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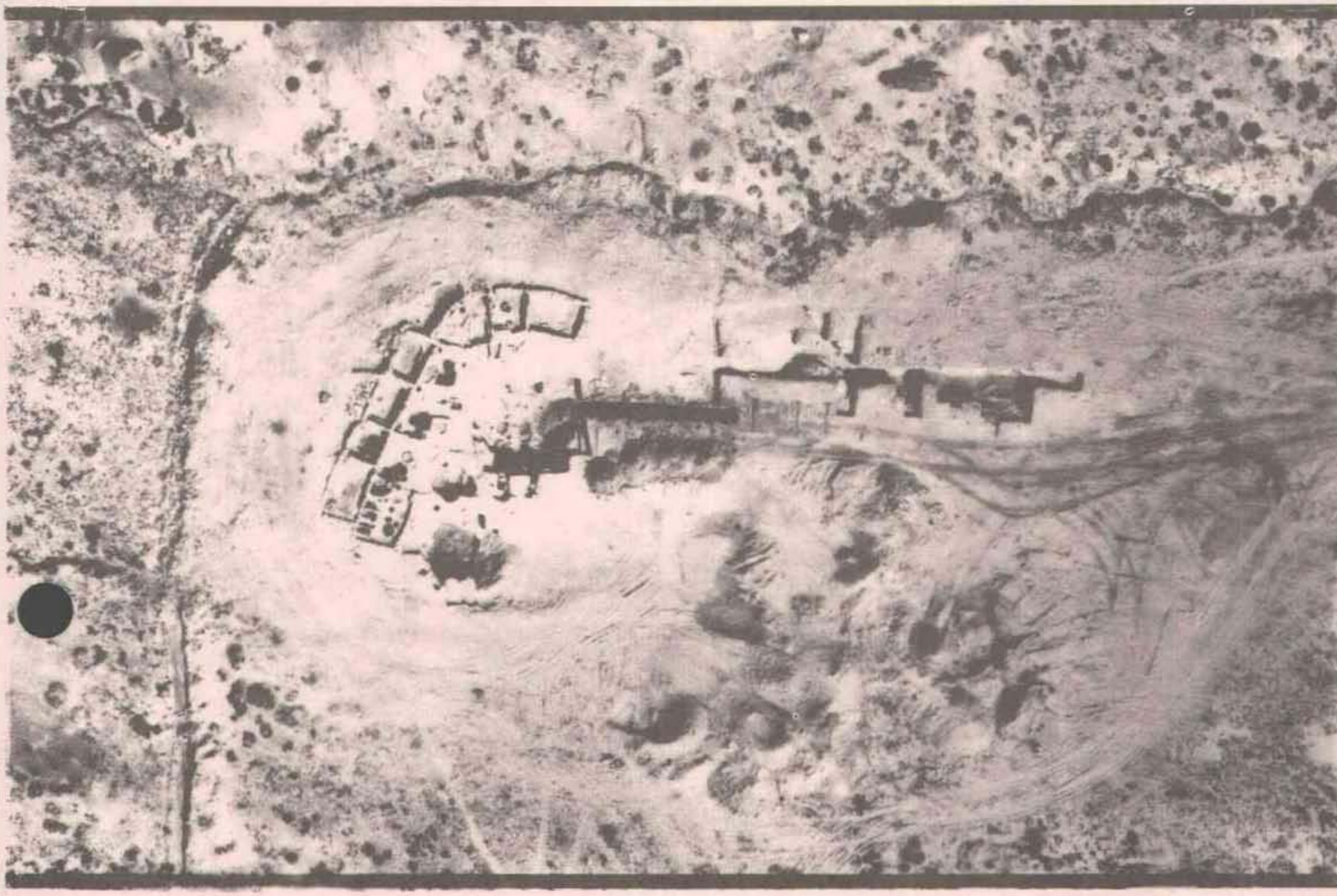
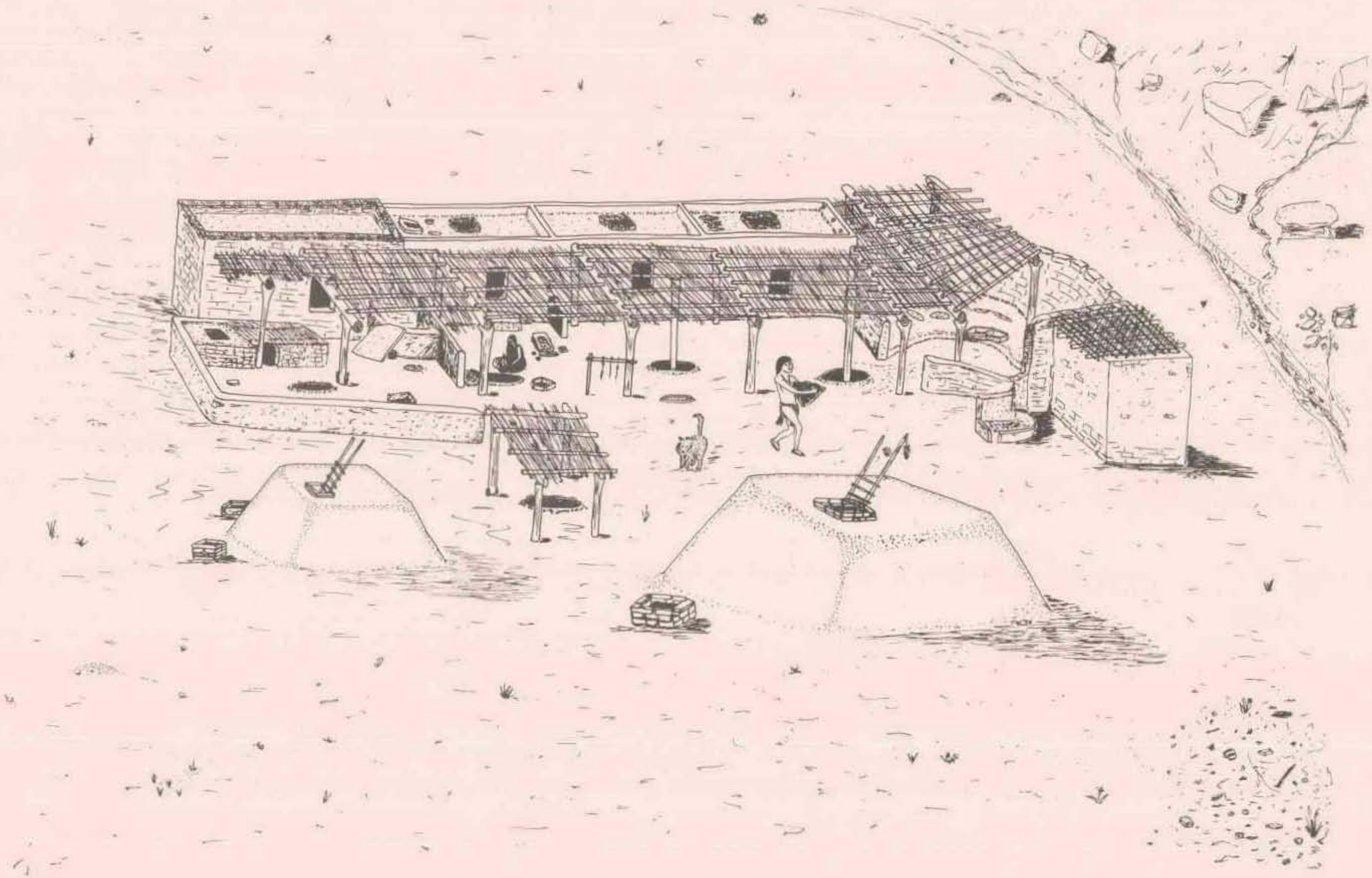


THE SPADEFOOT TOAD SITE: INVESTIGATIONS AT 29SJ 629 CHACO CANYON, NEW MEXICO

Volume I



Frontispiece. 29SJ 629 as it might have looked circa A.D. 1000.

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>
> *Volume II Investigations at 29SJ 629, Chaco Canyon New Mexico: Artifactual and Biological Analyses*, edited by Thomas C. Windes

This is a detailed report on the National Park Service excavations at a small house site that revealed evidence of turquoise jewelry manufacturing. Although the site is not greatly different from other small sites in the area, it is unusual in the amount of workshop debris. Windes compares this site with other excavated small sites in Marcia's Rincon and the Fajada Gap area and comments on the role of turquoise during Pueblo II in the Chaco area.

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THE SPADEFOOT TOAD SITE:

Investigations at 29SJ 629 in Marcia's Rincon and the Fajada Gap Pueblo II Community, Chaco Canyon, New Mexico

Volume I

by

Thomas C. Windes

With Contributions by

S. Berger, D. Ford, and C. Stevenson

1993

Reports of the Chaco Center

Number 12

Branch of Cultural Research

Division of Anthropology

National Park Service

Santa Fe, New Mexico

Mission: As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally-owned public lands and natural and cultural resources. This includes fostering wise use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interests of all our people. The Department also promotes the goals of the Take Pride in America campaign by encouraging stewardship and citizen responsibility for the public lands and promoting citizen participation in their care. The Department also has a major responsibility for American Indian reservation communities and for people who live in Island Territories under U.S. Administration.

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REPORTS OF THE CHACO CENTER

The Branch of Cultural Research, formerly known as the Chaco Center, was established in 1971 to conduct multidisciplinary research in the area of Chaco Canyon, New Mexico. From 1971 through March 1986, this was a joint National Park Service/University of New Mexico facility housed on the university campus in Albuquerque. Effective April 1, 1986, the staff moved to the National Park Service regional office in Santa Fe; the collections and all their documentation (archival material) are curated by NPS personnel located at the university.

One of the most important missions of the Branch of Cultural Research is to disseminate the results of its research to the professional community and to the interested public, in addition to Park managers and interpreters. Reports on research projects of the Branch are issued either in the National Park Service Publications in Archeology series or in the Reports of the Chaco Center series. The latter was established in 1976 to provide economical and timely distribution of the more specialized research undertaken during the Chaco Project studies. This report is issued as the twelfth in that series.

The Branch of Cultural Research maintains an up-to-date listing of all published papers, reports, and monographs that include Chacoan or Chaco-related research carried out under the general auspices of the Chaco Project, regardless of where they might be published. This list, entitled "Contributions of the Chaco Center," is available on request. Correspondence should be addressed to the General Editor, Branch of Cultural Research, National Park Service, P.O. Box 728, Santa Fe, New Mexico, 87504-0728.

PUBLISHED REPORTS OF THE CHACO CENTER

(Published as of 1993)

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   1976 Remote Sensing Experiments in Cultural Resource Studies: Non-destructive Methods of Archeological Exploration, Survey, and Analysis. Reports of the Chaco Center, No. 1. National Park Service and University of New Mexico, Albuquerque.

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12. WINDES, THOMAS C.

1993 The Spadefoot Toad Site: Investigations at 29SJ 629 in Marcia's Rincon and the Fajada Gap Pueblo II Community, Chaco Canyon, New Mexico. Reports of the Chaco Center, No. 12. Branch of Cultural Research, National Park Service, Santa Fe.

ACKNOWLEDGMENTS

The excavation of the Spadefoot Toad Site can be attributed to the group of archeologists who participated in that work. A myriad of folks worked in the rooms, including Earl Neller, John Schelberg, Mike Windham, and Bruce Yazzie, but the greatest load fell to Peter McKenna, who did an outstanding job, despite the many difficulties common to such a task. McKenna, Stephen Lekson, and Robert Powers worked on various areas of the plaza, although the complicated southern part fell to Lekson. William Gillespie was in charge of the Trash Midden excavations, but was aided by Cory Breternitz and Powers. John Schelberg handled the chore of fill removal from the Kiva in 1975, and Wolky Toll and Nancy Akins finished the job and subsequent floor work in 1976. Robert Powers handled the difficult task of the Pithouse 2 excavation, with valuable help from Akins and Toll. In Pithouse 3, William Gillespie and Cory Breternitz were the chief excavators. Of course, considerable help from our laborers and lab personnel also contributed to the final product. My thanks to them all for the excellent work they achieved (Table 1).

Data on artifacts included in the report came from many of the same staff. Information on abraders and human skeletal remains came from Nancy Akins. Manos and chipped stone were analyzed by Cathy Cameron, metates by John Schelberg, and hammerstones by Chip Wills. Anne Cully handled the analysis of pollen, with a later study by Glenna Dean, and Mollie Struever-Toll did the flotation analysis. Ceramics were rough-sorted by Mike Windham and myself, but the analysis was completed by Peter McKenna and Wolky Toll. Jerry Livingston is responsible for the majority of the photo reproductions, while Catherine Ross copied and assembled the report for the initial manuscript distribution in 1978. On short notice, Francis Vogel helped produce a few of the final photographs. Cheryl Ford provided immense help in putting some of the text and tables on computer, correcting tables, and assisting with a myriad of other tasks. Mary Jo Windes helped with much of the editing. Finally, between 1989 and 1993, F. Joan Mathien, the Chaco series editor, Jerry Livingston, scientific illustrator, and various typists, Carmen Silva, J. P. Moore, Rod Hardy, Margaret Mosher, and Sarah Chavez, produced the final manuscript. Jerry Livingston produced some of the final illustrations; the remainder were produced by the author. You were a great staff, thanks for all your efforts.

The reviews of the ground stone chapter by Jenny Adams and Cathy Cameron are greatly appreciated. Dr. Anita Pfeiffer, of the University of New Mexico, was most helpful with the written Navajo translation for the East Chaco Community, along with some helpful comments by David Brugge. Finally, my special thanks to the volume reviewers, Stephen Plog, Sarah Schlanger, and David H. Thomas, who offered many helpful ideas to improve the final product. Areas that suffer from faulty prose and thinking are strictly my responsibility. Also, I would like to extend my gratitude for funding from the Chaco Tours account at the Maxwell Museum, which allowed some of the flotation, radiocarbon, obsidian hydration, and pollen analysis to be completed.

Table 1. The Chaco Center staff involved with the excavations at 29SJ 629.

1975 Field Crew
(22 July - 12 Sept. 1975)

Chief, Chaco Center
Robert H. Lister

Project Supervisor
Alden C. Hayes
W. James Judge

Site Supervisor
Thomas C. Windes

Staff Archeologists
Earl Neller
John D. Schelberg

Volunteers
Lynn Arany
James Charles
Robert Greenlee
Dan Wasson

Laborers
Alvin Dennison
Ben Etcitty
James Kee
Jimmy Lopez
Johnny Martinez
Ben Noberto
Nelson Trujillo
Paul Tso
John Wero
Bruce Yazzie

1976 Field Crew
(25 May - 16 July 1975)

Chief, Chaco Center
Robert H. Lister

Project Supervisor
W. James Judge

Field Supervisor
Thomas C. Windes

Lab Director
L. Jean Hooten

Special Equipment Technician
Robert Greenlee

Staff Archeologists
Nancy J. Akins
Cory D. Breternitz
William B. Gillespie
Stephen H. Lekson
Peter J. McKenna
Earl Neller
Robert P. Powers
H. Wolcott Toll

Laboratory
Victoria Atkins
Fred Burt
Robert Sonnart
Wirt H. Wills
Michael Windham

Postexcavation Volunteers
Julian J. Anastasio 1983-1990
Steven DeSutter 1989
Cheryl Ford 1990-1993
Dabney Ford 1988-1990
Suzanne Hunt 1988
Donna O'Bryan 1988
Willy Schuster 1989
Charles Stearns 1988-1989
Francis Vogel 1990
Juergen Vollbrecht 1989
B. Todd Windes 1989
Connor L. Windes 1988-1989

Laborers
Wallace Castillo
Ben Etcitty
Jimmy Lopez
Lewis Lopez
Johnny Martinez
Paul Tso
John Wero
Bruce Yazzie

DEDICATIONS

Dedicated to the Navajo crew and the Anasazi who came before them.

Working with Native Americans can be an unforgettable and rewarding experience. Their knowledge of the ground is often superb, particularly by those with considerable archeological experience. Life in the surrounding Chaco Canyon area and on the reservation, however, is unlike that commonly experienced by most Anglos. Life for Navajos can be particularly harsh. In the winter and spring, miles of mud or snow can choke off access to paved roads, supplies, and services. Many homes have no running water or electricity, jobs are scarce, and it is a long way to a hospital if someone is hurt. Highway and alcohol-related deaths are legion, claiming at least four of those who have worked for the Chaco Project, including the two "old-timers" at the Spadefoot Toad Site (Jimmy Lopez and John Wero). It is a sad tale that John, like so many before him, met his end along the infamous stretch of State Highway 44 north of Chaco Canyon on October 1, 1988. Services were held on October 6 at the Brethren in Christ Mission near Blanco Trading Post to a host of John's friends and relatives. He was a good man.

John Wero (Plate 1) was one of several Navajo laborers who assisted in the excavation of the Spadefoot Toad Site, and this report is especially dedicated to him. Over the years, John's work for archeological projects included those with the Ruins Stabilization Unit with Gordon Vivian, the Inscription House project with Albert Ward, Bc 362, in Chaco Canyon, with Charlie Voll (1964), and several Chaco small-house sites and Pueblo Alto with the author.

After World War II, John started his long career with the National Park Service for Gordon Vivian in about 1946 or 1947. His primary task for the next several decades was being a "damn good" rock mason for the Ruins Stabilization Unit (Charles Voll, personal communication 1988). In this role, he participated in the stabilization of ruins throughout the Southwest, including Gran Quivira, Aztec, Chimney Rock, Betatkin, Wupatki, Crack-in-the-Rock (at Wupatki), Montezuma's Castle, Tuzigoot, Casa Grande, Tumacacori, and the many ruins in Chaco Canyon (Charles Voll, personal communication 1988).

John was the only one of the crew born in Chaco Canyon, at the mouth of Werito's Rincon on 15 June 1926, probably at site 29SJ 699. His parents were Welito Wero (Hastiin Bíláh Ntsah, "Mister Thumb") of the Bit'ahnii Clan and Christine Wero (Navajo name unknown, but daughter of Tomacito, who resided in South Gap during the Wetherill era) of the Tódích'íi'nii' Clan. Welito Wero's father was Wello (Old Wello), who took up residence before 1895 beneath Peñasco Blanco at the abandoned quarters of the L. C. Cattle Company (29SJ 612). The cattle company (from Texas?) found the Chaco environment too inhospitable and moved to Monticello, Utah, to run stock in what is now Canyonlands National Park. Old Wello provided Judd (1954:345, 349) with information about Chaco Canyon, and he apparently excavated in Peñasco Blanco to provide artifacts for George Pepper. Wello's Navajo name was Hastiin Tábąą Kini, "Man of the House Beside the Water," evidently in reference to a prominent nearby spring (now dry), which once had steps leading to it from Peñasco Blanco. Wello belonged to the Táchii'nii Clan and died in 1926. (Information from above is primarily from David Brugge, personal communication 1978).

The name Wero may have derived from Spanish abuela, "grandfather" (Tom Mathews, personal communication to David Brugge 1976) or from huero

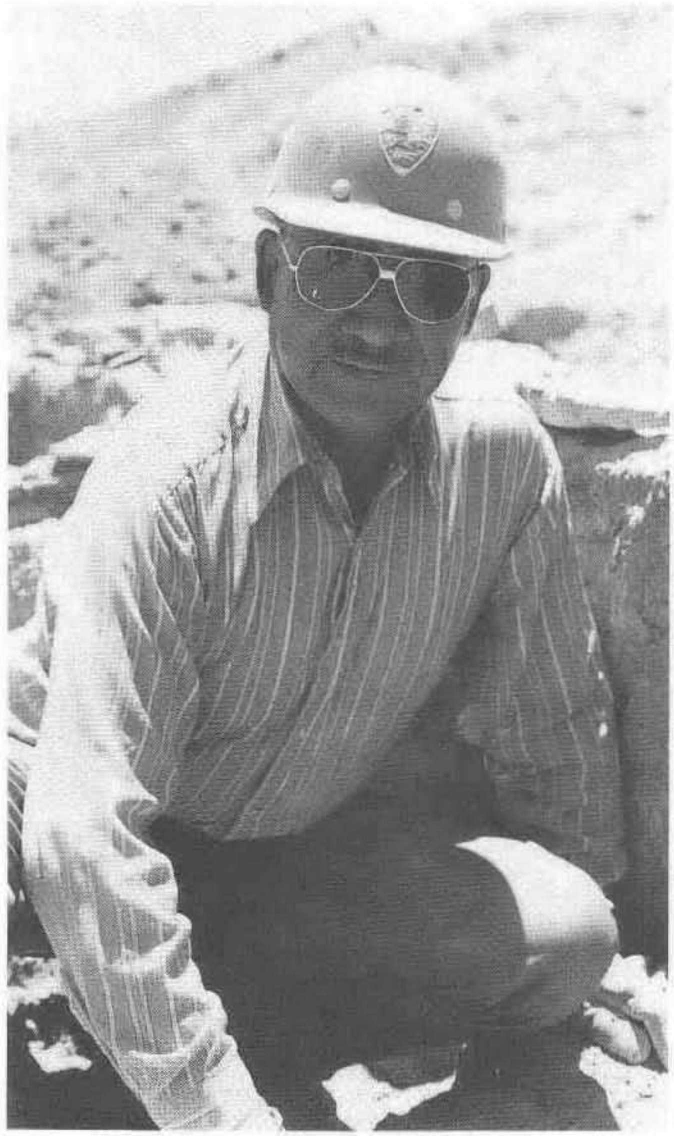


Plate 1. *John Wero of the Tódích' íi'nii' Clan, son of Old Wello, and a crew member at 29SJ 629 (NPS 12184).*

or guero, meaning "Blonde" (in a relative sense, not as among Nordics), which was sometimes used as a nickname (David Brugge, personal communication 1978).

In addition to John Wero and the Navajo labor force, volunteers play a major role in the success of any archeological project. I am indebted to them and the work they performed for the Chaco Project. In particular, I also wish to dedicate this report to Julian Anastasio (Plate 2), who gave several thousand hours to assist in the curatorial and analytical chores

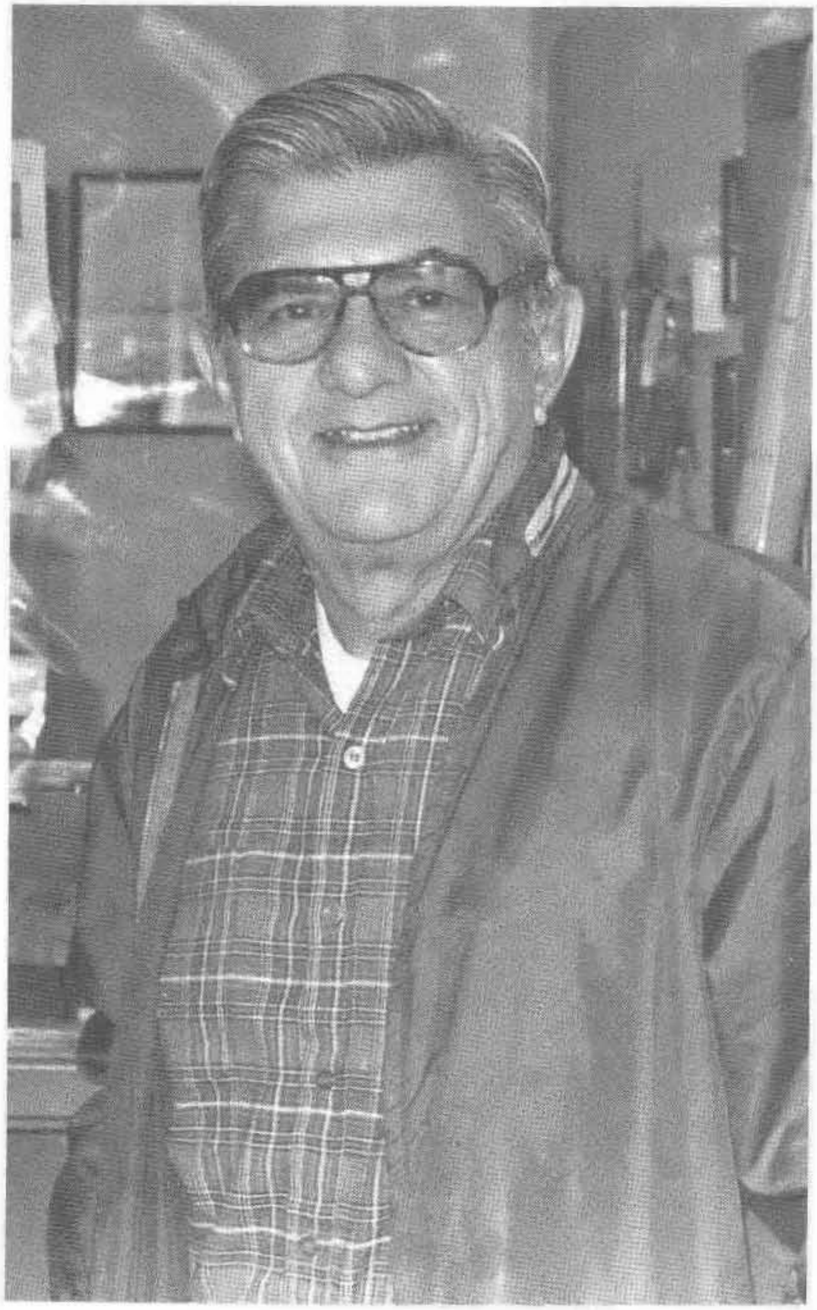


Plate 2. Julian Anastasio, a volunteer for the Chaco Project 1983-1990 (NPS 24748).

that are a necessary part of the business. Julian, retired from the Department of Justice, started work for us in 1983 and continued until his death on January 14, 1990. Besides his contributions in easing the tremendous backlog of work, Julian will be remembered by all for his humor and friendship, tireless efforts on our behalf, and his companionship. He is deeply missed.

Finally, I wish to dedicate this work to my mom, Margary Cramer Windes (11 November 1910-27 March 1990), who always managed to keep upbeat, despite the personal tragedies in her life. She loved to learn about and to see different peoples and places through travel. I like to think that her spirit and adventurous nature were important contributions to my own life. Farewell, mom.

