merely working hypotheses. But great numbers of types have recently been named after superficial examination of meagre lots of fragments; and the legitimate use of the hypothesis has habitually been exceeded by the logically unpermissible founding of further hypotheses upon theories untested by excavations.

An equally serious fault of much recent work is failure to publish adequate descriptions of types. ... (authors) are undoubtedly correct in feeling that pottery types are definable and that such types should be used as bases for classificational and genetic determinations. They have not, however, been willing to excavate larger and more abundant sherds than can usually be found on the surface; not to undertake meticulous studies of vessel-shape, paste, and decoration. And only adequate material laborously examined can yield valid typological results (Kidder 1936).

So, what was done about it? Sometimes nothing, sometimes a little progress, but on the whole not too good a record. So let us for now forget the poor, concentrate on the good, and place bounds on the present study.

Over the years progress has been made, although haltingly, toward three things:

1) Obtaining a clearer understanding of the nature of pottery types and varieties;

2) Obtaining better dates for the period over which a type or variety was made or used in a particular locale; and

3) Better bounds on the locale. Unfortunately, information on the above achievement is scattered, not easily obtained, and intermixed with too much misinformation. The objective of the rest of this paper is to draw together a summary of the data on points 2 and 3 above; point 1 is much too voluminous for a paper. For references on the various pottery types the reader is referred to Oppelt's 1976 bibliography.
Central New Mexico was not central to the origins of the prehistoric ceramic arts; in fact it was on the northeastern periphery of the area where pottery was first made and continued to be peripheral to the northward spread of the idea and practice of making ceramic vessels.

As time went on, regional specialization occurred. To keep track of these spatial developments, refer to the map of the southwestern United States and adjoining northwestern Mexico in Figure 1. The map has been divided into two zones. These, in turn, are divided into some 13 regions, and each region subdivided into a number of areas. The bounds of these fixed divisions are geographical, but were chosen with broad cultural differences in mind, particularly relating to evolving differences in types of pottery found in each area. Some types may be found in several areas or even regions, but with increasing specialization, the types, even though traded widely, may be made in only one area, or even in one district or one pueblo within a district (a district being a subdivision of an area).

The hierarchy of geographical divisions chosen that are pertinent to the present study and their codes (for use in later figures and the summary table) are in Table I. The order named is generally from north to south.

### Table I. Geographical Division and Code

<table>
<thead>
<tr>
<th>Name of Geographical Division</th>
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<tr>
<td>Gray Ware Zone</td>
<td>GWZ</td>
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<tr>
<td>Mesa Verde region</td>
<td>MV</td>
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<tr>
<td>Colorado Plateau region</td>
<td>CP</td>
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<tr>
<td>Kayenta–Hopi area</td>
<td>CP1</td>
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<tr>
<td>Little Colorado area</td>
<td>CP2</td>
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<tr>
<td>Chaco Basin region</td>
<td>CB</td>
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<tr>
<td>Chaco Canyon area</td>
<td>CB1</td>
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<tr>
<td>Chuska Valley area</td>
<td>CB2</td>
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<tr>
<td>Cebolleta–Acoma area</td>
<td>CB3</td>
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<tr>
<td>Cibola–Zuni area</td>
<td>CB4</td>
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<tr>
<td>Largo–Gallina region</td>
<td>LG</td>
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<tr>
<td>Rio Grande region</td>
<td>RG</td>
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<tr>
<td>Taos–Picuris area</td>
<td>RG1</td>
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<tr>
<td>Chama–Upper Rio Grande area</td>
<td>RG2</td>
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<tr>
<td>Upper Jemez area</td>
<td>RG3</td>
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<tr>
<td>Zia–Cochiti area</td>
<td>RG4</td>
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<td>Galisteo–Santa Fe area</td>
<td>RG5</td>
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<td>RG6</td>
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<tr>
<td>Estancia Basin area</td>
<td>RG7</td>
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<td>Albuquerque–Puerco area</td>
<td>RG8</td>
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<td>Socorro area</td>
<td>RG9</td>
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<tr>
<td>Plains–Eastern Periphery region</td>
<td>PE</td>
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<td>Brown Ware Zone</td>
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<td>Mogollon Mountain and Rimland region</td>
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<tr>
<td>Alpine area</td>
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<tr>
<td>Pine Lawn area</td>
<td>MR2</td>
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<td>Mimbres area</td>
<td>MR3</td>
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<tr>
<td>Black River area</td>
<td>MR4</td>
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<tr>
<td>Basin and Range East region</td>
<td>BE</td>
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<tr>
<td>Jornada–Tularosa area</td>
<td>BE1</td>
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<tr>
<td>Lower Pecos area</td>
<td>BE2</td>
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<tr>
<td>Lower Rio Grande area</td>
<td>BE3</td>
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<tr>
<td>El Paso area</td>
<td>BE4</td>
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</tbody>
</table>

The Rio Grande Region is shown in greater detail in Figure 2.

With this geographical framework in place, let us next examine what is known of the dated durations of pottery types to be found in the Rio Grande Region of central New Mexico.

### Temporal Status of Pottery Types Found in Central New Mexico

Over the years, dates for the occurrence of various pottery types
Fig. 1. Map of Southwestern pottery zones and their regions.

have appeared in numerous publications, including several compilations. But most are obsolescent, out of print, or both. Some sources are obscure papers, even manuscripts, so a readily available, reasonably current compendium seemed worthwhile. To this end, this paper contains 1) a set of graphical charts of beginning, mode, and end dates for pottery types charted in chronological order, area by area, and 2) an alphabetical tabulation by pottery type of these dates and other information. First, some terms and conventions are explained, then the charts are displayed and discussed. The table follows the end of this paper as Appendix 1.

Dates for the occurrence of pottery types, especially in their areas of production, are of variable quality and have been derived by various means. Each dated type is listed together with a reference to the source or sources for the dates given (see Appendix 1). Also given is a brief term describing the basis for the dates, another for the judged quality of the dates, the best range of dates, the maximum range (optional), and a modal date.

The primary source of absolute dates during the several centuries of interest (ca. A.D. 600 to 1700) is dendrochronology. But it has its drawbacks, especially the variable interval from when a tree was cut down until a pot sherd or vessel became associated with the structure or dump strata containing the dendro specimen.

Helping overcome this problem is the relatively recent advent of archaeomagnetic dating by which abandonment of a structure can be dated, i.e., the date when the last fire cooled. But again, association of sherds or vessels with such an event depends on careful excavation and interpretation of the archaeological record. This can be of variable quality.

The use of dendro data for dating pottery types has been explained by Breternitz (1966:62–66) and will not be repeated here. Analogous use of
Fig. 2. Map of Rio Grande pottery region and its subareas.
archaeomagnetic data, either alone or in conjunction with dendro data, inferentially dates a particular pottery type.

Dating inferences for a pottery type may have to rest on associated pottery types or on similar styles of decoration that are dated elsewhere. Under ideal conditions, such cross-dating procedures can yield fairly good results. Such conditions are seldom ideal, and cross-dating can yield poorer dates. Finally, numerous conferences have been held on Southwestern ceramics, and some of them have yielded a consensus on the time-span of pottery types under discussion. They seem to result in fairly good dating. But other conferences have not produced better dates, and some, such as the Eighth on Rio Grande Glazes, have even worsened the situation, at least for some types.

The quality of dating remains subjective and potentially controversial. Be that as it may, this compendium of dates for pottery types will recognize several dating bases, and several levels of date quality will be judged. The bases for dates given have been characterized by a short notation of: dendro., archaeomag., inference, assoc. types, stylistic, or consensus. The quality levels judged are good, fair, poor and very poor. The basis for picking a level is subjective, but a higher quality level was ascribed when the source documents contained good arguments based on multiple dating associations from carefully excavated contexts by people who seemed to know their pottery types. Poorer levels were put on types having few dating associations or lacking excavational data. Consistency of judgment was strived for, and of course quality, as well as the dates themselves, can be expected to improve in the future.

DATE RANGES, MODAL DATES AND GEOGRAPHICAL CONVENTIONS

Production of a pottery type occurred over some span of time, during which its rate of production and consumption rose as it became more popular, reached a peak, and then declined as other types became more popular. The mode of peak production conceptually provides a convenient measure to use for chronologically ordering pottery types, but how can it be determined? Arguments against a Gaussian, or normal distribution, have been advanced on occasion (e.g., Martin and Plog 1973:256), and Gomolak (1980) has suggested that the popularity distribution over time is skewed with its peak of popularity closer to its termination than its inception. He observes:

... Consider if you will, the rise and fall of various artifacts of folk culture; from the gradual acceptance of something new, through a period of increasing popularity to a modal point, then a decline (often a sudden disappearance) due to technological replacement, or simply "falling from fashion." When something is "out," it's out; the rush is on to the new and improved version, or to an entirely different artifact (Gomolak 1980:7).

This distribution of type popularity is blurred in the archaeological record by mixing dump strata, imperfect excavation procedures, and lack of absolute dating associations. The net result is a spreading out of the perceived distribution relative to the true distribution. Such spreading is sometimes partly compensated for by recognizing a best range of dates within a maximum range. But whether a maximum range is used or not, a best range has been selected for each type, and following Gomolak's lead (but not his formula), two thirds of the best date range has been chosen as the mode.
Chart 1. Pottery Type Durations for the Central Rio Grande Areas (RG8,4,...) Up to 1000 A.D.

FREQUENTLY ENCOUNTERED TYPES

- Lino Gray (native? dates are not)
- White Mound B/W (imported? dates are)
- Kana-a Gray (imported? dates are)
- Early Red Mesa/Kiatuthlanna B/W (imported? dates are)
- San Marcial B/W (imported?)
- Lino Gray, Silted Variety (native?)
- Kana-a Gray, Silted Variety (native?)
- Red Mesa B/W (native? dates are not)

LESS FREQUENT TYPES (all imported? dates are)

- Tallahogan Red (or Lino Red)
- La Plata B/W
- Alma Plain
- Abajo R/O
- Piedra B/W and Bluff B/R
- San Francisco Red
- Mogollon R/B
- Jornada Brown

In the following charts, the date ranges, mode, and quality judgments have been graphically represented by the use of a triangle formed with solid, solid and dashed, or dashed lines, or only a dashed and dotted line, thus:

- good
- fair
- poor
- very poor

| best range |
| maximum range |

mode at 2/3 of best range

An additional graphical feature is cross hatching to distinguish brown ware and gray ware utility types (no painted decoration). Gray wares are hatched thus, //////, and brown wares the opposite slant WWW.

One final comment on charting conventions. Frequently encountered types have been portrayed on the top part of each chart, and less frequent types on the bottom or else on a separate chart. Note that frequency alone is an insufficient basis for judging whether or not the type was made in the area under consideration. Often the most frequent was indigenous, but the less frequent might in older cases be the indigenous ware. Therefore no claim is automatically made for indigenous production on the basis of frequency alone.

Due to size limitations, dates for pottery types in a given area have been shown on several charts. Break points were selected to be as innocuous and consistent as possible.

Central Rio Grande Areas (RG8,4) Up to A.D. 1000.

In the central Rio Grande Region,
which includes the Albuquerque-Puerco, Zia-Cochiti, and possibly other areas, the earliest pottery types found are the undecorated brown and gray wares, Alma Plain and Lino Gray. Their periods of production are shown on Chart 1. In surveys, and especially in the several pit house sites excavated to date (see Hammack et al. 1983 for references), Lino Gray is more frequently encountered than Alma Plain, in contrast to more southerly areas to be discussed later. Also of less frequent occurrence, with dates during the 7th and early 8th centuries, are Tallahogan (or Lino) Red, and the first of the paint decorated wares, La Plata Black-on-white. Some Abajo Red-on-orange also appears at the beginning of the transition from plain Lino to neck-banded Kana-a Gray. Whether any of these types were made in this area is a moot question. Perhaps they were first made in the Rio Puerco district, and later in the Albuquerque district and Zia-Cochiti areas. However, convincing evidence (such as x-ray fluorescence analysis of trace elements in the clay) is lacking, and opinion is divided. Indeed, convincing evidence is lacking for the next century or two. But sooner or later it is probable that local production commenced with utility wares at first and paint decorated wares later.

The 9th century started with a strong showing of White Mound Black-on-white, a shift from Lino to Kana-a Gray, and the advent of two varieties of San Marcial B/W, classic and a silted clay variety. The use of silted clay in possibly local production of San Marcial Black-on-white, Lino Gray and Kana-a Gray has been recognized by Marshall (1980:178) and Ferg (1983:41) and their work is recommended to any serious investigator in this area.

The closing decades of the 9th century saw the frequent occurrence of Early Red Mesa or Kiatuthlanna Black-on-white in addition to San Marcial, and the less frequent presence of Piedra Black-on-white, San Francisco Red, and Mogollon Red-on-brown. Traces of surface textured brownwares may also be encountered but are not charted. They became common farther south.

During the 10th century, and probably extending into the 11th, Red Mesa Black-on-white took over as the dominant paint decorated type, and the El Paso and Jornada Brown types put in a sparse showing. By this time, pit structures began to be replaced with Chacoan pueblos on the Rio Puerco with the establishment of the Chaco outlier complex centered on Guadalupe Pueblo (Pippin 1979).

Situation West of the Rio Grande from A.D. 900 to 1300.

The establishment of a Chaco outlier complex on the western edge of the Rio Grande drainage may account for much of the Cibola Whiteware found farther east, which leads us to take a look at what was going on in the Chaco, Mesa Verde, and Mogollon areas farther west. The principal pottery types being made in these three broad areas that may be found in the Rio Grande area are listed with their dates on Chart 2.

To the west-northwest of the central Rio Grande Region, Cibola white and gray wares were being produced: Red Mesa, Chaco, Chaco-McElmo, Gallup, Puerco, and Escavada Black-on-whites; Tohatchi Banded; and Exuberant, Chaco, and Coolidge Corrugateds. Their periods of production spanned the 10th, 11th and first half of the 12th centuries in the Chaco Basin Region.

To the northwest of the central Rio Grande Region, Cibola white and gray wares were being produced: Red Mesa, Chaco, Chaco-McElmo, Gallup, Puerco, and Escavada Black-on-whites; Tohatchi Banded; and Exuberant, Chaco, and Coolidge Corrugateds. Their periods of production spanned the 10th, 11th and first half of the 12th centuries in the Chaco Basin Region.

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To the west-southwest of the central Rio Grande Region lie the Mogollon Mountain and Rimland areas where brownware utility types such as Reserve Plain Corrugated, Reserve Indented and Tularosa Patterned
Chart 2. Situation West of the Rio Grande from A.D. 900 to 1300.

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<td>Red Mesa B/W</td>
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<td>Tohatchi Banded</td>
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<td>Chaco-McElmo B/W</td>
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<td>Reserve Plain Corrugated</td>
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<tr>
<td>Wingate B/R</td>
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<tr>
<td>Wingate Polychrome</td>
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<tr>
<td>Rewerve Indented Corrugated &amp; Tularosa Patterned Corrugated</td>
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<tr>
<td>Tularosa B/W</td>
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<tr>
<td>Tularosa Fillet Rim</td>
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<tr>
<td>St. Johns B/R &amp; St. Johns Polychrome</td>
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**Chart 3. Southerly Rio Grande Areas (RG9,7) up to 1350 A.D.**

<table>
<thead>
<tr>
<th>A.D. 800</th>
<th>900</th>
<th>1000</th>
<th>1100</th>
<th>1200</th>
<th>1300</th>
<th>1400</th>
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<tbody>
<tr>
<td><strong>FREQUENTLY ENCOUNTERED TYPES</strong></td>
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<tr>
<td>Alma Plain</td>
<td></td>
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<tr>
<td>Mogollon Brownwares (Marshall's Pitoche group)</td>
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<tr>
<td>Lino Gray</td>
<td></td>
<td>(imported? dates are)</td>
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<tr>
<td>San Marcial B/W</td>
<td>(classic and Silted)</td>
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<tr>
<td>Lino Gray Silted (native?)</td>
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<tr>
<td>Red Mesa B/W (imported? dates are)</td>
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<tr>
<td>Casa Colorado B/W &amp; Elmendorf B/W</td>
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<tr>
<td>Socorro B/W (sparse in central river district)</td>
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<tr>
<td>Los Lunas Snudged</td>
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<tr>
<td>Chupadero B/W</td>
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<tr>
<td><strong>LESS FREQUENT TYPES FROM SOUTH &amp; SOUTHWEST</strong> (see Chart 2 for Cibola types)</td>
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<tr>
<td>Mimbres Bold Face B/W, Style I</td>
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<tr>
<td>Mimbres/Bold Face B/W, Style II</td>
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<tr>
<td>Mimbres B/W (Style III)</td>
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<tr>
<td>El Paso Brown, Late Variety</td>
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</table>

Corrugated, and Tularosa Fillet Rim were being made from about A.D. 1000 to 1300. At this same time, the paint decorated types being produced included Reserve and Tularosa Black-on-white and the White Mountain Redware to be so widely traded...Puerto Black-on-red, Wingate Black-on-red and Polychrome, and St. Johns Black-on-red and Polychrome.

The influence of the people making Alma through Tularosa Fillet Rim brownware types was especially strong in the southern Rio Grande areas, leading us back to consider the situation there.

**Southerly Rio Grande Areas (RG9,7) Up to A.D. 1350.**

Our knowledge of the ceramic situation in the Socorro area is mostly from surveys alone, because very little excavation has been accomplished in sites of any period. The situation is no better in the Estancia Basin region for the earlier periods. Excavation there has been, for the most part, at pueblos that lasted into historic times. Consequently, our knowledge of the pottery types and their chronologies is not very good, and for the presumably local brownwares (Marshall's Pitoche group), the quality of our knowledge is judged to be very poor, as shown on Chart 3.

Not much is known about the relative frequency of different types in this area before about A.D. 800. Alma Plain and Lino Gray are reported, as is some Kana-a Gray (not plotted). In addition, there is mention of red-on-brown sherds (Marshall and Walt 1984) but usually rather vaguely, and seldom of a dated type such as Mogollon Red-on-brown. So such types were not included in the chart.

During the 9th and 10th centuries, San Marcial and Red Mesa B/W were to be expected, along with a silted variety of Lino Gray based on dates from other areas. A slight showing of Mimbres Bold-Face Black-on-white has been reported, and a trace of El Paso Brown, probably the later variety but not necessarily, and again based on
The 11th century was probably when Casa Colorado and Elmendorf Black-on-white started to be made (for a brief description of them see Marshall and Walt 1984:77). Elmendorf Black-on-white was first named by Peckham at the 1971 "Pre-Biscuit Ware Carbon Paint Pottery in the Rio Grande Area" conference and has never been well described in print. Casa Colorado is not much better off. These types are poorly dated, mostly by Cibola types associated with them from farther west (see Chart 2) and the sparse showing of classic Mimbres Black-on-white with them.

Socorro Black-on-white is another poorly dated type that started about this time and continued to be made on into the 12th and 13th centuries. In the 12th century, Chupadero Black-on-white began to be produced, and this type became widespread in the Estancia Basin area as well as in the Basin and Range East region (Jornada Mogollon) farther south and east, especially during the 13th through 15th centuries.

The final brown ware plotted is Los Lunas Smudged, also poorly dated but apparently being made form the late decades of the 12th through the middle of the 13th century. Los Lunas Smudged seems to be an eastern continuation of Tularosa Fillet Rim.

Mention must be made, before proceeding to later types, about the situation in the textured brown wares. Their diverse nature was noted by Mera (1935) when he proposed the name Pitoche Rubbed-ribbed for one type. But just what is meant by a rubbed-rib was not explained, and the photographs included in his report leave much to be desired. Dittert (1959) named some of the brown wares in the Acoma district Pilares Banded and Pilares Fine Banded. Olsen and Wasley (1956) had already been using his term and illustrate vessels (poorly again) but defer type description to Dittert, which he does in his 1959 dissertation. There he states that Pilares Banded and Pilares Fine Banded are two types that previously had been lumped as Pitoche Rubbed-ribbed by Mera. Dittert separates them, based on "fillet" widths, and the two are said to exhibit temporal differences. But then Dittert's types and cultural phases are all rather poorly dated, relying on pottery cross-dating. More recently, Marshall (Marshall 1980; Marshall and Walt 1984) resumes and expands on the use of Mera's Pitoche nomenclature with no mention of, or comparison with, Dittert's Pilares types. In addition, in Marshall and Walt's tables there is a plethora of inconsistent terms describing various surface texturing treatments. So the brown ware ceramic situation is confused, and not at all well dated. Work is clearly needed here.

Central and Upper Rio Grande Areas (RG2-8), A.D. 1000-1350.

This period is shown on Chart 4. Red Mesa Black-on-white is a carry-over, but its occurrence spread over essentially all the Rio Grande Region, if not as an indigenous ware then at least as a trade ware. Along with it go a variety of utility wares, either textured gray wares or brown wares, and the typology of the gray wares is as confused as that of the brown wares. This seems a shame, as there certainly seems to be a broad chronology of surface textured styles...and pastes are of diverse composition. The variation in these characteristics surely contains temporal and spatial information. But until the details are worked out, the utility wares of the Rio Grande Region remain rather useless except in a very broad way.

During the 11th and 12th centuries, Gallup Black-on-white was probably being produced in the more westerly districts of the Albuquerque-Puerco area and exported to the other districts and other Rio Grande areas. At the same time, Kwahe-e Black-on-white became the dominant paint decorated type produced in all but the most northerly and southerly Rio Grande areas. Clearly a Rio Grande type, it marks the start of a
succession of types whose paste is unique to the Rio Grande Region and whose styles progressively became Rio Grande in nature. But influence from the west and northwest remained strong. Chaco Corrugated continued to dominate the utility ware frequencies on the Puerco side of the Albuquerque-Puerco area. A late version of Chaco-McElmo Black-on-white, called San Ignacio Black-on-white here and in early unpublished records at the Laboratory of Anthropology, accompanied it, particularly in the mid-13th century but possibly earlier and later as well. (See Bice and Sundt 1972, for a description; it is called Chaco-McElmo but the name must be changed in view of Winde's definitive 1985 work on Chaco-McElmo. San Ignacio is suggested for this late version of Chaco-McElmo.)

In the closing decades of the 12th and opening decades of the 13th century a change from mineral paint to carbon paint marked the shift from Kwae-e to Santa Fe Black-on-white. Pit houses gave way to surface pueblos east of the Puerco, and sites became more numerous. St. Johns Black-on-red and Polychrome, particularly the latter, occurred relatively frequently, even though virtually all of it was probably imported.

As the 13th century drew to a close, a number of ceramic developments occurred, all of them pointing toward strong influence from the west and northwest, if not immigration from there. Mesa Verde Black-on-white (see Chart 2) appears on sites from this period. At the same time or slightly later, local varieties of Mesa Verde appeared, such as, but not necessarily limited to, the Jemez variety (Sundt 1984). In addition, a variety of Vallecitos Black-on-white reached a peak of popularity in the mid-14th century in the Upper Jemez area (its dating is now supported with dendro data). Closely related technologically to Vallecitos is Rowe Black-on-white, a type localized in the Upper Pecos Area (it was the first of the sand and siltstone tempered, silty clay pastes characteristic of the area for the next several centuries). It seemed to start about A.D. 1300 and lasted to perhaps 1380, but is very poorly dated. Its similarity to Vallecitos suggests a tie between these two areas in which the Spaniards later found related Towa-speaking people.

Wiyo Black-on-white's period of production began, and as the 13th century closed a couple of westerly varieties of Galisteo Black-on-white (very poorly dated) came into existence; a Jemez Variety and a silty clay variety (not charted) from the Puname (Zia) district. Both are believed to have been very localized developments just preceding the start of voluminous production of Galisteo Black-on-white in its home area in the Galisteo Basin during the 14th century (see Chart 5). There were probably other such localized developments, waiting now to be identified, marking the fluid nature of the times. How important such developments might have been remains to be determined.

As the 13th century closed and the 14th started, another development occurred that was to have far-reaching consequences. Importation of St. Johns Polychrome was gradually replaced by Heshotauthla Polychrome (Chart 5) and, responding to their popularity, local potters started making a variety of local imitations that are included under the name of Los Padillas Glaze Polychrome. When these efforts became more refined, the result was the Arenal Variety of Los Padillas. This can be considered the first of the Rio Grande Glaze Ware types, a tradition that would come to dominate the central and southern areas for the next four centuries.

Central and Upper Rio Grande Areas (RG2-8), A.D. 1350-1700.

This period is shown in Chart 5. The early decades of the 14th century were still black-on-white pottery times, the coming popularity of glaze paint decorated red wares not having risen above the novelty level. Galisteo Black-on-white dominated the first
two-thirds or so of the 14th century, accompanied by lesser amounts of two poorer quality types, Poge and Pindi Black-on-white, particularly in the Galisteo-Santa Fe area. Then toward the end of the century, several varieties of Galisteo Black-on-white appeared, each probably of short duration, such as the Kendi Variety, which Schaafsma (1979) dates between 1360 and 1390. But by then, black-on-white was "out" (except in the Jemez and northern Tewa and Tiwa districts) and the "in" thing was glaze painted redware.

The span of production for Agua Fria Glaze-on-red in the central and upper Rio Grande areas under discussion covered the latter two-thirds of the 14th century, as did the minor flared rim variants Sanchez Glaze-on-red, Glaze-on-yellow and Glaze Polychrome, and the northern white slipped variety of San Clemente Glaze Polychrome. Contrary to some recently published date charts (e.g., Warren 1979) Cieneguilla Glaze-on-yellow did not start to be produced until about 1375, as is shown by excavation (e.g., Las Madres per Schaafsma 1979; Tijeras per Judge 1974) and survey information at numerous other sites where it was found to follow the advent of Abiquiu Black-on-gray rather than precede it.

In the Tewa districts (most of the Chama-Upper Rio Grande Area), Abiquiu Black-on-gray, or Biscuit A, marks the start of a sequence of types closely associated with the Tewa. This sequence began at about the same time that production of the Jemez Black-on-white started in the Upper Jemez River area, but Jemez Black-on-white continued to be made with little change for three centuries, whereas Abiquiu Black-on-gray gave way to Bandelier Black-on-gray just before the middle of the 15th century, to be followed sequentially by other types to be dealt with later. In the glaze ware areas, these northerly and mountainous black-on-white, gray or cream-colored types show up occasionally as obvious trade wares. Other trade wares of the 14th century that are
**Chart 5. Central and Upper Rio Grande Areas (RG2-8), A.D. 1350-1700**

<table>
<thead>
<tr>
<th>Type</th>
<th>A.D. 1300</th>
<th>1400</th>
<th>1500</th>
<th>1600</th>
<th>1700</th>
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<tr>
<td><strong>FREQUENTLY ENCOUNTERED TYPES</strong></td>
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<tr>
<td>Galisteo B/W, classic variety</td>
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<tr>
<td>Pindi B/W and Poge B/W</td>
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<tr>
<td>Sanchez G/R, G/Y, and G-Poly.</td>
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<tr>
<td>Galisteo B/W, Kendi Var.</td>
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<tr>
<td>Agua Fria B/W, northern varieties</td>
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<tr>
<td>San Clemente G-Poly., northern white slipped var.</td>
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<tr>
<td>Cieneguilla G/Y</td>
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<tr>
<td>Largo G/R [B rim]</td>
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<tr>
<td>Cieneguilla G-Poly.</td>
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<tr>
<td>Largo G/Y, G-Poly. [B rim]</td>
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<tr>
<td>Espinoso G-Poly. [C rim]</td>
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<tr>
<td>San Lazaro G-Poly. [D rim]</td>
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<tr>
<td>Jemez B/W</td>
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<td>Puaray G-Poly., G/W, G/R [E rims]</td>
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<tr>
<td>Pecos G-Poly. [E rim]</td>
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<td>Kotyiti G-Poly, G/Y, G/R [F rims]</td>
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<tr>
<td><strong>LESS FREQUENT TYPES</strong></td>
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<tr>
<td>Heshotauthla Poly. and Jeddidito B/Orange</td>
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<tr>
<td>Kwakina Poly.</td>
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<tr>
<td>Abiquiu B/Gray</td>
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<td>Pinnawa G/W</td>
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<td>Kechipawan Poly.</td>
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<td>Bandelier B/Gray.</td>
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<tr>
<td>Jeddidito B/Yellow. (less Awatobi B/Y)</td>
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<td>Sikyatki Poly.</td>
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<tr>
<td>Sankawi B/Cream</td>
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occasionally observed came from the west, such as Kwankina Polychrome and Pinnawa Glaze-on-white from the Cibola-Zuni area.

The 15th century was marked by a shift in the glaze wares from plain rimmed bichromes to thickened rims and/or polychromes: Cieneguilla Glaze Polychrome; Largo Glaze-on-yellow, Glaze-on-red, Glaze Polychrome; and Espinoso Glaze Polychrome, the late Group A, Group B and Group C rim profile types. The bulk of these types, especially in the Upper Pecos, Galisteo, Cochiti, and Pajarito districts exhibit glaze-outlined, red-colored motifs on the bowl exteriors and jar necks, all on a yellow or light gray background. To the west and south, the light-colored slip clays were not so readily available and orange or light red equivalents are found.

The end of the 15th and start of the 16th centuries marked a shift toward still fatter rims and more muted background colors, as well as changes in design style. San Lazaro Glaze Polychrome (the D and glaze IV rims) dates from about A.D. 1475 to 1515 or as late as 1696 (depending on who is doing the sorting) and Puaray Glaze Polychrome, Glaze-on-white, Glaze-on-red (the E rims) date from about A.D. 1515 to 1650. The interaction of taxonomy, dating and production centers has led to a certain amount of confusion about what was going on during this time, but the terminal types of the 17th century are fairly distinct: Pecos Glaze Polychrome with its fattest of all the E or glaze V rims and a distinct cream-colored slip, and the high straight F rims angling up from the bowls with runny glaze decorations that mark the Kotyiti Glaze Polychrome, Glaze-on-yellow and occasional Glaze-on-red vessels. In the north at least, Kotyiti spanned the 17th century and lasted for a while into the post-revolt 18th century, but it was soon replaced by later historic wares.

One late type, not plotted, is Yunque Glaze Polychrome. It was proposed as a type at the Eighth Southwest Ceramic Seminar by Florence Hawley Ellis based on her work at Yunque near San Juan Pueblo. Her description was given briefly by Warren and Snow (1976) as "a variant of San Juan Red-on-orange, a historic type made, presumably, at San Juan Pueblo. The addition of glaze decoration may have occurred during the brief period from A.D. 1550 to 1660. It is locally restricted to the Espanola Valley, apparently, although its distribution and frequency are not known." The author is unfamiliar with this type and the above seemed too brief to admit the type to the present compilation.

Southern Rio Grande Areas (RG7,9), A.D. 1350-1700.

While making her landmark study of the temper in glaze-decorated pottery from all over the Rio Grande Region, Shepard (1942) uncovered what appeared as a serious chronological discrepancy in the glaze ware sequence of types in the southern areas compared to that in the north, where all the tree-ring data was obtained. Her observation seems not to have caused much reaction. The prevailing assumption that glaze F was preceded by E, E by D, D by C, and C by either B or A was not challenged until recently when excavation of Mound 7 at Gran Quivira was undertaken by the U.S. Park Service under Al Hayes' leadership (1981), and both excavation and survey were undertaken in the Piro, or Socorro, area of the lower Rio Grande Region (Cordell and Earls 1984; Marshall and Walt 1984). Shepard's questioning of Mera's 1940 extension of the northern Rio Grande's supposed glaze sequence to the southern Rio Grande area has been reinforced by these and other studies. Indeed, the chronology of glaze types in the south differs significantly from the north, and even there the idea of a rigid sequence has come under fire, particularly in the 16th and 17th centuries (Dick 1965). It now seems the lettered rim groups overlap appreciably, rather than being
FREQUENTLY ENCOUNTERED TYPES.

A.D. 1350-1700

**CHUPADERO B/W**

*Agua Fria G/R, southern varieties*

Medio G-Poly.

*San Clemente G-Poly., southern or orange variety*

Pottery Mound G-Poly.

*Espinoso G/R, incl. Abo Variety [C rim]*

San Lazaro G-Poly. [D rim].

*Puaray G-Poly., G/W, G/R [E rims]*

Escondido G-Poly. [Socorro E variant]

Tabira B/W

*Kotyiti G-Poly., G/Y [F, Lemitar or Socorro late variant]*

Salinas Red

Tabira Plain

Tabira Polychrome

*Kotyiti G/Y, G-Poly., G/R [F rims (incl. Jornada variant)]*

Polvadera G-Poly. (exists?) [F rim, poly on red]

LESS FREQUENT TYPES (besides northern glazes)

Heshotauthla Poly. and Jeddito B/Orange

Lincoln B/R

Kwakina Polychrome

Pinnawa G/W

Abiquiu B/Gray

Bandelier B/Gray.

Jeddito B/Yellow. (less Awatobi B/Y)

Sikyatki Poly.

Sankawi B/Cream.
in a rigid sequence. But it may be that a stylistic sequence of some other sort exists within the wares of each production center. It just could be that our rim-based typology cannot illustrate the situation correctly. It is this author's opinion that the whole matter of the types of the 16th and 17th centuries needs to be critically re-examined.

As regards the southern area, the current situation is plotted on Chart 6. Here, black-on-white decorated wares never really went out of style, at least not in the Humanas district around Gran Quivira. Chupadero Black-on-white continued in production during the 13th, 14th, and 15th centuries, when it was gradually replaced by Tabira Black-on-white, Tabira Plain and Tabira Polychrome. This sequence terminated when the district was abandoned in 1672.

The glaze-paint-decorated wares started here, as elsewhere, with Agua Fria Glaze-on-red, at first largely imported from the Albuquerque district (sherd tempered), later to be replaced by local varieties. But in the southern areas, with their red- and brown-burning clays, Agua Fria continued to be made until the end of the 15th century. Its long period of production overlapped that of the equally popular San Clemente Glaze Polychrome. This southern or orange-slipped variety was much more popular than its northern cousin. And Agua Fria also overlapped Medio Glaze Polychrome, and the variety of Espinoso Glaze-on-red produced at Abo, the only variety of the C rim group produced in the southern area. But whether the design style of all the Southern Agua Fria varieties remained static is not clear. Brody's (1964) study of the pottery from Pottery Mound demonstrates it did not there.

As the 15th century closed, the Abo and other southern potters turned out their variety of San Lazarro Glaze Polychrome for a couple of decades or so before moving on early in the 16th century to the E and F groups, whose occurrences overlapped each other late in the 16th century and during the early decades of the 17th. The group E types here are southern varieties of Puaray Glaze-on-white, Glaze-on-red and Glaze Polychrome, and the Socorro district type Escondido Glaze Polychrome. The F types are Estancia Basin varieties of Kotyiti Glaze-on-red, Glaze Polychrome and Glaze-on-yellow and the Lemitar Glaze-Polychrome and Glaze-on-yellow or Socorro late variants which were grouped under Kotyiti by the Eighth Southwestern Ceramic Seminar participants (Warren and Snow 1976). In fact, Lemitar was deleted, as was Polvadera Glaze-on-red (all being put under Kotyiti), but Polvadera Glaze Polychrome was left as a red-slipped polychrome. Yet it is not present at Abo, Quarai, or Gran Quivira (Hayes 1981), and most pottery Marshall and Walt (1984) tabulate from their surveys is "Polvadera Glaze-on-red" (they do not even list Kotyiti). It is difficult to sort out types, much less dates, so for now the relatively good data from Hayes' excavations is used for Puaray and Kotyiti glazes. A separate entry for the Lemitar (or Shepard's Socorro Late Variant) of Kotyiti is set aside for the F types with light-colored slips in the Socorro Area. A starting date for them of A.D. 1550 is based on Baldwin's 1982 work (quoted by Cordell and Earls 1984), and ends with the rounded date of A.D. 1700 for the evacuation of the Piro district during the Pueblo Revolt. And Shepard's Jornada late variant, supposedly covered in part by Polvadera Glaze Polychrome, is in fact subsumed under Kotyiti Glaze-on-red.

Salinas Red, which is simply an unslipped, unpainted glaze ware with F-shaped characteristics, dates to the 17th century before the Estancia Basin area was abandoned.

Northern glazes, distinguished petrographically for the most part, make up a variable percentage of the pottery in southern sites, more so early than late. Besides Abiquiu and Bandelier Black-on-grays, the other Tewa types are occasionally encounter-
ed. The Zuni glazes Heshotauthla Polychrome, Kwakina Polychrome and Pinnawa Glaze-on-white are listed as infrequent types, as is Lincoln Black-on-red. Another infrequent type is Jemez Black-on-white (not shown on Chart 6). Also not shown are the poorly known Acoma glazes; Marshall and Walt (1984) report seeing them in their survey work. Other very infrequent types are not shown, nor are utility types for the reasons previously stated. However, the Corona utility types were present in the Estancia Basin area until its abandonment in A.D. 1672.

Northern Rio Grande, Tewa District (Most of RG2), A.D. 1350-1750.

Although this area falls outside the principal thrust of this paper, it is useful to present in one place chronological data for these trade wares to the central and southerly Rio Grande pueblos. The types and dates are taken from Harlow (1973) and are shown on Chart 7 without further comment.

PRODUCTION CENTERS FOR RIO GRANDE GLAZE WARE

Through the petrographic work of Shepard (1936, 1942) and more recently that of Warren (1976, 1981), a number of glaze ware production centers have been identified. Still more recently, x-ray fluorescence work by Larsen and Olinger (1986) promises to identify biscuit ware centers. Production centers were typically a single large pueblo, but might have been a closely clustered group of pueblos that were using the same clay beds and rock sources for temper, giving their pottery a distinctive paste. Although it takes at least a petrographic analysis to make the identifications with certainty, some of the more distinctive tempers may be possible to recognize using only the binocular microscope. But some clay and temper sources are so similar petrographically that it takes trace element analysis to isolate them. Larsen and Olinger have been doing this successfully using x-ray fluorescence, but results have not yet been published (the work is being done by Larsen for a doctoral dissertation).

Table II outlines notable production centers isolated to date, together with brief characterizations of their unique paste and gives references for further details. This is an incomplete list; much more field and laboratory work is necessary to do the subject justice. But even this brief listing highlights the growing complexity of both ceramic production and goods distribution systems in the 15th to 17th centuries.

Albuquerque, New Mexico
Table 1. Notable Glazeware Production Centers

<table>
<thead>
<tr>
<th>Area</th>
<th>Production Center</th>
<th>Groups Made for export</th>
<th>Distinguishing Paste Characteristics</th>
<th>Temper and other References</th>
</tr>
</thead>
<tbody>
<tr>
<td>RG1</td>
<td>Picuris (LA 127)</td>
<td>D, E, F</td>
<td>arkosic sand temper</td>
<td>Shepard, 1942:247; Dick, 1965</td>
</tr>
<tr>
<td>RG4</td>
<td>Tongue (LA 240)</td>
<td>C, D, E</td>
<td>hornblende latite in orange or buff clay</td>
<td>Warren 1976:B99; 1969, 1979</td>
</tr>
<tr>
<td>RG4</td>
<td>Zia Villages (eg LA 28,374,. )</td>
<td>D to F (some)</td>
<td>diabase (ophitic var. of crystalline basalt) in red firing clay</td>
<td>Warren 1977a, 1979; (Shepard, 1942:243)</td>
</tr>
<tr>
<td>RG6</td>
<td>Pecos (LA 126)</td>
<td>V (tr. III, IV)</td>
<td>Sand or siltstones in red firing clay</td>
<td>Shepard 1942:247; Kidder Shepard '36</td>
</tr>
<tr>
<td>RG7</td>
<td>Abo (Tompiro villages? eg LA 97, 200,...)</td>
<td>C to F</td>
<td>hornblende syenite (soda diorite) in reddish brown clay</td>
<td>Warren 1981:180 (Shepard 1942:248)</td>
</tr>
<tr>
<td>RG7</td>
<td>Quarai (East Tiwa villages? eg LA 95, 381,. )</td>
<td>E, F</td>
<td>Hornblende gneiss in a dark reddish brown or a light brown clay</td>
<td>Warren 1981:182; Shepard 1942:248</td>
</tr>
</tbody>
</table>
Table 2. Some Dated Pottery Types Found in the Rio Grande Region

<table>
<thead>
<tr>
<th>Type</th>
<th>Variety</th>
<th>Best Range Area</th>
<th>Mode Qual</th>
<th>Basis Max Limits</th>
<th>References Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abajo R/O</td>
<td></td>
<td>700 to 850</td>
<td>800</td>
<td>consensus</td>
<td>Breternitz et al. 1974</td>
</tr>
<tr>
<td></td>
<td></td>
<td>MV, CB, LG</td>
<td>good</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Abiquiu B/G</td>
<td>(Biscuit A)</td>
<td>1360 to 1450</td>
<td>1420</td>
<td>inference</td>
<td>start: Schaafsma 1970, stop: Harlow 1973</td>
</tr>
<tr>
<td>Agua Fria G/R,[A]</td>
<td>northern var's.</td>
<td>1340 to 1400</td>
<td>1380</td>
<td>inference</td>
<td>Warren &amp; Snow 1976, Schaafsma 1979</td>
</tr>
<tr>
<td>Alma Plain</td>
<td></td>
<td>300 to 950</td>
<td>734</td>
<td>dendro</td>
<td>Breternitz 1966</td>
</tr>
<tr>
<td></td>
<td></td>
<td>MR, BE, BW</td>
<td>fair</td>
<td>265 - 1331</td>
<td></td>
</tr>
<tr>
<td>Bluff B/R</td>
<td></td>
<td>750 to 900</td>
<td>850</td>
<td>consensus</td>
<td>Breternitz et al. 1974</td>
</tr>
<tr>
<td></td>
<td></td>
<td>MV, CB, CP, LG</td>
<td>good</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Casa Colorado B/W</td>
<td></td>
<td>950 to 1300</td>
<td>1183</td>
<td>assoc types</td>
<td>Marshall &amp; Walt 1984; no dendro or archaeomag.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>RG9</td>
<td>poor</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Cebolleta B/W</td>
<td></td>
<td>900 to 1150</td>
<td>1067</td>
<td>stylistic</td>
<td>Dittert &amp; Ruppe 1951</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CB3</td>
<td>poor</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Chaco B/W</td>
<td></td>
<td>1100 to 1120</td>
<td>1113</td>
<td>inference</td>
<td>Windes 1984; strictly, dates apply to CBl area</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CB, RG8</td>
<td>good</td>
<td>1075 - 1150?</td>
<td></td>
</tr>
<tr>
<td>Chaco Corrugated, in Chaco Canyon</td>
<td></td>
<td>1050 to 1100</td>
<td>1088</td>
<td>dendro.</td>
<td>Breternitz 1966</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CB1</td>
<td>poor</td>
<td>1043 - 1110</td>
<td>cf in Mesa Prieta area</td>
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<tr>
<td>Chaco Corrugated, Mesa Prieta area</td>
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<td>1050 to 1260</td>
<td>1190</td>
<td>inference</td>
<td>Author's judgment, Bice &amp; Sundt 1972, and others</td>
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<td></td>
<td></td>
<td>RG8</td>
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<td>-</td>
<td></td>
</tr>
<tr>
<td>Chaco-McElmo B/W</td>
<td></td>
<td>1105 to 1120</td>
<td>1115</td>
<td>inference</td>
<td>Windes 1984, 1985; for refined definition only</td>
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<tr>
<td></td>
<td></td>
<td>CB, RG8?</td>
<td>good</td>
<td>1100 - 1150?</td>
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<tr>
<td>Chaco-McElmo, Sundt's late var.</td>
<td></td>
<td>xxxxx to yyyy</td>
<td>1252</td>
<td>-</td>
<td>Bice &amp; Sundt 1972, see San Ignacio B/W</td>
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<tr>
<td>Chupadero B/W</td>
<td></td>
<td>1100 to 1545</td>
<td>1397</td>
<td>inference</td>
<td>Hayes et al. 1981, plus Wiseman 1982 start dates</td>
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<tr>
<td></td>
<td></td>
<td>RG2, BE1</td>
<td>fair</td>
<td>1050 - 1545</td>
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<tr>
<td></td>
<td></td>
<td>RG4, RG5, RG2</td>
<td>fair</td>
<td>-</td>
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<tr>
<td></td>
<td></td>
<td>RG5, RG4, RG2</td>
<td>good</td>
<td>-</td>
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<tr>
<td>Coolidge Corrug.</td>
<td></td>
<td>1000 to 1150</td>
<td>1100</td>
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<td>Olsen &amp; Wasley 1956</td>
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<td></td>
<td></td>
<td>CB3, 4</td>
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<td>-</td>
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<td>Cortez B/W</td>
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<td>967</td>
<td>consensus</td>
<td>Breternitz et al. 1974</td>
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<tr>
<td></td>
<td></td>
<td>MV</td>
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Table 2, continued.