1

INTRODUCTION

Abstract

The relationship of the small houses or villages to the contemporary large towns or greathouses of the Bonito phase (A.D. 900-1150) has long provoked discussion among archeologists (e.g., Kluckhohn 1939; Vivian 1970b, 1989, 1990) and was no less intriguing to the Chaco Project staff. Although attention has generally focused on greathouses as pivotal for deciphering sociopolitical complexity during the Chacoan Phenomenon, small-house occupation and the communities in which both large and small houses resided are important components of the Chacoan system. Our understanding of occupations in small-house sites excavated prior to 1974, however, has been hampered by lengthy site use and extensive remodeling. Before work by the Chaco Center, only the 3-C Site (Vivian 1965) provided a clear glimpse of early Pueblo II (A.D. 900s) small-house occupation in Chaco Canyon, a period of one of the heaviest Anasazi occupations in the canyon and the entire San Juan Basin.

The Spadefoot Toad Site (29SJ 629) is a small house located in Chaco Canyon, which abounds with nearly 200 similar, small contemporary structures and several large greathouses (Figures 1.1-1.2). During the 1970s and early 1980s, 29SJ 629 (Figure 1.3) and several contemporaneous sites in Marcia's Rincon were tested or excavated. A brief review of these excavations and others conducted by the Chaco Center was covered by McKenna and Truell (1986). This report, however, details the work at 29SJ 629, its analyses, the unusual finds recovered there, and its role within the surrounding community. Although the findings and interpretations from the site contribute to our understanding of the Chacoan Anasazi, a wealth of detailed data is presented which is not always directly relevant to the present interpretations. The work at 29SJ 629, nevertheless, is also relevant to the excavations undertaken at other contemporary sites during the project and forms a base of information that transcends the site-level analyses. Additionally, the widespread interest in understanding the Chacoan Phenomenon and the work conducted at a site held in the public trust require presentation of detailed information that provides enduring research material for the future, outlasting present interpretations and explanatory models.

Thus, this volume explores more than just the site cultural materials and architecture. In Chapter 2, the marginal environment of Chaco Canyon, sometimes seen as an oasis within the San Juan Basin, is placed in regional perspective. Additionally, the local geology and soils are covered as well as local climatic variation. An overview of 29SJ 629 construction sequences is covered in Chapter 3. Detailed excavation notes are discussed in Chapters 4 (the nine rooms), 5 (the three pitstructures), and 6 (the extramural areas: the plaza and midden). Chapter 7 explains feature nomenclature and summarizes detailed feature information for the 161 site features. Chronology and chronometric techniques used at the site are discussed in Chapter 8. Finally, Chapters 9 and 10 examine the community

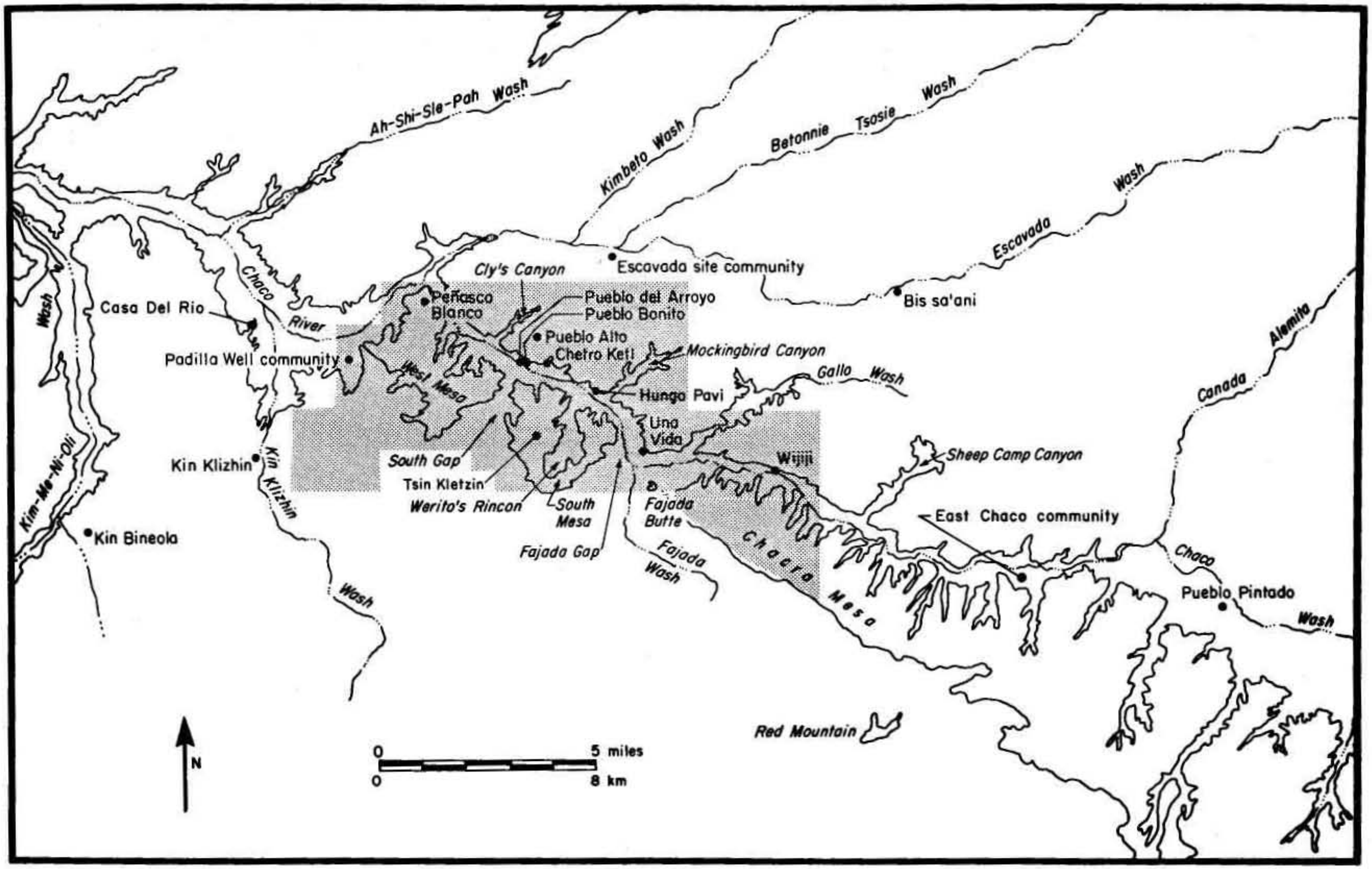


Figure 1.1. *Important topographic features, greathouse sites, and communities in Chaco Culture National Historic Park and its environs (NPS 310/83000 C).*

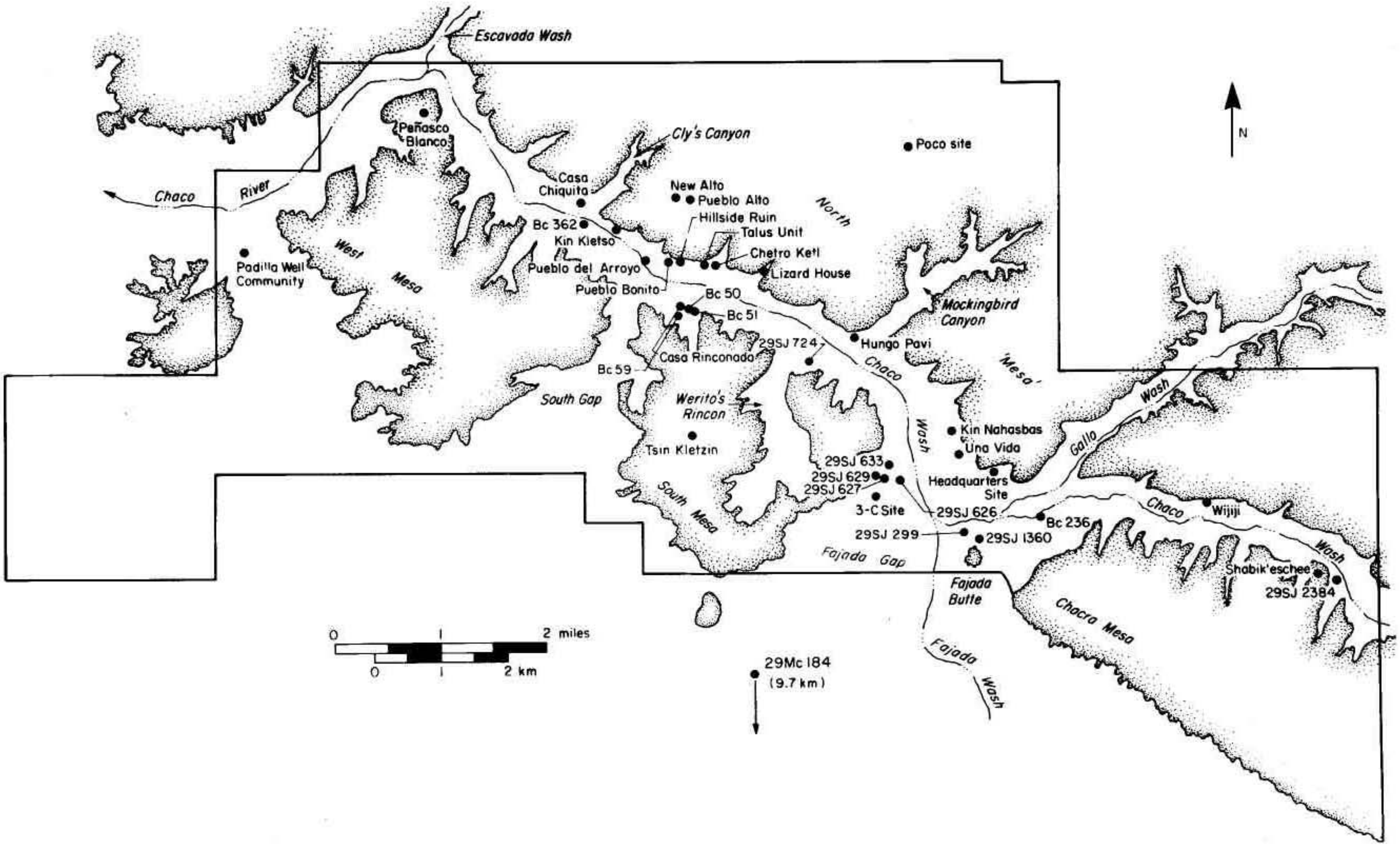


Figure 1.2. Important greathouse and excavated small-house sites in Chaco Canyon (NPS 310/82795 B).

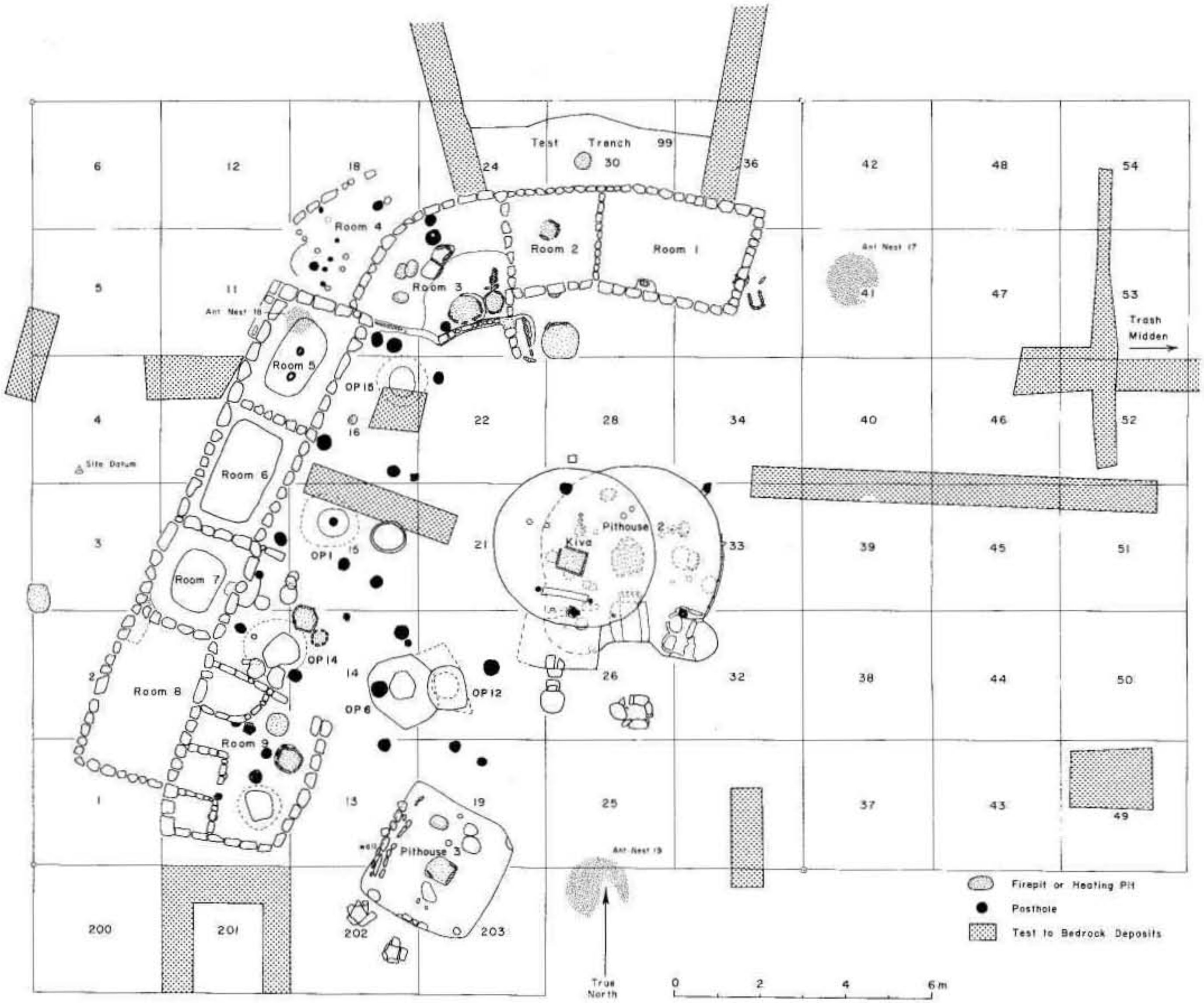


Figure 1.3. *Plan view of Spadefoot Toad Site (NPS 310/82835 A).*

of sites in which 29SJ 629 resides, the site in community context, the presence of craft activities at the site--particularly of turquoise jewelry--and the widespread extent of turquoise jewelry production in the San Juan Basin.

Overall, approximately 50,000 artifacts, samples, and other remains were recovered from the site. Detailed analyses of these cultural materials, and the ethnobotanical, faunal, and human remains are reported in Volume II.

Despite its small size, 29SJ 629 revealed a lengthy, but intermittent, occupation from about A.D. 900 to 1140. Although it spanned the entire Bonito phase (Figure 1.4), the site revealed little remodeling or rebuilding. Lengthy use of house sites in the Pueblo II and Pueblo III periods in Chaco Canyon was typical, although it contrasts with the short occupations that characterize many Anasazi house sites in the San Juan Basin.

More important was the finding of tools and masses of turquoise debris in Pithouse 2 and in the plaza, marking the production of turquoise jewelry at the site in the late A.D. 900s/early A.D. 1000s. That the site was not unusual in this respect was determined by evidence of turquoise craft activities at the majority of other contemporary sites in the community around Fajada Butte and in other communities in the San Juan Basin (Chapter 9). Turquoise craft specialization has often been considered a hallmark of the greathouses in Chaco Canyon. In particular, it brought power and influence to some inhabitants and helped to give rise to Chaco Canyon as an important and influential place (e.g., Cordell 1984; Judge et al. 1981; Neitzel 1989a,b). Evidence from 29SJ 629, however, suggests some alternative explanations.

Finally, from the small-house perspective, the excavations shed light on resource procurement and exchange during the Bonito phase, the rise of clustered settlements in Chaco Canyon, and the question of social differentiation between large and small sites.

Research Considerations

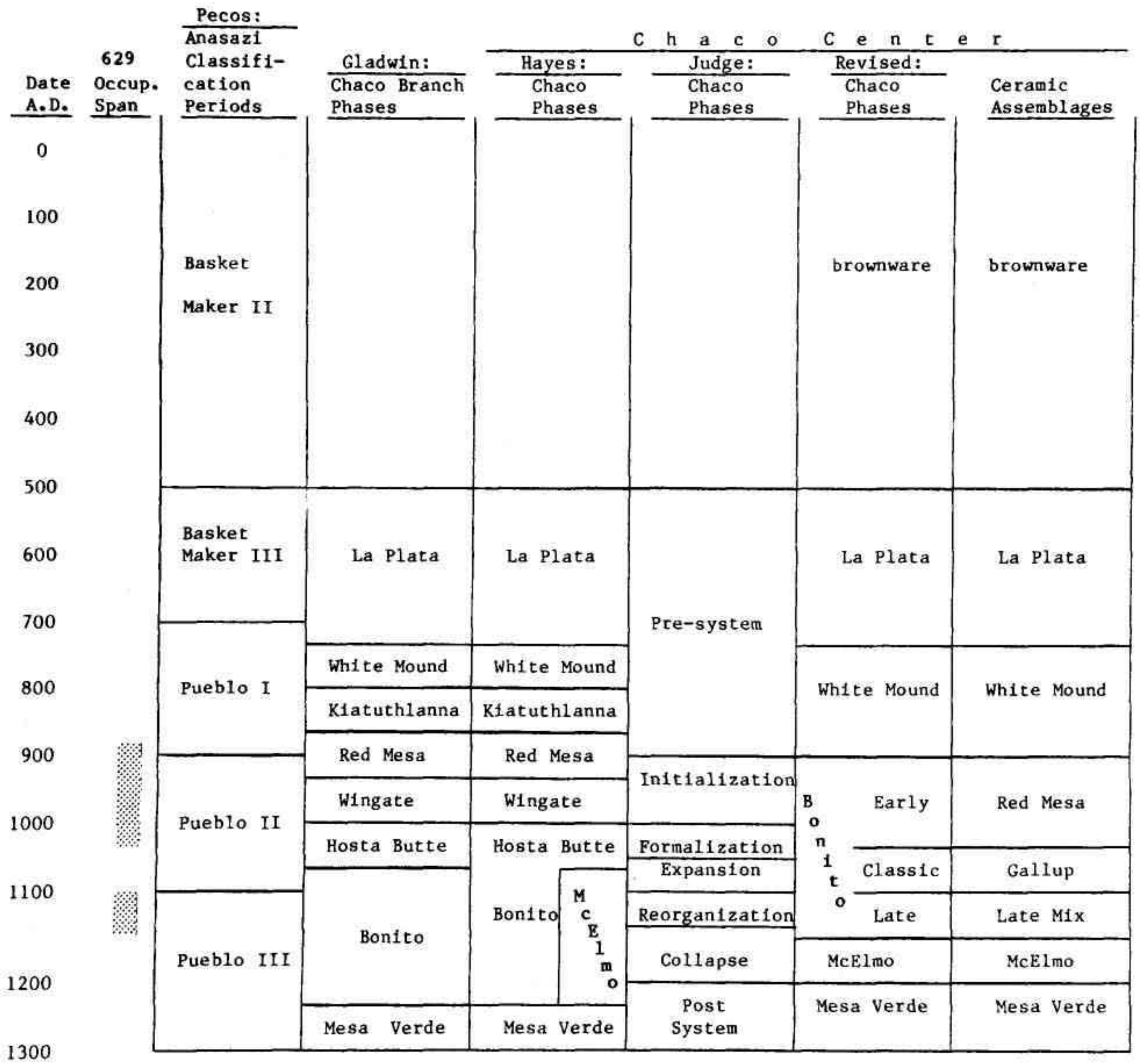
The rationale for the excavation of 29SJ 629 is partly covered under the research design for work in Marcia's Rincon (McKenna and Truell 1986; Truell 1992), located in a small rincon west of and across Chaco Wash from the park Visitor's Center (Figure 9.1). This locale acquired its name after Marcia Truell, the field supervisor for the excavation of sites in the area, which were carried out over four summers. Archeological work initially focused upon the rincon for two primary reasons:

First, the rincon was admirably suited to trace and identify development from Basketmaker III through Pueblo III times, giving better understanding of events leading up to the Bonito phase, and aiding recognition of earlier components within a greathouse selected for future excavations (initially to have been Una Vida, but later, Pueblo Alto). The eight sites there allowed for long-term research, which fit the more formal research design developed later (Judge 1975).

Briefly, the latter research design focused upon specific geographic areas within Chaco Canyon, where there had been prior project excavation. The purpose was to study prehistoric behavior through time and then to compare these geographic areas to help explain the Bonito phase developments in Chaco Canyon. Specifically, sought in two or three areas were the nature of social organization, its continuity within specific units and change through time, and causal factors relating to these changes. One of these was Marcia's Rincon. Further elaboration of the areas would concern the demography, subsistence, resources, and environment. At this point, research was expected to have lasted another 10 to 15 years.

Second, the rincon was ideal for the park management because it provided ease-of-access for visitors and a future area to illustrate the puebloan development of the Chaco Anasazi, similar to Ruins Road in Mesa Verde National Park. Unfortunately, preservation of fragile adobe and stone structures exposed to the elements is still a difficult task; thus, on-site interpretation and visitation has not yet occurred at the several sites excavated in Marcia's Rincon. Instead, all the excavations were backfilled with dirt to preserve the remains until they could be exhibited.

Our initial efforts for examining a ninth-century house focused on 29SJ 627 (Truell 1992), but it



[a]Modified from Windes 1987a:Figure 1.5.

Figure 1.4. Various temporal classificatory schemes for the Chacoan Anasazi culture and 29SJ 629's place within them.

was too complex for clear delineation of the ninth- and tenth-century occupations and for interpretative display. A search for a requisite site of shorter occupation resulted in testing the trash at three promising sites: 29Mc 184 (in McKinley County, 13 km south of 29SJ 629) along State Road 57; the western house of 29SJ 626 in Marcia's Rincon; and the northern house at 29SJ 724, at the mouth of Werito's Rincon. Ninth-century occupation in Chaco Canyon was expected to produce ceramics of Kana'a Neckbanded, and Whitemound and Kiatuthlanna Black-on-whites; however, none of the sites met this criteria. 29SJ 629 exhibited narrow neckbanded, indented corrugated ceramics, along with Kiatuthlanna\Red Mesa Black-on-white sherds, suggesting at least some occupation in the desired period, according to current ceramic wisdom. Its closeness to 29SJ 627 also allowed direct analytical comparison of the two neighboring sites as well as logistic advantages.

Thus, 29SJ 629 satisfied the research strategy of Alden C. Hayes for excavation of an early pueblo site. It further fulfilled the long range commitment in Marcia's Rincon to excavate all sites under the research design of W. James Judge. As it turned out, however, budget cuts reduced the Chaco Center's grandiose schemes, and 29SJ 629 became the last project site in the rincon to be completely excavated, although the overall work there was extensive: excavation of 29SJ 627, 29SJ 628, and 29SJ 629, with testing at 29SJ 626 (West House), 29SJ 630, and 29SJ 633. The nearby 3-C Site, excavated in the 1930s and early 1950s (Vivian 1965) might also be considered part of Marcia's Rincon. It was assigned survey number 29SJ 625 during the 1972 survey and was partly recleared during our work at 29SJ 629. In 1983 and 1984, the proposed paving and realignment of the park's Ruins Road forced excavation of another small site in the rincon, the East House of 29SJ 626. Thus, the Chaco Center's work in Marcia's Rincon yielded considerable information about Pueblo II occupation based on the excavations at 29SJ 625 (Vivian 1965), 29SJ 626 (1983 field notes), 29SJ 627 (Truell 1992), 29SJ 629, and 29SJ 633 (Mathien 1991), and form the basis, along with the work at nearby 29SJ 1360 (McKenna 1984), of our understanding of Pueblo II small-house occupation in Chaco Canyon. Finally, in 1988 and 1989, a reexamination of the small houses originally surveyed by the author in 1972, as well as those in lands adjacent to the park [partly inventoried in 1982-1984 by Robert Powers (1990)], was undertaken to broaden an understanding of the Fajada Gap Pueblo II Community and the role of the Marcia's Rincon sites within it.

Survey of 29SJ 629

The construction and use of a large Civilian Conservation Corps camp in the 1930s caused considerable activity in Marcia's Rincon. Plans for this camp had direct impact on one of the numerous small houses in Marcia's Rincon, resulting in the partial excavation of the 3-C Site, an early Pueblo II occupation reported by Vivian (1965). A few brass cartridge shells found on 29SJ 629 (and the East House of 29SJ 626) during surface stripping may attest to these earlier activities. Cartridges were found along the downhill side of the 29SJ 629 house mound, suggesting discard from target practice (Appendix A). A bluff about 70 m west of the site would have served as an excellent backstop for bullets.

Formal recognition of the site came in May 1972, when it was designated 29SJ 629 by a Chaco Center survey crew consisting of Roger Huckins, Earl Neller, John Schelberg, and Tom Windes [see the original form in McKenna (1986:110)]. The state (29) and San Juan County (SJ) prefix are Smithsonian Institution designations assigned to the site numbers of the survey (Mc was used for McKinley County). Later, when the site was excavated, it was named after the spadefoot toad found in the Kiva, one of the few excavated sites to be named. This site, along with others mentioned in the text, is listed with its corresponding state Laboratory of Anthropology (LA) number in Appendix B; a statewide inventory system maintained by the Museum of New Mexico.

Surface indications revealed the stone wall outlines of four rooms aligned north-south, with another block offset at the north end running east-west. Windes estimated six or more rooms and a kiva at the site (excavation revealed 9 rooms and 3 pitstructures), with architecture and midden ceramics indicating a Pueblo I-early Pueblo II occupation. Alden C. Hayes, director of the survey, believed the occupation was Pueblo II. Small numbers of early Pueblo III ceramics were scattered over the surface, but both investigators thought these were intruding from 29SJ 630, a site located 33 m to the northeast with many Pueblo III ceramics. An intensive scatter of trash (thought to be sheet trash) extended 24 m downslope to the east of 29SJ 629 and marked the main midden for the site.

A systematic method of sherd collecting was not employed during the 1972 survey. Instead, a grab sample was deemed most expedient to enable temporal assignment of the site to fit within the Pecos Classification. Sherds recovered from 29SJ 629 during survey and excavation are listed in Table 1.1. The grab sample was biased towards collection of identifiable ceramic types, thus emphasis was placed on recovering culinary and painted rim sherds, at the expense of unidentified service wares and plain gray culinary wares. An attempt was made to recover a range of types. Despite this sort of collection technique, temporal placement of the site agrees amazingly well with the survey and excavation ceramics, if plain gray and plain/unidentified whiteware sherds are discounted. In retrospect, however, neither the ceramic nor the architectural evidence prepared us for an occupation that lasted much later than what is suggested by surface evidence.

Excavation Strategy

Two field seasons were spent at 29SJ 629; the last half of the summer of 1975 and the first half in 1976. Only half of the Kiva, four rooms, and a small part of the Trash Midden were excavated in 1975. Events sometimes got beyond control of the supervisors, who were burdened with a high laborer-to-archeologist ratio (3-5:1) as well as being responsible for taking all the photographs and notes, and bagging and coding all the collected material. Due to an influx of experienced archeologists and a lower laborer-to-archeologist ratio (1:1), better control was evident in 1976. Additionally, procedures were standardized through use of a procedural manual (Judge et al. 1976) prepared for the work at Pueblo Alto, which began later that summer. The introduction of a feature form for the staff also provided considerable help.

Given the extra help, records and notes from the excavations were prolific. Approximately 1,800 pages of field notes and records, 784 black-and-white photographs, and 216 color slides were taken at the site. Some of the slides have been reproduced on microfiche for this report (Appendix I). Another 300 or more photos and slides were later made of artifacts removed from the site. These records are located in the Chaco Collections at the University of New Mexico (as of 1993).

Grid System

Before excavation, the house mound and area expected to yield pitstructures was divided into 3 m squares (Figure 4.1). These squares, or grids, were sequentially numbered in rows of six, starting at the southwestern corner of the site area and proceeding north. To incorporate the Trash Midden, the system was eventually expanded east downslope, still in rows of six. The last number used for a grid in the initial block was 104. With the discovery of the Pithouse 3 ventilators, it was necessary to expand the system south with an additional east-west row. These grids were numbered 200-203.

Grids were used for excavation control; however, their use was discontinued when the perimeters of structures became evident. Most rooms, for instance, were defined after surface-stripping and the grid designations dropped. Prolonged retention of grid designations occurred during testing for pitstructures, resulting in materials from the upper fill of these features often being listed from the associated grids rather than the pitstructure. Perimeters were difficult to define in the Plaza and Trash Midden; thus, control was maintained by grid provenience throughout their excavation. These latter grids may have acquired a number of formal designations, such as Trash Midden or Plaza Grids, for computer coding. For instance, Trash Midden 65 (TM 65), Grid 65 (G 65), or Trash Midden Grid 65 all refer to the same provenience square. Outside of major structures, features were coded under the appropriate grid designation; otherwise they were not. Features for this report refer only to wall cavities and floor pits (Chapter 7), rather than to the major provenience units at the site designated as rooms, pithouses, plazas, middens, or the initial grid assignments used for unstructured areas.

Excavation was planned to maximize removal of natural and cultural stratigraphic units, together with the associated cultural material. After establishing

Table 1.1. Ceramic totals from survey and excavation at 29SJ 629.[a]

Rough Sort Types	Survey (grab sample)		Site Surface (stripped)		Total (excavated)		Overall Total (estimated)	
	No.	%	No.	%	No.	%	No.	%
Plain gray	1	1.1	2,160	30.6	11,896	36.4	13,405	36.6
Lino Gray (rims/necks)	-	-	8	0.1	104	0.3	124	0.3
Lino Gray w/fugitive red	-	-	-	-	41	0.1	53	0.1
Wide neckbanded	3	3.4	82	1.2	685	2.1	816	2.2
Narrow neckbanded	15	17.1	718	10.2	3,187	9.7	3,453	[illegible]
Neck indented corrugated	-	-	87	1.2	216	0.7	225	0.6
PII indented corrugated rim	1	1.1	11	0.2	141	0.4	146	0.4
PII-PIII indented corrugated rim	1	1.1	1	T	7	T	7	T
PIII indented corrugated rim	1	1.1	-	-	3	T	3	T
Unclassified indented corrugated	6	6.8	870	12.3	4,061	12.4	4,339	11.9
BMIII-PI unpolished (mineral paint)	-	-	10	0.1	101	0.3	120	0.3
BMIII-PI polished (mineral paint)	1	1.1	11	0.2	191	0.6	234	0.6
Early Red Mesa B/w	4	4.6	142	2.0	1,094	3.3	1,219	3.3
Red Mesa B/w	32	36.4	1,187	16.8	3,449	10.5	3,862	10.6
Escavada B/w	-	-	2	T	11	T	12	T
Puerco B/w	1	1.1	10	0.1	36	0.1	37	0.1
Gallup B/w	5	5.7	43	0.6	256	0.8	264	0.7
Chaco B/w	1	1.1	6	0.1	19	0.1	21	0.1
Non-Cibola (mineral paint)	-	-	2	T	7	T	8	T
Undecorated whiteware	2	2.3	939	13.3	4,315	13.2	4,931	13.5
Unclassified PII-PIII (mineral paint)	5	5.7	646	9.2	2,342	7.2	2,687	7.3

Table 1.1. (continued)

Rough Sort Type	Survey (grab sample)		Site Surface (stripped)		Total (excavated)		Total (estimated)	
	No.	%	No.	%	No.	%	No.	%
BMIII-PI unpolished (carbon paint)	-	-	2	T	13	T	16	T
BMIII-PI polished (carbon paint)	-	-	11	0.2	101	0.3	119	0.3
PII-PIII whitewares (carbon paint)	4	4.6	51	0.7	149	0.5	160	0.4
Mesa Verde B/w	1	1.1	-	-	2	T	2	T
Redwares	4	4.6	27	0.4	181	0.6	218	0.6
Polished tan/gray wares	-	-	2	T	20	0.1	22	0.1
Polished smudged	-	-	22	0.3	96	0.3	98	0.3
Totals	88	100.0	7,050	100.0	32,724	100.0	36,601	99.8

[a] T = trace (less than 0.1%).

the grid system, the surface was shovel-stripped of brush, grass, and loose fill (Plates 1.1-1.2), with the cultural debris bagged by grid. In the Trash Midden, however, only that part of the grid to be immediately excavated was cleared. For room excavation, a 1-m-wide test trench was placed across one end and excavated in arbitrary 15-cm-deep levels until the floor (if any) was reached. In practice, this trench usually removed a third or so of the room fill depending on the room size. If the excavator noted a change in the fill during the initial test, a new level would be started. The result was that often the levels closely corresponded to those natural units subsequently removed. The fill exposed by the initial test was then defined by natural and cultural stratigraphic units ("layers"), mapped, described, and then removed by the units defined. Profiles of the excavation units were made and later extended across adjoining units (Figure 1.5).

The three pitstructures were dealt with differently. The east half of the Kiva (Pithouse 1) was removed in arbitrary levels to the floor. The same level units were maintained for the remaining ill-defined alluvial deposits that filled the Kiva. The east wall of the Kiva was formed by the fill in Pithouse 2, allowing this fill to be defined without extensive testing. Thus, most of the latter was removed in natural layers. Testing with a backhoe enabled discovery of the Pithouse 3 east wall ("Levels 3-6"). Hand-dug tests further defined the structure's perimeter and stratigraphy. Only about half of the original fill was left to be removed in natural units after testing.

After all major features were thought to be located, a road grader was used to strip an L-shaped area east and south of the roomblock. The scraping was closely monitored while 3-4, 10-cm-thick peels were planed off. Only three spots revealed cultural activity from this work: a lignite patch which marked the Pithouse 2 ventilator shaft, a large dark stained area east of Room 1 which marked the west end of the Trash Midden, and Other Pit (OP) 7 in Grid 19. The rest was sterile sand. Several backhoe trenches excavated to bedrock around the margins of the house mound later confirmed that no other pitstructures were close by.

Screening

Archeologists often assume that biases affecting material recovery are eliminated or greatly reduced by screening the fill. Nevertheless, the rates of material recovery depend entirely upon the skills and attentiveness of the screener, the condition of the equipment, and the type of matrix and artifacts, all of which may vary considerably (e.g., Windes 1987b:567). At least one Navajo with the project, James Kee, so thoroughly examined the fill he was digging that he rarely recovered much from the screens. On the other hand, some laborers failed to detect even manos lying in the screen.

Nevertheless, the general policy at 29SJ 629 was to screen all fill through 1/4 in. mesh. Deposits in floor features, however, were usually sifted through 1/8 or 1/16 in. mesh. Because material smaller than 1/4 in. is lost through the screen, samples from selected areas of the site (e.g., the Trash Midden) were processed through fine screen. This was done to monitor the small cultural material being lost and to determine cultural material densities (Appendix C). To determine these densities, a 0.027 m^3 sample (a 30-cm-cube) was collected for fine screening from several excavation units on the site. Unfortunately, the time spent fine-screening became prohibitive, and the heavy, bulky samples were difficult to move, forcing termination of the experiment.

To monitor charcoal-fleck density as a relative indicator of trash density, two-dimensional measurements were also taken. These were tabulated within 10-by-10-cm squares marked on profiles within natural or cultural units. Squares yielding less than 10 flecks or fragments of charcoal generally yielded little cultural material. More revealing, however, were those squares that exhibited counts of 20 or more, an indication of deposits darkened by charcoal from firepit cleanings (e.g., trash) or of in-situ burned deposits.

Turquoise was seldom collected from the screens, although our keen-eyed Navajo workmen were quick to spot the minute green and blue flecks, and they took extra care in examining the associated fill. There was a decided bias against recovery of

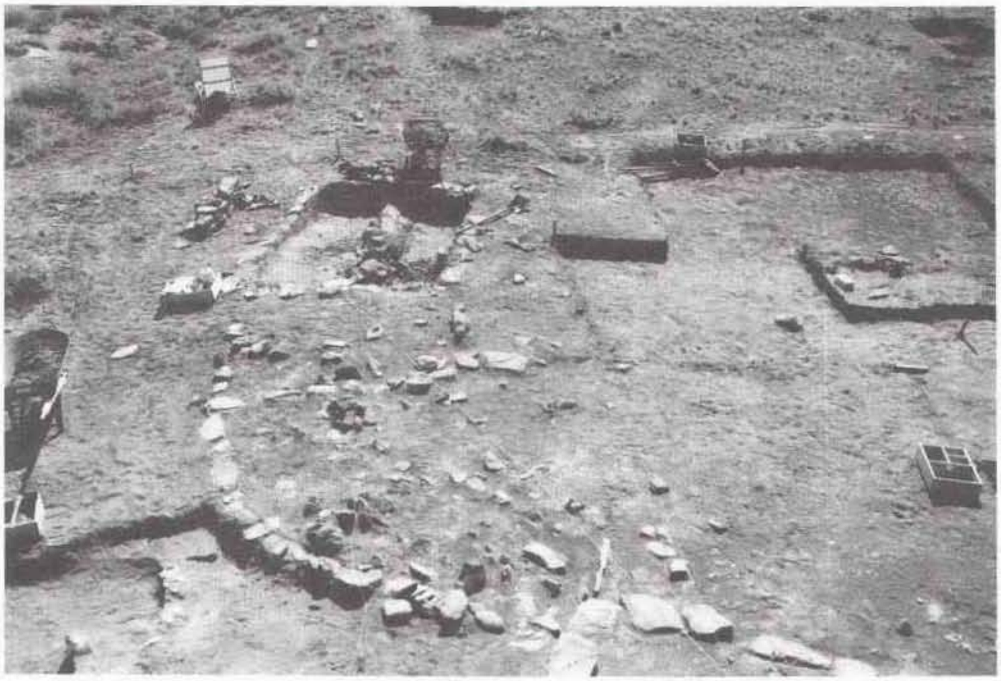


Plate 1.1. *Overview of Rooms 1-3 at 29SJ 629. Looking east at the excavations in Room 1 (NPS 12184).*

Plate 1.2. *Overview of Rooms 6-9 before excavation (NPS 10509).*

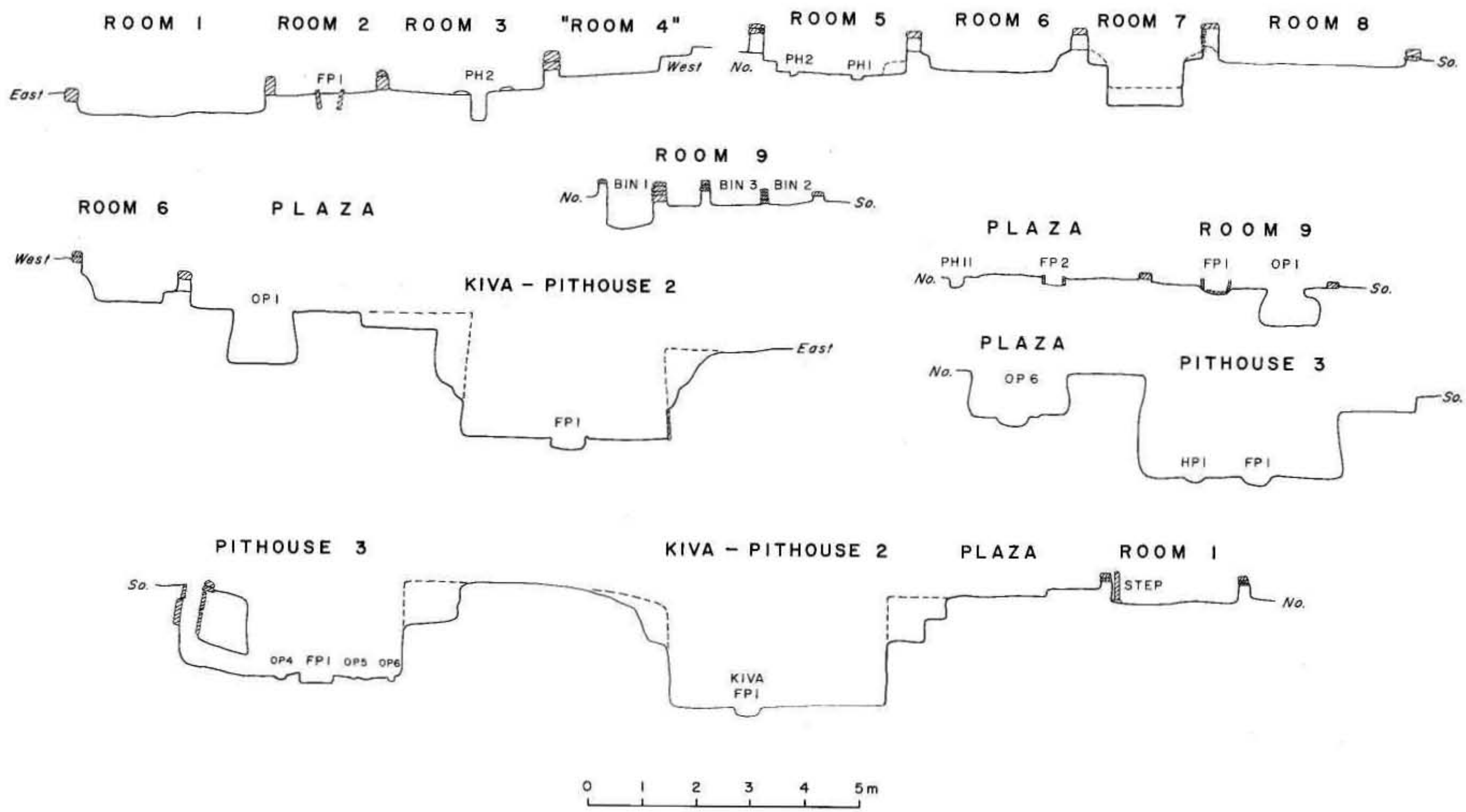


Figure 1.5. Profiles across major adjoining excavational units at 29SJ 629 (NPS 310/82800 A).

small rodent bones when utilizing 1/4 in. screens, although these bones were mostly from postoccupational activities. Often small materials, such as turquoise, small rodents, and eggshells, were missed during excavation, but were recovered from the residue of flotation samples, a method which provides a useful check on small items missed during 1/4 in. screening.

Collection of Samples

Large fragments of wood were collected for tree-ring dating. These were wrapped with string and then stabilized in a mixture of gasoline and paraffin. Smaller pieces, particularly brush and wood from burned pits, were saved for species identification. Radiocarbon samples were occasionally taken for backup chronometric analyses as well as from most hearths. An effort was made to collect samples from every well-burned feature on the site for archeomagnetic dating. Results of the samples recovered for dating are in Chapter 8.

Finally, to evaluate the effect of ants' nests on the turquoise distribution at 29SJ 629 and the potential contamination caused by their activities, they were also sampled for artifacts, flotation, and pollen around the general site vicinity (Appendix D). Dirt samples from every archeologically-determined unit of fill, all floors, and pits were collected for pollen and flotation analyses (Cully 1985; Dean, and Toll, this report) and sometimes, for future soil analyses. The majority of the 1,037 dirt samples collected were not analyzed and remain for future research.

Inventories and Computer Coding

All materials removed from the site were inventoried on Field Specimen (FS) sheets and coded for computer retrieval on Fortran sheets, key-punched on cards, and entered on magnetic tapes. This inventory and all subsequent analyses are now carried on main-frame computer tapes and personal computers with appropriate documentation, while the recent curatorial cataloging lists, along with the collections, are stored on a personal computer at the University of New Mexico (as of 1993).

Drawings, Photos, and Scales

Scale drawings were made of every unit of fill, excavation unit, and feature, except during our initial work in 1975. Overall site horizontal and vertical control was maintained from the site datum located just inside Room 5. Depths from this datum are commonly referred to as Below Site Datum (BSD) and are widely used in this volume as reference points for depths across the site. Photographs were taken of all major provenience units, all features before and after excavation, and major units of fill. Although it is common practice to show scale and direction in archeological photos, too often these are illustrated without proper notations. Four sizes of scales/north arrows were used at 29SJ 629, and these can be recognized by the number of scale increments:

1) 50 cm scales are divided into seven increments with ends divided into 5 cm parts and the body in 10 cm parts.

2) 30 cm scales are divided into six increments of 5 cm each.

3) 20 cm scales are divided into ten increments of 2 cm each. This scale has a barbed head containing a compass.

4) 15 cm scales are divided into five increments of 3 cm each.

The north arrow in photographs generally points to magnetic north, while on maps it shows either magnetic north (one-barbed tip) or true north (two-barbed tip), unless noted otherwise.

Analysis Strategies

Analysis strategies are covered by the individual analysts in Volume II of this report. Many of the site's materials, however, were analyzed as part of the overall project rather than specifically by site. Only Anne Cully's (1985) report on the pollen was published separately from this report and it is referenced extensively here. Pollen samples with low counts (generally less than 100 grains), however, were not included in her 1985 report but are reported here from her laboratory notes. As a result of the feature analysis, potential mealing catchment basins that were previously unanalyzed for economic pollen were examined in 1992 by Dean (this report). Finally, unusual concentrations of cultural materials within the site are specially noted throughout Chapters 4-6 in this volume while detailed analyses are covered in Volume II.

2

THE NATURAL ENVIRONMENT AND SETTING

Local flora and fauna resources were widely exploited by the Spadefoot Toad Site (29SJ 629) inhabitants, as they were at contemporary sites. Many of these species are present today in the immediate vicinity (J. Cully 1985; Mathien 1991; McKenna 1984; and Windes 1987a [for lists]) and indicate a past environment little changed from the present. While hunting was important to the subsistence strategy at 29SJ 629 (Gillespie and Lekson, this report), based on the site records, it was horticulture that assumed the greatest subsistence importance.

The majority of the Chacoan small sites indicate overwhelming evidence for the importance of horticulture. Economic plant remains found in small-house excavations, food preparation areas littered with food-processing tools, and the allocation of storage space all lend credence to this supposition. What is debated, however, is the range of and time commitments in the site households for the various activities that took place in and around them. How were they balanced against the natural environmental constraints, and what level of cooperation, if any, did households have with one another?

Because of new environmental data and its importance to understanding horticulture, this chapter examines the potential for horticulture in the Fajada Gap as a setting for 29SJ 629 and its role within the larger Fajada Gap Community (Figure 9.1). Additionally, some environmental constraints that affect horticultural success in Chaco Canyon are examined relative to other areas of the San Juan Basin.

The dense cluster of house sites found in Chaco Canyon suggest that site placement criteria was heavily influenced by favorable horticultural conditions. Small houses are scattered throughout the entire length of Chaco Canyon, but are particularly dense within and around the gaps of the canyon along the south side, like Fajada Gap. Generally, every side tributary along Chaco Canyon exhibits Pueblo II and Pueblo III sites, with the mouth of the larger drainage basins having the densest site concentrations adjacent to the Chaco Wash. Conversely, there is a notable lack of small houses along the north side of the canyon until after A.D. 1100 (Windes 1987a:403). Without doubt, some sites on the north side are buried from view, but the dichotomy in settlement pattern is probably real when the differences between the two sides of the canyon are further considered.

The physiography, soil, rainfall, runoff, and temperatures, among other elements, are important variables affecting successful horticulture, and it is these requirements that are examined here. We are still unsure what the exact limits were for successful horticulture in Chaco Canyon (see Peterson [1987a] for parallels in the Dolores region), and the issue has provoked much debate (e.g., see Sebastian 1988; Toll et al. 1985 for summaries). Nevertheless, the magnitude of constraints provides us with a relative measure of impact to canyon horticulture.

Luckily for this study, the rain and temperature gauges were moved in 1960 from Pueblo Bonito to the Visitor's Center in Fajada Gap, thereby providing more realistic readings for the area nearby 29SJ 629. To better monitor rainfall variability within Chaco Canyon, additional rain gauges were installed in April 1989 south of 29SJ 629 (Figure 9.8), near Shabik'eshchee Village, and at Pueblo Bonito. Additional gauges were installed inside and outside the canyon in 1991 and at the East Chaco Community in 1992.

Physiography and Geology

Fajada Gap was formed by erosion of the linear strip of uplifted sandstones and shales that comprise Chacra Mesa, which borders the south side of Chaco Canyon. The gap leads south to gently rolling plains spotted with low isolated buttes, mesas, and ridges (Plate 2.1). The most prominent local feature is an isolated butte in the middle of the gap known as Fajada Butte, which is prominent in Navajo mythology. The main tributary in the region, the Chaco Wash, is deeply incised, although the Fajada Wash that enters it near 29SJ 629 is only entrenched for the last kilometer from its junction with Chaco Wash. Long fingers of remnant shales and sandstones of the Menefee Formation are covered with aeolian sands and extend out from the mesas, separated by undissected ephemeral drainages. These ridges are the favored localities for Anasazi houses contemporary with 29SJ 629.

With minor exceptions, the basic surface geology at and around the site is typical of Chaco Canyon (Figure 2.1). 29SJ 629 is nestled near the head of a small, insignificant drainage (Marcia's Rincon) against the east flanks of South Mesa (Plate 2.2), which rises 80 m above the site in a series of broken sandstone and carbonaceous shale ledges and cliffs of the Menefee Formation. These ledges and cliffs are capped by beds of Cliff House sandstone, forming the top of the eastern tongue of South Mesa. The site is situated over widespread beds of shales and clays of the Menefee Formation, capped by a thin 50-cm-deep mantle of aeolian sand, which is just above the sheetwash Naha Alluvium that has filled the canyon floor since Upper Holocene times (Scott et al. 1984).

The majority of A.D. 900s and A.D. 1000s sites in Fajada Gap cluster on or near isolated deposits of Jeddito Alluvium and aeolian sands that formed during the Altithermal more than 4,000 years ago (Scott et al. 1984). The former deposit is particularly interesting because it yields numerous pebbles, up to 30 cm in diameter, of quartzite, quartz, petrified wood, and chert and was a source of flaking material where exposed (Cameron, this report). Exposed Jeddito deposits are sparse in the Fajada Gap locale and absent elsewhere in the canyon, except for a few exposed deposits near Peñasco Blanco (at the west end of the canyon), and along the western margins of Kin Klizhin Wash (to the west). The maximum thickness of the Jeddito deposit along the Fajada Wash is 10 m, while the aeolian beds range up to 12 m in depth. Aside from a source of lithics, the elevated sandy deposits may have been practical locales for house construction, particularly for pit-structures, because of ease of excavation and good drainage.

Soils

By modern standards, the soils in Chaco Canyon are inadequate for farming success. Nevertheless, they must have sufficed for the techniques practiced by the Anasazi. Three primary soil deposits are recognized in the Fajada Butte area (Figure 2.2): Blancot-Notal, Huerfano-Muff-Uffens, and the Shepard-Huerfano-Notal (Keetch 1980:Sheet 21). All have moderate-to-high sodium content, although the Blancot-Notal deposits, covering the canyon bottom, must be particularly high and a detriment to horticulture, because of high-sodium flood deposits (Scofield 1922). On the other hand, soil of the Sheppard-Huerfano-Notal series, located in a mass southeast of South Mesa and directly south of the 3000 series Fajada Gap sites (Figure 9.1), is the only one of the three soil series now used (elsewhere) for irrigated farming (Keetch 1980:7). For all three soils, effective rooting ranges between 5 and 21 cm, permeability is moderately slow, runoff is medium, and the hazard of water erosion is moderate (Keetch 1980). Salt tolerant plants, such as greasewood (Sarcobatus vermiculatus) and saltbush (Atriplex spp.) are prevalent in the flats of the Blancot-Notal deposits, while grasses dominate the elevated soils surrounding the flats [plant associations in the Fajada area are covered by McKenna (1984) and those in Marcia's Rincon are covered by Mathien (1991:Figure 2.1)]. Tree cover, except for sparsely clustered stunted junipers and rare pinyons to the east on top of Chacra Mesa, is absent in the area. In prehistoric times, South Mesa, above 29SJ 629, might have also enjoyed some tree cover, although impact from tree-cutting in historic and prehistoric times has virtually eliminated trees.