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<th>Type</th>
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<th>Mode Qual</th>
<th>Basis Qual</th>
<th>Max Limits</th>
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<tr>
<td>Cuyamungue B/Tan</td>
<td>---</td>
<td>1475 to 1600</td>
<td>1558</td>
<td>inference</td>
<td>1558</td>
<td>Harlow 1973</td>
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<tr>
<td></td>
<td>RG2</td>
<td></td>
<td>fair</td>
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<tr>
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<td>Kiatuthlanna? B/W</td>
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<td>883</td>
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<td>850 - 950</td>
<td>Windes 1984</td>
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<tr>
<td></td>
<td>CB</td>
<td></td>
<td>good</td>
<td></td>
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<td>Late Variety</td>
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<td>1000</td>
<td>Cl4, thrmlm</td>
<td></td>
<td>Whalen 1981</td>
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<td>BE4</td>
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<td>fair</td>
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<td>Elmendorf B/W</td>
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<td>1183</td>
<td>inference</td>
<td>1183</td>
<td>Marshall &amp; Walt 1984</td>
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<td></td>
<td>no dendro or archaeomag</td>
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<td>Escondido G-P</td>
<td>[E rim group]</td>
<td>1515 to 1650</td>
<td>1605</td>
<td>inference</td>
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<td>Warren &amp; Snow 1976, also</td>
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<td>Marshall &amp; Walt 1984</td>
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<td>1450 to 1475</td>
<td>1467</td>
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<td>Warren &amp; Snow 1976, max</td>
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<td></td>
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<td></td>
<td>limits Warren 1976</td>
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<td>Espinoso G/R,</td>
<td>[C]</td>
<td>1450 to 1490</td>
<td>1477</td>
<td>inference</td>
<td>1477</td>
<td>Hayes et al.1981; formal</td>
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<td></td>
<td>Abo Variety?</td>
<td></td>
<td>fair</td>
<td></td>
<td></td>
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<td>Exuberant Corrug.</td>
<td>---</td>
<td>925 to 1050</td>
<td>1008</td>
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<td>1008</td>
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<tr>
<td></td>
<td>CB</td>
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<td>890 - 1075</td>
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<td>Schaaafsma 1970</td>
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<td>Jemez Variety</td>
<td>?1290 to 1340</td>
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<td>inference</td>
<td>1323</td>
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<td>Gallup B/W</td>
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<td>1117</td>
<td>inference</td>
<td>1117</td>
<td>Winde 1984; strictly,</td>
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<td>good</td>
<td>1030 -1150</td>
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<td>Heshotauthla</td>
<td>Polychrome</td>
<td>1275 to 1400</td>
<td>1358</td>
<td>inference</td>
<td>1358</td>
<td>Woodbury &amp; Woodbury 1966</td>
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<tr>
<td></td>
<td>CB4</td>
<td></td>
<td>good</td>
<td></td>
<td></td>
<td>used stylistic &amp; dendro.</td>
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<td>Jeddito B/Orange</td>
<td>---</td>
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<td>1358</td>
<td>dendro.</td>
<td>1358</td>
<td>Breternitz 1966</td>
</tr>
<tr>
<td></td>
<td>CP1</td>
<td></td>
<td>fair</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Jeddito B/Yellow</td>
<td>(less Awatobi B/Y)</td>
<td>&lt;1350 to 1600</td>
<td>1517</td>
<td>inference</td>
<td>1517</td>
<td>Smith 1971; stop date</td>
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<tr>
<td></td>
<td>CP1</td>
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<td>fair</td>
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<td>from Colton 1956</td>
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<td>Jemez B/W</td>
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<td>1362 to 1657</td>
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<tr>
<td>Jornada Brown</td>
<td>---</td>
<td>900 to 1350</td>
<td>1200</td>
<td>assoc types</td>
<td>1200</td>
<td>Runyan &amp; Hedrick 1973</td>
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<td></td>
<td>BE1</td>
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<td>fair</td>
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<tr>
<td>Kana-a Gray</td>
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<td>760 to 900</td>
<td>853</td>
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<td>853</td>
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<td>CB, CP</td>
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<td>good</td>
<td>675 - 965</td>
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<td>Kana-a Gray,</td>
<td>Silted</td>
<td>900 to 950</td>
<td>933</td>
<td>archaeomag</td>
<td>933</td>
<td>Ferg 1983</td>
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<tr>
<td></td>
<td>RG8, RG9</td>
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<tr>
<td>Type</td>
<td>Variety</td>
<td>Best Range</td>
<td>Mode Qual</td>
<td>Basis Qual</td>
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<td>References</td>
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<tr>
<td>Kapo Gray</td>
<td>---</td>
<td>1650 to 1720</td>
<td></td>
<td></td>
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<tr>
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<td>RG2, 4</td>
<td>1697</td>
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<td>Kechipawan Poly.</td>
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<td>1442</td>
<td>inference</td>
<td>poor</td>
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<td>Woodbury &amp; Woodbury 1966</td>
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<td>Kotyiti G-P, G/Y, Lemitar?/south[F]</td>
<td>RG9</td>
<td>1550 to 1700</td>
<td></td>
<td>poor</td>
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<td>Kotyiti G/Y, G/R, G-P [F rim group]</td>
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<td>1600 to 1700</td>
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<td>Kwahe’e B/W</td>
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Describing the material remains left by a past population is the most basic task of archaeologists today as we attempt to address questions of culture change. During the first part of this century, description was the underlying goal of archaeological research in the Southwest, and the concern for building chronologies was its central theme (Willey and Sabloff 1974). Methods, including the Pecos Classification (Kidder 1927), stratigraphic excavation (Kidder 1924; Nelson 1914, 1916), artifact typologies (Gladwin and Gladwin 1928a, 1928b, 1930; also see Kidder 1927), ceramic and architectural seriation (Kroeber 1916; Nelson 1920; Roberts 1939; Spier 1917), and tree-ring (Douglass 1929) and radiocarbon dating (Libby 1955), were developed to order archaeological remains in a spatial-temporal framework (Willey and Sabloff 1974). A preoccupation with charts, graphs, and artifact typologies, which portrayed the developmental and geographic relationships of specific traits believed to be the hallmarks of certain cultural-temporal periods, was characteristic during this time. These area syntheses, or descriptive "cultural-historical reconstructions," were then used as the basis for comparisons between archaeological assemblages from different geographic areas.

STYLISTIC DISTRICTS IN THE ANASAZI SOUTHWEST

Using the above techniques, archaeologists have long recognized the presence of localized clusters in which stylistic attributes in decorated ceramics, architecture, and other items of material culture are similar. Plog (1979:121) notes that early researchers (e.g., Colton 1939; Gladwin and Gladwin 1934; Kidder 1924) interpreted this patterning as evidence of distinct social organizations. Ruppe (1953) developed the concept of archaeological "province" in reference to the Cebolleta Mesa area near Acoma Pueblo to convey the stylistic homogeneity of this local-
During the latter portion of the 10th century, the distribution of ceramic types became increasingly restricted, thereby facilitating the identification of local archaeological districts. Various researchers (Anschuetz 1984, n.d.; Cordell and Plog 1979; McAnany 1980) contend that this pattern of regional heterogeneity is most pronounced between late Pueblo II (A.D. 1050-1100) and Pueblo III (A.D. 1100-1325). With the beginning of Pueblo IV (A.D. 1350-1600), there is a dramatic decline in the degree of stylistic variability across the Anasazi Southwest as the prehistoric pueblos altered the structure and intensity of their social interactions (Anschuetz 1984). Plog (1979:122) defines 11 major spatial units in the Western Anasazi area, but cautions that "the strength of interaction within particular areas varied considerably" through time and that there were episodes "when dramatic events...drew populations...into stronger than usual patterns of interaction." Archaeologists working in the Eastern Anasazi area recognize another 12 to 15 districts, although not all are strictly contemporaneous (cf. Cordell 1979; Lang 1982). As indicated above, the eastern Anasazi districts reveal changing patterns of social interaction like their western counterparts. This is particularly true of the Albuquerque area during Pueblo III when it was situated on the frontier between the Socorro and Santa Fe districts. Eleven ceramic districts may be defined within the northern Rio Grande (Figure 1).

THE ALBUQUERQUE FRONTIER AS REPRESENTED BY CERAMIC ASSEMBLAGES

For late Pueblo II and Pueblo III, Lang (1982:166-167) defines three localities of "decidedly parochial styles": the Socorro and Albuquerque districts; the Santa Fe district; and the Taos district. Socorro Black-on-white, a mineral-painted ware (Mera 1935:27), is one of the major diagnostic ceramic types for this period. Dittert (1959:402, 539) contends that this pottery first appeared in the Acoma district between A.D. 870 and 950. Lang (1982:167) argues that this ware was technologically and stylistically derived from Red Mesa Black-on-white, a type that had a much broader range of distribution across the Anasazi Southwest (Cordell 1979). Although Socorro Black-on-white was initially derived from the Cibola ceramic tradition, the integration of Reserve Black-on-white and Tularosa Black-on-white design styles became central to the evolution of the ware after A.D. 1000 (Lang 1982:167). These stylistic changes were accompanied by the introduction of the Pilares Banded, Pilares Fine Banded, and Los Lunas Smudged culinary wares to the Socorro pottery association (Dittert 1959; Mera 1935).

Lang (1982:167, 174), after Dittert (1959) argues that the strength of the "Reserve-Tularosa stylistic assemblage appears to correspond to a northeastward shift of some northern Mogollon peoples" into the western Acoma highlands and the headwaters of the Rio Salado between A.D. 1000 and the early 1100s. Berman (1979:52) notes that Socorro Black-on-white sherds are among the dominant Pueblo II and Pueblo III decorated wares in the Ladron and Stallion Planning Units of the BLM Socorro Resource Area at the northeastern quadrant of the Socorro stylistic district. A recent inventory survey in the lower Rio Puerco drainage (Eidenbach 1982) further emphasizes the importance of Socorro Black-on-white and its associated culinary wares in Pueblo II and Pueblo III ceramic assemblages. These data support Lang's (1982) suggestion that the production area of Socorro Black-on-white during Pueblo III ultimately extended along the Rio Puerco and Rio Salado drainages west of the Rio Grande.

The influence of the northern Mogollon culture area on the Albuquerque ceramic assemblage up to A.D. 100 is manifest by the diversity of trade
wares from the south, e.g., pottery types included within the San Marcial Complex (Mera 1935), and locally produced stylistic cognates of Mogollon wares, such as Corrales Red (Frisbie 1967). The continuation of these ties is reflected by the appearance of Socorro Black-on-white in the northern Rio Grande region as an intrusive ware at ca. A.D. 1100 (Warren 1980:155). Lang (1982:174) states that this pottery type was produced in the Albuquerque area by the end of the 12th century. The associated brown ware assemblage, composed of Los Lunas Smudged bowls and the two varieties of Pilares Banded ware, further reflects the continuing importance of social ties with populations to the south (Warren 1980.)

The pottery recovered from the Coors Road Site (LA 15260), a mid-Pueblo III pithouse village partially excavated by the Museum of New Mexico, Laboratory of Anthropology (Sullivan n.d.; Vierra 1985), conforms to the Socorro Black-on-white ceramic association. Preliminary temper analyses (Warren 1985) indicate close affiliations between the residents of the site and populations residing in the Socorro District. Warren (1985:4-5) suggests that the mica schist found in brown wares at the Coors Road Site may have been obtained from either Precambrian outcrops at Ladron Mountain or in the Tertiary period Ortiz gravels of the Santa Fe Formation that extends along the Rio Grande Valley. Warren then cites the use of hornblende latite and rhyolite tuff tempers, which are known to occur in outcrops of the Datil Formation near the confluence of the Rio Salado and Alamocito Creek drainages in the north-central Socorro District, in Socorro Black-on-white sherds to corroborate this supposition.

Steve Post (personal communication 1986) alternatively argues that some of the mica schist-tempered gray and brown utility wares from the Coors Road Site may also have been obtained through trade with groups residing in Tijeras Canyon. Outcrops of this metamorphic rock are reported in the Tijeras area (Warren 1980), and Socorro Black-on-white and Los Lunas Smudged are known to have been produced within the canyon at this time (Warren 1980:155). Although the precise location(s) of the manufacture of the gray and brown utility sherds recovered at the Coors Road Site will remain unidentified until systematic examination of the various mica schist outcrops in the Socorro and Albuquerque areas are completed, Warren (1985:7) nevertheless asserts that the pottery recovered from the site may "represent a coherent assemblage" and she suggests that "for this reason, it seems likely that the inhabitants of the Coors Road Site brought the pots with them."

In the region north of Albuquerque during early and mid-Pueblo III, Anasazi ceramics are dominated by Kwahe'e Black-on-white. Whereas Mera (1935) suggests that this mineral-based ware was a copy of western Cibola pottery, others (Gladwin 1945; Kidder and Sheppard 1936) believe it to be stylistically related to the pottery rather than being produced in the northern San Juan region. Although Kwahe'e Black-on-white sherds at the southwestern and southern limits of the ware's range share some stylistic characteristics with Cebolleta Black-on-white (Dittert 1959) and Socorro Black-on-white (Land 1982), it is significant that the degree of this influence decreases as one moves north from the present site of Albuquerque to the Santa Fe district boundary. Lang (1982:175) reports that this pattern closely corresponds to the distribution of Socorro Black-on-white as a common trade ware.

Late Pueblo III in the northern Rio Grande is marked by a technical change in black-on-white decorated ceramics involving the switch from mineral to carbon-based paints throughout much of the region (Wendorf 1954; Wendorf and Reed 1955). The diagnostic ceramic type for the period is Santa Fe Black-on-white, the ware it replaced (Dickson 1979). In addi-
tion, many of the ceramics dating to late Pueblo III in the northern Rio Grande, most notably Santa Fe Black-on-white, technologically and stylistically resemble wares, such as McElmo Black-on-white and Mesa Verde Black-on-white, manufactured in northwestern New Mexico (Cordell 1979; Lang 1982; Warren 1980). Lang (1982:176-177) reports that available data indicate the western Jemez district as the center for these changes.

Many archaeologists interpret the appearance of these carbon-painted wares, coupled with abrupt increases in the number, size, and distribution of permanent year-round habitation sites, as evidence of the immigration of populations from the San Juan Basin (Bice and Sundt 1972; Eggan 1950; Hewett 1953; Mera 1935, 1940; Reed 1949; Stubbs and Stallings 1953; Wendorf 1954; Wendorf and Reed 1955) and the Gallina district (Ford et al. 1972; Lang 1982; Robinson and Warren 1971), which were concurrently undergoing the process of abandonment by Anasazi agriculturalists.

Lang (1982:178) notes that the southward diffusion of carbon-based paint technologies into the Albuquerque district resulted in a mixing of Socorro and Santa Fe ceramic technological and stylistic assemblages during late Pueblo III. Hammack (1966:11) reports that the blending of Socorro Black-on-white and Santa Fe Black-on-white at the Tunnard Site (LA 6868), a late Pueblo III artifact scatter located on the Sandia Reservation, "produced sherds with carbon paint and typical Socorro Black-on-white designs and surface treatment; sherds with mineral paint and Santa Fe Black-on-white designs and surface treatment; and other examples which range between these two extremes."

Shifts in patterns of social interaction within the Albuquerque district during late Pueblo III are also visible in Tijeras Canyon (Anschuetz 1984; Cordell 1980; Warren 1980). For most of the A.D. 1200s, Tijeras populations apparently maintained close affiliations with the central Albuquerque district and the Socorro area. However, excavations at the late 13th century communities of Dinosaur Rock (LA 14857; Oakes 1979) and Coconito Pueblo (LA 10794; Wiseman 1980) yielded ceramic assemblages that were tightly linked with the Santa Fe district. The dominant local decorated ware recovered from these sites consists of a hybrid Santa Fe/Wiyo Black-on-white.

Although these pottery data suggest an increased emphasis on social affiliations with the Santa Fe district, the previous trade ties the Albuquerque and Socorro districts were not completely neglected. Socorro Black-on-white and Los Lunas Smudged are present at Coconito Pueblo and Dinosaur Rock as trade wares, which were most likely imported from the vicinity of Albuquerque (Wiseman 1980). Warren (1980:156) reports that 14% of the Coconito utility sherds are tempered with a welded tuff that occurs only in the Datil Mountains of the northern Mogollon region.

It is also of interest that 3% of the Coconito Pueblo ceramic assemblage is composed of St. Johns Black-on-red, St. Johns Polychrome, and other White Mountain Red Wares, which were obtained from the area west of Zuni (Wisemen 1980). Snow (1982) notes that the frequency of the White Mountain Red Wares increased greatly in the late 13th century and that their distribution was largely confined to areas south of Santa Fe. These data suggest that the reorganization of social ties between the Albuquerque district and its neighbors was of radical proportions. By the end of Pueblo III, Albuquerque was no longer on a frontier between two competing social groups; rather it had come to occupy a central location with respect to the large-scale reorganization of the regional Anasazi cultural system that emphasized the maintenance of strong social ties across broad geographic areas (Anschuetz 1984).
A CULTURAL-ECOLOGICAL ASSESSMENT OF STYLISTIC DISTRICTS IN THE NORTHERN RIO GRANDE

Whereas previous archaeological research has succeeded in documenting shifting patterns of local and regional interaction through time, processual explanations for these changes have only begun to be developed. The underlying purpose of this paper is to address why stylistic districts emerged and subsequently reached their pinnacle between A.D. 1050 and 1300 or 1325. Central to this discussion is the proposition that culture is a complex system in which human behavior is articulated with both natural and cultural environments. The appearance and elaboration of identifiable districts within the Anasazi Southwest are examined from the perspective of territorial boundaries, in which local populations attempted to retain control of limited subsistence resources, including arable land, wild plants, and animals. The following explanatory model uses available dendroclimatological reconstructions (Jorde 1977; Rose et al. 1981) and recent studies of organizational changes in Anasazi trade and exchange systems (Anschuetz 1984, n.d.) to assess Pueblo III subsistence and settlement around Albuquerque and the changing role of the district within the regional cultural system.

Precipitation Patterns and Anasazi Adaptive Responses

Examination of a dendroclimatological study of five widely dispersed localities across the Southwest (Jorde 1977; also, see Dean et al. 1985; Euler et al. 1979) suggests that changing precipitation regimes may have positively influenced the development of the trend toward increased stylistic variability during late Pueblo II and Pueblo III. Jorde uses spectral analysis of variance in tree-ring width to argue that regional precipitation patterns between A.D. 750 and 1049 were characterized by short-term (high-frequency) cycles of periodicity, each of which averaged only two years in duration. In addition, this time span is characterized as a period of low effective moisture and low spatial variability in climate (Dean et al. 1985). Dean et al. argue further that a severe cycle of floodplain downcutting occurred between A.D. 750 and 950.

As I have maintained elsewhere (Anschuetz 1984, n.d.), these climatic patterns, coupled with increasing regional population densities, would have threatened the survival of some Pueblo I and early Pueblo II groups, particularly those in the barren lower elevations of the central San Juan Basin. Simply put, the greater numbers of people would have increased competition for limited subsistence resources and reduced group mobility as the natural environment became filled. The prevailing rainfall pattern would have heightened agricultural risk by adversely affecting plant productivity and reliability. Low spatial variability in climatic conditions further selected against population movement: because more localities in the Anasazi Southwest equally suffered the qualitative affects of these climatic conditions, there would have been few viable outlets for migration.

To reduce their subsistence risk, Pueblo I and early Pueblo II populations were forced to intensify their agricultural practices to buffer against potential shortfalls in local natural productivity. On the one hand, an increased dependence upon farming entails tremendous social costs to the cultural system. Greater amounts of labor are required to clear fields, plant, tend crops, gather the harvest, and store the produce (Anschuetz 1984 n.d.). These increased labor demands and the need to maintain the filled storehouses, in turn, further reduced group mobility. On the other hand, the unpredictability of rainfall during Pueblo I and early Pueblo II selected against subsistence
specialization, such as that described for the intensification of agriculture (Jorde 1977). To rely exclusively on farming under these circumstances would have entailed the acceptance of unnecessary risk, because of the threat of crop failures. That is, agricultural intensification, such as the development of water and soil conservation technologies, could not fully reduce the effects of short-term rainfall periodicity cycles and high year-to-year variance in precipitation. Although Anasazi populations continued to intensify their farming efforts between A.D. 750 and 1049 (Plog 1979), I argue that it was also necessary for local groups to have retained access to a broad geographic area to meet their long-term subsistence needs.

Access to a broad territory would have fulfilled two functions. First, the incorporation of a variety of environmental settings would have offered the Anasazi farmers flexibility in the selection of field locations. Floodplains along permanent drainages, with their high water tables and alluvial soils, would have been among the potentially most productive farming locations in the Southwest. These settings, however, are subject to the adverse effects of stream entrenchment, which lowers water tables, and the increased risk of periodic, sometimes unpredictable, environmental deviations. They include episodes of prolonged flooding during heavy spring runoff, violent short-term flooding following intense rainfalls, and frost damage resulting from cold air drainage patterns characteristic of lower elevations. Arable lands in upland settings would have provided buffers against these problems, as well as allowing the Anasazi farmers to disperse during favorable periods of rainfall to dry farm and postpone further agricultural intensification in the floodplains (Anschuetz 1984; n.d.).

Second, access to broad geographic areas would have been important for the procurement of wild plants and game animals. The observation that the floodplains, in comparison to the adjacent upland settings, possess a limited range of resources (Cordell et al. 1984) underlines the need for an extensive home territory. Despite years of high agricultural productivity in the floodplains, it is likely that hunted and gathered foodstuffs still composed a significant proportion of the diet throughout the Anasazi sequence (Richard I. Ford, personal communication 1975; Ortiz 1969: 176). Intensified hunting and gathering efforts, in addition, could have formed another, albeit short-term, substitute for farming when agricultural crops failed. However, to ensure the long-term viability of hunting and gathering in their subsistence economy, the Anasazi had to be certain to maintain rights to a wide territory to offset differential spatial, annual, and year-to-year availability of many economically important plant and animal populations (Anschuetz 1984, n.d.).

The combination of increasing regional human population densities, the constraints of unpredictable climatic patterns, and the Anasazi adaptive responses to these natural and cultural conditions served to heighten competition among social groups for limited subsistence resources. In contrast to the central San Juan Basin, the northern Rio Grande during Pueblo I and early Pueblo II may be characterized by generally low population densities relative to the potential productivity of the natural environment. Competition, although increasing, would most likely have taken the form of nonaggressive scrambles (Nicholson 1954; Wilson 1968), which occur when two or more populations attempt to use the same resource that is in limited supply.

As discussed previously, there is a proliferation of decorated pottery types in northern Rio Grande ceramic assemblages during this time. However, the wide distribution of many of these wares from a relatively few centers of manufacture (Cordell and Plog 1979: 416) suggests that social integrative
networks still encompassed broad areas. Given the relatively low level of Anasazi farming technology before A.D. 1050, the low annual productivity of the natural environment within the prevailing climatic conditions, and the patchy distribution of most subsistence resources, it is unlikely that overt territoriality would have developed for the direct control of critical resources. Most resources exploited by the northern Rio Grande Anasazi during this early time period were not readily defensible (cf. Planka 1974:105), because they were either dispersed across a wide area or were highly mobile. Agricultural lands, which may yield localized and highly aggregated crops, are notable exceptions to this generalization.

Late Pueblo II and Pueblo III

The precipitation regime across much of the Anasazi Southwest underwent a significant shift between A.D. 1050 and 1100 (Jorde 1977; also, see Dean et al. 1985; Euler et al. 1979). These changes consisted of a lengthening of periodicity cycles to a pattern of longer term (low frequency) oscillations and a decrease in year-to-year variance in rainfall. Dendroclimato logical reconstructions from the Arroyo Hondo area in the Santa Fe district (Rose et al. 1981) demonstrate that these modified precipitation patterns persisted from A.D. 990 to 1430 in the northern Rio Grande. Jorde (1977:393) notes that a lengthening of the periodicity cycle further increases the probability of two or more sequential dry years. Anasazi populations confronted with this change would have responded with more elaborate cultural buffering mechanisms to better control subsistence resources. These buffers are believed to have included further increases in the quantities and duration of food storage, intensified agricultural practices, such as the construction of water and soil control devices, and the aggregation of population along permanent drainages (Jorde 1977:385). Jorde (1977) further contends that the decrease in year-to-year variance in rainfall would have positively influenced the adoption of an economy more dependent on agriculture, because short-term precipitation would have been more predictable. Intensified agricultural practices would have been necessary to meet the increased storage requirement of the cultural system. This greater emphasis on farming would have increased the value of limited arable resources, especially along the floodplains, as well as further reducing group mobility.

Other climatic variables also fluctuated during this period. Dean et al. (1985) report that the trends of floodplain aggradation and rising water tables, which began in early Pueblo II, continued through Pueblo III along the primary drainages of the region. The groundwater curve is uninterrupted, except for a short cycle of downcutting during the mid-A.D. 1100s that was accompanied by prolonged drought conditions. Pollen evidence indicates that effective moisture increased between A.D. 850 and 1125 or 1150, after which time it began a significant and prolonged decline (Dean et al. 1985). The time between A.D. 1000 and 1150 was further characterized by high spatial variability in climatic conditions, whereas the period between A.D. 1150 and 1300 marked the return of low regional climatic differences.