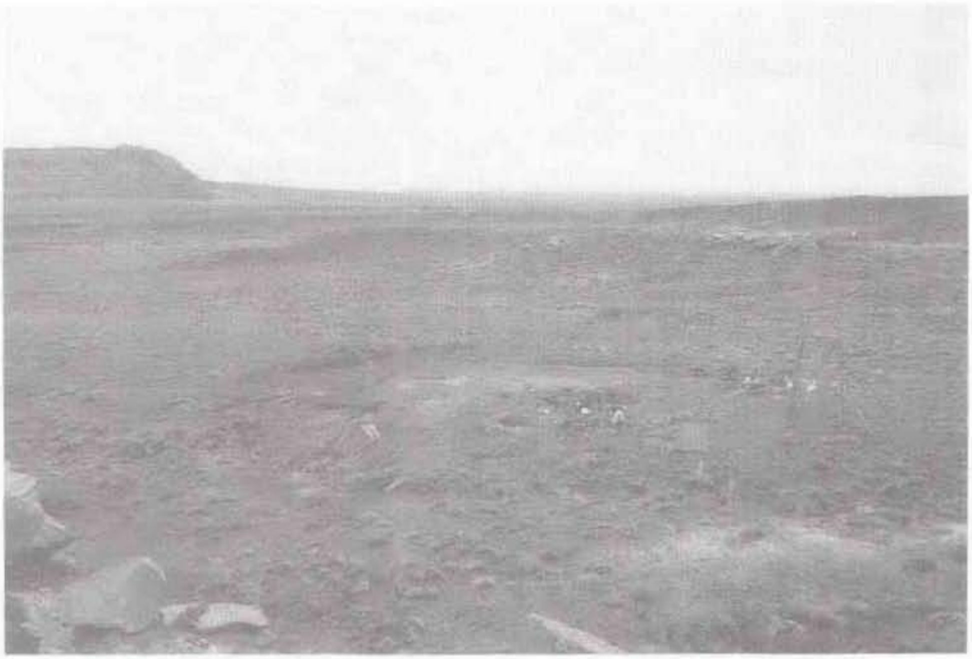


Plate 2.1. *Overview of 29SJ 629 looking to the southeast. Note Fajada Butte and Chacra Mesa in the upper left (NPS 10582).*

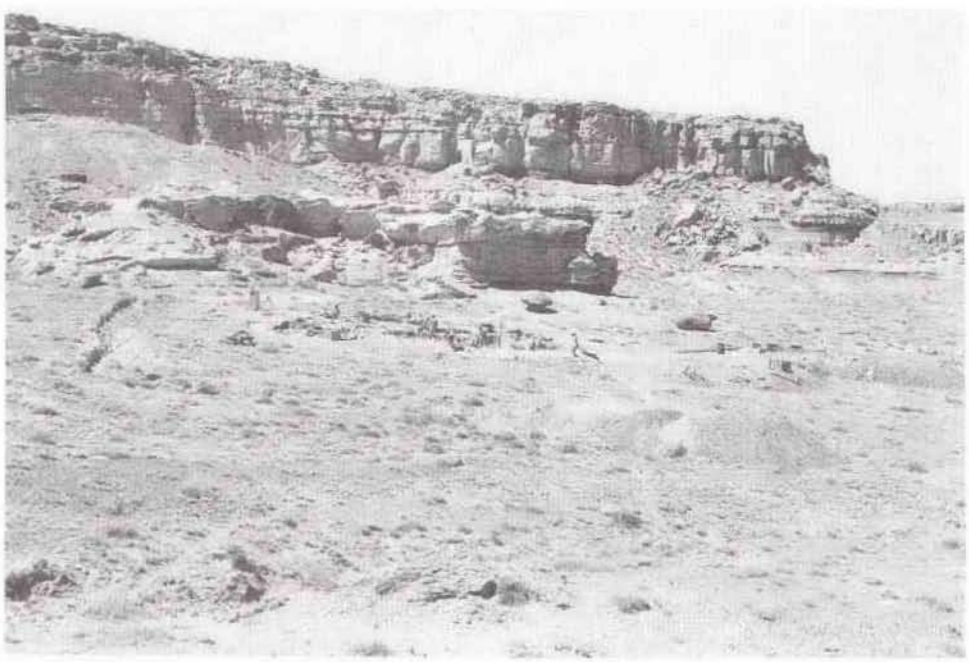


Plate 2.2. *Overview of 29SJ 629 looking to the north. South Mesa is in the background (NPS 11879).*

Figure 2.1 *Surface geology in Fajada Gap area (NPS 310/82796 A)*

Description of map units for Figure 2.1[a]

Qal ALLUVIUM (HOLOCENE). Light-gray to white, fine sand and dark-gray silt derived from sandstone bedrock or reworked from deposits of older alluvium. Contains sparse well-rounded red quartzite pebbles and fragments of petrified wood. Fills channels and forms floodplains of larger ephemeral streams. Acts as a major source of shallow ground water. Maximum thickness is approximately 1.5 m.

Qnt NAHA AND TSEGI ALLUVIUMS UNDIFFERENTIATED (UPPER HOLOCENE). Naha Alluvium. Grayish-brown, friable to slightly hard, thinly laminated and cross-stratified sand and silt in discontinuous layers. Fills washes of ephemeral streams and the entire alluvial column near center of Chaco Wash. In vertical banks along center of deep washes, shows a complex sequence of cut-and-fill channels. Forms upper 1.2 m of alluvial column where it overlies Tsegi Alluvium. Thickness ranges between 3 and 6 m. Tsegi Alluvium. Yellowish-gray or grayish-brown, firmly consolidated, fine to coarse sand, silt, and clay containing several clay and humus-rich layers. Tsegi either makes up the whole terrace or lies beneath the Naha in the deep arroyo along Chaco Wash and probably is widespread beneath Naha Alluvium in the valley fills. Thickness is about 3 m.

Qsw EOLIAN SAND (UPPER HOLOCENE TO UPPER PLEISTOCENE). White, well-sorted, cross-stratified loose quartz sand in active barchan and climbing dunes. Sand was blown from channels of major washes and from sandy bedrock by winds that still trend N 60°-70°E. Older deposits consist of light-brown, slightly consolidated, fine to medium sand containing subrounded to rounded, frosted quartz grains in stabilized linear dunes and sand sheets on the uplands. Discontinuous soil in upper part of older sands is marked by a reddish-brown oxidized B horizon up to 25 cm thick underlain by a firmly consolidated, light-brown Cca horizon up to 46 cm thick containing scattered carbonate nodules. Thicknesses of 12 m or more in active dune fields and more than 2 m in the older deposits.

Qes EOLIAN SAND (HOLOCENE TO UPPER PLEISTOCENE--PINEDALE AND YOUNGER AGE). Well-sorted, cross-stratified, loose quartz sand in active linear dunes along valleys. Sand was blown from channels of major washes and from sandstone bedrock by winds having a prevailing direction of about N 60°-70°E. Clasts of chert, quartzite, and petrified wood commonly cover blowouts between dunes. Thin stabilized eolian sand overlies much of the gravelly sand. A discontinuous soil marked by a reddish-brown oxidized B horizon up to 25 cm thick, underlain by a firmly consolidated light-brown Cca horizon as much as 46 cm thick containing scattered carbonate nodules, is developed in the upper part of the older sand deposits. The soil is probably formed during the Altithermal--middle part of Holocene time--and shows that part of the sand has been stable for more than 4,000 years. Thickness ranges between 2 and 12 m.

Qj JEDDITO ALLUVIUM (LOWER HOLOCENE TO UPPER PLEISTOCENE). Dark-yellowish-brown sand containing moderate yellowish-brown, angular, pebble- to cobble-sized clasts of sandstone and very dark brown to black, pebble-sized clasts of ironstone. Along the Fajada Wash most clasts are from the underlying Menefee Formation. Along Fajada Wash, a reddish-brown, well developed, Altithermal soil formed in the upper part of the alluvium up to 103 cm thick. Jeddito Alluvium forms a terrace about 7 m above the Fajada Wash. Maximum thickness along the Fajada Wash is 10 m.

Kch CLIFF HOUSE SANDSTONE (UPPER CRETACEOUS). White to dark-yellowish-orange, thin- to thick-bedded, fine- to coarse-grained, lenticular and crossbedded or massive sandstone. Contains gray or brown carbonaceous shale lenses. Forms bold cliffs and rides. Contains casts of the burrows of Ophiomorpha major indicative of a near-shore marine environment and marine fossil invertebrates. Thickness as much as 131 m.

Kchu UPPER BED OF CLIFF HOUSE SANDSTONE (UPPER CRETACEOUS). Brown and yellowish-gray, massive sandstone. Commonly capped by a dark-brown sandstone about 60 cm thick, which contains abundant broken bits of marine fossil invertebrates. Forms conspicuous ledge that is everywhere separated by a tongue of the Menefee Formation from underlying parts of the Cliff House Sandstone. As much as 17 m thick.

Kmf MENEFEE FORMATION (UPPER CRETACEOUS). Heterogeneous sequence of thick, lenticular beds of grayish-yellow to brown, fine- to medium-grained, crossbedded sandstone and interbeds of dusky-yellow to olive-gray, sandy shale and mudstone, moderate-brown, sandy limestone; and lenticular beds of carbonaceous shale and shaly coal. Coals beds occur sporadically in the upper 75 m of Menefee Formation. The coal beds are commonly burned at the outcrop; red outcrops along the base of Chacra Mesa are burned coal. Formation thickens south from Menefee Mountain, Colorado (122 m thick) to Chaco Canyon (457 m thick). The Menefee Formation is widely exposed in the southern San Juan Basin.

Kmft TONGUES OF MENEFEE FORMATION (UPPER CRETACEOUS). Gray and brown, lenticular sandstone interbedded with black carbonaceous shale, gray claystone and siltstone, some thin beds of highly weathered coal. Occurs as beds within Cliff House Sandstone that thin northward. Beds undoubtedly represent two or more separate tongues extending northward from main body of Menefee Formation. Stratigraphic connection, however, has since been removed by erosion in map area. Thickness 0-24 m.

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[a] After Weide et al. (1979) and Scott et al. (1984).

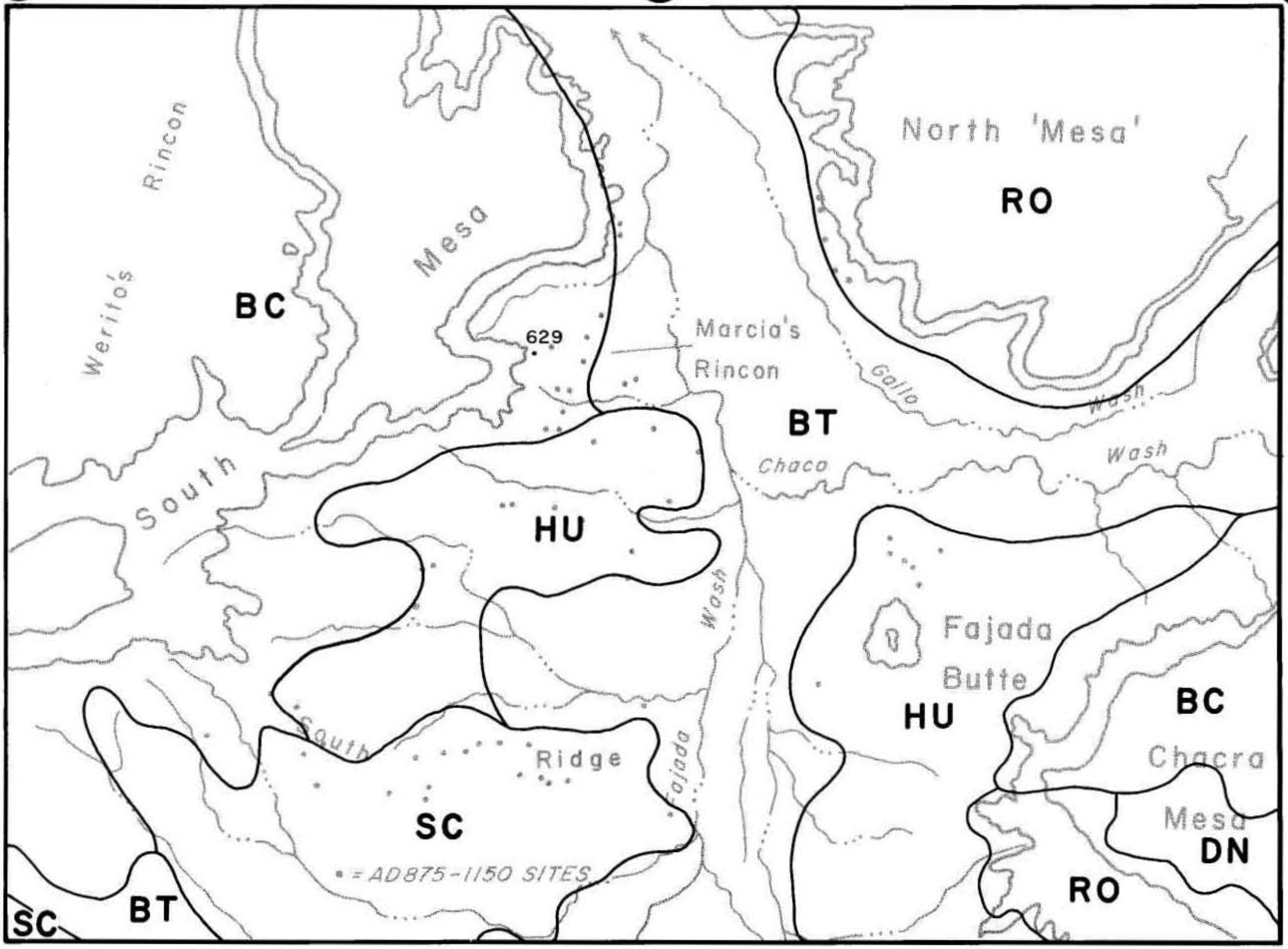

Figure 2.2 *Soil complexes in the Fajada Gap area (NPS 310/82797 A).*

Description of map units for Figure 2.2*

BC - Badland-Rock outcrop-Persayo complex. An extremely steep unit on hills, ridges, and breaks. Slope is 30 to 70 percent. The native vegetation is mainly pinyon, juniper, and grass. This unit is 35 percent Badland and 30 percent Persayo clay loam and 35 percent others. Badland consists of nonstony, barren shale uplands that are dissected by deep, intermittent drainages. The Persayo soil, formed from shales, is shallow and well drained with a surface layer of clay loam about 5 cm thick. Permeability of the Persayo soil is moderately slow, water capacity is very low, and runoff is rapid with the hazard of severe water and wind erosion. Effective rooting depth is 25-51 cm, and the average wetting depth is 13 cm. The soil is slightly saline.

BT - Blancot-Notal association. A gently sloping unit on alluvial fans and valleys. Slope is 0 to 5 percent. The native vegetation is mainly grass (western wheatgrass, galleta, and Indian ricegrass) and fourwing saltbush. The unit is 55 percent Blancot loam and 25 percent Notal silty clay loam. Blancot loam is on the fans and in upland valleys, while Notal silty clay loam is on fans and valley bottoms. Soils, derived from sandstone and shale, are deep and well drained with a surface layer of loam about 5-8 cm thick. Permeability of the soils is moderate to slow, water capacity is high, and runoff is medium with moderate water erosion but with moderate to high wind erosion. Effective rooting depth is 152 cm or more, and the average wetting depth is 15-41 cm. The soils are slightly saline.

DN - Doak-Avalon association. This map unit is gently sloping, 0 to 5 percent, on mesas, plateaus, and terraces. The native vegetation is mainly grass, including blue gamma, galleta, Indian ricegrass, needle-and-thread, winterfat, and western wheatgrass. The unit is 50 percent Doak loam and 35 percent Avalon loam. Soils are deep and well drained and formed from sandstones and shales with a surface layer of loam about 10-13 cm thick. Permeability of the soils is moderate to moderately slow and the water capacity is high, with slow to medium runoff but moderate to high wind erosion. Effective rooting depth is 152 cm or more, and the average wetting depth is 41-46 cm. The soils are slightly saline.

HU - Huerfano-Muff-Uffens complex. This is a gently sloping, 0 to 8 percent, unit on mesas and valleys. Native grasses are dominant but fourwing saltbush, black greasewood, shadscale, and snakeweed may increase under poor conditions. Huerfano sandy clay loam comprises 40 percent of the unit, Muff very fine sandy loams 30 percent, and Uffens fine sandy loam 20 percent, and 10 percent others. Soils, derived primarily from shales and siltstones, range from shallow (Huerfano) to deep and are well drained with a surface layer of loam 3-20 cm thick. Permeability of the soils is slow to moderately slow with slow to medium runoff and low to moderate water erosion. The hazard of soil blowing is severe. Effective rooting depth ranges from 25 cm (Huerfano) and 51 cm (Muff) to 152 cm or more (Uffens). The average annual wetting depth ranges between 10-31 cm. The soils are slightly saline.

RO - Rock outcrop. Exposures of barren sandstone on cliffs, breaks, bluffs, and ridges typifies this map unit. Slopes are 5 to 70 percent.

SC - Sheppard-Huerfano-Notal complex. A gently sloping unit, of slopes 0 to 8 percent, on valley bottoms, fans, mesas, and plateaus. The plant community includes grasses (Indian ricegrass, muhly, sacaton, galleta, wheatgrass, etc.) and fourwing saltbush, sagebrush, shadscale, snakeweed, Mormon-tea, and greasewood. Sheppard loamy fine sand comprises 30 percent of the unit, Huerfano sandy clay loam 30 percent, Notal clay loam 20 percent, and others 10 percent. Soils, derived from shales and siltstones, range between shallow (Huerfano) and deep, and are well drained with a surface layer of loamy fine sand or clay loam 3-13 cm thick. Permeability of the soils is very slow (Notal), to moderately slow (Huerfano), to rapid (Sheppard) along with slight to moderate water erosion. Wind erosion potential is high to severe. Effective rooting depth ranges between 25 cm (Huerfano) and 152 cm. The average annual wetting depth ranges between 15-20 cm and 61 cm (Sheppard). The soils are slightly to strongly saline (Huerfano).

* Abbreviated descriptions from Keetch (1980).

Precipitation

Rainfall is probably the major limiting factor to successful horticulture in Chaco Canyon. The mountains surrounding the San Juan Basin always deplete precipitation for the basin interior, which is graphically illustrated in Figure 2.3. No matter from which direction storms arrive, they are captured by the surrounding high peaks. The one direction in which there is a lack of great uplifted masses is to the southwest--the very direction prevailing storms arrive during the present growing seasons. We might expect, therefore, that major shifts in storm pattern direction would decrease available moisture rather than increase it. No matter how the precipitation came to Chaco Canyon or from which direction, Chaco Canyon must have always been relatively drier than the margins of the San Juan Basin, where many of the Chacoan outlying communities were located. Potential evapotranspiration and the moisture deficit are also relatively high in the Chaco Basin, compared to the surrounding region (Tuan et al. 1973:48-49). Nevertheless, it seems unlikely that the Chacoans experienced a very different climate than today, particularly given studies of tree-ring data that show that the northwestern plateau has been a dry place since A.D. 652 (Burns 1983).

Rose et al.'s (1982) modeling of past precipitation in the Chaco Canyon area and the northwestern plateau provides valuable insights into yearly conditions from A.D. 900. Precipitation variability by decade prior to A.D. 900 has been modeled by Dean and Robinson (1977). Despite the lack of precise figures, it appears that there is a strong relationship between site frequency and rainfall (Burns 1983). During the wetter periods (e.g., in the A.D. 900s/early A.D. 1000s, early A.D. 1100s, and mid-A.D. 1200s) site frequency is high, while the opposite is true for drier periods. It is assumed that the higher site frequencies, therefore, are causally related to improved horticultural success in Chaco Canyon during the wet periods. How precipitation runoff was manipulated by various groups in Chaco Canyon has been the basis of various explanatory models of the Chacoan Phenomenon and the rise of the greathouses (e.g., Grebinger 1973; Judge et al. 1981; Sebastian 1988; Vivian 1970a, 1970b, 1990).

It is illustrative to compare the predicted conditions for Chaco Canyon with another group, the Hopi (Figure 2.4), who have been successful farmers in a marginal environment seemingly similar to Chaco's. Hack (1942:8, 19) reported that rainfall in the Hopi region varied between 250 mm in the lower elevations to 330 mm in the higher ones. More recent studies have shown that annual precipitation ranged between 250 mm of precipitation at Oraibi to 305 mm at Keams Canyon (Adams 1979:289). U.S. Weather Service records from Keams Canyon between 1963 and 1990 reveal that it receives, on the average, 45 mm more annual precipitation than Chaco Canyon, although this difference may be much less near the Hopi villages, if the records at Oraibi are typical. More interesting is the similarity between the annual records between Keams Canyon and Chaco Canyon (Table 2.1), which usually reveal far more moisture at Keams Canyon, despite the annual fluctuations. Rainfall trends between the areas appear to be in concert.

Similar amounts of precipitation are received at the pueblos of Acoma and Zuni (Table 2.2), located just beyond the San Juan Basin (Figure 2.4), and both measure higher amounts than at Chaco Canyon. In the Dolores, Colorado, region of the Four Corners area, Peterson (1987b:225) reported that there is only a narrow range of precipitation--between 330 and 457 mm--for successful dry farming and corn growth. Hack (1942) believed that the Hopi enjoyed success when they planted in areas receiving 300 mm of annual moisture, and the length of the growing season was about 130 days (Hack 1942:8). The latter period has been revised upward to between 155 and 193 frost-free days for the Hopi (Adams 1979:289, 291, 293), which would lessen considerably the risk of crop frost damage. Despite these conditions, Hack considered the rainfall inadequate without other efforts to increase the amount of water to the fields, especially through flood-water farming. Dry years in Hopi lands were often probably equivalent to normal years in Chaco Canyon, where the average precipitation over the past 1,000 years, according to Rose et al. (1982), was estimated at about 250 mm.

A four-year drought, documented for the Hopi between 1777 and 1780, and again between 1866 and 1870, resulted in nearly total crop failure and the abandonment of many villages (Dockstader 1979:525; Ellis 1974:3; Kennard 1979:555), a tale repeated, undoubtedly, throughout Hopi history. Many Hopi fled to the eastern pueblos, among them Zuni, during these bad times, while scores died from starvation.

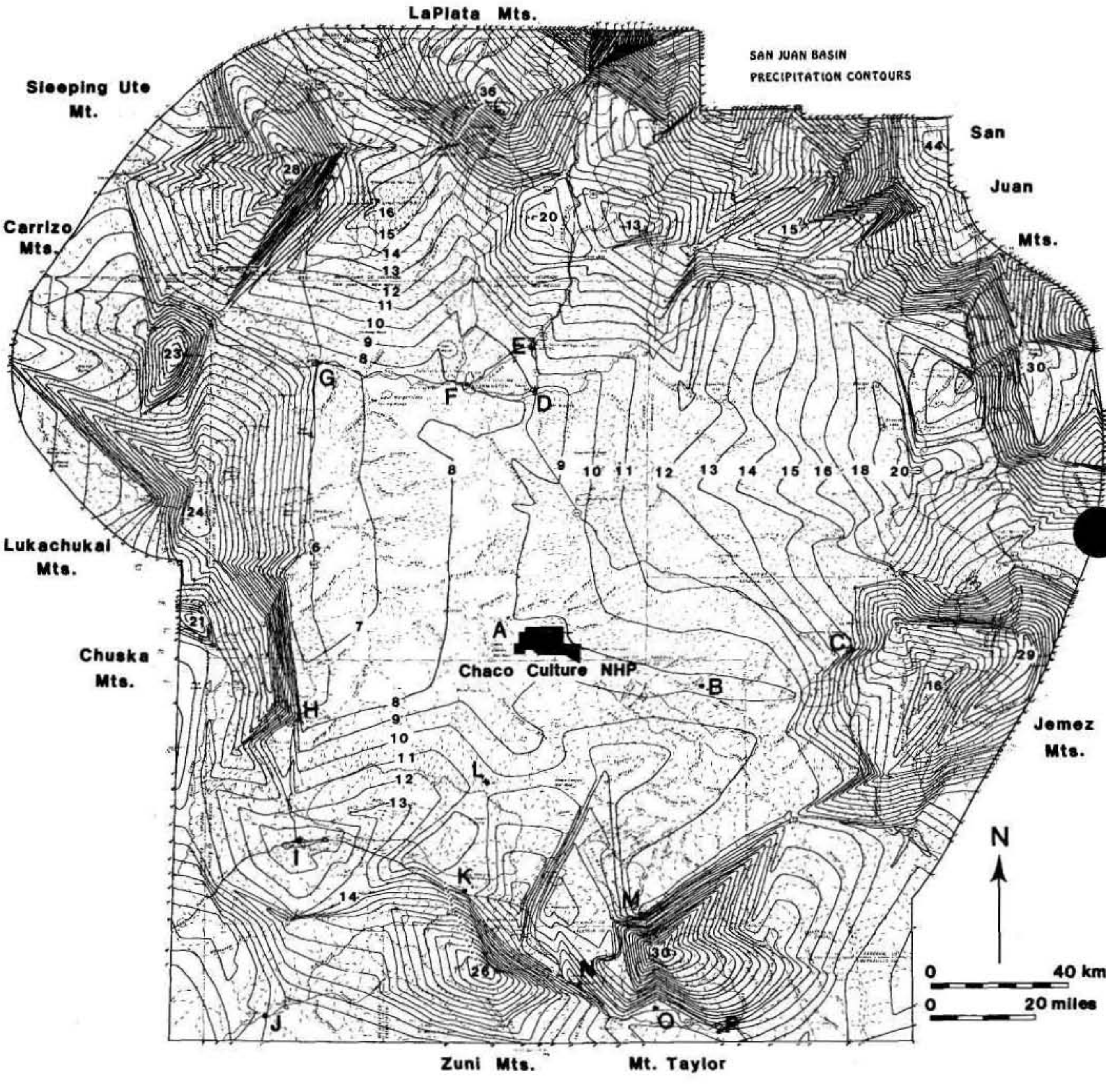

Figure 2.3. *Isopluvial contours in the San Juan Basin (in inches). Letters mark selected recording stations (Table 2.5) (NPS 929/82282 B).*

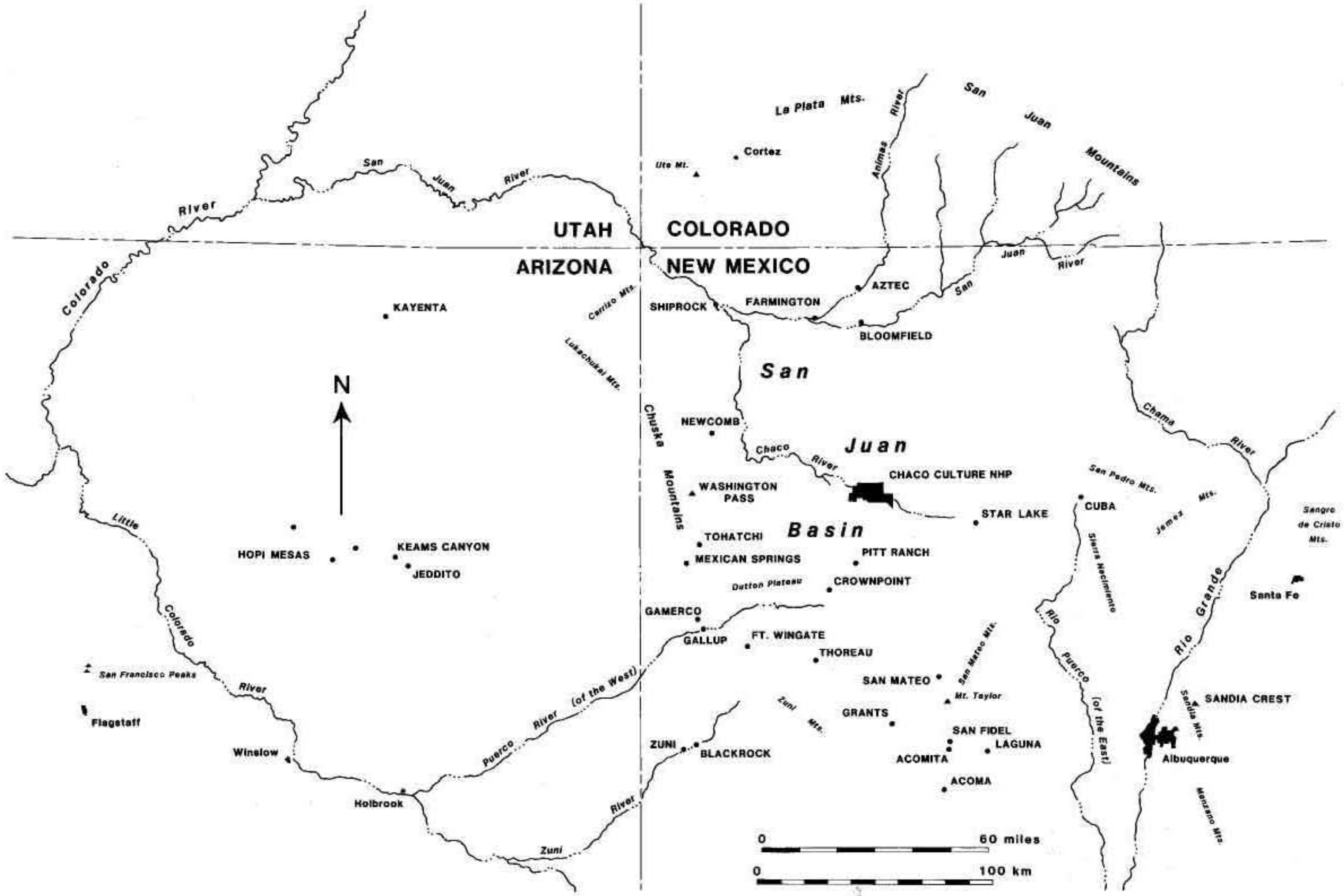

Figure 2.4. *Locations of some weather stations in and around the San Juan Basin and in northeastern Arizona (Tables 2.2 and 2.5) (NPS 929/82283 A).*

Table 2.1. 1963-1991 precipitation (mm) and annual temperatures at the Visitor's Center in Fajada Gap, Chaco Canyon, compared with precipitation at Hopi, Arizona.[a,b]

					Growing Season for Maize Agriculture								Total		Frost-free days above		Mean temp	Hopi[c]
Year	Jan.	Feb.	March	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	(mm)	(in.)	28°F	32°F	°F	(mm)
1963	5.3	18.0	7.1	0.3	2.5	2.8	9.9	54.9	45.2	13.2	12.7	25.4	174.5	6.87	150	127	48.7	259.6
1964	2.5	16.0	6.9	12.2	7.6	0.3	24.6	34.8	29.0	0.0	24.1	14.7	172.7	6.80	145	100	46.5	268.5
1965	12.4	8.1	6.6	21.1	18.3	30.2	47.0	34.0	37.3	29.0	23.1	30.0	297.2	11.70	115	80	47.6	436.9
1966	5.3	7.1	2.0	5.6	11.4	23.9	22.9	20.3	45.5	0.5	6.1	28.4	179.1	7.05	155	143	53.5	207.5
1967	1.8	T	5.8	T	6.6	35.3	80.3	38.1	36.6	3.6	2.5	14.5	225.0	8.86	144	121	-	279.4
1968	2.8	29.7	23.1	9.9	10.4	4.6	51.1	40.1	1.3	16.0	16.3	11.7	216.9	8.54	91	71	47.0	289.1
1969	11.9	15.2	17.3	18.3	22.1	37.8	35.8	56.6	31.5	67.6	11.4	11.7	337.3	13.28	158	133	49.5	283.5
1970	3.8	T	23.9	4.3	10.9	19.8	37.8	13.7	33.0	13.2	8.9	7.4	176.8	6.96	114	97	-	289.6
1971	1.8	11.2	6.9	0.8	0.8	2.0	31.8	54.9	59.4	24.4	17.0	8.9	219.7	8.65	106	89	48.2	185.2
1972	0.5	2.5	0.5	T	2.5	15.5	2.5	33.8	28.7	149.4	6.4	15.7	258.1	10.16	129	129	49.9	298.2
1973	9.1	18.0	37.8	10.2	29.5	-	-	16.0	23.6	2.8	2.3	-	149.4+	5.88+	75	74	47.8	246.4
1974	16.3	1.8	2.0	0.0	0.5	0.0	52.3	19.6	12.7	74.4	4.3	6.1	190.8	7.51	131-	131-[d]	49.1	185.4+
1975	10.7	8.6	12.4	9.7	19.3	1.3	23.6	10.2	39.4	1.5	7.4	1.8	145.8	5.74	100	91	47.3	181.1
1976	4.3	3.3	1.3	6.6	11.9	6.1	22.4	35.6	20.1	7.9	10.7	3.0	133.1	5.24	149	96	48.2	195.6
1977	29.0	15.2	T	5.1	12.2	7.4	37.1	30.7	15.7	10.4	14.0	9.9	186.7	7.35	136	100	49.7	211.6
Mean	7.8	10.3	10.2	6.9	10.0	12.1	34.2	32.9	30.6	27.6	11.1	13.5	208.1	8.19	126.2	103.6	48.7	259.4
sd	7.5	8.4	10.8	6.7	8.3	12.1	19.6	15.0	14.6	40.7	6.8	8.9	56.9	2.2	26.2	23.1	1.8	66.1
CV%	95.8	81.5	105.9	96.1	83.1	99.5	57.3	45.5	47.8	147.7	61.1	65.6	27.3	27.3	20.8	22.2	3.7	25.5

Table 2.1. (continued)

Year	Jan.	Feb.	March	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total (mm)	Total (in.)	Frost-free days above 28°F	Frost-free days above 32°F	Mean temp °F	Hopi[c] (mm)
					Growing Season for Maize Agriculture													
1978	26.2	22.4	20.8	12.7	63.5	1.8	4.8	24.9	64.0	33.3	55.6	18.5	348.5	13.72	126	94	50.6	409.7
1979	35.3	0.5	19.6	3.3	46.7	15.7	12.7	62.7	0.3	34.5	41.9	8.9	282.2	11.11	154	108	48.5	333.5
1980	18.0	38.6	10.9	3.8	12.2	0.0	9.4	34.5	17.3	14.2	0.0	13.0	172.0	6.77	119	100	-	320.3
1981	6.4	2.0	21.1	12.7	16.5	15.0	47.2	11.4	16.5	40.1	1.8	0.0	213.9	8.42	154	123	-	287.5
1982	3.0	48.8	38.4	6.9	71.4	0.0	34.3	31.2	93.0	0.0	21.1	21.8	369.8	14.56	143	136	-	288.5+
1983	33.5	15.5	33.5	10.2	15.7	20.8	18.5	20.3	25.7	27.7	24.4	35.1	280.9	11.06	125	98	-	364.2
1984	7.6	0.0	25.9	15.2	6.6	18.3	17.8	49.0	37.1	43.9	3.6	18.0	243.1	9.57	159	128	49.1	385.1
1985	21.1	1.8	16.0	59.9	8.6	5.3	73.2	32.3	34.3	20.6	17.3	9.4	299.8	11.80	159	121	50.2	348.0
1986	T	37.1	18.3	20.8	5.6	24.6	51.6	30.2	55.6	30.2	83.6	24.4	382.0	15.12	144	134	50.9	272.3
1987	24.6	26.7	11.9	2.0	16.5	0.0	32.8	16.4	6.1	15.2	31.5	19.6	208.3	8.20	176	149	48.6	230.9
1988	17.8	12.4	1.3	17.8	15.7	40.1	8.6	55.4	36.1	12.7	19.1	0.3	232.4	9.15	143	120[e]	48.3	293.6
1989	47.5	14.7	2.5	0.0	5.8	0.5	44.5	17.3	3.3	14.7	0.0	2.5	153.3	6.04	143	119	50.4	124.2
1990	3.8	19.1	20.3	45.2	11.2	20.1	29.6	7.4	23.9	30.2	13.2	30.7	254.6	10.03	181	124	49.3	208.5
1991	0.0	8.4	9.9	12.7	2.5	60.2	47.0	27.7	23.4	11.9	57.2	34.0	294.9	11.61	145	107	49.0	-
Mean	17.5	17.7	17.9	15.9	21.3	15.9	30.9	30.1	31.2	23.5	26.5	16.9	266.8	10.51	147.9	118.6	49.5	298.1
sd	14.8	15.5	10.5	16.9	22.3	17.5	20.1	16.2	25.5	12.6	25.1	11.8	69.5	2.7	17.8	15.8	1.0	81.0
CV%	84.6	87.5	58.4	106.1	104.4	110.1	65.1	54.1	81.9	53.5	95.0	69.9	26.1	26.1	12.1	13.3	1.9	27.2
Mean[f] 1932-83	11.2	14.0	15.0	9.4	18.0	9.7	28.2	33.8	30.0	26.2	13.2	16.0	224.3	8.83	139	116	49.7	--

[a] From National Oceanic and Atmospheric Administration (1963-1991) annual summaries for Arizona and New Mexico.
[b] T = trace (less than 0.1 mm). Plus (+) measurements not calculated for overall means.
[c] Measurements from Keams Canyon, Arizona.
[d] 131 days at 24°F. Not included in mean totals.
[e] Official span is incorrect because of inaccurate readings (not listed here).
[f] After Kunkel (1984:43). Frost-free days record here covers 1949-1983 (35 years). See Table 2.2.

Table 2.2. Comparison of environmental variables at Chaco Canyon with the Western Pueblos, towns in northeastern Arizona, and places around the periphery of the San Juan Basin.[a]

		Length of Frost-free Season (in days)				Annual Precipitation			Average Annual Temperature		
Location	Year Span	28°F	(yrs)	32°F	(yrs)	(mm)	(in.)	(yrs.)	(°C)	(°F)	(yrs.)
Chaco Canyon[b]	1933-1992	143	42	117	42	230	9.1	60	9.9	49.8	44
Hopi, AZ	?	-	-	155-193	?	250-305	9.8-12.0	?	9.9-12.5	49.8-54.5	?
Keams Canyon, AZ	1911-1991	167	36	139	37	267	10.5	41	10.1	50.1	26
Jeddito, AZ	1932-1954	166	7	140	7	282	11.1	23	11.1	52.0	21
Kayenta, AZ[c]	1921-1976	188	22	163	23	211	8.3	40	11.7	53.0	28
Zuni Pueblo, NM	1909-1991	164	40	143	39	305	12.0	76	10.0	50.0	69
Acoma, NM	?	-	-	118	?	254	10.0	?	10.8	51.5	?
(Acomita, NM)	1942-1953	186	5	170	7	211	8.3	11	10.7	51.3	7
(San Fidel, NM)	1911-1975	163	23	144	23	241	9.5	48	10.8	51.4	41
Laguna, NM	1850-1991	182	40	160	40	251	9.9	71	11.9	53.4	65
Aztec, NM	1895-1991	165	44	139	44	247	9.7	86	10.6	51.0	75
Bloomfield, NM	1892-1991	192	42	171	42	224	8.8	84	11.0	51.9	66
Farmington, NM	1915-1991	178	44	151	44	210	8.3	70	11.0	51.8	45
Shiprock, NM	1927-1991	172	37	146	31	180	7.1	56	11.6	53.0	45
Newcomb, NM	1949-1970	172	20	158	21	149	5.8	21	11.2	52.2	17
Tohatchi, NM	1915-1991	182	37	161	36	229	9.0	54	11.4	52.5	41
Washington Pass, NM	1977-1991	-	-	-	-	437	17.2+[d]	15	-	-	-
Mexican Springs, NM	1935-1971	-	-	-	-	256	10.1	32	10.3	50.5	8
Gallup, NM	1919-1991	152	41	128	41	289	11.4	67	9.3	48.7	57
Ft. Wingate, NM	1869-1965	187	18	156	18	329	13.0	61	10.0	50.0	37
Thoreau, NM	1930-1991	173	28	151	28	273	10.8	42	10.1	50.1	29
Crownpoint, NM	1915-1969	188	16	166	15	264	10.4	46	10.6	51.0	33
Pitt Ranch, NM[e]	1941-1967	-	-	-	-	219	8.6	19	-	-	-
San Mateo, NM	1940-1987	172	22	150	22	231	9.1	23	9.2	48.6	13

Table 2.2. (continued)

Location	Year Span	Length of Frost-free Season (in days) 28°F	(yrs)	32°F	(yrs)	Annual Precipitation (mm)	(in.)	(yrs.)	Average Annual Temperature (°C)	(°F)	(yrs.)
Grants, NM	1946-1991	158	43	130	43	259	10.2	42	10.0	49.9	34
Cuba, NM	1939-1990	129	42	103	42	343	13.5	48	8.0	46.4	30
Star Lake, NM	1922-1991	138	33	112	33	227	8.9	40	8.4	47.1	32
Sandia Crest, NM[f]	1953-1979	129	27?	109	27?	586	23.1	27	3.0	37.4	27

[a] Most years of record not continuous. Number of years of record listed as (yrs). See Figures 2.3-2.4. Frost-free periods here recorded from 1948 on. Yearly records from multiple stations at Gallup (-Gamerco) and Farmington averaged. Data from Adams 1979 and Hack 1942 (for Hopi), Garcia-Matson 1979 (for Acoma), Kunkel 1984, National Oceanic and Atmospheric Administraion 1911-1991, and Reynolds 1956a, 1956b.

[b] All time highs (mean for maximum yearly highs = 98.6°F): 106°F (7/42), 104°F (7/45, 7/79). All time lows (mean for maximum yearly lows = -13.9°F): -38°F (12/61), -37°F (1/71, 12/90). Author's estimates for missing data in 1941 (the wettest year at 19.27"), 1942, 1944, 1948.

[c] Calculated without 20- and 35-day seasons in 1970 and 1974 (otherwise 28°F = 181; 32°F = 152 days).

[d] Data for 2-4 months was missing for each year from 1984 through 1987. Mean without these bad years is 17.8 inches (sd = 4.8). Washington Pass station located in Chuska Mts. at 9372'.

[e] Pitt Ranch was located 32 km south of Chaco Canyon near Seven Lakes.

[f] Station at the top of the Sandia Mountains (elevation: 10,678'), just east of Albuquerque, NM. Note similarity of frost-free days at 28°F and 32° F to Chaco Canyon, Cuba, and Star Lake near the head of the Chaco Wash.

Just two years of consecutive drought caused temporary historic puebloan abandonments, while eight years resulted in permanent relocation (Slatter 1979:71-86, 119). It takes little imagination, then, to perceive the disruptive effects that droughts must have had on horticulturalists in the drier, marginal Chaco Basin.

The precipitation measurements over the past three decades in Chaco Canyon (Table 2.1) provide examples of the wild swings that the Anasazi must have experienced and that are duplicated in Rose's models of the past. Compare these records in Chaco Canyon with those from Keams Canyon (Table 2.1). Grouping these measurements into two periods of about 15 years each (1963-1977 and 1978-1991) can be illustrative for examining very wet and very dry spans and their potential effects upon farming, aside from what may be causing our recent changes in weather. More important, these data suggest that dry or wet periods might be predictable once they begin. The length of these examples can be considered sufficient to have enticed farmers to Chaco Canyon when it was wetter and to leave during drier periods (e.g., Colson 1979; Slatter 1973). Despite mechanized equipment, a similar strategy was followed for dry farming in southwestern Colorado and southeastern Utah in the 1920s and 1930s (Dave Breternitz, personal communication 1989; Peterson 1987b).

If dry farming was the mode for the Fajada Gap residents, then the 305 mm of water per annum, suggested as minimal for success (Hack 1942:20), was not reached (on the average) in either group. Insufficient moisture, however, may have been mitigated by the importance of moisture in the spring and summer months and the practice of flood-water farming. In the two examples from Chaco Canyon, it was notable that the primary difference in annual precipitation for the three decades did not occur during the summer, but just prior to and after it. The wetter decade consistently yielded much greater moisture during the spring (Figure 2.5), when it assisted initial plant growth, and this was clearly evident in the relatively lush vegetation observed in Chaco Canyon during the wetter decade. We can expect many variations in the weather patterns when the ancients could have been successful farmers, and this last decade intuitively would have been one, but not in the drier decade in the A.D. 1970s. Perhaps an indicator of wetter times was marked by multiple above-average years of moisture interspersed by average years. In the 1978-1991 period, this was marked by four pairs of very wet years, while none occurred in the drier period. Very wet Januarys and Februarys may also indicate wet summers. The critical month is May, when crops are planted and ground moisture is necessary for seed germination. Dry spring seasons often discouraged the Chaco Navajo from planting crops (e.g., Brugge 1980), so that the month of May can be seen as a pivotal month for farming success.

Flood-Water Events

Given the attention to runoff control and flood-water farming as possibilities of increased horticultural success at Chaco Canyon, recent records of runoff may be informative. Since 1976, when stream-measurement gauges were installed in the Chaco Wash and its tributaries (Tables 2.3 and 2.4), ancillary data can be assimilated with the precipitation measurements to provide a picture of conditions in the Fajada Gap where 29SJ 629 and many other contemporary small houses were located. Although the data since 1976 was spotty, with little consistency in recording from the three stations in Fajada Gap (by 1984 only one remained until it was abandoned in October 1989, and then reestablished in 1991), it did reflect consistent periods when the washes were in flood. Not unexpectedly, the washes ran during the periods of greatest precipitation, although seldom did local rainfall influence wash flooding. Generally, floods occurred during rapid late winter/early spring snow melting (January and February) or when huge storms crossed the upper watersheds during a span of several days or more in the fall (August-September). Neither of these two periods, although predictable, was particularly advantageous. When moisture was critical for crops, the washes only ran sporadically. Unfortunately, every major side drainage in the region has had earth dams built across them (many of them now broken and in disrepair), which probably hindered much of the runoff from ever reaching the gauges. Thus, runoff from storms of moderate, or less, intensity may not have been recorded.

The Chaco Wash, with a watershed of 982 km^2 (379 mi^2) by the time it reaches Fajada Gap, provides the greatest amount of water, but it carries salts and minerals that prohibit flood-water farming (Judd 1964:230-231; Scofield 1922; U.S. Geological

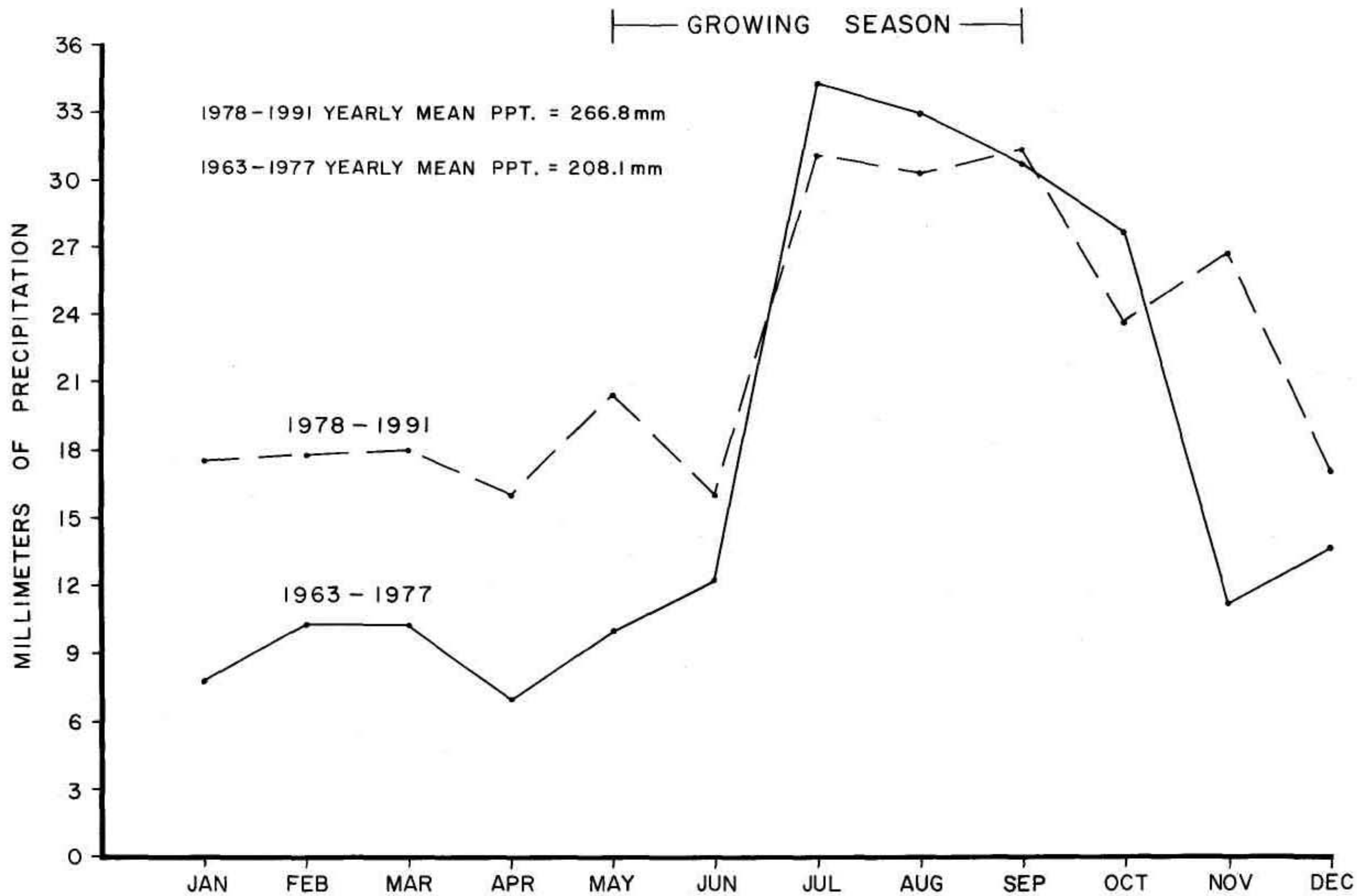

Figure 2.5 *The contrast of a recent wet period (A.D. 1978-1991) and dry period (A.D. 1963-1977) in Chaco Canyon by month (NPS 310/82801 A).*

Table 2.3. 1976-1988 water discharge records for three washes in Fajada Gap, Chaco Canyon.[a,b,c]

					Maize Agriculture										
Year	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Max. Month	Total	Mean/ Day
1976[d]															
Chaco	-	-	-	-	-	-	301.3	141.6	341.2	0.0	0.0	0.0	Sept.	784.1 +	4.2+
1977															
Chaco	0.0	5.6	1.3	0.0	0.0	0.0	664.5	913.9	4.1	8.3	0.2	0.0	Aug.	1597.9	4.4
Gallo	-	-	-	-	-	-	-	-	-	0.0	0.0	0.0		-	-
1978															
Chaco	1.6	118.9	216.2	1.0	287.3	0.0	0.0	28.2	58.0	10.2	7.4	14.8	May	742.3	2.0
Gallo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	none	0	0
1979															
Chaco	1101.1	3627.3	402.8	0.0	41.8	403.1	264.4	120.4	0.0	12.5	27.0	0.0	Feb.	6000.4	16.4
Gallo	300.8	36.7	0.3	0.0	0.0	0.0	3.5	5.8	0.0	0.0	0.0	0.0	Jan.	347.1	1.0
1980															
Chaco	57.2	144.5	0.0	0.0	0.0	0.0	0.0	0.0	9.8	0.0	0.0	0.0	Feb.	211.6	0.6
Gallo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	none	0	0
1981															
Chaco	0.0	0.0	10.9	0.8	5.9	87.3	187.3	58.5	122.8	288.0	0.0	0.0	Sept.	767.5	2.1
Fajada	-	-	13.9	-	4.1	76.0	73.9	0.0	0.0	45.6	0.0	0.0	June	213.1	0.6
Gallo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	none	0	0
1982															
Chaco	0.0	52.3	63.3	1.4	3.7	0.0	8.0	802.7	84.8	0.0	1.0	5.2	Aug.	1022.4	2.8
Fajada	0.0	14.6	5.1	0.0	2.3	0.0	4.8	185.4	95.5	0.0	0.2	4.3	Aug.	312.0	0.9
1983															
Chaco	19.4	258.8	57.0	16.3	0.5	0.0	3.6	407.7	4.1	64.7	2.3	101.9	Aug.	936.4	2.6
Fajada	19.7	23.7	5.4	0.0	0.7	0.0	0.0	6.0	3.2	-	-	-	Feb.	58.7	9.0
1984															
Chaco	95.0	209.0	30.5	12.1	0.0	0.0	0.0	43.0	91.6	422.7	1.1	24.0	Oct.	929.0	2.5
1985															
Chaco	11.2	429.9	84.2	330.1	35.3	0.0	235.0	307.5	101.7	5.7	0.0	0.0	Feb.	1540.5	4.2

Table 2.3. (continued)

						Maize Agriculture									
Year	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Max. Month	Total	Mean/ Day
1986 Chaco	0.0	0.0	0.3	8.2	0.0	106.7	461.9	45.4	228.4	263.3	493.0	0.0	Nov.	1607.0	4.4
1987 Chaco	0.0	180.0	482.5	0.0	0.0	0.0	28.3	177.1	0.0	0.0	34.5	0.0	Mar.	902.4	2.5
1988 Chaco	0.0	115.2	0.0	0.0	0.0	26.8	336.6	2358.3	1183.8	0.0	0.0	0.0	Aug.	4020.7	11.0

Mean (1977-1988) for Chaco Wash: 4.66 ft^3/sec., 3,380 acre-ft/yr.