I suggest that the superimposition of cycles of increased annual precipitation, more reliable spring and annual rainfall, and favorable geomorphic conditions accompanying stream aggradation would have increased the range of settings that could be farmed successfully on at least a periodic basis. During cycles of significantly greater than average rainfall, the Anasazi would have relocated some of their populations into settings of greater elevation and latitude to dry farm or practice simple runoff-irrigated agriculture (Anschuetz 1984; Mackey and Holbrook 1978). As with the preceding climatic regime, this stra-
tegy allowed the Anasazi farmers a buffer against flooding and cold air drainage, while continued access to extensive upland areas would have been necessary to maintain the hunting and gathering sector of the subsistence economy.

Support for this agricultural diversification argument is found in the regional settlement patterns during Pueblo III. The geographic distribution of Anasazi occupation in the northern Rio Grande increases (Cordell 1979), including the first significant population of Tijeras Canyon (Anschuetz 1984; Cordell 1980; Oakes 1979; Wiseman 1980). Some of the newly founded settlements in the upland areas, e.g., Coconito Pueblo (Wiseman 1980), reveal episodes of use and abandonment that may be linked to the patterns of precipitation periodicity (Anschuetz 1984).

Alternatively, during periods of much less than average precipitation, it logically follows that Anasazi populations would have focused their seasonal agricultural activities along the better watered floodplains of the major drainages. The option to farm in higher elevations may have been substantially reduced if available farming practices could not insure the maturation of agricultural plants within the shortened growing seasons and cooler ambient temperatures (Anschuetz 1984; Mackey and Holbrook 1978). As discussed below, the occupation of the Coors Road Site (Sullivan n.d.; Vierra 1985), which also has evidence of repeated site occupation and abandonment, may reflect this floodplain farming strategy.

Underlying the above changes in Anasazi settlement and subsistence was the rapid growth in northern Rio Grande population densities through a combination of local processes (Anschuetz 1984) and the large-scale immigration of groups from the San Juan Basin (Bice and Sundt 1972; Eggan 1950; Hewett 1953; Mera 1935, 1940; Reed 1949; Stubbs and Stallings 1953; Wendorf 1954; Wendorf and Reed 1955) and the Gallina district (Ford et al. 1972; Lang 1982; Robinson and Warren 1971). This demographic shift is manifest in the archaeological record by the increase in the number and size of residential sites (Cordell 1979). The net result of these processes was greatly heightened competition for arable land, hunting territories, and foraging resources. Whereas Dean et al. (1985:543) argue that the high spatial variability in climatic conditions between A.D. 1050 and 1150 would generally "have favored if not stimulated interaction among the populations of the Colorado Plateaus," I believe that environmental conditions—both natural and cultural—within the northern Rio Grande would have actually selected for territorial maintenance (Anschuetz 1984). In other words, I contend that local populations in relatively rich resource habitats were attempting to establish overt ownership of tracts of land, and I interpret the elaboration of definable ceramic stylistic districts within the region at this time as evidence of competing social groups.

The nonaggressive scrambles described for the Pueblo I and early Pueblo II periods gave way to direct interaction competition, such as contests and territoriality (Nicholson 1954; Wilson 1969; Pianka 1974). Nicholson (1954:20) characterizes contests as competition between rivals for an amount of favorable space, which an individual or population can then appropriate for itself. Territoriality is not only defined as an overt action on the part of an individual or population against intruders of the same species, but also includes the degree to which a unit of space is used exclusively by its occupant (Wilson 1968:194).

The preconditions for territoriality stipulate that a resource be defensible and in short supply (Pianka 1974:106). Farmlands under intensified cultivation meet these criteria. First, under conditions of increasing regional population densities, agricultural lands would have become premium resources. Second, agricultural
lands, which are localized resources and may yield aggregated crops, may be defensible. This is particularly true of the lands along the major drainages, which contain the potentially most productive and well-watered soils. The reduction of short-term risk during favorable precipitation cycles would have encouraged the human populations to more closely guard their agricultural holdings.

THE ROLE OF THE ALBUQUERQUE DISTRICT IN THE PUEBLO III REGIONAL SYSTEM

Unfortunately, the study of the Pueblo III period within the Albuquerque area is limited. Published excavation reports are restricted to the Tunnard Site (Hammack 1966), and Coors Road Site (Sullivan n.d.; Vierra 1985), Coconito Pueblo (Wiseman 1980), and the Dinosaur Rock site (Oakes 1979). Frisbie (1967) provides survey data on five Pueblo III sites near Corrales. Survey data are also available for two other small pueblos with "pure" Pueblo III components in Tijeras Canyon (Anschuetz 1984; Museum of New Mexico, Laboratory of Anthropology Archaeological Site Records, 1984). Pueblo III site locations in the Corrales and Tijeras areas may be characterized as occupying settings immediately adjacent to major drainages and arable land (Cordell 1979:44; Frisbie 1967; Oakes 1979).

Another 67 transitional Pueblo III/Pueblo IV sites, which date between A.D. 1300 and 1400, have also been recorded in the Tijeras area (Anschuetz 1984; Blevins and Joiner 1977; Museum of New Mexico, Laboratory of Anthropology Archaeological Site Records, 1984). These sites include 22 small pueblos and major occupations at Tijeras Pueblo (Cordell 1977a, 1977b, 1980; Judge 1974) and San Antonio Pueblo (Dart 1980).

It is significant that none of the known "pure" Pueblo III sites reveal substantial permanent year-round occupations in the Albuquerque district during this time. As mentioned previously, the Tunnard site (Hammack 1966) is a nonstructural artifact scatter and the Coors Road Site (Sullivan n.d.; Vierra 1985) provided considerable evidence of repairs suggestive of at least four short-term episodes of occupation. Blevins and Joiner (1977) suggest that Tijeras Canyon was first inhabited on a year-round basis at the end of Pueblo III, and Wiseman (1980:148-149) interprets the presence of a kiva, which was among the first structures built at Coconito Pueblo, as evidence that the site was initially a locus of permanent habitation. Because the kiva was abandoned, new pithouses were superimposed over it, and above-ground rooms show repeated repairs of rodent-damaged floors, Wiseman concludes that the later occupation of the site was periodic. It is not until the early 14th century that large, permanent pueblos were apparently inhabited in either Tijeras Canyon or the adjacent Rio Grande Valley.

The ceramic and settlement data suggest that the Albuquerque area was an intermittently occupied northern extension of the Socorro district during most of Pueblo III. Specifically, preliminary ceramic temper analyses (Warren 1985) suggest that populations residing along the Rio Salado drainage north of Ladron Mountain periodically moved into the vicinity of modern Albuquerque.

Whereas I have previously suggested that prolonged periods of drought would have necessitated an increased focus on the well-watered floodplains, Frisbie (1967) has proposed the argument that Pueblo III settlement patterns may be explained, in part, by changes in the seasonality of rainfall, which resulted in arroyo cutting. Frisbie's supposition of stream entrenchment as a contributing factor in the observed short-term settlement shifts certainly deserves further consideration. The recent paleoclimatological reconstruction by Dean et al. (1985) describes a pattern of aggradation along the major floodplains during this time. However, there is some fluctuation in groundwater levels
along secondary streams. Whereas prolon- 
ged drought cycles might have in-
fluenced erosional cycles in some up-
land areas, the major floodplains 
could have remained agriculturally 
productive because of their stable 
high water tables even though they 
also received less rainfall. The 
periodic occupation of the Coors Road 
Site (Sullivan n.d.; Vierra 1985) may 
relate to these processes.

I believe that Tijeras Canyon and 
other piedmont settings near the Albu-
querque area would have been important 
for dispersed farming practices during 
periods of significantly greater than 
mean rainfall. There would have been 
sufficient moisture to help crops ma-
ture within the shortened growing sea-
son and cooler ambient temperatures of 
the higher elevations (Anschuetz 1984; 
Mackey and Holbrook 1978). Under con-
ditions of greater annual precipita-
tion, it is possible that the flood-
plains settings would have been inund-
dated into the late spring by heavy 
winter runoff, and a dispersal of pop-
ulations to peripheral areas would 
have relieved some of the stress placed 
on the still arable lands in the 
lower elevations. The occupation at 
Coconito Pueblo (Wiseman 1980) may re-

clect, in part, these climatic condi-
tions.

Tijeras Canyon would have also 
offered a diversity of wild plant and 
animal resources (Judge 1974; Cordell 
et al. 1984) until population pres-
sures apparently depleted some of the 
larger game animals toward the end of 
the period (Anschuetz 1984). The avail-
ability of these resources would have 
also likely been a factor in influenc-
ing the settlement of the canyon.

The overlay of Santa Fe Black-on-
white ceramic technologies and styles 
on the Socorro Black-on-white assem-
blages in late Pueblo III, the intro-
duction and rapid spread of White 
Mountain Red Wares from the Zuni area 
in the 13th century, and the first 
truly large-scale, permanent occupa-
tion of the Albuquerque district dur-
ing transitional Pueblo III/Pueblo IV 
are the result of both cultural and 
climatic variables that necessitated a 
radical reorganization of the regional 
system of social interaction. The mi-
gation of populations out of the San 
Juan Basin and the Gallina district 
throughout Pueblo III placed increas-
ing pressure on limited subsistence 
resources in the northern Rio Grande, 
and by the Great Drought of A.D. 1276–
1299 (Jorde 1977), the Rio Grande Ana-
sazi populations had passed a critical 
population-resource threshold. Local 
groups, by segmenting their natural 
and cultural landscapes into increas-
ingly discrete units, were susceptible 
to the effects that prolonged droughts 
and other periodic climatic conditions 
that would adversely affect the pro-
ductivity of local areas (Anschuetz 
1984). The need for access to greater 
tracts of land caused local popula-
tions to begin to develop social mech-

isms to counteract the growing ad-
verse affects of territoriality. I 
interpret the superimposition of Santa 
Fe Black-on-white pottery and the ad-
dition of significant numbers of White 
Mountain Red Wares in what had pre-
viously been a locality with a "de-
cidedly parochial" ceramic style (Land 
1982) as the material remnants of this 
social reorganization.

The period between A.D. 1295 and 
1335 was characterized by consistently 
above-average precipitation, espe-
cially in the spring and early summer 
(Rose et al. 1981). Tijeras Canyon 
would have been particularly attrac-
tive for agriculture under these con-
ditions. This wet cycle may have also 
influenced the western expansion of 
the Plains, which, in turn, would have 
increased the availability of bison 
along the east flanks of the Sangre de 
Cristo, Sandia, and Manzano Mountains 
(Anschuetz 1984). I believe that the 
importance of Tijeras Canyon was 
greatly enhanced by virtue of its cor-
ridor to the Plains. Albuquerque, and 
Tijeras Canyon, in particular, then 
occupied a central location with re-
spect to transportation routes that 
linked the newly productive western 
edge of the Great Plains with western 
New Mexico and the Socorro area with
its competitor, the Santa Fe district. With these links, regional social integration was reestablished to facilitate the coordinated, cooperative movement of people to available resources to decrease both the short-term and long-term subsistence risk confronting Anasazi populations.

CONCLUSIONS

This paper presents a cultural-ecological model that attempts to explain the emergence of localized clusters of stylistic attributes in material culture in the Anasazi Southwest in general, and the northern Rio Grande in particular, between ca. A.D. 1050 and 1300 or 1325. Following the work of previous researchers (e.g., Ruppe 1953), I assume that these stylistic districts represent nodes of intense local interaction. I further argue that these stylistic breaks may be examined in terms of territorial boundaries, in which local Pueblo III populations in the northern Rio Grande attempted to retain control of critical subsistence resources, including arable land, wild plants, and game animals.

From this theoretical perspective, I interpret the ceramic data as evidence that the Albuquerque area formed the northern periphery of the Socorro area until the late 13th century. Settlement data, which show limited occupation of the area including a history of repeated site use and abandonment, suggest that the arable lands within the lower elevations of the Rio Grande floodplain would have been important locations for more intensified agricultural practices during cycles of prolonged drought. During wet periods, the upland areas of Tijeras Canyon would have been important resources for more dispersed farming techniques. Under all climatic conditions, the upland areas would have offered a diverse range of wild plant and animal resources required by the hunting and gathering sector of the Anasazi subsistence economy.

By late Pueblo III, a critical population-resource threshold had been reached in the northern Rio Grande. Territoriality, which previously had been a viable short-term adaptive strategy, became maladaptive as regional population densities grew, climatic conditions generally worsened, and the need for access to a wider geographic area became increasingly critical to buffer against localized crop failures. As the system of Anasazi social ties expanded, groups in Albuquerque began to interact more closely with populations residing in the Santa Fe district to the north, while retaining their relations with the Socorro area. As a result, Albuquerque began to lose its identity as simply the northern periphery of the Socorro district.

After these changes were initiated, a sustained cycle of generally moist climatic conditions began. Together, these cultural and climatic factors contributed to the reorganization of the role that the Albuquerque area, with its increased availability of bison along the western periphery of the Plains, came to play within the regional Anasazi system. After approximately A.D. 1300, the Albuquerque district occupied a central location by virtue of its location along major north-south and east-west transportation corridors.

(1) In his overview of northern Rio Grande Anasazi prehistory, Wetherington (1968) defines zones of local interaction similar to what Ruppe had described. Wetherington, however, terms these clusters of stylistic attributes "districts". Recent discussions of northern Rio Grande prehistory (Cordell 1979; Dickson 1979; Lang 1982) have continued to designate these local units as districts. To avoid introducing confusion in the literature for the northern Rio Grande, I have used "district" in my discussion to refer to localized archaeological assemblages within the region.
ACKNOWLEDGMENTS

I thank Linda Cordell for initially helping me to pursue the problem of Anasazi territoriality during my thesis research. Without Linda's help and encouragement, I would not have learned the lessons that now underlie much of my current work. Brad Vierra and Richard Sullivan have generously shared with me their investigations at the Coors Road Site, and Steve Post has offered valuable insights into the site's ceramic assemblage.

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INTRODUCTION

The Albuquerque area contains a variety of animal habitats that differ in the species present and in the relative densities of exploitable forms. The most important are the Rio Grande Valley and the mountain-foothills. In addition, there are ephemeral water systems such as the Rio Puerco and Jemez River drainages that provide yet another set of habitats.

The number of archaeological sites with reported faunal remains is fairly small and the reports are quite variable in quality. Those from the UNM Field School/School of American Research era, such as Kuana (Sinclair 1951) and Puaray (Tichy 1939), contain only lists of the more interesting species, usually with little indication of the relative number. Information from sites excavated later may or may not be quantified and may not give an indication of how a site was sampled. When quantification is present, it may be in numbers of bones, the number of individuals—calculated by a fill level or even by bag—and the unidentified elements may or may not be quantified. When dealing with such an array of data, not to mention excavation strategies that range from testing to large scale, and rarely knowing what the collection procedures were, statements about animal use are very difficult to make. Although it is possible to make some observations on a strictly presence-and-absence basis, it is the relative use of species that often leads to more important conclusions.

The Rio Grande Valley has a very complete faunal record in terms of time depth. Early sites are represented with a sprinkling of information from later sites. It is an interesting area because there were major changes in species utilization that undoubtedly coincide with other important events. The Mountain-foothill samples are some of the largest and best documented but are lacking in time depth. Other scattered sites help to highlight the effects of the two other environments.

THE RIO GRANDE VALLEY

Coronado's chroniclers describe the Rio Grande as flowing "through a broad valley planted with fields of maize and dotted with cottonwood groves." The inhabitants were said to "have a good supply of maize, beans, melons, and turkeys in great abundance," (Bolton 1964:184). These early observations conflict with the faunal record for the earlier prehistoric sites (Table 1). Turkey is rare or absent from faunal assemblages dating before Pueblo IV times. The same is true of riparian-dependent animals, such as beaver, raccoon, muskrat, and fish. The exact nature of the Rio Grande Valley before the large-scale entrenching of the 1930s is still unresolved, a nature that faunal analysis could help clarify—but that undertaking is beyond the scope of this paper. For example, porcupine, raccoon, and even deer may have been more numerous in these assemblages had there been stands of cottonwood resembling the bosque of today.

The earliest groups of sites are the Basketmaker III-Pueblo II Artificial Leg sites west of the river at Rio Rancho. Frisbie (1967) reported an impressive list of fauna from his excavations at three of them. Recent work at two more sites and one of the same (NM 1:10:4:16 is Frisbie's Site II) adds a quantitative dimension to the list of remains. Rabbits, especially jack rabbits, are the most common forms present, but a wide range of species appears to have been commonly exploited, including sciurids (squirrels and prairie dogs), woodrats, deer, and pronghorn. Occasionally recovered taxa include turkey, quail, duck, and beaver, although the latter is often in the form of incisors and may have been used for ornamental purposes rather than as food. Turtle shell, usually from hard-shelled species, was found in most samples,
and some has evidence of having been eaten. The two Pueblo II and Pueblo III sites add few new taxa and generally indicate that animal utilization changed little, if at all. This in itself is unusual because the earlier sites appear to have been seasonally occupied quarters of nonhorticultural peoples, where ground stone is virtually absent (Albert Ward, personal communication 1986). Trough metate fragments and burned corn were found at the Pueblo III Coors Road Site (Sullivan 1986).

The Pueblo IV assemblages finally begin to compare with the Spanish descriptions. Turkey is a significant contributor at Chamisal (Linda Mick, personal communication, 1986) and at LA 677 (Bertram 1982); and was "abundant" at Kuana (Sinclair 1951). In addition, the cottontail rabbit is the more numerous of the rabbits at the Taylor Ranch Site (Stiner 1986) and at Chamisal (Linda Mick, personal communication, 1986). The number of individual jack rabbits at LA 677 only slightly outnumber the number of cottontails when calculated by bag, a procedure that tends to inflate the numbers of rarer forms (Bertram 1982). Fish appear at many of these later sites along with muskrat and raccoon, indicating an increased use of water-dependent species. Elk is more common than in the earlier sites, possibly confirming the Spanish observation of hunting and trading parties to the east (Sinclair 1951:212). The absence of mountain sheep in all later samples may suggest dwindling numbers or a shift in hunting areas.

Deer, and to a lesser extent pronghorn, are found throughout the time span, though in small numbers. Such a distribution suggests that they were present, possibly close to the river, but were never very numerous.

Differences between the earlier and the Pueblo IV faunal assemblages are consistent with increased utilization of the floodplain for agriculture, presumably with the practice of irrigation. Before such use, saltgrass flats were probably a larger feature of the riverside habitat. A biological survey of the Albuquerque area (Ivey 1957) found that jack rabbits commonly occurred in saltgrass flats of the river bottom, and cottontails were especially numerous in areas of arroyo cutting and broken terrain. Under prehistoric conditions one might expect jack rabbits to be the more abundant of the rabbits if saltgrass flats were a common feature. However, once the floodplain began to be farmed on a large scale, the resulting habitat changes would favor cottontail rabbits and account for the shift in species use. Irrigation features provided homes for muskrats, some turtle and fish species and would have allowed the spread of or increase in the availability of beaver and raccoon. The fertile floodplains would also have increased the production of corn to the extent that the domestic turkey could have been kept. Turkeys are expensive to maintain in areas where abundant natural forage is not available. Castaneda's statement that seven years of corn was harvested in a year (Winship 1896:521) suggests a surplus that could have been used to maintain large flocks.

MOUNTAIN-FOOTHILL SITES

Mountain-foothill sites with faunal assemblages were occupied later in time than those from the valley and often were multicomponent (Table 2). All but Two Dead-Juniper Village and Paa-ko are located in or near Tijeras Canyon. Two Dead-Juniper Village is a little further south at the base of the Manzano Mountains on Kirkland Air Force Base and has the most unusual assemblage. The nine-pithouse, one-kiva site produced an assemblage consisting mainly of bison remains—at least 20 to 50%—and possibly as much as 90% of the bones were from bison (Akins 1983). Four to five animals were indicated by body parts. Foot elements and rib fragments were the most common, but at least one individ-
ual was represented by other elements such as skull, thoracic vertebra, scapula and a femur. This suggests that rather than transporting meat from the Estancia Basin, people may have hunted herds of bison in the Manzano foothills at least into the occupation of Two Dead-Juniper Village, probably in the late A.D. 1000s/early 1200s. One other site, Comanche Springs, 20 mi (32.2 km) south of Albuquerque along the west side of the Manzanos, consisted of a Late Archaic/Basketmaker II bison kill-site at a spring (Hibben and Fulgham 1973), again indicating the presence of this species. Reed (1955) believed that no good evidence existed for the presence of bison in the Rio Grande Valley. Bison bones occurred in all excavated sections of Paa—ko, located east of the Sandias near San Antonio (Lambert 1954:145) and a few were found at the Tijeras Canyon sites of Coconito and Tijeras Pueblo (Young 1980).

Two Dead-Juniper Village also had remains of the usual southwest fauna—cottontail rabbit, jack rabbit, deer, and pronghorn. No turkey remains were found. Faunal information was also obtained from two other small sites (LA 14875 and Coconito). LA 14875 had a relatively small sample, but the forms present were also those found at most other sites. Compared to the later dating, large sites of Tijeras and San Antonio, Coconito had fewer artiodactyl, carnivore, and bird taxa.

Environmental differences between the mountain-foothills and the Rio Grande may account for the different faunal assemblages at sites in these areas. Only one of the mountain-foothill sites had more jack rabbit than cottontail. Cordell (1977) noted that in the Tijeras-Sandians area, suitable cottontail habitat is far more common than for jack rabbit. Cottontails were from two-to-four times as common as jack rabbits at most of the sites. Similarly, turkeys would have had natural forage and would not have been expensive to maintain and utilize for food as they would have been in the Rio Grande Valley. New Mexico turkeys eat pinyon nuts, acorns, and juniper berries in winter; flower buds, grass and other seeds, wild oats, berries, prickly pear and other fruits plus a variety of insects in summer (Schorger 1966:210). Turkey remains were found in all but one mountain-foothill site, and in relatively large numbers. More numbers and variety of carnivores are also found, reflecting their more immediate availability in woodlands. Pronghorn and deer occur in each of these sites while riparian-dependent taxa are extremely rare.

OTHER SITES

The remaining sites (Table 3) represent a number of areas and the earliest sites in the Albuquerque area. Sites BR 16 and 45 are located 11.5 and 12.5 mi (18.5 and 20.1 km) west of the river, yet are quite similar to the early Rio Grande sites in the species represented. The two rabbits, pocketgophers, and woodrats were found at both sites, and canid and pronghorn occurred at one. Boca Negra Cave, only 5.75 mi (9.2 km) west of the river, had an impressive number of bones and diverse fauna. Unfortunately, the cave was also the home of various carnivores and raptors whose daily activities added to the faunal assemblage. In addition, modern domestic animal remains were found in most levels of the fill (Harris 1968; Rhinehart 1968). These kinds of disturbances make it difficult to separate the prehistoric cultural component, yet the commonly exploited forms for the area are all represented.

Sites near Zia, one excavated by UNM in 1956 (Vyltacil and Brody 1958) and the Sheep Chute Site (Ferg 1983), produced small faunal assemblages, but both had cottontail, jack rabbit, and deer. Further south on the Rio Puerco, recent excavations at Pottery Mound (Cordell 1979) recovered a large sample of bone. While only some taxa were tabulated to the species level, cottontail was outnumbered by jack
rabbit, and both turkey and artiodactyl remains were relatively scarce. Emslie (1981), working on a sample from more extensive early excavations at the site, reported that about half of the bird remains were turkey. Unfortunately, we do not know what portion of the fauna was represented by birds. Although it is consistent with the earlier sites in the Rio Grande Valley in the species present, Pottery Mound is a large site. Fields to support such a concentration of people should have attracted cottontail rabbits and turkey, and artiodactyls should comprise more of the assemblage. If this recent sample is representative of the site, subsistence practices may have been quite different from other large southwestern sites.