[a] From United States Geological Survey (1978-1989).

[b] Chaco Wash discharge measured at the Visitor Center bridge, which includes the Fajada discharge. Discrepancies of lower discharges at the Chaco Wash station from those at the Fajada station are probably the result of silted recording stations.

[c] In ft^3/second.

[d] 1976 was the first year for measurements and 1989 was the last.

Table 2.4. Storm variability at 5 rain stations in Chaco Canyon (in.).[a]

	Rain Station Locations[b]				
Date	Visitor Ctr./ Fajada Gap	Pump House/ Fajada Gap	S. Boundary/ Fajada Gap	E. Boundary/ Shabik'eshchee	P. Bonito/ South Gap
1989:					
January	1.87	-	-	-	-
February	0.58	-	-	-	-
March	0.10	-	-	-	-
April	0.0	0.0	0.0	0.0	0.0
May	0.23	0.15+	0.15	0.40	0.28
June	0.02	0.01	0.0	0.0	0.0
July	1.75	1.42	1.52	1.40	1.83
August	0.68	0.66	0.70	0.90	0.87
September	0.13	0.09	0.23	0.45	0.05
October	0.58	0.45	0.37	0.52	0.40
November	0.0	0.0	0.0	0.0	0.0
December	0.10	0.02	0.0	0.0	0.0
Totals (9 mth)	3.49	2.80	2.97	3.67	3.33
1990:					
January	0.15	0.06	0.17	0.22	0.12
February	0.75	0.41	0.62	0.57	0.62
March	0.80	0.64	0.80	0.84	0.88
April	1.78E	1.69E	2.00	1.57	1.92
May	0.44	0.44E	0.48	0.31	0.43
June	0.79	0.75E	0.88	1.16	0.22
July	1.165	1.38	1.25	2.68	1.43
August	0.29E	0.24	0.15	0.17	0.44
September	0.94E	0.76	0.92	1.07	1.00
October	1.19	1.09E	0.93	1.04	0.89
November	0.52	0.52E	0.40	0.48	0.61
December	1.21	1.21E	1.45	1.77	1.64
Totals	10.025E	9.19E	10.05	11.88	10.20
1991:					
January	0.0	-	0.0	0.0	0.03
February	0.33	-	0.365	0.58	0.45E
March	0.39E	-	0.34	0.55	0.44E
April	0.50[c]	-	0.36	0.50	0.38
May	0.10	-	0.15	0.12	0.10E
June	2.37E	-	2.43	1.82	1.93
July	1.85	-	1.37	0.49	1.61E[d]
August	1.09	-	1.09	1.33	1.50
September	0.92	-	0.78	1.19	0.74
October	0.47	-	0.43	0.78	0.40
November	2.25	-	2.20	2.49	2.26
December	1.34	-	1.33	1.42	1.21
Totals	11.61		10.845	11.27	11.05

Table 2.4. (continued)

[a] These gauges were measured in different ways, accounting for some variability: Visitor's Center (the official station) was measured by a hand-held stick, the maintenance-yard gauge (at the Pump House) was measured electronically, while the others produce cylinder graphs that must be removed and interpreted. Times of reading/recording vary that may also affect individual storm results. Maximum canyon distance between stations is about 12 km (East Boundary to Pueblo Bonito, with the Visitor's Center 6 km from both), minimum distance is about 540 m (Visitor's Center to the Pump House). The South Boundary gauge is about 2 km from the Visitor's Center gauge. All gauges installed 4-5/89 except for the Visitor's Center gauge. The U.S.G.S. tipping-bucket gauge will not accurately record snow ppt. The Visitor's Center record for 21 Oct. 1989 was 0.31", which was changed to 0.03", one of many errors in its record. U.S.G.S. station terminated on 19 Oct. 1990.

[b] E = estimate. Adjustments made for probable bad readings at Visitor's Center on April 30, August 5, September 4, and September 25 (result is 0.425" reduction in official yearly total of 10.45"). Pump House estimates made for multi-week periods from Visitor's Center readings.

[c] Reading likely is too high. Widespread storm of 10 cm of snow at Visitor's Center. Compare to other gauges.

[d] No record for July at Pueblo Bonito. Amount estimated.

Survey 1982:499; 1983:463-464; 1984:397). A 12-year average for the Chaco Wash shows only a yield of 3,380 acre/ft per year of flood water (U.S. Geological Survey 1988). The smaller side tributaries to the Chaco Wash at Fajada Butte may be more suitable for flood-water farming, although their run-off potential is considerable smaller. Gallo Wash drains 93.8 km^2 (36.2 mi^2) of land and the Fajada Wash empties an area of 515 km^2 (199 mi^2) (U.S. Geological Survey 1982). Fajada Wash's proximity to the numerous sites in Fajada Gap marks it as potentially useful for past flood-water farming. At least one hydraulic structure (29SJ 2044) has been found in the incised channel of the Fajada Wash, which suggests that water diversion was practiced sometime in the past. Unlike the Chaco Wash, it does not contain the high salts and other undesirable minerals (U.S. Geological Survey 1982:499; 1983:463-464; 1984:397) when it floods (Kim Ong, U.S. Geological Survey water quality analyst, personal communication 1988). The Fajada Wash does not carry the destructive torrents and heavy loads of sediment that sometimes roar down the Chaco Wash, and it may have been a more reliable source of water during periods of above normal, summer rainfall.

Despite the confluence of the three washes at Fajada Gap, an advantageous situation that may have been instrumental in the rise of the Chacoan great-house of Una Vida (e.g., Judge et al. 1981; Sebastian 1988), a reliance on sufficient water for crops may have depended primarily on rainfall and runoff from the nearby mesas (Cully 1986; Vivian 1974, 1984, 1990). Physiographic conditions surrounding much of South Mesa, which borders the west side of Fajada Gap and 29SJ 629, exhibit abrupt topographic variability. This high land mass causes thermal inversions, which increases local storm precipitation (Ralph Pike, U.S. Weather Service, personal communication 1988).

The southern periphery of South Mesa was studied by Cully (1986) for agricultural suitability in conjunction with the 1983 survey of new additions to the park (Powers 1990). This area was low in cultivable acreage (156 acres/63 hectares), perhaps 20 percent or less of the area studied by Cully next to South Mesa. Cully (1986:33, 38, 39) found that the potential cultivable land in the "South Addition," on the southeastern side of South Mesa, was mostly in and adjacent to the ephemermal drainages that separated the ridges, not in the floodplains of the Chaco and Fajada washes. Like areas farmed at Hopi (Bradfield 1971), the ephemermal drainages had the advantages of wide, adjacent strips of bare sandstone ledges and benches that bordered South Mesa, supplying needed runoff and soil nutrients to the fields below (Vivian 1970a, 1974). If a pygmy pinyon and juniper forest once existed on South Mesa, as one now does on Chacra Mesa, then organic matter from it would have replenished the nutrient content of the soils below (e.g., Nabhan 1983:162-165)–a compelling reason for practicing silviculture in Chaco Canyon to protect the trees (Windes 1987a: 213). Cully (1986:Table 2) examined the richest and poorest organic content from 14 soil samples, which were recovered from various new additions to the park below South Mesa.

Much has been made of the water control systems along the north side of Chaco Canyon (LaGasse et al. 1984; Vivian 1972, 1974), but similar structures have been found along the south side near Casa Rinconada, above Werito's Rincon, and in Fajada Gap (see above). All were centers of small-house occupations in the A.D. 900s, 1000s, and 1100s. Many more of these may be buried by alluvium. Although it has been argued that runoff and water control along the north side offered advantages for horticulture that were not available to those living on the south side of the canyon (Judge et al. 1981; Sebastian 1988; Vivian 1970a, 1974, 1990), such may not be the case. At best, the north-side water control structures may have opened up marginal areas for farming, but only when there was sufficient rain and longer growing seasons.

Temperature

Adequate, prolonged, and warm temperatures are also critical to horticultural success. At Hopi, for instance, Hack (1942:19) points to the problems of short, growing-season frosts that can cause considerable damage to crops. The dangers of a scanty water supply compounds the danger of frost because crops grow slowly and, thus, are more endangered by their longer growing seasons. The average frost-free season at Keams Canyon is about 130 days (Hack 1942:19-20), which Adams (1979) believes prohibited occupation until recent times. Referring to the problems of cold-air drainage in Keams Canyon and at Hopi, Adams (1979:293) could have been describing Chaco Canyon when he stated, "In an agriculturally marginal area with a growing season of 150 days or less, narrow valley areas would be avoided for agricultural activity areas in favor of more open or high areas." (See also Gillespie and Powers 1983:6-7).

Recent studies at Hopi have suggested a growing season between 155 and 193 days, with the longest period found on the mesa tops (Adams 1979:289-293). Corn is planted at Hopi between the middle of May to June 21 and then is harvested by September 25, after the frost (Ellis 1974; Hack 1942:20). Earlier plantings of corn take place in April and then are harvested as green corn at the end of July, approximately a 100-day season. Other Western Pueblos around the periphery of the San Juan Basin also exhibit a longer growing season than Chaco Canyon (Figure 2.4, Tables 2.2, 2.5).

At Chaco, there is only a 57-year temperature record (as of 1992); therefore, this must serve to illustrate possible prehistoric conditions. Within the San Juan Basin, Chaco Canyon exhibits the shortest growing season, except for Star Lake and Cuba to the east (Table 2.2; Schelberg 1982:84). Schelberg's (1982:85) study calculates that damaging frosts will occur in Chaco Canyon 60 percent of the time within 120 or less days during the summer, 45 percent of the time for 110 or less days, and 30 percent of the time for 100 or less days–clearly making horticulture a risky venture.

The frost-free period calculated by Vivian and Mathews (1965:10) was 150 days when the recording station was located at Pueblo Bonito. After 1960, however, the station was moved to the Visitor's Center, near Una Vida, where Gillespie (1985:18) discovered that the frost-free period had suddenly dropped to an average of only 100 days. Both the shift in recording and changes in climate may be responsible for the drastic change, although the weather service believed the two locations were compatible (files on Chaco Canyon with Richard Synder, U.S. Weather Service, Albuquerque). Particularly lacking at the present Visitor's Center station, however, is the high, broad cliff, which acted as a huge passive solar screen behind Pueblo Bonito (Baxter 1982; Knowles 1974; Paul 1977; Williamson 1978) that lengthened the recorded frost-free season. In reality, however, the Chaco station has changed locations a number of times, all in the vicinity of Pueblo Bonito and the Visitor's Center (Table 2.6).

Nevertheless, there are problems with the present data that warrant additional caution, including constant errors in recording at the Visitor's Center station and inconsistency when the minimum and

Table 2.5. Frost-free spans at recording stations in and around the San Juan Basin.[a]

			Length of Frost-Free Season (days)				
		Years				Minimum-Maximum	
	Years of	of				30°F	
Location[b]	Record	Data	28°F (sd)	30°F[c] (sd)	32°F (sd)	28°F 32°F	CV%
A. Chaco Canyon	1923-1949	15		158 (20)		92-182	12.8
	1950-1992	42	143 (26)		117 (23)	75-181, 71-179	17.8, 19.9
B. Star Lake, NM	1954-1991	33	138 (19)		112 (17)	113-177, 74-148	13.4, 15.2
C. Cuba, NM	1941-1947	7		112 (35)		74-168	31.0
	1948-1990	42	129 (21)		103 (20)	99-177, 46-138	16.1, 19.2
D. Bloomfield, NM	1911-1946	32		156 (17)		123-215	11.2
	1949-1991	42	192 (17)		171 (16)	145-222, 136-207	8.8, 9.4
E. Aztec, NM	1911-1947	31		157 (22)		106-207	13.8
	1948-1991	44	165 (23)		139 (23)	111-197, 79-178	13.8, 16.7
F. Farmington, NM	1939-1947	8		163 (27)		115-200	16.5
	1954-1991	42	178 (23)		151 (23)	124-220, 99-189	12.9, 15.0
G. Shiprock, NM	1927-1947	16		167 (18)		133-199	10.6
	1948-1991	37/31	172 (26)		146 (29)	119-220, 30-178	15.2, 19.8
H. Tohatchi, NM	1918-1943	17		174 (18)		131-209	10.9
	1948-1991	37/36	182 (21)		161 (20)	109-221, 109-193	12.0, 12.5
I. Gallup/	1919-1947	27		156 (19)		107-202	12.2
Gamerco, NM	1949-1991	41	152 (20)		128 (22)	112-188, 85-182	13.0, 17.5
J. Zuni Pueblo/	1911-1947	35		152 (24)		108-206	16.0
Blackrock, NM	1948-1991	40/39	164 (17)		143 (18)	121-206, 105-176	10.5, 12.9
K. Thoreau, NM	1964-1991	28	173 (17)		151 (17)	139-204, 118-193	9.9, 11.3
L. Crownpoint, NM	1915-1947	28		168 (19)		108-206	9.3
	1949-1969	16/15	188 (15)		166 (17)	163-215, 135-194	7.9, 10.5
M. San Mateo, NM	1966-1987	22	172 (19)		150 (16)	145-209, 122-181	10.8, 10.3
N. Grants, NM	1948-1991	43	158 (19)		130 (19)	111-195, 93-167	12.0, 14.7
O. San Fidel, NM	1911-1943	27		167 (20)		132-200	12.2
	1948-1975	23	163 (18)		144 (19)	124-195, 106-177	11.2, 12.9
P. Laguna, NM	1910-1945	21		184(19)		145-224	10.2
	1949-1991	40	182 (18)		160 (19)	146-221, 118-195	9.8, 11.7

Table 2.5. (continued)

			Length of Frost-Free Season (days)				
		Years				Minimum-Maximum	
	Years of	of				30°F	
Location[b]	Record	Data	28°F (sd)	30°F[c] (sd)	32°F (sd)	28°F 32°F	CV%
Sandia Crest, NM[d]	1953-1979	23	129 (30)		109 (33)	47-172, 6-166	23.5, 30.3
Jeddito, AZ	1932-1947	16	166 (19	155 (22)	140 (20)	106-193	14.1
	1948-1955	7				140-187, 104-166	11.4, 14.4
Kayenta, AZ[e]	1924-1947	18		170 (21)		132-212	12.5
	1948-1976	23/25	181 (40)		152 (43)	22-233, 20-190	28.5, 13.8
Keams Canyon, AZ	1911-1915 & 30	6		146 (24)		116-185	16.3
	1954-1991	36/37	168 (21)		139 (19)	126-207, 105-173	12.4, 13.8

[a] Compiled from the annual summaries for New Mexico (National Oceanic and Atmospheric Administration, 1911-1991 and from Kunkel 1984). Before 1947/1949, frost-free season only measured at 30°F.

[b] Many of these locations (see Figure 2.4) have had station changes.

[c] Listed as the period of "killing frost," approximately 30°F (Gillespie 1985:19).

[d] Station at the top of the Sandia Mountains (elevation: 10,678 ft.), just east of Albuquerque, NM.

[e] Without frost-free spans of 20 and 22 days in 1970 and 35 days in 1974, periods are 188 and 163 days, respectively.

Table 2.6. History of the Chaco Canyon Weather Station(s).[a]

Date of First and Last Observation	Location(s)	Station	Elevation	Principle Observers
12/1/09-7/31/10	T21N, R11W, Sec. 12, 36°04', 107°58'	Putnam, at Pueblo del Arroyo?	6125'	Richard Wetherill
8/10/12-6/18/13	same as above	Putnam, at Pueblo del Arroyo?	6125'	C. F. Spader
5/17/22-9/25/30	same as above	At Pueblo Bonito.	6125'	U.S. National Museum (Neil Judd Expedition)
6/1/32-4/30/61	same as above	At Pueblo Bonito: about 600 ft. south of Pueblo Bonito and 500 ft. west of Ranger Contact Station.	6125'	Chaco Trading Post 6/32-7/35; NPS 8/35-4/61
5/1/61-2/28/69	T21N, R10W, Sec. 28, 36°02', 107°54'	At Visitor's Center: 250 ft. SSW of VC and road.	6175'	NPS
3/1/69-4/26/82	same as above	At Visitor's Center: about 75 ft. E from NE corner.	6185'	NPS
4/27/82-1/18/83[b]	same as above	At Visitor's Center: about 325 ft. NE from NE corner, or at junction of residence road and trail to VC about 115 ft. NE of Kin Finn Pueblo.	6179'	NPS
1/19/83-present[c]	same as above	At Visitor's Center: about 30 ft. W of NW corner.	6174'	NPS staff
2/12/88-10/19/90[d]	T21N, R10W, Sec. 28	At well pump house in maintenance area.	6200'	U.S.G.S.: Mike Kernodle

Table 2.6. (continued)

Date of First and Last Obervation	Location(s)	Station	Elevation	Principle Observers
4/1/89-present[e]	Pueblo Bonito;	Next to RSU parking lot.	6120'	NPS: staff/Tom Windes
	Shabik'eshchee;	Near E fence and service road.	6240'	NPS: staff/Tom Windes
	Fajada Gap	At W fence near 29SJ 2773.	6238'	NPS: staff/Tom Windes
/91-present[e]	N. boundary ("Alto"); T21N, R11W, Sec. 1	Just west of State Hwy 56.	6290'	NPS: Tom Windes
	So. Gap boundary fence ("S. Gap"); T21N, R11W, Sec. 14	At old cattle guard & old road.	6183'	NPS: Tom Windes
	Outside N. boundary ("Gallo")	Overflow pit near oil pumps	6360'	NPS: Tom Windes
1/92-present[f]	E. Community T20N, R9W, Sec. 11	Mouth of Wild Horse Canyon	6400'	NPS: Tom Windes
	T20N, R9W, Sec. 14	Head of Wild Horse Canyon	6600'	NPS: Tom Windes

[a] From U.S. Department of Commerce (1982), active files kept by Richard A. Synder, NOAA-National Weather Service, Albuquerque, NM, and records by Thomas C. Windes.

[b] In addition to Weather Service gauges, there were temperature, precipitation, pyrheliometer, and wind speed gauges at Kin Finn pueblo. The records from these latter instruments were discarded at the Western Archeological Center, Tucson, AZ (Dennis Finn, personal communication 1988).

[c] Glass thermometers replaced in service by electronic digital instrument, 9/11/85.

[d] Measured barometric pressure, temperature, relative humidity, and precipitation.

[e] Rain gauges only. October 1991 gauges read by Navajo Tribe, Water Resources Dep't. (Robert Becker).

[f] Between Wijiji and Pueblo Pintado in Chaco Canyon.

maximum temperatures are read (also see Rose et al. 1982:104). There are also some differences between the old glass and the newer electronic thermometers, because "90 percent of the time," the glass thermometers read 2°F (1.1°C) higher for the daily maximum temperature, although no differences have been discerned for the minimum temperatures (Dick Synder, U.S. Weather Service, personal communication 1989). Additionally, it is clear that there are great variations in temperatures even within a few hundred meters of the present official recording station. Great variability in the length of frost-free seasons for mesa and canyon topography, like Chaco Canyon, was demonstrated for the Dolores, Colorado, area by Peterson and Clay (1987). The Chaco region does not have the careful, systematic studies of the environment produced by the Dolores Project. Consequently, small bits of information must suffice for trying to understand similar constraints on Chacoan horticulture.

During October 1988, temporary stations were established near the great kiva (29SJ 1253) on a ridge south of 29SJ 629 (Figure 9.6), in the staff housing area, and at the Gallo Campground (Table 2.7). The park staff housing area consistently measured 4.5°F (2.5°C) colder than the official station at the Visitor's Center about 400 m away--a significance verified by a paired t-test. Likewise, the campground was even cooler, suggesting that the northern side rincons are significant cold-traps that would be highly risky areas for crops. A new station located at the maintenance area in the same rincon as the staff housing was significantly warmer than the Visitor's Center and staff housing area. The differences, however, may be attributed to the recorder's location, which is 3 m above ground, the presence of the nearby cliffs, and the large asphalt parking lot nearby which acts as a large heat reservoir.

There was also some information from the two stations established in 1979 at the mouth of Werito's Rincon and in the flats below Peñasco Blanco during the corn crop experiments (Schelberg 1982:Table 2; Toll et al. 1985). These also revealed considerable differences (Table 2.7). During the summer, both were considerably warmer than the official Visitor's Center record, usually by 10-14°F (5.6-7.8°C) during the day, and often 1-2°F (0.6-1.1°C) cooler at night. Oddly, Werito's Rincon, where there is a cluster of Anasazi houses, was warmer at night in the spring than the Visitor's Center area up until June 12 and again after October 19--periods that are critical for the last spring frost and first fall frost, respectively. This probably results from the changing sun angle against the cliffs. More important for this study, the adjacent ridges southwest of the Visitor's Center measured moderately warmer for the daily highs and lows when they were compared to the Visitor's Center that is situated on the canyon floor. The ridges are where Pueblo II sites are thickly arrayed and where Marcia's Rincon is located.

Site location may indicate that a knowledge of these temperature differences was well known and facilitated settlement choice. Almost no Anasazi houses exist in the Gallo Canyon, for example, where the coldest temperatures were recorded. House sites are also notably absent in the flats below Peñasco Blanco, where daily lows were also colder than those registered at the Visitor's Center. Experimental corn plots also suggest that the south side was a better place for crops than the north side (Toll et al. 1985:125-126), despite intensive water control techniques along the north side of the canyon. While Anasazi houses probably do not mark field areas, they may reflect preference for warmer areas. It is no surprise that Anasazi settlement in Chaco Canyon was primarily in areas that are probably the wettest and warmest. Conversely, three of the five A.D. 900s greathouses in Chaco Canyon were built on the north side of the canyon where it was drier and colder. Their locations, however, may offer microenvironmental advantages, such as cliff-face radiation and greater slick-rock runoff, making habitation possible. Nevertheless, there is not a clear dichotomy between small houses and greathouses on opposite sides of the canyon. Large greathouses built in the A.D. 900s, in fact, are nearly evenly split between the two sides (including one at the east end of Chaco Canyon, which is built on the ridges similar to those in Fajada Gap and surrounded by A.D. 900s houses; Appendix F), refuting arguments that they were built on or next to the best lands, in contrast to the small-house locations.

The two periods used as examples for precipitation (Table 2.1) reveal unexpected frost-free period results. Generally, studies show the inverse correlation between precipitation and temperatures: the greater the precipitation, the cooler the year and, thus, a shorter frost-free season. Conversely, a drier

Table 2.7. Comparison of high and low temperatures at various substations in Chaco Canyon to the Visitor's Center station.

Location of Substations	Side of Canyon	Period of Observation	Number of Observations Low-High	Temperature difference with Visitor's Center (°F) Lows Mean	Highs Mean	Paired t-test result Lows t	df	p	Result
Gallo Canyon (Campground space A2)	north	10/88, 6/89	4 15, 16	- 3.6 0.6	- 2.7	- 0.61	- 15	- .550	- Reject difference
HQ Rincon (Residence area, Apt. B4)	north	10-11/88, 2-4/89	69	- 4.5	-	11.67	68	.000	Accept difference
HQ Rincon (Pump House)[a]	north	10/88, 3-4/88	85	5.6	-	11.22	84	.000	Accept difference?
West side of Fajada Gap (on ridge near 29SJ 1253)[b]	south	10/88, 6-7/89	28, 24 31, 38	2.0 - 0.3	3.3 1.8[c]	4.20 0.59	27 30	.000 .28	Accept difference Reject difference
Mouth of Werito's Rincon (base of dune near 29SJ 302)[d]	south	5/79-10/79	30	0.3[e]	9.0[f]	0.24	29	.405	Reject difference
Near Peñasco Blanco (on flats near 29SJ 1760)	north	5/79-10/79	21	- 1.5	12.0	1.28	20	.110	Reject difference

[a]Station is 3 m above ground adjacent to paved parking lot (biasing the results?). Manned by U.S.G.S. since Feb. 1988.
[b]See location in Figure 9.6.
[c]Temperature difference (HIGHS): t = 9.2, df = 37, p = .000, accept difference.
[d]Up to June 12 and after October 19: Mean = 3.0°F, sd = 5.6, CV% = 187.4, n = 11; t = 1.77, df = 10, p = .053. Between June 13 and October 18: Mean = -2.3°F, sd = 7.9, CV% = 350.3, n = 19; t = 1.24, df = 18, p = 0.11.
[e]Without the extremes of +14°, +18°, and +20°: Mean = -2.3°F, sd = 4.7, CV% = 206.0.
[f]Without the extreme low differences of -9° and -16°: Mean = 10.5°F, sd = 4.9, CV% = 46.5. Temperature difference (HIGHS): t = 6.5, df = 29, p = .000, accept difference.

period marks a warmer year and a longer frost-free season (Hack 1942:8, 19; Rose et al. 1982). In our case, however, the wet 1980s decade produced a considerably longer frost-free period than the drier warmer 1960s and 1970s; a difference of 144 days versus 122 days, and a trend of wetter, warmer summers (Gillespie 1985:17). This difference would have been particularly advantageous, with high rainfall and longer growing seasons, on the average, for dry farming. Of course, this may be a unique trend, and with the concerns over modern pollution, it cannot be trusted as a prehistoric possibility. Studies at Dolores, Colorado, have shown how critical climatic stress is to marginal subsistence success in areas in the Four Corners, like Chaco Canyon, where the farming belt is determined by precipitation and temperature (Peterson 1987a).

The reader should also be alert to how frost-free periods are calculated. Often, the period is determined by the last spring and first fall days when temperatures reach freezing at 32°F (0°C) (e.g., Peterson and Clay 1987:188). This is a marginal limit, particularly considering the variation within Chaco Canyon. Probably a level of 28°F (-2.2°C) for a killing frost is more certain to be detrimental to crops (Gillespie 1985:19). Differences among the different "frost-free" periods in recent times are listed in Table 2.2.

Most important for Chaco Canyon is that on calm, clear nights the cold air settles in the canyon bottom where temperatures are lowest and their duration is longest, although depending on the time of year, radiant energy may have kept areas warmer near broad cliffs faces (e.g., Bradfield 1971:6). Radiant heat from cliffs acting as passive solar collectors could have extended the growing season, particularly in the small northern side rincons, but it is unknown at what distance out into the canyon from the cliffs this heat would have been effective. This advantage must have been at least partly offset by cold-air drainage. Crops in the canyon bottom would have been at the greatest risk. On the adjacent ridges around 29SJ 629 and in Fajada Gap, it is warmer because of their elevation above the canyon bottom, the lack of cold air pooling, and the early sunrises that first warm the southern areas of the canyon--all attributes necessary for successful horticulture.

Summary

The gaps eroded through Chacra Mesa at South Gap and Fajada Gap provided favorable locales for horticulture because these areas probably receive greater summer rainfall and are warmer than the canyon bottom. Settlement at the mouths of long, deep rincons along the southern side of the canyon also seems ideal because of potential concentrations of runoff useful for flood-water farming and less cold-air drainage than is experienced along the northern side. The uniquely situated gaps and deep southern rincons appear to have enjoyed favorable microenvironmental conditions in the form of greater moisture, including rainfall, longer frost-free seasons, and warmer temperatures. It is here that small sites cluster. During the summer months, storms often penetrate the canyon through these openings. Intuitively, then, the southern gaps and openings into Chaco Canyon receive greater summer moisture than the northern side of the canyon, and may explain the differential density of settlements along the two sides of Chaco Canyon.

By any account, modern records suggest that high uncertainty prevailed throughout the San Juan Basin and that no area was predictably better than any other area (Rose et al. 1982; Schelberg 1982:93), although this may not be true on the microenvironmental level. It is clear that the peripheries of the San Juan Basin always receive greater precipitation (Figure 2.3) than Chaco Canyon. Accurate monitoring of moisture and temperature throughout Chaco Canyon and the San Juan Basin, however, is badly needed to assess the microenvironmental variability that may have influenced settlement patterns.

A century of above-average rainfall in the A.D. 900s and very early A.D. 1000s (Figure 2.6) probably was influential in creating suitable conditions for flood-water and dune farming in the gaps and rincon mouths of Chacra Mesa (including its remnant parts, South Mesa and West Mesa). It is in these areas that numerous A.D. 900s and early A.D. 1000s small houses and greathouses are found. It is during the longest, wettest of these periods that food surpluses are predicted to have been high (Sebastian 1988:Figures 4 and 5) and the first greathouses appeared along with a community of small houses

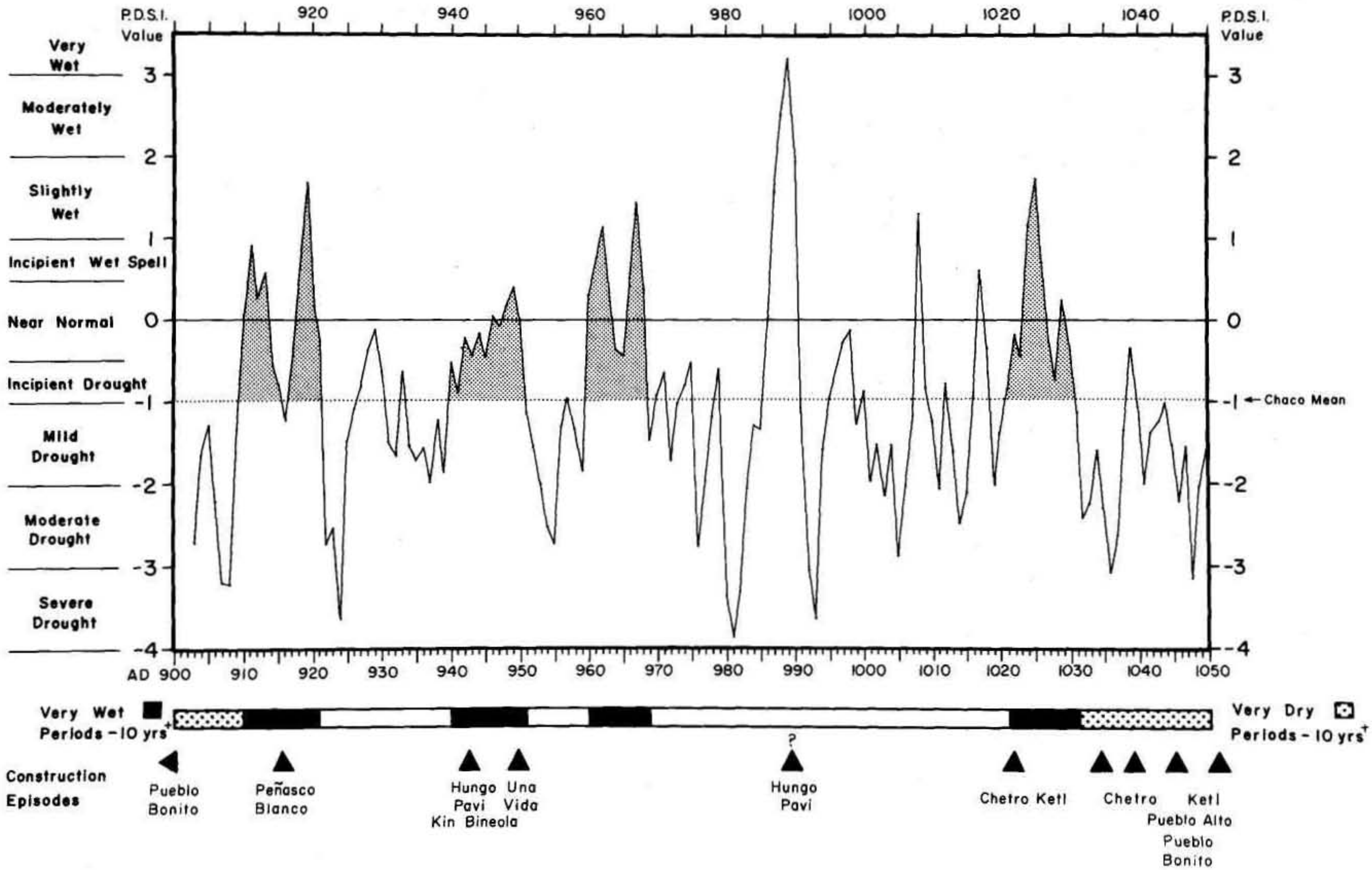

Figure 2.6. *Yearly precipitation in the San Juan Basin from A.D. 900 to A.D. 1050 based on 3-year running means of the Palmer Drought Severity Index. Note correlation between decade-long wet periods (stippled peaks-black bars) and the early construction episodes at the greathouses based on clusters of tree-ring dates (NPS 310/82798 B).*

(Windes and Ford 1992). When conditions became drier and more erratic after A.D. 1030, many of these small houses were abandoned, including 29SJ 625, 29SJ 626 East, 29SJ 629, and 29SJ 1360. There may also have been reduced activity in the greathouses (e.g., Windes 1982:9; 1987a:360). The very dry span between about A.D. 1031 (or earlier), and 1050--with only a single year having better than mild drought conditions (Figure 2.6) and the worst period since before A.D. 652 (Burns 1983)--would seem causal in forcing major societal adjustments among the inhabitants of Chaco Canyon. Wet conditions reappear in the early A.D. 1100s, when small houses proliferate and 29SJ 629 was reoccupied, although former densities in Fajada Gap do not return to previous levels (Windes 1987a:403). It is possible that there were fewer but larger sites during this period, without a reduction in population (Marcia Truell-Newren, personal communication 1988), although the discrepancy in site numbers was not compensated for by greater room frequencies (Chapter 9). In contrast, the area around Pueblo Bonito and South Gap, 9 km down canyon from Fajada Gap, reached its greatest site density during the early A.D. 1100s (Lekson 1988).

In conclusion, microenvironmental variation within Chaco Canyon may refute the seeming marginality of the area presented by historic climatic records from Chaco Canyon, or, at least, in parts of Chaco Canyon. The gaps along the south side of the canyon, such as where 29SJ 629 is located, may be the best areas for horticulture and are not less advantageous than the north side, where some greathouses are located. Nevertheless, when Chaco Canyon is viewed as part of the regional San Juan Basin, the canyon ranks poorly in categories that are important for successful horticulture: precipitation, temperature, and frost-free seasons. By all accounts, Chacoan settlements around the periphery of the San Juan Basin were more favorably located than those in Chaco Canyon. Despite the records, successful horticulture in Chaco Canyon was clearly possible, but how synchronic and diachronic climate variability affected its success is still controversial. These critical factors need further resolution before the Chacoan occupation can be fully explained.

3

SITE CONSTRUCTION SEQUENCE

As part of the temporal setting for the detailed architectural and stratigraphic discussions that follow in Chapters 4-6, this chapter covers the site development through time. Wall abutments (Figure 3.1) provide the primary means of identification for the sequence of building, but ceramics and a sprinkling of chronometric dates provide the temporal framework. Occupation at the Spadefoot Toad Site (29SJ 629) evidently took place over a period of two centuries. Much of the site use appears to have been intermittent based on the house orientation and later changes that suggest a shift in occupancy duration. Judging from the amount of refuse generated and the intensity of remodeling, site activities reached their peak in the late A.D. 900s and very early A.D. 1000s. The site appears to have been abandoned after this time, to be partly reoccupied a half century later for a short period.

Phase I (A.D. 875-925)

The architectural core of the site is assumed to represent the original occupation (Figure 3.2). The architecture employed and the spatial distribution of the three major units (pithouse, ramada, and tublike storage rooms) follows a well-established pattern common to Chacoan Pueblo I sites in Chaco Canyon (e.g., Gladwin 1945; Truell 1986, 1992; Vivian 1965; Windes 1976a, 1976b).

The three tub rooms, the earliest room-forms present architecturally, are located directly behind the earliest form of pitstructure at the site, Pithouse 2. This arrangement, with the pitstructure centered directly in front of the associated roomblock, is the traditional Anasazi arrangement and was followed at 29SJ 629. The southern extension of the ramada (Figure 4.1) suggests that a fourth tub room once might have been present in the location covered by Room 8, but it could not be verified.

Pithouse 2 exhibits many of the architectural features, such as a D-shape, four roof supports incorporated into the house walls and (vestigal) wing walls, and numerous floor pits (including heating pits) that distinguish eighth, ninth, and tenth century Anasazi domiciliaries. By A.D. 1000, and earlier in some regions, these traits were replaced by non-subdivided circular pitstructures with few floor features and a different means of roof support (Gillespie 1976; Truell 1986). Female work areas in pitstructures are noticeably absent by A.D. 1000, which supports the contention of many that there was a transition from an emphasis on domestic activities to ceremonial functions (e.g., Gillespie 1976). The other two pitstructures at 29SJ 629 are morphologically and chronologically later in time.

The 6 m between Pithouse 2 and the tub rooms is largely taken up by a series of large, bell-shaped pits and a rectangular arrangement of ramada postholes. The three tub rooms reflect construction of a single, planned, storage unit. Each room is partially sunk into sandy native earth, leaving a narrow balk to support the walls. Tub rooms at sites occupied at about A.D. 800 in Chaco Canyon consist of aboveground mud walls supported by a foundation

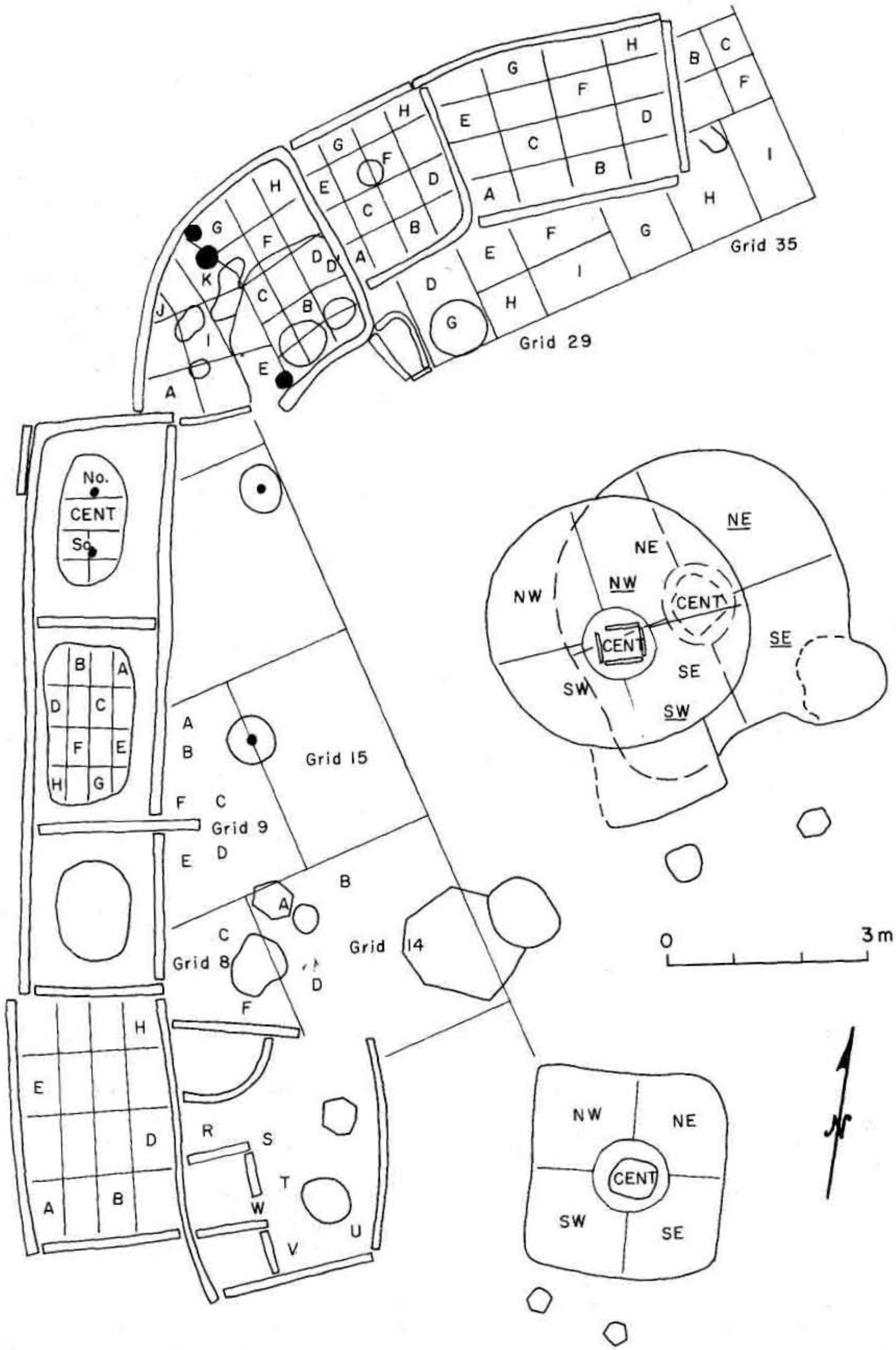

Figure 3.1. Wall abutments and pollen/flotation grids at 29SJ 629 (NPS 310/82274 A).

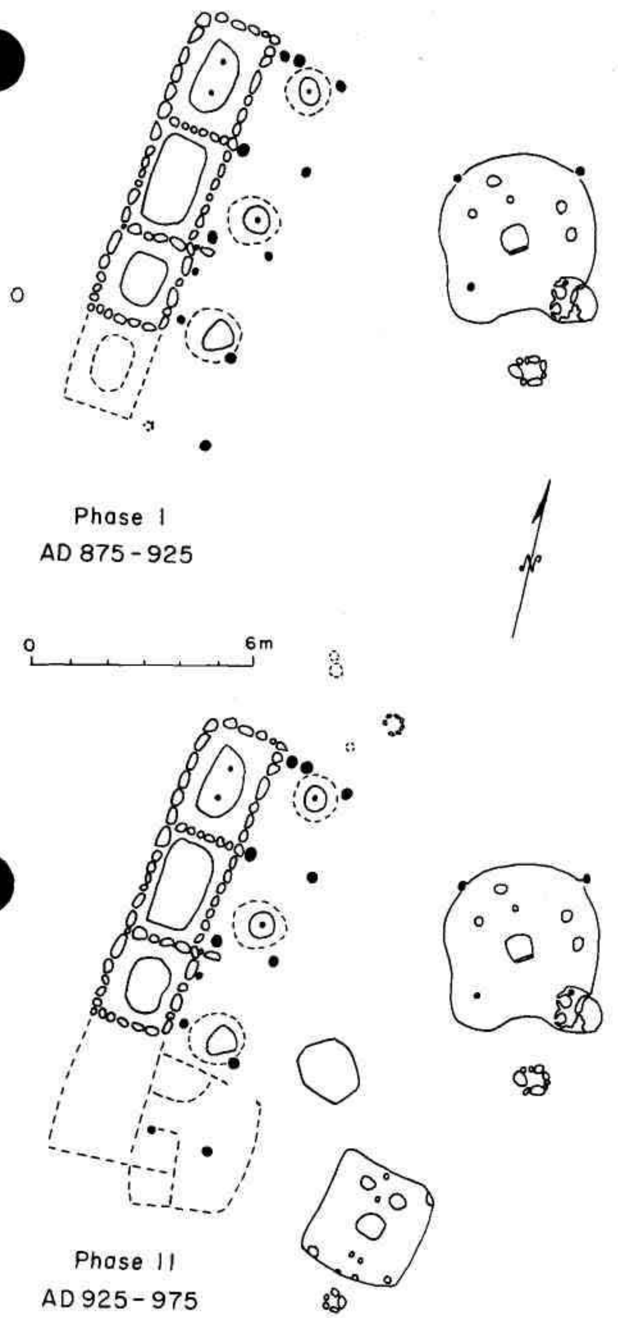

Figure 3.2. *Sequence of construction and abandonment at 29SJ 629, Phases I and II (NPS 310/82275 B).*

of upright slabs (e.g., 29SJ 299, 29SJ 724, and 29SJ 627). At 29SJ 629, however, the initial courses are of stone masonry and mud that rise until they are level with the original ground surface, an A.D. 900s trait. The paucity of associated stone rubble indicates that the walls were made primarily of mud above the foundation stones. There were no indications of poles for supporting the walls.

Wall abutments attest to the planned construction of the original storage unit. The west wall of Rooms 5-7 and the north wall of Room 5 are, in fact, a single continuous wall, probably the first laid. This was followed by a segment that became the east walls of Room 5 and 6. Then, in an unknown sequence, the remaining wall segments were added, completing Rooms 5-7. There was no evidence for reconstruction or remodeling of the walls--the entire sequence for Rooms 5-7 reflects a single, planned effort.

Roof remains found in all three tub rooms also suggest a single continuous roof for the unit or three separate roofs of similar construction. Artifacts associated with roof fall in the rooms indicates that roofs probably were utilized for outdoor activities. Deposition in all three rooms is similar, which suggests that abandonment, too, was a singular contemporary event at the end of the main site occupation. Trash was noticeably absent from the three rooms.

Although architecture of the proposed early construction is late Pueblo I in appearance, associated ceramics in the rooms and plaza reflect an early Pueblo II age. There are three alternatives for explaining the discrepancy: 1) the architecture is temporally misleading, or conversely 2) the ceramics are temporally earlier than credited, or 3) there was an occupation of long duration retaining early architecture but yielding primarily later ceramics. Site accretion, the volume of refuse, evidence of extensive activities, and the remodeling in Pithouse 2 and elsewhere argues for a long site occupation.

It is possible, however, that the early appearance of the room architecture has been given too much weight because the earliest site ceramics are the primary evidence for the Phase I occupation. Dates from Pithouse 2's lower floor, Floor 2, indicate use of the structure by the mid or late A.D. 900s. Floor 2, however, was constructed of roofing impressions that predate use of the floor. Their presence, the architectural morphology of the pithouse, and its proximity to nearby 29SJ 628 (occupied in the late A.D. 700s and early A.D. 800s) suggests that Pithouse 2 might have been earlier than the dates suggest and later rennovated.

The earliest ceramic assemblage occurs from trash deposited in a former arroyo north of Rooms 1-3 in Test Trench 99 (Table 6.6). Subsequent construction of those rooms undoubtedly removed the earlier deposits underneath but was responsible for limiting site activity to the north of the three rooms; thus, preserving the undisturbed nature of the early assemblage where it was found in Test Trench 99. Early ceramics were continuous downslope along the former arroyo, reaching into the dense midden 15 m east of Room 1. It is not surprising, then, that 9 of the 10 test trench vessels with matches outside TT 99 were found in the main midden area over 15-24 m away. These matches tie the two areas temporally together. Other early ceramics were recovered behind the initial roomblock, Rooms 5-7. A firepit in Grids 2 and 3 behind the roomblock yielded the earliest radiocarbon date from the site, which correponds in time with the early ceramics.

Ceramics of the earliest assemblage reveal use of Lino Gray and wide neckbanded ("Kana'a" style) culinary vessels, along with decorated service vessels of San Juan Redwares, Lino Black-on-gray, Kana'a, Whitemound, Kiatuthlanna, early Red Mesa Black-on-whites, and contemporary Chuskan wares (Crozier and Tunicha Black-on-whites). There was a conspicuous absence of sherds with straight-line hatching or predominate solid designs, such as Gallup and Puerco/Escavada Black-on-whites. Production of this assemblage can best be assigned to the period A.D. 875-925 (Chapter 8), which is consistent with the early-style architecture.

Phase II (A.D. 925-975)

Extensive development occurred after Phase I, but its exact sequence is unclear (Figure 3.2). Possibly Pithouse 3 and Plaza OP 6, a large storage pit, were added at this time due to population growth at the site. The diminutive size of Pithouse 3 and its location, offset from the core rooms of the site, suggests that it was secondary to Pithouse 2. The limited number of floor features in Pithouse 3 has suggested that it might have served in a capacity as a ceremonial structure for the site inhabitants while Pithouse 2 was retained for domestic purposes. Overall storage capacity in Pithouse 3, however, is greater than Pithouse 2's, while a second heating pit in the former structure, like Pithouse 2, may also suggest multiple family use. It is during this period that a transition from domestic to ceremonial use takes place in pitstructures (Gillespie 1976). During this same period, however, small pitstructures placed beyond the site core and associated with a larger pitstructure increase in popularity in some areas (notably Black Mesa, Arizona). These apparently functioned as mealing rooms in Black Mesa (Gumerman et al. 1972:200), but there is no certain evidence for such use in Pithouse 3, although the southern half of the floor was covered with corn pollen (Cully 1985). An analogous situation to that at 29SJ 629 occurred at the Blue Spruce Site near Prewitt, New Mexico (Bussey 1964:201-208). This is a contemporary Cibolan site with a remarkably similar plan to 29SJ 629, including a pithouse analogous to Pithouse 3. The number of features, the site layout, and the amount of trash suggests that the site might have evolved from similar responses and needs, if not from a similar widespread cultural pattern.

Although the lack of floor features suggest that Pithouse 3 was built primarily for ritual, the number of floor features in ninth and tenth century pithouses may be directly proportional to the size of the house; therefore, not necessarily a chronological or functional indicator. Duration of use often determines the number of floor features. The location of Plaza OP 6 suggests an association with Pithouse 3, 130 cm to the southeast. The pit is similar to small tub rooms associated with pithouses a century earlier and may have served for storage after Pithouse 3 was built. Finally, both were abandoned and filled with similar refuse, including parts of the same vessels, suggestive of a coeval event. Thus, Pithouse 3 might simply reflect use for domestic residence, perhaps to accommodate an expanding site population. During this period, the abandoned arroyo to the east continued to serve as the focus for refuse deposition.

Ceramics during this period were now dominated by Red Mesa Black-on-white and neckbanded vessels, while typologically later Gallup Black-on-white and indented corrugated wares were absent.

Phase III (A.D. 975-1000)

Abutment studies reveal units of two rooms each (Rooms 2 and 3, and 8 and 9) were added to the ends of the core tub room unit (Figure 3.3). Each new unit consisted of a room with features that indicate domestic/living activities (firepit, heating pits, and storage pits), along with a prepared floor. Each, in turn, connected to a room with a native earth floor devoid or nearly devoid of features and presumably utilized for storage. Ethnobotanical analyses of floor samples confirm a dichotomy that can be interpreted as food preparation areas yielding a diversity and high numbers of economic plant remains in the multi-feature rooms and few economic remains in the featureless (storage) rooms.

Although offset from one another, Rooms 8 and 9 share a wall that indicates the builders planned for the two-room unit. The east and west walls of Room 8 did not align with those in adjoining Room 7, marking a hiatus in construction between the core rooms and the southern 2-room unit. The west wall of Room 8, in particular, is set to the outside of Rooms 5-7 west wall alignment (Plate 4.12).

Room 3 was added to the north end of the initial roomblock but was offset from Room 5, which indicates a hiatus in construction between the two rooms. Room 2 was added to Room 3, but the probable step in Room 3, and the distribution of refuse in Room 2 (as if thrown from Room 3), argues for at least partial contemporary use of the two rooms. Earlier firepits in both Room 3 and 9 reflect archeomagnetic orientations in the mid- to late-A.D. 900s, or later, while architecture and ceramics also suggest a similar period of construction.

Construction of the two 2-room units probably was accompanied by the reflooring of Pithouse 2 and a shift to use of a subfloor ventilating system. A lintel pole from the ventilator tunnel was tree-ring dated at A.D. 985vv, which indicates construction after A.D. 985. The small size of the pole and its limited number of rings determine that ring loss was minimal, placing construction at about A.D. 1000 (Chapter 8).