DISCUSSION

Although the inhabitants of the different areas basically relied on many of the same species, it is difficult to document how the area differed in the proportions of taxa utilized. The sites are variable in the scope of work having been done there: large versus small excavations, what was analyzed—the check-list approach to earlier works compared with comprehensive screening and complete analyses, and the manner of quantification. Table 4 utilizes the quantitative information that could be gathered and ranks the frequency for the common food taxa—cottontail rabbit, jack rabbit, deer, pronghorn, and turkey. This is not an ideal form of comparison, in that some assemblages are reported in numbers, and others in MNIs. There are considerable differences in sample sizes, preservation, and breakage.

Regardless of these problems, there are some definite trends, some of which have been noted above. Jack rabbit was almost universally the most abundant taxa in the valley sites and was always followed by cottontail. In only one instance were the numbers reversed and cottontails were more numerous than jack rabbits. Compared to the rabbit frequencies, artiodactyl and usually turkey remains are rare.

The mountain-foothill sites differ from the valley sites both in the rank and the amount of turkey and artiodactyl remains. Turkeys commonly rank second (5 of 8 cases) in overall numbers. Jack rabbit is most likely to be third or fourth. Although deer and pronghorn still rank near the bottom, the numbers are proportionately much larger than in the valley sites. Identifiable pronghorn elements outnumber deer in five of the eight samples.

Sites that are neither Rio Grande Valley or mountain-foothills are more similar to the valley sites; although most have small samples, and their excavation procedures should favor the recovery of larger forms. Jack rabbits tend to be the most numerous, with artiodactyls and turkeys comprising fewer numbers.

CONCLUSIONS

The greater abundance of forms such as deer, pronghorn, and turkey in the mountain-foothill area may have been a significant factor in the settlement of the area. Compared to the valley, Tijeras Canyon has more precipitation (averaging 32.8 cm/12.9 in. versus 19.2 cm/7.6 in. in a 10-year period) but a shorter growing season (an average of 136 compared to 186 days), and less suitable land for cultivation (Cordell 1977). Under these conditions, agriculture would be a fairly risky undertaking, and we would expect more reliance on hunting and gathering (see also Anschuetz 1984 and Cordell 1977).

Animal utilization in the Rio Grande Valley appears to have remained virtually unchanged from Basketmaker III through Pueblo III; a fact that suggests little was done to alter the riverside environment. Seasonal flood-
ing of the Rio Grande and the paucity of rainfall were undoubtedly major problems; however, increasing utilization of the floodplain, probably in Pueblo IV times, may have contributed to the changes documented in the faunal record.

Albuquerque, New Mexico

Table 1. Fauna from Sites along the Rio Grande.

<table>
<thead>
<tr>
<th>period:</th>
<th>Basketmaker III</th>
<th>Pueblo I</th>
<th>Pueblo II</th>
<th>Pueblo III</th>
<th>Pueblo IV</th>
<th>Pueblo IV &amp; Historic</th>
<th>number of occur.</th>
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<td>NM 1:10:4</td>
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<td>Taylor Ranch</td>
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* analysis in progress, more taxa will be added
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# number of identifiable bones
* rough sort information
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Young, Gwen
INTRODUCTION

In September 1984, 360 chipped stone artifacts were introduced into active and inactive sandy surfaces in the dune system on the Albuquerque West Mesa. Since September 1984, at intervals of 1 to 4 weeks, these artifacts have been visited and their locations and disposition recorded. Thus a body of data amenable to the investigation of artifact behavior—the movement and disposition of artifacts—has been compiled. This paper presents both gross trends in artifact mobility and visibility gleaned through analysis and the significance of these analytic results for archaeological work conducted in dunes and for archaeology in general.

The objective of this experiment was to evaluate the degree of artifact movement under different conditions found in dune fields. This particular landform was examined to the exclusion of others because of the tremendous number of artifacts usually found in such landforms in the Southwest and elsewhere. Given this archaeological fact, I was interested in finding out how much the integrity of the prehistorically deposited assemblages had been affected by natural disturbance processes common to dune fields. I hoped to find that artifacts manifested patterned "behavior," for example, moved around in specific ways under specific circumstances. If artifacts manifest this sort of systematic behavior, then systematically validated N-transforms, to use Michael Schiffer's (1976) term for natural disturbances or "distortions" occurring after artifacts are deposited, could be constructed and used to filter out patterning introduced by the wind, rain, and gravity. Presumably, the remaining patterns would be solely referable to culture and would inform us then on very specific activities of the prehistoric occupants of a place.

The examination of this problem of assemblage integrity in active areas has obvious merit for archaeologists concerned with interpreting the cultural remains found in areas dominated by dune landforms. For example, site AS-1, located in dunes on the Albuquerque West Mesa, excavated by the Albuquerque Archaeological Society and reported on by Bice (1968), whom this conference honors, is a textbook example of a constellation of archaeological remains found in active sand. Interpretation of these remains, strata containing firepits and artifacts situated in currently and probably prehistorically active sand, could be (not that it necessarily has been) reduced to a question of how much integrity these remains have; that is, how much they have been disturbed since they were abandoned. Other appropriate questions, prompted by the results of experimental research reported on here, will be posed later.

To better understand the formation of and the impact on the integrity of archaeological deposits in arid and semi-arid areas, much experimental work has been done to define the parameters of artifact behavior in sediments worked upon by eolian processes (Barton n.d.; Barton and Bergman 1982; Beckett 1980; Cahen and Moeyersons 1977; Gifford-Gonzales et al. 1985; McPherson and Harlan 1982; Moeyersons 1978; Shelley and Nials 1983, 1986; Simms 1984; Villa and Courtin 1983). I have reviewed the results of this work elsewhere (Wandsnider n.d.) and will briefly reiterate that summary here. In short, where experimenters have used controlled experimentation and have accumulated many data points (either through monitoring a large experimental assemblage or through tracking a small assemblage through multiple "disturbance" events), they have found robust patterning in artifact behavior and can speak with some confidence about the causes of that patterning. Where the experimental control has been less than optimal and where few data points were recovered, patterning was also found, but it is not always clear what was responsible for differential artifact behavior or whether the results are due to the operation of rare or chance events.

Substantive observations pertinent
Here include 1) artifacts on very compact surfaces tend to be more mobile than artifacts on very loose substrate (Beckett 1980); 2) some artifacts on slopes, interestingly enough, tend to move downslope (Beckett 1980; Simms 1984); 3) under certain conditions, larger subsurface artifacts may migrate downward more than smaller artifacts, as observed in at least one experiment reported by Moeyersons (1978) and inferred by Barton and Bergman (1983) to explain the archaeological fact of higher artifact weights at the bottom of the stratigraphy at Hengistbury England; [however, Villa and Courtin (1983) could find no such relationship in their experimental study]; and 4) small artifacts may show more surface mobility than larger artifacts (Simms 1984).

All experimenters working with contemporary assemblages in dunes observed some amount of movement, as summarized in Wandsnider (n.d.). Beckett (1980), whose experiment was conducted in southern New Mexico during the springtime, noted movement amounting to between 0 cm/day and 8 cm/day (0 in/day-3.15 in/day); Shelley and Nials (1983, 1986), whose experiment took place in extreme west Texas during the springtime, reported an average movement of about 1.2 cm/day (0.47 in/day); and Simms, who conducted his experiment in dunes in Utah during the fall, winter, and early springtime, gives an average artifact movement of about 0.05 cm/day (0.02 in/day). Not only do artifacts in sand dunes move, they can move very rapidly as the experimental results of Beckett and Shelley and Nials indicate.

In the conclusions reached by these researchers, several common themes emerge. The foremost is that eolian processes will likely change or destroy whatever structure an artifact assemblage might have had when the prehistoric inhabitants left the site (Beckett 1980; Shelley and Nials 1983; Simms 1984). That is, activity areas, a phenomenon religiously sought for in artifact clusters by many archaeologists, will only rarely be preserved in dune contexts. Shelley and Nials (1983:55) further conclude that patterns found in eolian-active environments are as likely due to erosional and depositional processes as to cultural processes of discard and loss.

To Shelley and Nials and to Simms (1984:387), the lack of integrity in artifact assemblages in dunes means that point-proveniencing of artifacts in such contexts is not very useful. Although the archaeological record in such areas may be useful for the investigation of other questions, Shelley and Nials (1986) conclude that it cannot be used to reconstruct moments in prehistory; for these goals, which demand only general provenience information, artifacts may be located or collected within a grid system with large cell size. This is an important conclusion in many respects, and I will return later to the question of the integrity of archaeological assemblages in eolian-active environments and the methodological implications this conclusion appears to have for many archaeologists.

EXPERIMENTAL METHODS

Through continued monitoring of contemporary artifacts in the Albuquerque West Mesa laboratory during the past two years, patterning in artifact behavior referable to specific kinds of disturbance events has emerged. Because I was interested in being able to discuss gross trends in artifact behavior, it was important to ensure that whatever artifact behaviors I was observing were not due to incredibly rare events. This insurance is most easily obtained by acquiring a large number of observations on artifact location and situation, and I choose to do it by following a relatively larger number of artifacts (360) through many disturbance events (the stations have been visited at least 34 times in the past 2 years). While the desire to track the experimental artifacts at close intervals enabled me to develop a movement trajectory for each artifact, it also
meant that the study area could not be too far from Albuquerque. Fortunately, the Albuquerque West Mesa hosts several active and inactive dune fields, and I was permitted access to one of them on Westland Development property (Figure 1). In that this land is fenced, and access to it somewhat restricted, the experimental stations I have installed there have been impacted by off-road enthusiasts on only one occasion, who left a motorcycle track through a station with deeply buried artifacts.

Sites for the experimental stations were selected to allow for some variability in exposure, in substrate compactness, in slope angle, and in amount of vegetation. Table I summarizes the local environment of each station.

The artifacts used in this study were made by students of knapping from quartzites, obsidian, and chert not common to the West Mesa. They ranged in length from less than 1 cm/0.39 in to about 10 cm/3.94 in and in weight from less than 1 g/.035 oz to more than 300 g/10.58 oz. The distribution of experimental artifact length or weight assumes a left-skewed normal distribution ranging between these extremes, with a mean length of 3.99 ± 1.87 cm (1.57 ± 0.74 in) and a mean weight of 26.85 ± 84.25 g (0.94 ± 2.97 oz). Some of the artifacts were copper-plated, so that upon burial, it was hoped that they could still be located using a metal detector. Unfortunately, the close spacing of the artifacts made it difficult to detect a single artifact if it was within 10 cm (3.94 in) of either another artifact or the iron rebar at each station corner. Before the experiment, artifacts were measured, cataloged, and photocopied (to ensure identification even after the catalog number had been weathered away; following Nash and Petraglia 1984). At each station, 36 artifacts were arranged in a rectangular grid pattern with 6 rows of 6 artifacts at intervals of 20 cm/7.87 in.

Every 1 to 4 weeks, the stations were visited and the disposition (buried, near a hoof print, etc.) and location of each artifact with respect to both the vertical and horizontal datum plane of each station were measured. The vertical datum is the plane formed by the tops of the rebar at the four corners of each station defining a level plane. The horizontal datum is the 0,0 coordinate of an x,y grid system formed by a rigid measuring frame strung with fishing line at 10 cm (3.94 in) intervals. The frame is held in place on the rebar by copper pipe covers. These rebars have remained stationary since their installation. Artifact position was measured with respect to its point of introduction with a plastic cursor (ruled in centimeters) through which a plumb line passed. The plumb line was also ruled in centimeters so that elevation of the artifact with respect to the vertical data could be measured. Artifact locations were called out and recorded on a microcassette tape recorder. These measurements were later transcribed into a microcomputer file and then transferred to the University of New Mexico mainframe where SAS (Statistical Analysis System; SAS Inc. 1982) files were created. All analyses reported here were performed using SAS.

Also recorded during each visit were the elevation of the ground surface at each station with respect to the vertical plane, the amount of precipitation that had accumulated in a rain gauge at each station since the last visit, and the spacing, height, and orientation of ripples in the sand at each station. The elevation of the station surface recorded with each visit measured the net amount of erosion and/or deposition occurring at the station. Ripple height and spacing provided information on the most recent wind event to have occurred prior to the recording visit, and ripple orientation provided data on wind direction.

These latter measurements on wind and precipitation contribute information about local weather patterns, because lack of funds and security pre-
Fig. 1. Study area and experimental stations.
included the installation of a true weather station. The analysis presented here does not make use of the sand ripple data but relies on wind intensity data from the Albuquerque International Airport located about 40 km (25 mi) east of the study area (U.S. Department of Commerce 1984, 1985, 1986). I have also compiled from this source information on daily temperature means and daily rainfall amounts. Shelley and Nials (1986) comment that inclusion of weather information from the Albuquerque International Airport in an analysis of West Mesa artifact behavior is inappropriate given the extreme spatial and temporal variability in semi-arid land weather. Of course, the ideal situation would be to obtain meteorologic information from more accurate and precise on-site instrumentation, but this was impossible for the reasons stated above.

However, I was only interested in gross weather trends (presence/absence of rainfall or high intensity winds) and their impact on artifact behavior. Thus, I used weather information from the Albuquerque International Airport to augment the information from with West Mesa field instrumentation. Although the experimental stations are located at a distance from a well-instrumented weather station, rainfall at the West Mesa stations is positively correlated (r=0.78, alpha=0.0001) with rainfall recorded by the National Weather Service.

EXPERIMENTAL RESULTS

These data on artifact location and situation are still accumulating, and the analysis of the data from the past 2 years is currently underway. Some general trends in artifact behavior observed between September 30, 1984 and June 16, 1986 are given here. Table II summarizes gross artifact behavior as extracted from 12,096 measurements made on 360 artifacts. In general, for 50.8% of the observations, artifacts were recorded as buried or almost buried (they were found because I knew where to look for them). The artifacts remaining on the
surface moved an average of 2.09 cm (0.82 in) (+ 5.31 cm/2.09 in) between visits. This translates to a mean horizontal velocity of 0.129 cm/day (0.051 in/day). Some vertical change was also observed, resulting in a mean vertical velocity of 0.005 cm/day (0.002 in/day) meaning that the depth of artifacts below the datum plane increased on average by this amount each day.

In addition to the elements of wind and water, cattle and other creatures also played an active role in the movement and disposition of the experimental artifacts. I was unwilling to fence off the stations to protect them from this form of disturbance because this might have attracted vandalism. I also was interested in securing information about the impact of domestic and wild animals on surface artifact assemblages. On only a few occasions were dog and rabbit prints observed in any of the stations. The primary non-geomorphic agents responsible for disturbing the experimental artifacts are cattle. Forms of bovine disturbance experienced by artifacts include: being kicked, being stepped on such that the artifact is depressed inside a hoof print, and being otherwise disturbed by the near passage of a cow or other animal.

Table II shows artifact behavior on the basis of observed bovine disturbance. From the 403 observations made on artifacts which had been disturbed, movement is obviously greater than for those artifacts manifesting no such disturbance. Disturbance attributable to cattle appears to result in increased artifact visibility. Although 51.3% of the undisturbed artifacts were buried, only 36.7% of the disturbed artifacts were buried. This is consistent with my field impression that cattle disturbance seems to be responsible for exhuming previously buried artifacts.

Figure 2 shows gross, non-bovine artifact movement during the time for which measurements were available. Not surprisingly, mean horizontal velocity (the amount of observed artifact displacement divided by the number of days passing between visits) is highest during the spring and summer. Spring, of course, is the time of the year when high-velocity winds are more frequent and such winds affect artifact locations as well as move sand and dust, which typically cloud spring skies in this area. As discussed below, spring is also when more smaller and more mobile artifacts, when exposed by the winds, again become part of the surface system. Thus, the high mean horizontal velocity recorded during the spring is the joint result of higher levels of artifact mobility and the surface presence of more highly mobile, smaller artifacts. Table III shows that no matter the artifact size, somewhat higher mean horizontal velocities are recorded during those times when high intensity winds were reported by the Albuquerque International Airport (the threshold value of 47 km/hr [29.4 mph] is an arbitrarily chosen value to distinguish between low and high maximum wind velocities). This higher mobility is especially true of artifacts that are less than 5 cm (.20 in) in length. The very high standard deviations associated with these means, however, suggest that other factors are contributing to artifact behavior summarized by the mean.

High velocity winds do not typically occur during the summer in this area, but post-July cloudbursts are not uncommon. These spatially and temporally unpredictable events can be quite intense and it is not unexpected that artifact mobility will be higher as a result of overland flow prompted by sudden rainfall. In general, as given in Table III, artifacts showed more displacement for those times in which large amounts of precipitation were recorded at the station and the amount of displacement was largest for smaller artifacts (the threshold value of 40 mm (0.16 in) accumulated rainfall between visits is chosen arbitrarily to distinguish between low and high rainfall accumulations. This is
consistent with my impression that just after a major rain event, indicated by a raindrop-pockmarked surface and full rain gauges, I could identify specific artifacts that had been rafted downslope.

Artifact behavior is also affected by the type of substrate, i.e., the grain size and induration of sediments, lying immediately beneath the artifact. Substrate induration or density was measured with a penetrometer obtained in loan from the University of New Mexico Civil Engineering department during the summer of 1985. Shelley and Nials (1986) observe that a penetrometer does not provide reliable information on surface sediment induration due to transient qualities of sediments, such as moisture content and crusting. During the short period of time when I was able to monitor compactness of the surface sediments at the experimental stations, I did observe changes in the amount of surface induration (Figure 3). In general, the sediments at stations 7 and 8 were always much more indurated than those at the other stations, whereas those at stations 9 and 10 always were the least compact. Also, the sediments at stations 1, 2, 5, and 6 gave similar penetrometer readings and they were usually intermediate between those obtained at stations 9 and 10 and those from stations 3 and 4. Although the actual penetrometer readings themselves are probably not meaningful, they do show that the relative induration of surface sediments at each of the stations seems constant at least through the measurement period. It may be possible that sediment compactness will change with season, although this is contrary to my impressions. I have noticed, however, that the erosion occurring at stations 9 and 10 exposed a surface that is more compact, whether by virtue of higher moisture or clay content, than earlier, higher elevation surfaces at the same stations.

When artifact behavior is examined according to substrate compactness as measured by a penetrometer (see Table 3).

Fig. 3. 1985 data - Mean penetrometer readings for station dyads according to date.
Fig. 4. Percent of artifacts recorded as buried (or almost buried) according to substrate compactness and date.

I), interesting patterns emerge. Figure 4 considers artifact burial through the measurement period according to station substrate. After several months, a clear tendency for high degrees of artifact burial in those stations with loose sediments was noted and, conversely, low proportions of artifacts buried in those stations with indurated surface sediments were seen. The processes at work here were simple deflation coupled with aggradation. The surface upon which the artifacts lay was deflated and later buried by windblown sediments. The amount of deflation experienced at a specific station seemed to be limited by the erodibility of the sediments, as measured by sediment induration, and the degree of exposure of the surface to the wind. At the stations with very loose sediments, more deflation and aggradation occurred, with the ground surface falling about 15 cm (5.90 in) in April/May of 1985, rising almost 35 cm (13.78 in) in June of 1985. At stations with very indurated sediments, little erosion had occurred but some aggradation of windblown sediments buried the smaller artifacts during April/May of 1985.

This trend is further elaborated on in Table IV. Again, using only those observations with no obvious bovine disturbance, it is clear that small artifacts are more often buried than are larger artifacts. This tendency is enhanced by substrate compactness. Eighty-three percent of the artifacts less than 2.5 cm (0.98 in) in length on loose substrate were buried; in marked contrast, only 1.42% of larger artifacts on indurated surfaces were covered. This phenomenon is simply related to the fact that, given the same thickness of windblown sediment, larger artifacts will more often protrude through this layer of sediment (and therefore be visible) than will smaller, thinner artifacts.

A related pattern is that of artifact movement, considering artifact size and substrate induration. In general, artifact movement was highest at stations with very loose sediments,
less high at stations with indurated sediments, and lowest at stations with sediments having intermediate compactness. At the same time, as the size of the artifact increased, its mobility, in general, decreased. Small artifacts on loose and compact sediments showed the greatest amount of mobility, and larger artifacts on sediments of intermediate compactness showed the least amount of movement. This phenomenon was also reported by Beckett (1981), who found that in loose sediments, the wind was able to excavate the sediment from underneath the artifact, causing it to move downward and in the direction of the wind. The size of the artifact in this situation may not make an artifact more or less sensitive to the wind, because the sediments underlying the artifact are primarily being transported. On indurated surfaces, the artifact is able to sail before the wind. Thickness of the artifact or thickness standardized by artifact weight, rather than length, is probably a better indicator of the potential of an artifact to be moved on indurated surfaces.

**IMPLICATIONS**

These results reinforce previous experimental findings and point out other important trends in the visibility and mobility of artifacts. I found, for example, higher mobility for artifacts on indurated and very loose sediments, lower mobility on substrates with intermediate compactness. At the same time, these results show a tendency for smaller artifacts to be more mobile than large artifacts. There is also the not unexpected, but nevertheless startlingly consistent, relationship between an artifact's visibility and induration of the station substrate and the positive correlation between the size and visibility of the artifact.

Using locational data for just nine months, I have elsewhere (Wandsnider n.d.) discussed the impact of meteorological factors on the behavior of West Mesa artifacts, noting specifically the relatively higher artifact activity levels in springtime. When an additional year of data was analyzed, this same tendency for more artifact displacement during the spring emerged. Furthermore, somewhat higher levels of activity were found for those times when high mean winds were recorded at Albuquerque International Airport and for those times during which high levels of precipitation were recorded. These experimental results have implications for both the discovery of artifacts during a surface survey and for the analysis of archaeological remains from environments dominated by eolian processes.

The implications for the discovery of archaeological remains are fairly obvious. Although I would not say because artifacts were on the average visible only 50% of the time that surface assemblages represent only 50% of the potential archaeological record in dune-type environments, we should not be surprised to see few surface artifacts. Second, the perceived archaeological record of a place may vary just because of the season during which field work was conducted. For example, in the same place the results of a winter field season may differ dramatically from those of a spring field season because different parts of the landscape are exposed with seasonally different prevailing winds. If such variability in exposure is not taken into account, we might even be faced with interpretations of different "cultures" emerging from two surveys conducted at the same place during different times of the year.

Both of these lower level implications have higher order ramifications in terms of the sorts of questions archaeologists ask of the archaeological record. For example, any question that turns on the assumption that one can obtain either a "complete" or consistent picture of sites in a region is perhaps a poor question to ask of an archaeological record gained through surface survey. Of what predictive power is a predictive model built on survey data derived both from the spring, when scouring may expose
more of the archaeological record, and other seasons, when this type of exposure may not hold? Such data are inconsistent and so therefore the utility of the model is suspect. Similarly, settlement pattern and demographic analyses rely on a consistent picture of the distribution of archaeological remains through space. If some of those remains are differentially visible, whether by virtue of their size or because of the substrate they rest on or in, then the surface archaeological record is inconsistent. This must be taken into account by any analysis of settlement pattern or demographic growth. Kirkby and Kirkby (1977), working in the Deh Luran Plain in southwest Iran, discuss the serious implications for reconstructing population growth curves on the basis of sites dated by the presence/absence of time-diagnostic sherds, given the differential burial of older sites.

The experimentally documented effects of eolian dynamics also have implications for the conduct of cultural resources management of archaeological remains in areas dominated by eolian processes. In that the archaeological surface in such areas is in a state of flux and this flux shows systematic properties, it is not appropriate to assume that the one-time survey of an area will give us a consistent or representative picture of the kind and distribution of cultural remains in an area. Rather, the seasonal (or other temporal) component to surface stability associated with different landforms suggests that a one-time survey of an area will be anything but representative. A fruitful area of research, then, might be the continued monitoring of the evolving archaeological surface of select, isolated locales so that the surface record might be calibrated for a specific kind of landform and season.

The results reported here and those from other experiments also have general and far-reaching implications in terms of just what the archaeological record means; that is, what it can tell us, both in areas subjected to eolian and other less-destructive processes. First, the question of the "integrity" of surface assemblages is found to be somewhat misguided. Integrity is a concept that has been equated by some archaeologists with "truth" or "purity"—if archaeological remains have integrity, then they can tell us about what went on in the past. Assemblages without integrity are aggregations of artifacts for which inter-artifact spatial relationships contain little or no information about the past.

This sort of concept of integrity can only have meaning within an explicitly episodic paradigm in which what one is seeking is the reflection of past events to reconstruct an instantaneous, prehistoric "scene" (read museum diorama). It is unfortunate that much of archaeology is uncritically directed toward this kind of reconstruction, as almost all studies of artifact deposition and the natural processes that affect artifacts after their deposition show, dynamic surface processes are not confined to environments dominated by eolian processes. Indeed, it could be argued that it is in dune environments, where depositional and erosional events are frequent (compared to our lifetime), that we can best observe the effects of "disturbance" events that may happen with less frequency in other environments. However, the action of these less frequently occurring processes over hundreds or thousands of years will nevertheless affect the archaeological record in perhaps similar ways.

The natural processes that convert things dropped on the surface of the ground to buried contexts occur with frequencies varying from a few days, as in the case of eolian deposition/erosion, to many months or even years, separated by inverse periods of surface inactivity. The separation, in the archaeological record, of single episodes or events is influenced not only by the characteristics of the natural event that encapsulates it, but also by the amount of time between en-
capsulating events (Binford 1981, 1982; Ferring 1986). That is, the integrity of an assemblage is the direct result of the interaction between the frequency of artifact depositional events and natural erosional/depositional events. In dune areas, we may observe rapid deposition, where the chance of preserving a single behavioral episode is high relative to other environments. Concomitant with this deposition, however, we usually find erosion and deflation, which may collapse the remains of separate episodes into palimpsests, and may also spatially rearrange the artifacts. Although we can talk about the tendencies in artifact behavior in a general sense, we cannot know the behavioral history of individual artifacts. Yet, it is precisely this knowledge that would be required to transform an assemblage into its pre-disturbed state. Thus, Schiffer's N-transforms can be neither defined nor applied for archaeological deposits in dune areas, and very likely, in most other kinds of environments.

If we can't derive "filters" that let us remove the distortional effects of specific natural events to arrive at a true picture of specific past cultural events, what can we say about archaeological remains in dune areas? In fact, the argument could be made that what we can say is far more interesting than simplistic reconstructions. The stability or activity of surfaces, best documented through experimental work of the type reported here and showing the question of assemblage integrity to be meaningless, has very interesting ramifications for the interpretation of archaeological remains. If natural processes similar to those we see today operated in the past, and there is no reason to doubt this, then prehistoric use of a place on the landscape was probably heavily influenced in a complex and fascinating way by such dynamics. For example, consider Figure 5, in which two extreme kinds of surface stability are modeled. In Figure 5a, a very active situation is depicted, with artifacts deposited on the surface at T1. Thereafter the surface was subject to various deflational and aggradational events with stratigraphic consequences for the artifacts as given at T2 and T3. In Figure 5b, the contrasting situation of a very stable surface is given. Artifacts again were deposited at time T1 and remained accessible to the successive prehistoric occupants of the landscape who further reduced in size and perhaps in number by "mining" the original assemblage, and who also added to it (as at time T3).

These two surfaces, with contrasting amounts of stability, would interact with the ongoing cultural system in very different ways. For example, the toolkit of a mobile residential group would be very different if the group anticipated returning to a place littered with lithic material from previous occupations versus a place where such material was effectively sealed from discovery or use. (Indeed, we could postulate the existence of a positive feedback loop in the archaeological surface-culture system wherein a previously used place was returned to again and again, so that the assemblage there could be mined and picked over.) In this light, the site AS-1, which Bice (1968) interpreted on the basis of the stratigraphic superposition of several hearth features to be a sequence of short-term camps of mobile gatherers, becomes immediately interesting. In site AS-1, are we dealing with a node on the landscape that was very active and often returned to by members of a group sharing knowledge about items cached there? Or, are we dealing with a situation in which people, unrelated either by blood or by shared knowledge, were drawn to the site by its transient surface remains or by the presence of some rare commodity, like shade? Certainly, places on the West Mesa with trees are used and reused by cattle, who considerably leave behind more redolent artifacts. Inspection of the assemblage at AS-1 and a comparison of this assemblage with others in both more and less active contexts.
Fig. 5. Model of cultural deposition - surface stability with consequences for the size and distribution of artifacts; a) active and b) inactive erosional/depositional environment.
may provide information about the nature of the use and reuse of places on the landscape.

This interplay between the natural dynamics of an archaeological surface and ongoing cultural deposition presents a challenge to archaeologists working in areas that are subject to eolian processes, for it becomes clear that much of the character of an assemblage in such a place is referable to this interplay. However, an analysis of this interplay cannot be approached by considering only a single site situated on just one type of surface with one kind of activity or stability. Rather, the character of the culture-nature interaction can only be seen when many different assemblages in many different kinds of geomorphic situations are compared and contrasted.

One obvious avenue toward an understanding (or at least an appreciation) of the interaction between natural and cultural processes lies in the analysis of the history of landscape use and formation of the archaeological surface assemblages. These sorts of investigations (e.g., Camilli et al. 1987; Ebert 1986; Irwin-Williams et al. n.d.) require both detailed descriptions of mechanical (i.e., size, shape, weight) and cultural (material type) properties of artifacts and highly resolved spatial information for large portions of the landscape. Parenthetically, it has been our experience that maintaining the accuracy and precision of a grid system across expanses of undulating terrain is more time-consuming, and therefore more costly, than point-proveniencing artifacts (Camilli et al. 1987). Archaeological investigations of this sort, currently underway, rely also on middle-range research like that reported here. We must know something about the behavior of artifacts in different contemporary situations before we can interpret, in any meaningful way, archaeological assemblages of artifacts.

ACKNOWLEDGMENTS

The research presented here could not have been conducted without the intellectual assistance of Lewis R. Binford, Eileen L. Camilli, James I. Ebert, Signa L. Larralde, Jeremy Sabloff, and Phil Shelley. Mr. Alfredo Candelaria allowed me access to Westland Development land, for which I am grateful. Some support for this research was provided by Sigma Xi, the Scientific Research Society.

Department of Anthropology
University of New Mexico
Table I. Environmental attributes of experimental stations.

<table>
<thead>
<tr>
<th>STATION</th>
<th>SLOPE</th>
<th>Penetrometer*</th>
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<th>VEGETATION</th>
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<tr>
<td></td>
<td></td>
<td>Mean Rank</td>
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<tr>
<td>1</td>
<td>low</td>
<td>7.67 5</td>
<td></td>
<td>moderate</td>
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<tr>
<td>2</td>
<td>low</td>
<td>7.88 6</td>
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<td>moderate</td>
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<tr>
<td>3</td>
<td>moderate</td>
<td>13.04 7</td>
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<td>moderate-high</td>
</tr>
<tr>
<td>4</td>
<td>high</td>
<td>13.20 8</td>
<td></td>
<td>moderate-high</td>
</tr>
<tr>
<td>5</td>
<td>high</td>
<td>7.63 4</td>
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</tr>
<tr>
<td>6</td>
<td>moderate</td>
<td>7.08 3</td>
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<td>29.32 9</td>
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<td>2.61 2</td>
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<tr>
<td>10</td>
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<td>1.90 1</td>
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* Penetrometer readings range from 9 (loose substrate) to 110 (compact substrate).

Table II. Summary of gross artifact behavior, September 1984 through June 1986.

<table>
<thead>
<tr>
<th></th>
<th>OVERALL</th>
<th>BOVINE DISTURBANCE</th>
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<tr>
<td></td>
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<td>Absent</td>
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<tr>
<td>Number of Observations</td>
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<td>11,693</td>
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<tr>
<td>Percent Artifacts Buried</td>
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<td>51.3</td>
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<td>Horizontal Distance/Artifact/Visit (cm)</td>
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<tr>
<td>Mean</td>
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<tr>
<td>Std</td>
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<tr>
<td>Horizontal Velocity (cm/day)</td>
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<tr>
<td>Mean</td>
<td>0.129</td>
<td>0.109</td>
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<tr>
<td>Std</td>
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<td>0.269</td>
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<tr>
<td>Vertical Velocity (cm/day)</td>
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<td></td>
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<tr>
<td>Mean</td>
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<td>0.005</td>
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<tr>
<td>Std</td>
<td>0.100</td>
<td>0.097</td>
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</table>
Table III. Summary of non-bovine artifact behavior according to artifact size and wind intensity and precipitation, September 1984 through June 1986. First entry is the number of observations made on artifacts within a specific size class, second entry is the percent of observations for which artifacts were buried, third entry is the mean horizontal distance (cm), and the fourth entry is the standard deviation of the horizontal distance.

<table>
<thead>
<tr>
<th>ARTIFACT LENGTH (cm)</th>
<th>WIND INTENSITY (km/hr)*</th>
<th>PRECIPITATION (mm)**</th>
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<tr>
<td></td>
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<td>&gt;47</td>
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<td></td>
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<tr>
<td></td>
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<td>2.5 - 5.0</td>
<td>4095</td>
<td>2038</td>
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<tr>
<td></td>
<td>54.1</td>
<td>50.2</td>
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<td>5.0 - 7.5</td>
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<td>726</td>
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<td>35.9</td>
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<td>7.5 - 10.0</td>
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<td>221</td>
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<td>1.69</td>
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<tr>
<td>ALL ARTIFACTS</td>
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<td>3896</td>
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<tr>
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<td>52.5</td>
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<tr>
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<tr>
<td></td>
<td>4.43</td>
<td>3.24</td>
</tr>
</tbody>
</table>

* Maximum daily mean wind velocity recorded at the Albuquerque International airport between recording visits.

** Maximum rain gauge reading (of readings from 5 station dyads) or sum of precipitation recorded at the Albuquerque International Airport between recording visits.
Table IV. Summary of non-bovine artifact behavior according to artifact size and station substrate, September 1984 through June 1986. First entry is the number of observations made on artifacts within a specific size class, second entry is the percent of observations for which artifacts were buried, third entry is the mean horizontal distance (cm), and the fourth entry is the standard deviation of the horizontal distance.

<table>
<thead>
<tr>
<th>ARTIFACT LENGTH (cm)</th>
<th>SUBSTRATE COMPACTNESS</th>
<th>Loose</th>
<th>Intermediate</th>
<th>Loose</th>
<th>Intermediate</th>
<th>Compact</th>
<th>Compact</th>
<th>TOTAL</th>
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<tr>
<td>0 - 2.5</td>
<td></td>
<td>663</td>
<td>422</td>
<td>513</td>
<td>723</td>
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ARCHAEOLOGICAL INVESTIGATIONS AT THE TAYLOR RANCH SITE

BETH LAURA O'LEARY AND JAN V. BIELLA

INTRODUCTION

As with other Western cities, Albuquerque grew furiously in the decades following the Second World War. This development expanded from the valley west to the mesa and volcanoes and eastward into the foothills of the mountains. With this growth, archaeologists assumed that the prehistoric and historic communities that once dotted the Middle Rio Grande Valley have been lost to the new high rises and residential and industrial complexes.

The 1970s and 1980s have brought a renewed and intensified archaeological interest in Albuquerque's prehistory and history. Also there has been an inherent assumption by archaeologists that although prehistoric peoples may have utilized the floodplain of the Rio Grande, their sites have been totally destroyed or deeply buried by the river's cyclical flooding. This assumption has been most critically challenged by Sargeant's work in the Los Ranchos area on the east side of the river where she discovered a large pueblo site with earlier components within the floodplain. Our own work at the Taylor Ranch site (LA 33223), located less than one-half mile west of the present channel of the river, has substantiated the fact that archaeological sites remain preserved along the river and underscores the need for systematic survey and identification of the archeological sites that remain unrecognized and unexplored in Albuquerque.

The city of Albuquerque, in recognition of the potential for significant archaeological finds, is now considering including archaeological preservation as part of its planning process. One of the critical problems in undertaking such a program is funding. Because archaeological studies can be costly, both archaeologists and the city need to look at creative ways of financing the research necessary to preserve our cultural heritage along with promoting healthy economic development. One such answer is funding through private sources. The work described in this article was funded by a developer with a long-standing personal interest in archaeology. Though the funding was limited, the benefactor underwrote six days of fieldwork, a modest budget for analysis (including radiocarbon analysis and obsidian hydration readings) and report production; the work provided provocative and significant findings. New ways of encouraging and cultivating relationships between the private sector and the archaeological community need to be found to benefit both parties.

BACKGROUND

The Taylor Ranch Site, LA33223, is located in northern Albuquerque on the alluvial plain on the west side of the Rio Grande. The present floodplain of the Rio Grande lies 200 meters to the east. To the west is the area known as the West Mesa, a probable source of lithic raw materials. Soils at the site are in the Bluepoint loamy fine sand series with rapid permeability. Available water capacity is 4 to 5.5 inches (Hacker 1977:13). Modern vegetation is made up of various grasses (including mesa dropseed, Indian rice-grass and black grama), Russian thistle, greasewood, rabbitbrush, saltbush, and cholla and prickly pear. The eastern edge of the site is bounded by the Bosque, where there are groves of tamarisk, Russian olives and cottonwoods. Mean annual precipitation is 7 to 10 inches with a frost-free period of 165 to 195 days.

The Taylor Ranch Site was first recorded by archaeologists with the New Mexico State Highway Department in conjunction with evaluation of a proposed bridge crossing the Rio Grande at Montano Road (Figure 1). At that time the site was described as a surface scatter of basalt clasts, lithics, and ceramics and was thought to represent an early 14th century field house. In 1982 archaeologists with the Laboratory of Anthropology, Museum of New Mexico, investigated the area to assess the dates of occupation and site function (Novick 1982). The ex-
Fig. 1. Los Griegos, Bernalillo County, NM.
tent of surface materials at the site was documented at this time and a limited testing program (5 test pits, 40 auger holes) was instituted to define the depth and complexity of the site. These tests yielded over 2,800 artifacts; the majority were ceramics and chipped stone. Approximately 95% of the diagnostic ceramics were Rio Grande Glaze A wares. The test pits also revealed the presence of large amounts of burned adobe and charcoal, fragments of a collapsed adobe wall, and a possible compacted dirt floor. It was clear that the site was more than a simple field house.

Two years later, Quivira Research Center conducted limited tests and salvage in the northern section of the site in an area of on-going construction. Heavy equipment had removed the upper 75 to 100 cm of soil, revealing the lower few centimeters of several features. Work concentrated on mapping, collecting, and excavating the exposed features, which included five circular hearths, four post holes, two possible storage pits (one superimposed over the other), two burials, and a large (20 by 10 m) irregularly shaped charcoal-stained area (Condie 1984). Although the collected artifacts could not be provenied because of the previous earthmoving activities, materials dating both to Basketmaker III/Pueblo I and Pueblo IV were recovered.

From these studies, it was clear that the Taylor Ranch Site had a long occupation, with evidence of multiple features. Novick's (1982) studies suggested the presence of adobe structures in or adjacent to Montano Road. Condie's (1984) investigations documented a series of extramural features of the kind found in plazas or trash. But neither study recovered evidence of major habitation structures. The basalt concentrations, originally thought to represent one or two field houses, remained unexplained.

THE PRESENT STUDY

In 1985 Ray Graham, the private landowner of the southern portion of the site, requested that additional archaeological investigations be conducted on his lands with the goal of identifying the importance and extent of cultural materials on his property. He personally funded Archaeological Research Consultants of Albuquerque to implement a testing program. The focus of the program was to investigate the basalt concentrations and associated artifacts, to expose large areas of stratigraphy and to relocate the possible adobe structures indicated by previous testing.

In this article, we present a synopsis of the results of the testing program. A more detailed report for the project may be found in O'Leary and Biella (1986).

Field Studies

A 50 x 22 m grid system was laid out over the scatter of basalt clasts, ceramics and lithics. All surface artifacts in this area were collected in 2 x 2 m grids and the configuration of basalt clasts was mapped. Subsurface investigations involved excavation of six trenches using a backhoe, and the stratigraphy was mapped of at least one face of each profile. The trenches varied in length from 8 to 34 m, totaling 134 m (Figure 2). The intent of this work was to define the horizontal and vertical limits of the site. Hand excavations were concentrated in the eastern portion of the site where Novick (1982) had found remnants of adobe structures and high concentrations of artifacts. Eight 1-x 1-m grids were excavated by hand and screened through 1/4-in mesh. None of the dirt from the backhoe trenches was screened but cultural materials were randomly sampled and noted in the field.

Trench Profiles

Extensive detailed observations and profile illustrations were completed for all hand-dug and backhoe trenches and can be found in O'Leary and Biella (1986). A representative sample is presented in this report.

Hand-excavated trenches were grid-
Fig. 2. Map showing details of Taylor Ranch Site.
ded into 1 x 1 m squares. They were first excavated in arbitrary 10 cm levels but were changed to reflect natural stratigraphic units. All cultural materials were bagged and catalogued by grid and level. In Trench 2, North Wall (Figure 3), adobe concentrations thought to represent either roof or wall fall were found. These churls of burned pink adobe had impressions of lattias and small branches. An attempt was made to delineate any walls of the adobe component. With the exception of possible wall fall in stratum 3 of grids L and P, no walls were located. These grids served as the control for subsequent backhoe trenches.

Trench 5, North Wall, is representative of the strata throughout the site (Figure 4). Stratum 5 contained the majority of artifacts and consisted of compact sands interrupted by pockets of charcoal. Flotation samples were also taken. The trench bisected the surficial L-shaped configurations of basalt clasts. A radiocarbon sample was taken from a hearth and dated to 1130+ 100 years B.P. Although this hearth was early, a second hearth at a slightly higher level was associated with a turkey bone and Agua Fria Glaze I red sherd. The lowest level consisted of silty clay grading into red clay. This red clay layer underlay the entire southern and eastern section of the site.

Summary of Stratigraphy

The entire site was covered with a loose, yellow brown, loamy fine sandy topsoil, which varied in depth from 10 cm to 60 cm. This soil is in the Bluepoint series, which is excessively drained soils that form in sandy alluvial and aeolian sediments on alluvial fans and terraces (Hacker 1977). This is underlain in most areas by moderately to highly compacted sands. In the southernmost trench (Trench 7) the topsoil covered a layer of red clay devoid of any cultural artifacts. This clay layer was also observed in the southern end of Trench 4 and a small pocket of clay was found in the east end of Trench 8. This represented the easternmost trench and the farthest downslope that was tested. The red clay deposits so clearly seen in Trenches 7 and 8 were probably an old river bank, which had once deposited the clay and silt in the more slowly moving water. This could have occurred with both seasonal flooding and run-off (Knight, personal communication 1985). Before flood control devices were constructed, the river had many braided river channels that changed both sides of the river with each springtime flood by washing out old soil and depositing new alluvium.

There seem to have been two spatially and temporally distinct occupations. Basketmaker materials were concentrated in the western part of the site, whereas in the northeastern part of the site, evidence of Pueblo IV structures was found.

Though the strata vary greatly in the eastern end of Trench 3 and northern end of Trench 6 where the pithouse is located, the strata seem to be culturally deposited. Several isolated charcoal areas and hearths were present in Trenches 4, 5, and 8 but there was a distinct layer of lightly blackened to heavy black charcoal/ash, which ran in a visible strip through these same trenches. They varied in thickness from 5 cm, where it was most black and distinct, to 45 cm where the layer became lighter and more diffuse. The depths below present ground surface varied from 25 to 75 cm.

This may represent a burn, either of cultural or natural origin. Prehistorically, the Bosque area did not have the understory of small shrubs and tamarisk it has today. Instead, marshy areas or open grasslands would have been dominant. Due to the slope from west to east, evidence of the burn would wash downslope and would tend to concentrate in the lower areas. Because there were no definite charred pieces of wood or twigs observed in the trenches, the burn was assumed to be from a lowland shrub and grass fire. Such burning was known to have occurred both naturally and for
TRENCH 2, GRIDS D, H, L AND P, NORTH WALL

STRATUM 1 - loose, yellow brown fine sandy loamy topsoil
STRATUM 2 - moderately compacted fine tan sand
STRATUM 3a - moderately compacted brown sandy soil with some clay, charcoal lenses and burned chunks of adobe (hard-packed clay surface in Grid P)
STRATUM 3b - concentrations of burned adobe (roof or wall fall)
STRATUM 3c - charcoal and ash-stained soil
STRATUM 4 - lightly compacted clayey sand with flecks of charcoal

Fig. 3. Trench 2, north wall.
Fig. 4. Trench 5, north wall.

Fig. 5. Basketmaker pithouse at Taylor Ranch Site.
agricultural purposes (Knight, personal communication 1985).

A radiocarbon sample (LA 33223-1) was taken from a hearth at the top of this stratum in Trench 5 and dated to 1,730±100. The early date of this hearth is puzzling, because Pueblo IV sherds were found in good association only 10 m downslope in the same stratum. This may be evidence of multiple burns at the site. It is clear that this layer is very complex culturally and requires additional investigation.

Below the burn layer were strata of either lightly compacted sands or clay. In both strata there was a marked decrease or absence of artifacts, most clearly illustrated in the hand-dug trenches.

Results of the Field Studies
As a result of our investigations, we were able to document two major cultural components at LA 33223: Basketmaker III/Pueblo I; and Pueblo IV. For the Basketmaker component we located one pithouse and an open-air hearth. The Pueblo IV component was less successfully defined in terms of architecture even though chunks of burned adobe in association with large quantities of material culture were recovered.

Cultural Components
As a result of field studies, we documented two major cultural components at LA 33223: Basketmaker II/III; and Pueblo IV. For the Basketmaker component we discovered one pithouse and an open-air hearth. The date of 2,040±110 B.P. from the pithouse is the earliest known for this type of site along the Rio Grande Valley at the present time. The Pueblo IV component was dated by obsidian hydration and ceramic assemblage to the early part of the 14th century A.D. It was less successfully defined in terms of architecture, even though chunks of burned adobe with post or lattia impressions in association with large quantities of material culture were recovered. Evidence for the presence of an adobe constructed structure or structures was recovered in the eastern part of the site. The exact nature of the adobe structure(s) and whether they represented jacal construction was not resolved. A scatter of basalt on the surface of the site may have represented remnants of one or two small isolated Pueblo IV fieldhouse structures.

Basketmaker II/III Components
During the excavation using a backhoe, we discovered a pithouse at the western end of Trench 3. It was most clearly revealed on the north wall. Other sections of the structure were exposed on the south wall of Trench 3 and the west wall of Trench 6. Two subfloor features were found.

Description of Pithouse
The pithouse is shown in Figure 5.

Dates: Charcoal samples were recovered from three areas in the fill of the structure: Sample 2 was from Pit 2 at a depth of 1.25 m BSD; and Samples 4 and 5 were from Pit 1 at depths of 1.18 m and 1.82 m BSD. Due to the small size of the samples, they were combined into a single 0.9 gm sample for purposes of dating, yielding a date of 2,040 ± 110 B.P. or 90 B.C. ± 110.

Shape: It was saucer-shaped in profile and estimated to be roughly circular in plan(?). The western edge of the structure was poorly preserved but appeared to curve upward sharply, and the eastern and southern edges had a more gradual curve which elongated respectively to the east and south.

Dimensions: 5.9 m east/west on the north wall of Trench 3 (the charcoal staining disappears to the west).

Depth: The floor was 1.4 m BSD, which is approximately 1.1 m below the present ground surface on the western edge and 85 cm on the eastern edge. On the south the floor is approximately 1.25 m from the ground surface.

Fill: The fill of the pithouse was found in the profiles of three different trenches. It appears that we bisected the structure along its southernmost portion. The first stra-
tum consisted of the loose, yellow-brown fine sandy loamy topsoil. The second stratum was more compacted sand than is found in the other trenches. It had intermittent rodent burrows outside the western edge of the pit-house. Stratum 3 was made up of occasional lenses of caliche and charcoal. The pithouse itself was dug into stratum 4 which was a lightly compacted sand. A burial, LA 33223-4, which was left in situ, was outside the pithouse on the interface between strata 2 and 4. The bottom two strata (5 and 6) contained both charcoal and ash; the lowest stratum had small chunks of adobe. These strata were densest on the eastern side of the pithouse and may have been caused by the fact that the ground sloped gently to the east, concentrating this fill. Two storage pits were noted within these strata.

Possible Floor: A thin (ca. 2 cm) hard-packed clay surface may have represented a floor of the pithouse. It disappeared to the east and south. This surface was best defined in the south wall of Trench 3 and the west wall of Trench 6.

Walls: The walls were not clearly defined; no evidence of plastering was observed. If the charcoal staining indicates the sides of the wall, then the walls were excavated into lightly compacted sands (stratum 4, north and south walls of Trench 3).

Interior Features: Two subfloor pits were found. Pit 1 was a bell-shaped pit (75 cm deep and 1.25 cm long at the bottom). It was defined in the north wall of Trench 3. The opening was 60 cm wide. No closure was observed. The fill in the pit was lightly colored, very loose charcoal and ash-stained sands, and charcoal lenses with one chunk of burned adobe. There was no evidence of plaster or lining of the pit. Pit 2 was shallow and semicircular in profile in the north wall of Trench 3. It was about 35 cm deep and 70 cm wide at the mouth. The fill was very loose, charcoal-stained sands. There was no evidence of plaster or lining of the pit. Flotation and pollen samples were taken from this pit and analyzed. The flotation sample (#3) yielded 32 seeds (9.2 per liter) including the following plants: Zea maiz, Chenopodium, Amaranthus, Portulaca, Sporobolus and Euphorbia (a probable contaminant). Of the six taxa, only the corn and goosefoot were carbonized. Pollen taken from this pit was poorly preserved; the only pollen types noted were a few pollen grains of pinyon (Pinus edulis) and ponderosa pine (Pinus ponderosa). The laboratory felt that because the samples were laden with microscopic charcoal and ash, and the mixing of that combination with rain water and snow melt created a corrosive interaction that destroyed the pollen in situ prior to collection.

Other floor features commonly occurring in pithouses such as antechambers, hearth, postholes, ventilator shafts or tunnels, or deflectors were not exposed in the trench.

Exterior Features: Two exterior features may be associated with the Basketmaker component at the site. The first (Hearth 1, LA 33223-1) is associated with this component based upon a radiocarbon date. The second, a burial (LA 33223-4), is associated with this component based upon its physical relationship to the pithouse. Hearth 1 was located approximately 18 m to the southeast of the pithouse in Trench 5. Hearth 1 is also situated in the interface between stratum 1 and 2. It had the largest chunks of charcoal and was most clearly defined in all the trenches. One ash concentration (22 cm thick) was located approximately 15 cm below Hearth 1. A single piece of fire-cracked rock was observed. Two other ash pits were immediately east of the hearth at the same depth as the others.

Dates: The hearth designation with this component is based solely upon the radiocarbon date of 1,730 B.P.± 100 (A.D. 200± 100).

Shape and Dimensions: From the profile, it appeared to be an irregularly shaped band 1.7 m long and 25 cm thick. No evidence of a formal basin was observed.
Depth: 40 cm BSD and 18 cm below the present ground surface.

Fill: Medium chunks (5 cm) of charcoal.

Flotation Samples: Two samples were taken near the hearth. Sample 1 was taken 1.5 m east of the hearth at a depth of 46-48 BSD in stratum 4 just below the interface with the topsoil in the same stratum as the hearth. Sample 2 was taken 50 cm directly below the hearth in a soft sandy stratum (5) at 80-100 cm BSD. Sample 1 yielded the highest density of charcoal and diversity of carbonized economics. It had 126 seeds (38.1 per liter) including Oryzopsis, Chenopodium, Amaranthus, Portulaca, Zea and Phaseolus (rare in open sites). Compositae and Euphorbia were found and are probable contaminants. Sample 2 included only carbonized corn cob fragments and kernels, with Compositae and Euphorbia as probable contaminants. Pollen in these two samples was poorly preserved as a result of the mixing of the corrosive ash with water.

Because of the hearth's stratigraphy, we had anticipated that it was from the Pueblo IV occupation, because numerous glazeware sherds were exposed during the excavation of the trench. Another hearth in Trench 5 approximately 10 m east of Hearth 1 was in a lower stratum and contained a turkey bone with an Agua Fria G/r sherd in direct association. It would appear that the eastern section of site LA 33223 had the majority of Pueblo IV occupation, and west toward the low dunes, the Basketmaker component was found below the surface. It is possible that the other hearth or hearth-like features exposed in the trenches were associated with the Basketmaker component. Such exterior features were common in BM II/BM III sites.

Pueblo IV Occupation

The Pueblo IV component was dated both by obsidian hydration and ceramic analysis. The obsidian hydration tests were obtained from the hand-excavated grids. Six specimens of obsidian were selected from Grids A and B for hydration analysis, because these grids had the best vertical control. Although Grid A was excavated to sterile soil at level 5, 107 cm BSD, Grid B did not reach sterile soil at the same depth. An additional 10-12 cm in Grid B was excavated, and occasional artifacts were found in the fill of these lowest levels (level 5 in Grid A corresponds stratigraphically to levels 6 and 7 in Grid B).

Dates: Grid A level 2 dates to A.D. 1347±38. Grid A level 3 dates to A.D. 1355±32. Grid A level 4 dates to A.D. 1344±27. Grid A level 5 dates to A.D. 1169±40. Grid B level 6 dates to A.D. 1330±18. Grid B level 7 dates to A.D. 1351±35.

In terms of sourcing, four of six samples were Obsidian Ridge, and the other two were Polvadera.

Surface Component: The surface component at LA 33223 was defined by a low density scatter of basalt clasts, ceramics and lithics. These materials were thought to represent the remains of one or two small field house structures and associated artifacts. The clasts were distributed in two discrete areas. The first, in the southern part of the site, consisted of an L-shaped configuration, 1.85 m east/west by 0.85 m north/south. The clasts were arranged directly on the present ground surface. Trench 5 was excavated through this alignment to determine possible depth to this feature, but the profile of this trench failed to show any evidence that the L-shaped alignment had any subsurface depth or that the rocks had been placed in a trench.

The second area lacked any clear wall alignments. The basalt clasts were scattered over a 17 m north/south by 12 m east/west area. Trenches 3 and 6 were excavated to bisect this area but did not provide any evidence that the basalt rocks served as foundations or elements of surface or shallow rooms.

Although the basalt is clearly in-
trusive to the site, we were unable to substantiate that the rocks were remnants of isolated surface rooms or fieldhouses.

Subsurface Component: Adobe Features. When we began our testing program, our first goal was to relocate the areas with burned adobe and then expand the excavations to define walls of the adobe structure(s) found by Novick (1982). We located large quantities of burned adobe including fragments with impressions of small posts or latillas(?) in Test Trenches 1 and 2 (the hand-excavated grids). In Trench 1 the adobe was orange-red in color and located in heavily blackened soils. Burned maize was also recovered in this area. Burned adobe chunks were recovered from Trench 2 and Trench 8, which were the only backhoe trenches to yield adobe chunks. There also appeared to be a concentration of wall fall and a hard-packed clay surface (22 cm long) in Trench 2 (Figure 3). Although we were able to find evidence of adobe structures, as did Novick, we were unable to define their structural function. It is possible that the adobe could represent either jacial construction or could be shallow pitrooms. Although our backhoe trenches may simply have missed the architectural features in the southern portion of the site, we believe it more likely that the structure(s) were located in Montano Road or immediately north of the road, if they still exist. This interpretation is based on the high artifact densities recorded in the ditch adjacent to Montano Road (Test Trench 1), although it is possible that these densities are midden rather than structural areas.

Artifact Assemblages

The ceramic, lithic, and faunal assemblages recovered from the controlled surface collections and the hand excavations are described in the following sections. The hand-excavated units are presented by grid and level. In some cases adjacent grids were excavated together for some levels. Table 1 presents the quantities of artifacts by grid and level. The ceramic, lithic and faunal assemblages are then summarized.

Ceramics

The primary purpose of the ceramic analysis was to place the site chronologically. Ceramics from the surface collections and hand-excavated grids were sorted in three general categories: rims, utility, and painted wares. All rim sherds were then sorted into types and tabulated. In addition, a sample of 252 surface and subsurface painted and utility body sherds was tabulated according to type. A. H. Warren analyzed the ceramics and the following information has been abstracted from her report (Warren 1986:72–97).

Potsherds recovered from LA 33223 represented vessels dating within the time period A.D. 1250-1350. The majority are early Glaze A sherds which is consistent with a major occupation between A.D. 1300-1350. A 100% sample of rim sherds (237 total count) revealed similar patterns in the surface and subsurface assemblages. Agua Fria G/r was the most predominant (29% surface; 44% subsurface). It was followed by Rio Grande Gray (micaceous and corrugated) (22% surface; 27.6% subsurface).

For the sample of body sherds, 83% of the decorated wares recovered were classed as sherds from early Glaze A red vessels, primarily Agua Fria G/r. Polychrome types included Los Padillas Glaze-polychrome, Arenal Glaze-polychrome, and San Clemente Glaze-polychrome, all of which are contemporaneous with Agua Fria G/r. Only four sherds of Cieneguilla Glaze-on-yellow were present. Seventy-eight percent of all the utility sherds were classed as Rio Grande Gray and Rio Grande Micaceous; these types are also known as "Blind Indented Corrugated" in the literature. Twenty miscellaneous black-on-white sherds included Socorro Black-on-white, Santa Fe B/w, Gallup B/w, and Abiquiu B/w. Although the first two types are generally considered to be of Pueblo III (A.D. 1050–
1300), they frequently appear on Pueblo IV sites. The single Lino Gray sherd found on the surface probably eroded from the earlier Basketmaker component at the site.

The presence of a variety of utility and whiteware potsherds from west-central New Mexico or the Upper Little Colorado area of Arizona may indicate contacts with that area. These include a polished brownware, Pilares Banded and Fine Banded, and Los Lunas Smudged. A sampling of temper types of the decorated wares suggests that at least some of the glaze-paint vessels were intrusive to the Taylor Ranch site from Cochiti, Bernalillo, and Tijeras Canyon.

Lithic Assemblages

The 2,635 lithic artifacts recovered from the excavations at LA 33223 were rough sorted and tabulated by general type (flakes, chunks, cores, tools) and material (Kuhn 1986:98-114).

The lithic assemblage recovered from LA 33223 reflects a relatively expedient reduction technique with a heavy reliance on locally available raw materials. With few exceptions the source of raw material for all of the lithic artifacts could have come from the Santa Fe formation or Rio Grande channel gravels. The materials observed included a variety of "Federal Cherts," silicified wood, quartzites, basalts and related volcanics (Jemez, Obsidian Ridge and Polvadera obsidian). The assemblage is consistent with a highly restricted range of movement and the relatively expedient reduction technique.

The assemblage is characterized by relatively small overall size of the lithics, a "chunky" or nonstandardized debitage, and rare formal tools. Retouch, where present, is marginal and not intensive. All of the cores present in the sample, and most of the cores from which flakes can be inferred to have been derived, could be characterized as highly informal. Only one flake showed evidence of definite platform preparation, and a single recognizable "core trimming" flake was observed. A small, but recognizable component consisting of biface reduction flakes was noted, but this kind of debitage was present at very low frequencies. Raw material usage could be considered intensive because pieces were generally reduced to a very small size. The quantity of unretouched, apparently unutilized stone suggests that most lithic reduction/manufacture was performed at the site. In general, the assemblage may be characterized as expedient production, for the purposes of short-term use and immediate discard.

There are two other characteristics of the lithic sample that merit discussion. One concerns the frequency of burned material. Burning was common in some levels and grids. It was also probably responsible for the high frequency of chunks (angular debris, shatter) that is often in this sample fire-spalled pieces. In no sample are all pieces burned. This suggests that the lithics were not burned in-place but were moved around and mixed by human and/or natural taphonomic agents. The excavated sample may have been situated in a reworked trash dump area.

The other interesting comparison is the relation between surface and subsurface materials. The surface materials were dominated by larger pieces, contained a higher proportion of tools, and included more quartzite and less obsidian than did the subsurface deposits. It may be that these differences were due to sampling biases. Larger pieces are more easily seen on the surface, and more likely to be picked up during surface collections.

Faunal Remains

The faunal remains represent materials collected from the hand-dug excavations and a sample from a backhoe trench. Data collected included provenience, taxon, number, element, portion, site and evidence of burning (Stiner 1986:115-127).

Given the relatively small size of
the faunal remains (493 bones), a wide array of food and probably intrusive animal species are represented, especially small species labelled Rodentia, Thommys and Neotoma. Lagomorphs (Sylvilagus audoboni and Lepus californicus) are the most common. Lagomorph bones were fragmented in nearly all cases. Most often they display transverse breaks. The primary agents of damage to bones appear to be human. Elements of the appendicular skeleton and cranial fragments were the most common parts found but it is likely that such biases are a product of differential resistance of bone elements.

The taxons were also organized into minimum number of individuals. After lagomorphs, the most numerous were rodentia, ungulates (including an elk), turkey, aves and fish. Considering the small extent of the excavations, the faunal collection is quite substantial. Preliminary conclusions on animal utilization for prehistoric Pueblo IV occupations suggest that small mammals especially lagomorphs provided a substantial part of the diet. These probably existed in the local environment of the West Mesa in larger quantities than at present. Also the use of riverine resources is evidenced by fish and bird remains. The Bosque area represents a rich environment which, from our site, was not simply a temporary or special purpose locality but a settled farming community. The presence of corn and beans is documented in the floral records. Even through structural remains were lacking, the amount of faunal remains and artifacts indicates a substantial population.

SUMMARY AND DISCUSSION OF LA 33223

Previous research has shown that the Basketmaker II and III occupations occurred in upland areas. Haury (1956:5) believes that Basketmaker villages were established before A.D. 700 and were composed of "independent dwelling units arranged in clusters without formal order, strategically located with respect to water and arable land, and usually on high ground." Frisbie (1967a) states that there was probably a relatively large population in the Middle Rio Grande Valley as early as BM II and continuing in BM III. Our early dates for the BM III substantiate Frisbie's idea. Many sites were located on the Puerco escarpment on the West Mesa. Frisbie believes there was a population expansion down to the Rio Grande valley and riverine zones during the latter portion of the early BM III. He implies that this movement was driven by the need to cultivate new farm lands, caused by changing ecological conditions in which people were forced to change from the drainage area to valley floor farming which, he speculates, included ditch irrigation.

Our work at the Taylor Ranch Site contradicts the idea that Basketmaker populations were exclusively locating in upland areas. Our early dates clearly demonstrate that people were living on the flood plain in riverine settings in early Basketmaker II.

Some have speculated that the lack of sites along the Rio Grande is a function of frequent flooding, which either destroyed or buried them under alluvium. One of the difficulties in resolving this problem is the lack of a systematic archaeological survey of the alluvial plain along the river and a less than detailed knowledge of the river's changing course in prehistoric times. Sargeant (1985:ii) correctly points out that there has been bias in archaeological sampling:

In the past the archaeology of the floodplain has been largely ignored on the assumption that prehistoric populations would have preferred to live on terraces bordering the valley rather than to risk destruction by the river's seasonal flooding. Sites not destroyed by flooding were assumed to have been irretrievably buried under the river's silt deposit.

Sites obscured by alluvium can only be revealed by stripping with mechanical equipment. Also the rapid development in Albuquerque's West Mesa
has usually not involved prior archaeological investigation.

The Pueblo IV occupation of the flood plain has been documented by previous work. Sargeant's (1985) survey of 85% of the Los Ranchos area of Albuquerque on the east side of the river has documented at least six sites with a P IV component within the flood plain. A search of the ARMS files at the Laboratory of Anthropology of five USGS quads surrounding LA 33223 revealed 13 sites with P IV components. The Tunnard site, a P IV site north of Albuquerque near the Sandia Reservation, had river deposits indicative of successive floods. Ham-mack (1966:4) believes that this, together with recent cultivation, probably accounted for the lack of architectural features. LA 6867, north of the Tunnard sites, was on higher ground and contained adobe walled rooms and a kiva.

One of the environmental reasons for locational shifts to permanent streams and rivers was the lack of rainfall and increased drought in the late 1200s. Stuart and Farwell (1980) demonstrated the move during this period to riverine settings. One of the significant patterns of P IV sites is that the large clustered communities were unstable and frequently abandoned. Population pressure or packing seems to have been the ultimate cause (Hunter-Anderson 1979, Cordell 1979a, 1979b). It may have been more efficient to move the village than to intensify the occupation. Inhabitants of the P IV period intensively exploited the river and adjacent valley for both farming and in smaller locations for hunting and gathering. Both strategies could be practiced concurrently.

LA 33223 fits the pattern of P IV pueblos in riverine settings. The concentrations of burned adobe and chunks of jacal (?) over a large area of approximately 75 square meters discovered both by Novick (1982) and our excavation, coupled with the greater density of artifacts, indicate that LA 33223 was a substantial site although the architectural features could not be traced in the tested areas. Even if the pueblo structure is missing, the quantity of artifacts makes the assemblage important. The early dates of the P IV period point to a significant transition from the P III to the P IV occupation.

Because the majority of P IV sites in the Albuquerque area are large multi-room pueblos such as Kuaua, smaller pueblos or those of a shorter duration may be underrepresented in the literature. LA 33223 may prove to be one of those sites. Our documentation of a very early Basketmaker component and a P IV occupation in the flood plain may prove that riverine settings were used early and frequently in all Anasazi periods.

ACKNOWLEDGMENTS

We would like to acknowledge the following people who assisted us in the field: Peggy Gerow, Paul Robertson, Jim Snyder, Steve Kuhn, Kit Sargeant, Dan King and Ray and Barbara Graham. The various analyses undertaken by the following people also contributed to our report: lithic analysis by Steve Kuhn, ceramic analysis by Helene Warren, faunal remains by Mary Stiner, flotation by Nollie Toll, pollen analysis by Karen Clary and human remains by Marily Landen. Beta-Analytic processed our radiocarbon date and monlab processed the obsidian.
Table I. Artifact Counts from Surface and Subsurface Grids at LA 33223.

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<th>Ground Stone</th>
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TOTAL 4,605 2,635 13 446 7,699

* 1 stone bead
** 1 possible shell bead
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THE NIGHTHAWK SITE (LA 5685), A PITHOUSE SITE ON SANDIA PUEBLO LAND, SANDOVAL COUNTY, NEW MEXICO*

CAROL J. CONDIE

ABSTRACT

Two pithouses were excavated at Nighthawk Site, LA 5685, a site on the left bank of the Rio Grande near Sandia Pueblo, Sandoval County, New Mexico, in 1960 and 1961 by James V. Sciscenti. In 1982, tests were made by Quivira Research Center (QRC) to determine whether additional features of significance existed at the site. QRC’s analysis of ceramics and lithics included most of those collected by Sciscenti.

The site consists of two pithouses (and a possible third), 14 cobble-and-charcoal-filled firepits, several extensive charcoal-stained areas, at least one outdoor use area, extensive lithic and sherd litter, and a pathetic number of tools. It is estimated that occupation of the pithouses occurred about A.D. 700 or 800, but that casual use of the site as a source of lithics extended both earlier and later than the pithouse occupation.

HISTORY OF WORK AT THE NIGHTHAWK SITE

Two pithouse structures at LA 5685 (here called the Nighthawk Site in deference to a nighthawk that was nesting on the site in 1982) were excavated by James V. Sciscenti, then with the Laboratory of Anthropology, in November 1960 and April 1961 in anticipation of the State Highway Department’s using the site area as a gravel source. Because Sciscenti was unable to produce a report on the site, the results of his work (Sciscenti 1960, 1961) are included here.

In February 1980, the Sandia Pueblo gravel terraces again having become candidates for gravel operations, B.I.A. personnel performed an archeological clearance survey on 470 acres (Keesling 1980). Nineteen cultural resource sites were identified and recommendations made for impact mitigation.

When destruction of LA 5685 (B.I.A. Site S-18) became imminent in 1982, B.I.A. Area Archeologist Bruce Harrill recommended that the boundaries of the site be more precisely defined and that testing be performed to determine the presence or absence of additional significant structures or other features. In June 1982, Mr. Jim Shiver of New Mexico Aggregates requested that QRC develop a plan to perform testing for significant cultural resources at the site.

MODERN ENVIRONMENTAL SETTING

The site is located on the first left-bank gravel terrace above the Rio Grande at an elevation of 5120 ft. Situated between the floodplain to the west and the Sandia Mountains to the east, the site’s location would have permitted an economy that combined horticulture and hunting/gathering. The Rio Grande now runs approximately 1 mi west of the Nighthawk Site. Being a notorious shifter-of-beds, however, the river may frequently have been much closer to the site than it is now. Vegetation on the site is Upper Sonoran—primarily native grasses, matchweed (Gutierrezia sarothrae), cacti (Opuntia sp.), and Mormon tea (Ephedra viridis); also a few other unidentified forbs. Cover averages approximately 30–50% within the site limits.

THE SITE

Trenches A and H, dug with a backhoe to expose off-site stratigraphy, revealed that natural soil on the site is shallow, reaching depths of only 1 1/2–2 ft (.2–.6 m) before the cobble/caliche bed is encountered. Although some white and gray clayey deposits are present, most of the soil is tan to brown, fine, sandy, and light.

The QRC investigations identified five charcoal-stained areas (CSAs), 14 rock-filled firepits, several lithic scatters near the site proper, one partial in situ pot and two large in situ sherds in the main site area, large numbers of sherds and lithic debitage scattered over the main site,

* This is a revised and abbreviated version of a contract report written in 1982 as Quivira Research Center Publications 45.
and a cobble/lithic/ceramic scatter that may be a pithouse on a low alluvial tongue below and west of the main site. Most of the CSAs occurred between and east of Sciscenti's two pithouses, but two CSAs and two firepits occurred south of Pithouse 1. One firepit lay west of Pithouse 1, one (apparently never used) north of Pit­house 2, and one at the north edge of the site proper. The main site area covers approximately 65,524 ft/6078 m/1.5 ac/.61 ha.

As the ceramics indicate (Table 1), the site is multi-component, the obvious long-term attraction being the large quantities of knapping quality stone in the gravels on which the site lies. It seems likely, too, that people resorted to the site for a few hours or days of tool-making during the periods both before and after those represented by the ceramics. Some or all of the firepits may represent pre-pithouse users.

The location of the site—just above the Rio Grande floodplain—suggests that horticulture may have been practiced during the pithouse occupation, though no charred botanical remains were recovered by our tests or Sciscenti's excavations. The site's proximity to the Sandia Mountains would have allowed hunting, trapping, and gathering. Again, however, neither Sciscenti's excavations nor our tests recovered wild plant remains or charred bone. (Sciscenti's collections contain three small uncharred bone fragments from the Pithouse 1 fill, but recent rodent activity may explain them.)

Elements of the main site during the pithouse occupation include the two pithouses, the CSAs (which yielded primarily Lino/Kana'a gray sherds), and possibly some of the firepits (not one of which yielded a single sherd or a lithic fragment). Occupation of possible Pithouse 3, on the alluvial tongue west of the main site, may have coincided with that of Pithouses 1 and 2.

Length of occupation is impossible to determine. My guess would be a few
years at most. The two pithouses probably indicate two families, perhaps extended. Additional structures, aboveground jacales, are a possibility, but we found no evidence of postholes or living floors in or near the likeliest candidates for burned jacales—the CSAs. No burials were found. In neither Sciscenti's excavations nor QRCs tests were more than a few tools present.

The date of occupation is questionable. Although several dated pottery types were present (see Ceramics, below), the dates derive primarily from Four Corners sites and are not, as Cordell notes (1979:42), securely dated in the Rio Grande. If the present dates are someday proved valid for the Rio Grande, a date of around A.D. 700 or 800 is indicated.

Structures

Prior to the 1960-1961 excavations the Nighthawk Site appeared as four shallow depressions among stone and sherd surface litter. Excavation demonstrated that two of the depressions were pithouses. Sciscenti tested the other two depressions and ran several trenches, but found no additional pithouses. His notes, on file at the Laboratory of Anthropology, have been relied on for the descriptions of Pithouses 1 and 2.

Pithouse 1 (excavated by Sciscenti in November 1960). The oval floorplan (Figure 1) of burned Pithouse 1 measures approximately 10 ft (3.0 m) east-west by 15 ft (4.6 m) north-south. The builders apparently excavated 4 ft (1.2 m) below then-existing grade. The walls were stabilized with outward-sloping posts (no diameter given) set in adobe at approximately 1 1/2-2 ft (.5 m) intervals around the wall perimeter, the whole then being plastered over with three or four layers of clay. By the time of Sciscenti's excavation the poles, adobe, and clay plaster had deteriorated (presumably through weathering and rodent activity) to a level about 2 ft (.6 m) above the floor. If the east-west section sketch included in Sciscenti's notes was drawn to accurate horizontal scale (as it appears to be), the ventilator shaft, which pierces the east pithouse wall 11 in (28.0 cm) above floor level, remains nearly level until it reaches a point 2 1/2 ft (.7 m) east of the wall. The shaft then makes a right-angle turn and rises 3 1/2 ft (1.0 m) to then-existing grade. Inside the room, the ventilator is fronted by a lip or apron (of clay?) that curves down to meet the floor. The house roof, evidenced by chunks of burned wood and adobe not far above the unplastered floor, was apparently supported by four posts (three postholes located, the fourth possibly destroyed by workmen). Entry was probably through the roof. Other floor features include a central hearth (the sides, but not the bottom, plastered), a possible ashpit east of the hearth, and a plastered trench, 1 1/2 in (3.8 cm) deep by 3 ft (.9 m) north-south, several feet south of the hearth. A metate and mano lay on the floor northwest of the firepit (but were not found in Laboratory of Anthropology storage). Sciscenti's notes indicate that the lower 2 ft (.6 m) of fill was dry, powdery, and charcoal laden, containing only a few sherds and flakes. The upper 2 ft (.6 m), which Sciscenti felt was more recent, was damp and contained many small pebbles but no sherds.

The house was apparently cleared of most of its portable property before it burned. See Table 1 for sherd counts from Pithouse 1 fill. In addition to the metate and mano noted above, Sciscenti's notes indicate a metate fragment (from the fill?), also unrecoverable from storage.

Pithouse 2 (excavated by Sciscenti in April 1961). Construction materials and methods were much like those of Pithouse 1 except that Pithouse 2 (Figures 2, 3), which is roughly circular in floor plan, is much larger, measuring 23 1/4 ft (7.1 m) in north-south dia., 22 1/2 ft (6.8 m) in east-
Fig. 2. Details of Pithouse 1.
west dia., and approximately 6 1/2 ft (1.9 m) deep. As opposed to the outward-sloping walls of Pithouse 1, those of Pithouse 2 are vertical. Wall stabilization was accomplished as in Pithouse 1—by using vertical cottonwood poles set in adobe. The reinforcing poles were apparently used only when the soil conditions required them, since they occur primarily in the northern half of the structure (Figure 3). The walls, which Sciscenti noted were in excellent condition, were then finished with clay plaster. Four postholes indicated a post-supported roof, probably of cottonwood members and adobe. Although abundant charcoal occurred in the fill, it is not clear whether the structure burned, Sciscenti noted.

Sherds of a partially restorable pot (Figure 10b) were recovered from the floor, as were two metate fragments. Sciscenti noted that very few sherds or other artifacts were recovered from the floor or the fill.

The notes do not indicate whether the floor was plastered, although it looks plastered in Sciscenti's photographs (see Figure 3). Floor features include a shallow central plastered hearth, an ashpit, two pot rests (plastered depressions?), two ladder sockets between the hearth and the deflector, three shallow holes, and a 12 in-deep (30.0 cm) sipapu west of the hearth in line with the hearth/deflector/ventilator complex. A trench (plastered?), approximately 1 1/2 ft (.5 m) wide by 10 ft (3.0 m) long by 12 in (30.0 cm) deep running north-south about 2 ft (.6 m) west of the hearth, may be a foot drum, Sciscenti suggested. Forming a partial circle around the hearth, ashpit, pot rests, and ladder sockets is a shallow trench of unknown function, to which another shallow trench (excavated to receive a wing wall?) angles to join the deflector cavity. Approximately 1 1/2 ft (.5 m) above floor level, the ventilator is punched through the east wall, the shaft maintaining a constant upward slope for a distance of 9 ft (2.8 m), where it abruptly turns to make a 3 ft (1.0 m) rise to ground level. The sloping shaft ceiling is reinforced with poles laid at right angles to the shaft's long section.

Pithouse 2 exhibits characteristics that may indicate use as a kiva—primarily its large size, possible footdrum, and carefully aligned floor features, including a decided sipapu. That it functioned exclusively as a kiva seems unlikely, for two site-internal reasons: 1) Pithouse 1, though smaller and lacking a recognizable sipapu, also contains a plastered trench, which is as likely a footdrum candidate as that in Pithouse 2. (It is equally possible that neither plastered trench is a footdrum. Caution is probably the best cure for our propensity in the Southwest to label as footdrums almost any large unexplained cavities in pithouse floors.) 2) If Pithouse 2 was reserved for kiva activities only, it means that one family built and maintained two structures, but inhabited only one. It is, of course, unreasonable to expect human beings to behave in a cost-efficient manner at all times, but maintaining one of only two structures solely for religious purposes seems unnecessarily pious. —A more reasonable interpretation would seem to be that both pithouses were inhabited and that Pithouse 2 served as the gathering place for ceremonies that included both families or that required a sipapu.

[Watson Smith (1972:121) reports that in querying Hopi friends about the absence of sipapus in some kivas, he was told that "a sipapu must be present only in a kiva that is used for ceremonies in which a sipapu is necessary."] Stewart Peckham (personal communication, September 1982) comments that he has long believed that many kivas and kiva-like structures were inhabited in prehistoric times and that to draw a strict ethnographic analogy with historic kivas is unjustified.

Possible Pithouse 3. A cobble/sherd/lithic scatter (Figure 4), approximately 24 ft (7.0 m) in dia., lies on
Fig. 3. Details of Pithouse 2.
a low alluvial tongue west of and below the main site area. Charcoal flecks are apparent on the surface. The area was not tested because disturbance was unlikely.

Charcoal-Stained Areas. Five sizable charcoal-stained areas (CSAs) were revealed by trenching and grading (Figure 5). The outlines are irregular, but rough measurements are: CSA 1—approx. 10 by 15 ft (3.0 by 4.5 m), CSA 2—approx. 13 by 18 ft (4.0 by 5.5 m), CSA 3—approx. 5 by 12 ft (1.5 by 3.6 m), CSA 4—12 by 25 ft (3.6 by 7.6 m), CSA 5—20 by 20 ft (6.1 by 6.1 m).

Three of the CSAs (1, 2, and 5) show what appears to be deliberate excavation (e.g., CSA 2, Figure 6), presumably in an attempt to contain cooking fires or to confine dumped charcoal. Ceramics and lithics contained in the undisturbed "fill" of CSAs 1, 2, and 5 (and, for CSA 1, the backdirt from the trench) consisted of:

CSA 1 Ceramics: Lino/Kana'a Gray-59, Lino Fugitive Red-2, Alma Plain(?)-1, Brown Ware I-25.

Lithics: sandstone mano-1, siltstone abrader-1, debitage 2.

CSA 2 Ceramics: Lino/Kana'a Gray-59, Lino Fugitive Red-28, Kana'a Neckbanded-1, Tallahogan Red-1, Corrales Red-1, Alma Plain(?)-1, Alma Neckbanded-1, Brown Ware I-6, San Marcial B/W-7, unidentified white wares-16.

Lithics: basalt hammerstone-1, debitage-17.

CSA 5 Ceramics: Lino/Kana'a Gray-5, Lino Fugitive Red-2, Brown Ware I-2.

Lithics: quartzite cobble hammerstone-1.

CSAs 3 and 4 were mere charcoal stains, perhaps deposited when Pithouse 1 burned, perhaps the stain from backdirt Sciscenti removed from the structure.

Firepits and CSAs are proximate in only one instance (Figure 5). The charcoal staining of CSA 5 runs over two rock-filled pits (Firepits 13 and 14), but whether the temporal associa-
Fig. 5. Firepits and charcoal-stained areas.

Fig. 6. Charcoal-stained area (closeup).
Firepits. Fourteen firepits were located (Figure 5). All but one (9) contained thoroughly decayed charcoal and cracked, soot-blackened cobbles, which, to judge from their size (Figure 7), were carried up to the site from the gravel slopes below. The rock in Firepit 9, which lay mounded just under the present surface, had been collected but apparently never used. The firepits range in size from Firepits 2-7, which average about 4 to 6 in (10.0 to 15.0 cm) deep by 18 in (45.0 cm) in dia., to Firepits 1, 8, 10-14, which are deeper (range 14 to 18 in/35.0 to 45.0 cm deep; 14 to 27 in/35.0 to 68.0 cm in dia.).

A Problem: Cooking Areas and Cracked Cobbles. Cordell notes (1979:43): "Firecracked rock and burn areas are common [on Albuquerque area pithouse sites] and in the absence of ceramics, they may be misidentified as Archaic." Although ceramics and stone in the CSAs make their contemporaneity with the pithouses probable, I feel less sure in certifying that the firepits and the pithouses were coeval. It is true that the rock-filled firepits are scattered over the area that would have been most used during the pithouse occupation, but several circumstances suggest that they may not have been contemporaneous:

1) With the possible exception of Firepits 13 and 14, which are associated with CSA 5, all firepits had apparently been used only once. Decayed charcoal is restricted to the discrete area of the pit; the scattering that would occur (and apparently did occur in the CSAs) from the trampling and disturbance of a repeated daily routine at the site is absent.

2) The decayed charcoal fill of the firepits is completely sterile, which suggests that they were used and covered with drifted or washed-in sand prior to the time of pithouse habitation. An occasional sherd or lithic would be expected if the firepits were contemporaneous with or post-pithouse
3) The only highly similar sites I have been able to uncover in the literature are LA 3289 and LA 3290 (Peckham 1957), which are located approximately 1 1/3 mi (2.1 km) south-southwest of the Nighhawk site, also on a gravel bench on the left bank of the Rio Grande. At LA 3289 there were four rooms (one of which contained a burial) and 13 roasting pits or hearths. At LA 3290 there were five rooms (one contained two burials) and one cluster of burned rocks and charred material on the site surface. All firepits at LA 3289 were like those at the Nighthawk Site—sterile save for cobbles and decayed charcoal. The numbers of rooms, the three burials, and the greater abundance of artifacts from the rooms suggest longer site occupations than that of the Nighthawk Site. Accordingly, a proportionately larger number of firepits should have been present at Peckham's sites to reflect the longer habitation if the firepits were indeed contemporaneous with the pithouses.

4) Features designated "firepits," "hearth," etc. are extremely common in the literature of this area, and apparently occur more often in a non-pithouse context than with pithouses. Winter and Stiger (1982:39-40) discuss "hearth" occurrence in the Galisteo Creek-Rio Puerco-Rio Grande area. However, since many of the sites they list are known only from survey, we know little about genuine architectural associations with cooking pit and hearth types.

5) To further complicate the issue, firecracked rock—but no rock-filled firepits—occurred on at least two excavated sites in the area. At Site AS-1, a pre-ceramic non-structural Basketmaker campsite 25 mi northwest of Albuquerque, Bice (1968) found both shallow disk-shaped firepits scooped out of the sand and "firecenters." The firecenter, charcoal stains of varying depths and intensities, represent fires built on the ground surface, rather than in excavated basins. Although numerous cracked cobbles were scattered over the surface (Bice 1968:20), no rock-filled or -lined firepits were present.

The surface at La Cantera, a quarry site on the gravel terraces of the Sandia Reservation (Condie 1986), bore eight cracked-cobble clusters. Some of them were near areas of faint charcoal staining, but there were no firepits—cobble-filled or otherwise—at the site. The only radiocarbon-dated feature at the site is late (ca. A.D. 1430-1490), a date that may apply to most of the site.

The point of all this discussion is that we may have been leaping to unwarranted conclusions about cracked cobbles and cooking areas, particularly when cultural assignments are made only on the basis of survey evidence. It may be that firecracked rock signals several cultural and time periods. — That we know too little about cultural distinctions in styles of hearth/firepit/oven construction, with or without cobbles, is apparent.

Whether or not the firepit/pithouse association at LA 3289, LA 3290, and the Nighthawk Site is valid must be left open to question. My personal leaning is toward seeing the apparent association as coincidental, the rock-filled firepits and the CSAs representing two separate periods. Since fleeting use of the area occurred after the pithouse occupation (attested by ceramics), it is reasonable to assume that earlier people, presumably Archaic, may have made ephemeral visits to the area as well.

Use Area 1. Use Area 1, just north of Pithouse 2 (Figure 5), contained ceramics (Lino/Kana'a Gray 34, Lino Fugitive Red-19, Lino B/G-1, Brown Ware I-1, San Marcial B/W-1, unidentified white wares-2) and lithics (vesicular basalt mano-1, quartzite hammerstone-1, basalt chopper-1, chert biface-1, chert core-1, debitage-19). This area was peeled not because of charcoal stains, but because of the presence of (unused) Firepit 9 and because of a clay deposition that looked as if it
Lithic Scatters. Eleven isolated lithic scatters (LSs) were located on three tongues southeast of the site proper (Figure 5). Eight of the "scatters" consisted of only one object and, had their proximity to the main site been less immediate, would more properly have been termed isolated objects. Because the scatters consisted almost solely of debitage, there is no way to place them within a time frame. In all cases, the scatters consisted of only one variety of stone. None gave the appearance of more than a few minutes' knapping activity. Numerous scatters similar to these are undoubtedly obscured within the main site boundaries.

ARTIFACTS

Ceramics
A total of 943 sherds, some of the Lino/Kana'a Gray sherds being from partially restorable vessels, were recovered during the 1960-1961 and 1982 work (Table 1, Figures 8-10). (Sciscenti's FS sheets indicate that a few sherds were collected from his Feature 3, a test pit, but they were not present when QRC analyzed his collections.) For more detailed information, see Condie (1982).

Lithics
Richard W. Loose identified the lithics. See Table 2 and Figures 11 and 12. For more detailed discussion, see Condie (1982).

SUMMARY AND CONCLUSIONS

The Site's Probable History
Human presence at the Nighthawk Site probably began during the Desert Archaic, visitors being attracted by the abundance of workable stone. It seems probable that Archaic people were responsible for the 14 rock-filled firepits, each firepit perhaps representing a stop of a day or two.

The two pithouses, one of them probably used for ceremonies as well as for habitation, were occupied for a time brief enough that deaths did not occur there. Whether the occupants survived by gardening or by hunting and gathering is impossible to determine, but both are possible at this site and both seem probable. Habitation probably occurred about A.D. 700 or 800.

One pithouse burned, but apparently after desertion of the site, since both houses had been cleared of usable goods [with the exception of a complete (?) metate and a mano in the burned house]. Cleaned-out burned pithouses are not unusual in the Albuquerque area (Allen and McNutt 1955; Frisbie 1967:25-49; Peckham 1957; Vivian and Clendenen 1965), but most of them are at sites at which habitation apparently continued after one or more pithouses were abandoned. Houses containing burials may have been deliberately fired. Vytlacil and Brody (1958:177) report that a Zia resident told them "...in the past it was customary to place the dead in a house, break pottery and other utensils in that house, and then burn the structure." Pithouse 1 contained no burial. It is tempting to suggest that after the original owners moved out, leaving the structures intact, casual use of the site was resumed by people looking for knappable stone or making their way up and down the valley on visits or collecting expeditions. Camping out in a roofed structure is an old historic pattern for travelers. So is permitting a fire to burn out of control, as many owners of modern barns and vacant buildings can attest.

A problem apparent in the ceramic distribution needs discussion here. Types from the floor and fill of the pithouses are restricted to Lino/Kana'a Gray, Lino Fugitive Red, Tallahogen Red, and Corrales Red. However, CSAs 1, 2, and 5, Use Area 1, and the only one of Sciscenti's test pits for which the sherds are available yielded brown wares and San Marcial B/W, in addition to the pithouse types. An argument could be made that these features represent a distinct occupation.
Table 1. Ceramics from the Nighthawk Site (LA 5685)

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<tr>
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<th>CSA 1</th>
<th>CSA 2</th>
<th>CSA 3</th>
<th>Use Area</th>
<th>Pithouse 1</th>
<th>Pithouse 2</th>
<th>Pithouse 2 fill</th>
<th>Possible Pithouse 3</th>
<th>Scasenti's Feature 2 (test pit)</th>
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<td>176</td>
<td>28</td>
<td>16</td>
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</table>

*Includes 47 sherds from three partial in-situ pots. *Includes possible restorable pot.
Fig. 8. Sample of ceramic sherds from the site.

Fig. 9. Sample of painted sherds from the site.

Fig. 10. Fragmentary vessels found at the site.
The CSAs, though, suggest repeated walking-back-and-forth-and-scattering-of-charcoal, which would presumably require some duration of residence. Use Area 1 and the Lino/Kana'a pot and sherds left on the site's surface indicate that a good deal of living and food preparation occurred outside (as does ethnographic analogy). The same types of sherds may have been left by immediate post-desertion visitors, but it seems most rational to attribute those in the CSAs and Use Area 1 to the pithouse occupants.

Visits to the site between the pithouse occupation and Agua Fria times may have ceased or may simply have been by transients who broke no pottery on the site.

Significance of the Nighthawk Site

The Nighthawk Site appears to have had a long history of use, but only a brief period of steady occupancy. There are no diagnostic lithics that indicate Paleo-Indian use, but Archaic use seems plausible, especially if the 14 firepits are really Archaic. Habitation of the site by two families who lived in two pithouses occurred for a short time, perhaps as early as A.D. 550 or 600, perhaps as late as A.D. 800. Use of the site then returned to its former sporadic nature, the last datable use, marked by Agua Fria Glaze-on-Red sherds, being A.D. 1300-1500.

An assessment of the information derived from the site must include our failure to locate features such as stratified deposits, datable charcoal, etc., that would aid in resolving questions of time period or the relationship of the rock-filled firepits to the pithouse occupation. The investigation was useful, however, in indicating that rock-filled firepits are probably Archaic and not pithouse-related, in expanding the documented occurrence of Lino Fugitive Red designs, in hinting that burning of structures need not occur as a result of outside attack or of accidental conflagration by site occupants but may be chargeable to casual post-aban-
donment visitors, and in suggesting that sources for apparently exotic lithics probably exist at undiscovered nearby locations.

The Nighthawk Site in A Regional Context

Albuquerque is located in the Anasazi-Mogollon contact area, a zone identified by its architectural and ceramic mix, and usually thought of as a band beginning in east central Arizona and extending east to the Albuquerque area. It should be noted here, however, that the distribution of brown wares, the ceramic indicators, describes a reversed "C," moving from east central Arizona and western New Mexico to central New Mexico, then northward in a wide swath along the Rio Grande to northern New Mexico and southern Utah (see, for example, Cordell 1979:42-43; Danson 1950, 1957; Dittert, Eddy and Dickey 1963; Jennings 1966:51-53; Peckham 1957; Vivian and Clendenen 1965).

Architectural affiliation of the Nighthawk Site lies with the Anasazi, as do all pithouse sites in the Albuquerque area except for LA 4955 near Bernalillo, which is a Mogollon affiliate, "the two most obvious traits," according to Wiseman (1976:44), being "ramp entries (post lined with adobe flooring) and incredible numbers of post holes and pits in the floors." Stewart Peckham (personal communication, September 1982) informs me that McNutt now believes that what he and Allen reported (1955) as entry passages in the Santa Ana pithouses are, in fact, ventilator shafts. Major ceramic affiliation is Anasazi, as well, brown wares being numerically vastly inferior to Anasazi types. Whether the existence at the Nighthawk Site of Lino Fugitive Red designs should be understood to indicate ties as far-distant as the Hopi and southeastern Utah areas is doubtful. It seems more likely that sherds bearing similar designs are still underground at intervening sites or have been too well scrubbed by assiduous sherd washers.
Fig. 11. Ground and chipped stone found at the site.

Fig. 12. Chipped stone artifacts.
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<th>Pithouse 2 Fill</th>
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**TOTAL:** 36
Finally, the question of the Rio Grande's marginality should be addressed. In her discussion on the subject, Cordell (1979:64) notes the feeling among many workers that the Middle Rio Grande makes little sense in Anasazi prehistory because of its meager participation in the Four Corners/Chaco sequences. She observes that the Rio Grande does make sense when viewed against Southwestern prehistory as a whole, noting (p. 65) that until Pueblo III the Chaco area itself differed little from anything else in the Anasazi Southwest. Comparisons with the Four Corners are even more convincing. Survey and excavation during the Glen Canyon Project revealed that even as late as the 1200s most people were not living in large aggregated pueblos, but in scattered two-or-three-room villages (Jennings 1966). Jennings feels it is the large sites that are aberrant, stating (1963:13): "The real Anasazi were clever, ingenious small ranchers whose ability to exploit the environment was equal to, and possibly derived from, the Desert Culture ancestor whose skills were retained in large degree."

This said, it is now possible to turn to Stuart and Gauthier's discussion of the northern/north central New Mexican pattern for this period. They observe (1981:410):

"When the pithouses are deep... and the proportion of painted wares is small and the Kana'a scarce...either a BM-III or BM-III/P-I transitional classification is made. These BM-III/P-I sites are usually small, occur often in areas where no large Classic BM-III villages are present and, most importantly, are in lower elevational settings (roughly 5,000-5,500 feet), often riverine...Ceramic assemblages on these are often modest."

That the Nighthawk site fits comfortably into the patterns prevailing over the Anasazi area generally and the northern/north central New Mexico area specifically is obvious.

Quivira Research Center, Albuquerque

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