A number of floor features may also have been added to the plaza area in front of Room 7 at this time. With the construction of Rooms 2 and 8, an increase in storage space may have allowed immediate abandonment and filling of the main plaza bell-shaped pits. It could be argued that an increase in pitstructure space should accompany expansion of the surface rooms. With the modifications to

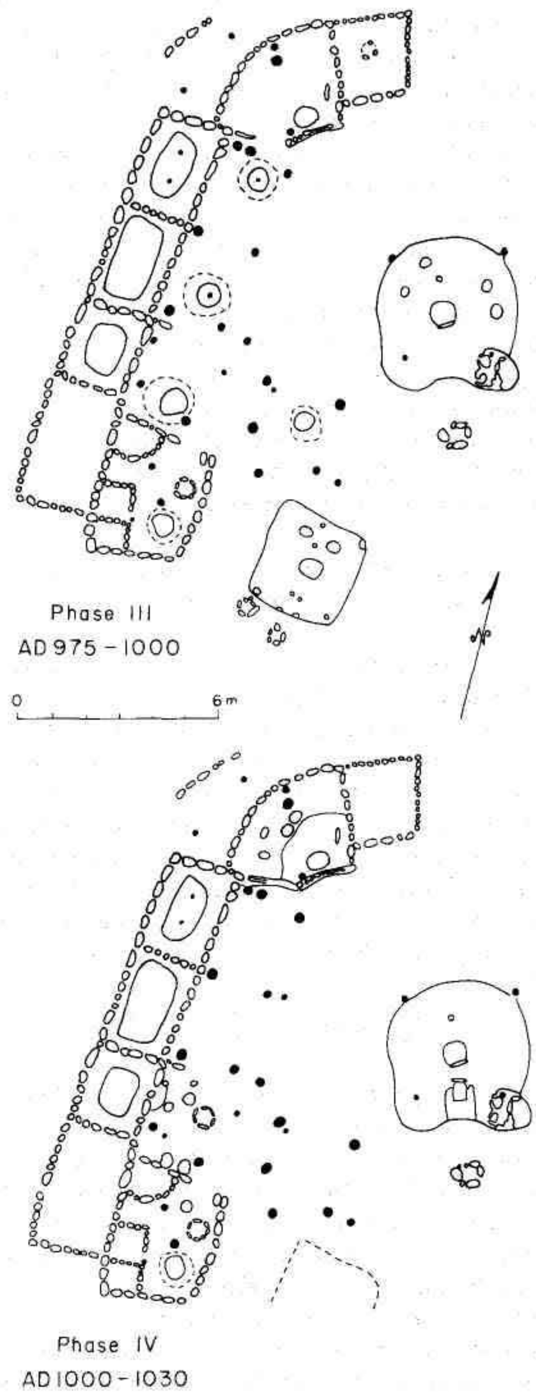

Figure 3.3. Sequence of construction and abandonment at 29SJ 629, Phases III and IV (NPS 310/82276 B).

Pithouse 2, however, it is proposed that the diminished number of floor features, including the absence of heating pits, reflects a shift to greater use of the space for ceremonial use, including the production of turquoise items. Domestic activities must have shifted to the surface rooms. Apparently, Pithouse 3 was abandoned at this time and along with nearby Plaza OP 6 began to accumulate site refuse, as did Plaza OP 14. There was little trash from this period deposited in the gully midden to the east.

The inhabitants from Pithouse 3 could have partly shifted domestic activities to Room 9 coeval with a similar shift of activities from Pithouse 2 to Room 3. If paired mealing bins (Chapter 7) indicate multifamily use, then two families may have had a parity of space at the site. Neither surface room was fully enclosed and, therefore, must have been inhabited only seasonally during the warmer months. If this is true, then cold weather occupation should have forced habitation back to Pithouse 2 or to a different locale. Turquoise jewelry manufacture appears to have dominated the last use of Pithouse 2.

Phase IV (A.D. 1000-1030)

It is believed that during this period (Figure 3.3), both pitstructures were abandoned and only surface rooms occupied. Both habitation rooms (3 and 9) apparently were occupied until the final main occupation. No trash had accumulated in Room 3 before the roof and back wall fell and a few late ceramics associated with the structure were left. Although Room 9 was filled with trash, this may have been redeposited from Pithouse 2 during the later kiva construction. Fragments of vessels from the floor of Room 3 match those in Room 2 and those in the upper fill of Pithouse 3. A single ceramic match also came from the Room 3 floor and the ventilator tunnel fill of Pithouse 2. There can be little doubt, therefore, that Pithouse 3 had been long abandoned, as was possibly Room 2 for only a short time, when the exodus from Room 3 occurred.

This period is marked by the introduction of straight-lined hatching as the primary motif on painted vessels (late Red Mesa or early Gallup Black-on-white) and neck indented corrugated jars now designated as Coolidge (neck) Corrugated (Windes and McKenna 1989).

Phase V (A.D. 1030-1050)

It is uncertain when the main occupation at 29SJ 629 ended. Tree-ring and archeomagnetic dates indicate major remodeling at A.D. 1000 or slightly earlier. The relative lack of Gallup, Puerco, and Escavada Black-on-white sherds, overall indented corrugated ceramics, and late carbon-decorated ceramics must reflect abandonment before A.D. 1050 (Windes 1987a:240-269). A few overall indented corrugated jars, easily identified by their bottom coils, however, make their first appearance at the end of the primary occupation (Figure 3.4). Thus, a reasonable time of abandonment for 29SJ 629 should be in the period of about A.D. 1030-1050.

Phase VI (A.D. 1100-1150)

This period was marked by limited, late use of the site, most apparent by the presence of a kiva superimposed over Pithouse 2 and by late materials in areas next to the Kiva (Figure 3.4). Materials left in Pithouse 2 were partly removed during the Kiva construction. Clearly, the filling of Pithouse 2 marked a hiatus in site occupation before the Kiva was built. At least one piece of broken metate left on the pithouse floor was recovered by the Kiva builders and used in the Kiva ventilator construction.

Fill with a similar content to that found in Pithouse 2 was encountered in Rooms 2 and 9 and the eastern third of Room 3 and in Plaza Other Pits 6 and 12. It is disconcerting, however, to find almost no ceramic matches among these proveniences, as the probability should be high that pieces from parent vessels would have been separated during redeposition. Each of the proveniences revealed, instead, internal mixing so that pieces from the same vessels were found in almost every unit of fill excavated, from the floor to the surface. It is reasonable to assume, then, that the fill in these proveniences was from redeposition. It is particularly difficult to reconcile the large numbers of charred pole fragments in the fill of Room 9 and the quantities of oxidized sand in Plaza Other Pit 6 without a noticeable associated source of burning. That source appears to have been in Pithouse 2, which exhibited at least some localized destruction by fire after abandonment.

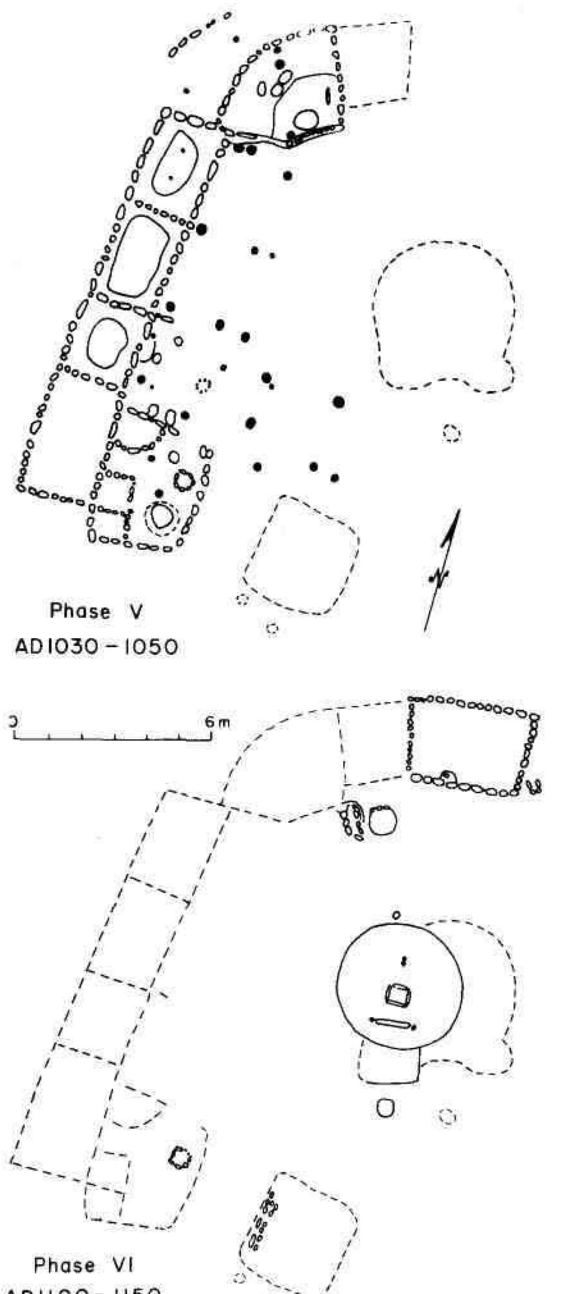

Figure 3.4. *Sequence of construction and abandonment at 29SJ 629, Phases V and VI (NPS 310/82277 B).*

Late ceramics of White Mountain Redware, Chuska, Gallup, and Chaco-McElmo Black-on-whites, and overall indented corrugated sherds that were found on the Kiva floor, nearby on the plaza grids, and in an area southwest of the Kiva in Grids 201-203 marked ephemeral early A.D. 1100 activities. The surface location of the late ceramics suggested that what little refuse was generated from kiva activities was allocated for disposal to the southwest. This might explain the masonry wall bordering and slightly extending over Pithouse 3. Access to the southwest from the Kiva would have required scrambling over the refuse and construction debris in Room 9 or passing along a narrow strip between Room 9 and the Pithouse 3 depression. Placement of a wall along the pithouse depression would have prevented slumpage and increased the safety of passage.

Room 1 is closest to Room 8 in size, shape, and construction. Abutment studies reveal that Room 1 was added to Room 2, probably after destruction of the latter. The intricate care in placing a spall veneer over the west and north walls, however, sets it apart from the style of masonry used in the rest of the site construction. A sherd with flattened, indented corrugations below the jar shoulder, probably Chaco Corrugated, that was found sealed under the room's south wall marks wall construction after A.D. 1050. Burned material, presumably from Room 2, also was sealed under the wall. While Room 1 could be contemporary with Rooms 8 and 9, it was not trash-filled. The paucity of room ceramics do not clarify the temporal placement of Room 1, but its unusual architecture does not rule out an isolated storage unit associated with use of the Kiva.

Just outside the offset postulated doorway of Room 1 was Plaza Firepit 5 and, next to it, Plaza Bin 1. At one end of the firepit lay a slab metate, an indicator of contemporaneity with the Kiva. Slab metates are rarely found in Chaco Canyon and only after about A.D. 1100. Several late redwares and carbon-painted sherds nearby point to this area as a late focus for food preparation and storage activities. Thus, it is postulated that the last use of the site involved the Kiva, Room 1, and the outdoor space between them for special, perhaps ceremonial, activities. Because there was a contemporary house and much refuse nearby at 29SJ 630, the limited late use of 29SJ 629 is seen as an extension of activities from 29SJ 630.

Although later cultural material, including three sherds of Mesa Verde Black-on-white and several spent cartridge cases, was deposited at the site, there was no evidence to suggest more than a fleeting interest in 29SJ 629 after A.D. 1150, when Chaco Canyon was depopulated.

Summary

The Spadefoot Toad Site exhibits three pitstructures and a number of additions to the core set of rooms, indicating a lengthy use of the site. Abutment studies reveal the sequence of construction, but the duration of occupation is difficult to gauge solely from architecture. Ceramics and a few dates suggest that first use of the site occurred in the late A.D. 800s or early A.D. 900s with the construction of Pithouse 2 and, perhaps, other structures. Multiple floors occur in Pithouse 2, but the lack of remodeling of Rooms 5-7 and the plaza indicate that these may have had much shorter use than the pithouse. Early ceramics and the architectural style of Pithouse 2 may link it with the late Basketmaker III-Pueblo I site (29SJ 628) nearby, prior to when surface rooms and the ramada were built. These were all abandoned by A.D. 1050.

Pithouse 3, living Rooms 3 and 9, and storage Rooms 2 and 8 were added to the site in the late A.D. 900s or early A.D. 1000s. These were abandoned after a comparatively short time. Pithouses 2 and 3 had filled with deposits before evidence of another use of the site in the early A.D. 1100s. A kiva was built into former Pithouse 2. Room 1 may have been added with it, and a few outside features were built for limited or specialized activities.

4

ROOM ARCHITECTURE AND STRATIGRAPHY

Introduction

Chapters 4-6 cover the structural and cultural remains and the associated deposits at the site. The wealth of information presented in these chapters forms the basis for many of the site interpretations, as well as structuring many of the analyses. Overall, the construction and layout of the Spadefoot Toad Site (29SJ 629; Figure 4.1) resembles many of the approximately 200 contemporary small-house sites in Chaco Canyon (Chapter 9; McKenna and Truell 1986). The surface rooms comprised the primary visible remains at the site prior to excavation. Large, soft blocks of sandstone set in linear alignments marked the room foundations. For the most part, the former walls of mud and spalls had disintegrated into and around the rooms. When possible, however, the original room heights have been estimated from the wall remains. Roofs were built of small poles covered by brush and mud, but generally, the wood was salvaged prehistorically, leaving the fragments of the mud roofing within the structures covered by aeolian sands and wall fall. The distribution of cultural remains in some of the rooms suggest that the roofs served as work areas.

29SJ 629 followed convention in its spatial organization. The use of space is linked to behavioral patterning when based on the premise that space is differentially organized in response to activities set within a societal framework. Four spatial areas may be distinguished by the architectural and cultural remains: surface rooms (Chapter 4), pitstructures (Chapter 5), an open work area shaded by a ramada (Chapter 6), and a refuse area (Chapter 6). The vast majority of small houses, like 29SJ 629, were oriented to face within in an arc between east and south (e.g., Hayes 1981:Figure 39), probably because of solar advantages (Chapter 9). Usually the highest elevation within a house occurs along the "back" side of the roomblock on the west and/or north edge of the site and then descends to the east or south where the refuse was discarded. The areas behind the rooms seldom yield evidence of activities, and it can be presumed that few activities occurred there. At 29SJ 629, a few hearths and pits were located behind the seven rooms, but the majority of outdoor features clustered in the plaza area between the rooms and the three pitstructures to the east and south. Further east from the pitstructures and rooms was an old gully that had served for the primary refuse deposition. Later, when parts of the site were abandoned, some rooms and pitstructures served as refuse receptacles.

The roomblocks at the site were unusual for the period because they were formed by two rows of rooms connected at one corner to form an L-shaped roomblock (Figure 4.1). These rooms were not built simultaneously. The orientation of the site was initially east when Rooms 5-7 were built, but this may have shifted after Rooms 2 and 3 were added, extending the site to the east along the north side. The overall plan of the site is common for other contemporary sites in the Fajada Gap Community,

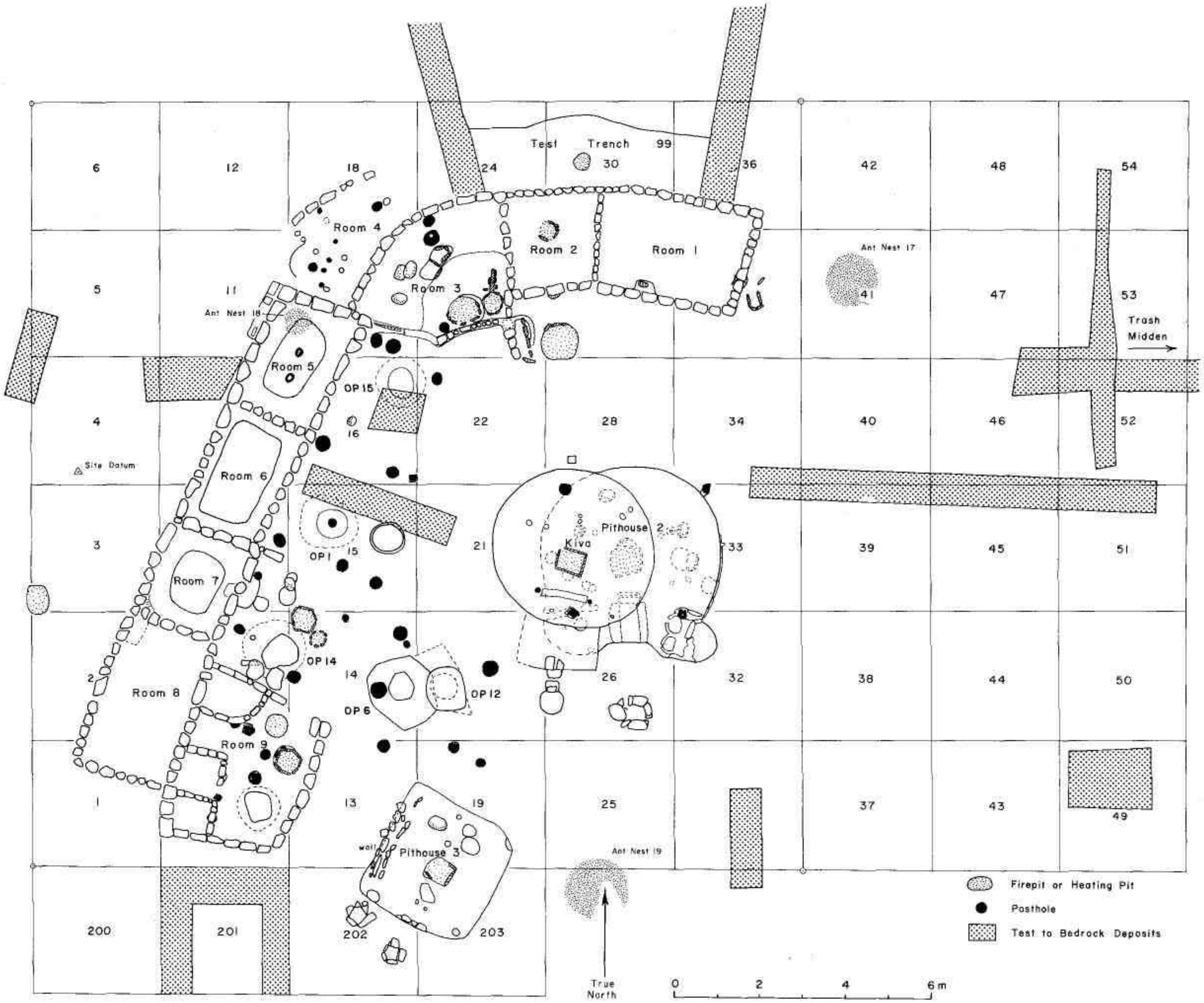

Figure 4.1. *Plan view of 29SJ 629 and its grid system (NPS 310/82196 E).*

but generally those sites are unidirectional with an orientation within a 90° arc between east and south. It is not until the mid or late A.D. 1000s that roomblocks routinely formed L- or C-shaped houses.

Room 1

The easternmost room at the site was Room 1, which may have been the last built. Initial trenching was across the eastern third of the room. The remaining fill stratigraphy was then examined, mapped, and removed. Overall, the room was 340 cm by 220 cm (7.2 m^2) and about 50 cm deep, but contained little cultural material.

Fill

Two arbitrary 15-cm-deep levels and 4 cm of floor fill were removed in the initial test before reaching sterile sands. A profile of the remaining fill revealed two stratigraphic units of wall fall and alluvial deposits, which were subsequently removed as separate units.

Layer 1. The uppermost unit in the room, about 24 cm thick, was comprised of stone and mortar from wall fall. The majority of the fill was clay and a few rows of upright stones parallel to the north wall and topped by large stones 132 cm from the north wall. Directly underneath was a similar alignment perpendicular to and extending 134 cm out from the northwestern corner. Again, this was capped by two large stones. Position of the rows indicates collapse of the north wall, with the large stones probably serving as the cap stones.

Approximately 65 stones (0.28 m^3), like those in the remaining walls, came from Layer 1. Their overall volume was less than the standing north wall's (0.32 m^3) and would have added only 31 cm of height to the wall, if mortar was not considered. Cultural debris was rare and consisted of a few sherds and ground stone fragments that had probably been built in the walls, a practice documented elsewhere on the site and for the Room 1 walls.

Layer 2. Soft, tan sand, full of tiny sandstone chips, sparse charcoal flecks, and lenses of gravel comprised the lowest fill, 10-15 cm deep, indicating water deposition from the gully just beyond the north wall of the room. Except for 10 stones along the walls, few others were recovered in the layer. Five pieces of possible roofing adobe with grass impressions came from the initial test. A piece of turquoise came from the northeastern corner, but subsequent 1/16 in. screening yielded only a second tiny piece. Otherwise, Layer 2 was nearly devoid of cultural material. Another piece of turquoise came from Layer 1, but otherwise, this material was rare in Room 1. An active ant nest on the surface nearby, however, was covered with turquoise flecks.

Floor

A slightly compacted, irregular, and discolored surface marked the semi-subterranean room floor (Plate 4.1), 47-52 cm below the ground surface. In places, there was little to distinguish it from the underlying sterile sands or from Layer 2. In the northwestern and north-central part of the room, a 1- to 2-mm-thick wash of adobe that rested on fine residual gravels was the only possible floor remnant left. The floor was not level but followed the natural slope down towards the east. The eastern end rested at 147 cm below the site datum (BSD) while the western end was 9-13 cm higher.

Floor Artifacts. Four sherds were recovered from the floor or just above it, while a few flakes of chipped stone were recovered during screening of the floor fill. Pollen samples were not analyzed but flotation yielded few seeds. A dense concentration of unburned Portulaca seeds from a single grid may have derived from the gathering of wild plant foods (M. Toll, this report). The otherwise sparse seed remains, however, suggest that the seeds were postoccupational.

Floor Features. Only a single feature, a step, was found in the room (Plate 4.1). This step was made of a trough metate split longitudinally and set in adobe on the floor, 3 cm from the south wall and 79 cm from the west wall. The stone was 36 cm high, extending 4 cm above the existing south wall, and was 21 cm wide and 8 cm thick, with the trough facing into the room. Although no entry through the wall remained, the worn top of the stone suggested wear from foot traffic.

Subfloor Test. An 84 by 74 cm pit was sunk in the southeastern corner to examine the subfloor stratigraphy. Except for a sherd of Kana'a Banded in

Plate 4.1. *Room 1, Floor 1 and north wall. Note stone step in lower left of room and subfloor test pit in lower right (NPS 10484).*

a gravel lens about 2 cm below the floor, the fill was sterile to the bottom of the 42-cm-deep test pit. Alternate layers of sand, gravel, iron concentrations, and sandstone chips, similar to the materials in the nearby gully, comprised the subfloor fill and marked its pre-site deposition. Several caliche-covered rocks and clayey loam at the pit bottom indicated the proximity of bedrock.

Walls

A single row of horizontal, unmodified, stone blocks, identical to those in the talus nearby, enclosed the room. These were the foundation stones set in almost no mortar on the original surface. The uphill north and west sides of the room were dug into soft sand and gravel deposits and stabilized by a lining of spalls that extended to the floor. The south and east walls exhibited only two courses of stone, which did not quite reach the floor. Similar numbers of blocks comprised the north and west walls but were interspersed with numerous spalls (Plate 4.2; Table 4.1). A 1- to 2-cm-thick coating of gray clay plaster covered the interior spall and block facing. The Room 1 walls butted those of Room 2, indicating that it was built after Room 2 (Figure 3.1).

Adobe wall collar. An 8-cm-high, 5-cm-thick adobe collar was affixed to the bottom of the interior walls along the east, south (east of the step), and north (west end) walls. Under the east wall, behind the collar and the stone step, was a soft, siltlike deposit mixed with burned brush and a mano fragment. Above the subfloor test pit was burned reddish-black material, like that in adjoining Room 2. Additionally, a Blue Shale or Hunter Corrugated jar sherd was sealed behind the collar under the south wall. Apparently, the collar served to retain and stabilize the soft fill under the east and south walls, as the spalls did for the other two walls. Thus, the presence of the corrugated sherd as a temporal marker for the late room construction is an important piece of evidence.

Summary and Conclusions

Artifacts. With the possible exception of turquoise, the few artifact remains found in the room could be postulated to have come from use in construction. Little turquoise came from this section of the site, except from Ant Nest 17, 2 m east of the east wall on the site surface. This active nest yielded quantities of turquoise, but we have no clues as to

Plate 4.2. Room 1, west wall. 30-cm scale (NPS 10611).

where it was originally deposited (see Chapters 6 and 9, and Appendix D regarding turquoise). Layer 2 in the room, in which two of the three turquoise pieces were found, must have been deposited mainly by water, for its composition is the same as that found in the gully nearby and underlying the floor.

Architecture. The fallen north wall suggested walls stood about 132 cm or higher, creating an interior room height of about 182 cm (extent of north wall fall = 132 cm + inside depth of floor = about 50 cm). Mortar comprised over 50 percent of the walls. Lack of roof material and rubble from other walls suggested that most of the superstructure was salvaged for use elsewhere--a common practice in Chaco Canyon.

Room Function. The few materials and features found in the room suggested use for storage, although in what capacity is unknown. The probable step in the room indicated that entry was solely from the plaza and that it was not directly linked to either of the two site habitation rooms.

Temporal Assignment. Several aspects unique to Room 1 suggested that it was the last built, perhaps after a considerable hiatus. Wall abutments revealed that it was the last built in the east-west wing, which in turn post-dated the original north-south roomblock (Figure 3.1). While not conclusive evidence, the style of construction exhibited better craftsmanship and knowledge of wall stresses not evident in earlier construction at the site. This was in contrast to the remaining rooms in the same wing, and suggested a hiatus in construction. The burned material sealed under the Room 1 walls also supports a hiatus between the burning and abandonment of Room 2 and the construction of Room 1.

The few Puerco and Gallup Black-on-white sherds that were recovered from the wall rubble were produced in the A.D. 1000s and 1100s and suggest use as wall chinking for construction (Table 4.2). In addition, the late Chuskan overall indented corrugated sherd found under the south wall indicated wall construction after the introduction of indented corrugated jars in Chaco Canyon at about A.D. 1025. Thus, the room probably was built at the end or after the primary occupation of the site in the early A.D. 1000s or later.

Table 4.1. Blocks and spalls in walls of Room 1.

	East Wall	South Wall	West Wall	North Wall
No. of blocks	18-22	19	25-30	25
No. of spalls	9	9	180	300+

Room 2

Room 2 was bracketed by Rooms 1 and 3 in the center of the east-west wing and was partially visible before excavation. Because of its small size (210 by 200 cm; 4.4 m^2), nearly half of the fill was removed along the east side in two levels during the initial test. Cultural deposits within it reached a mere 30 cm deep, although the room was filled with cultural materials and had evidence of an extensive fire. The room seems to have been built as a unit with the adjacent habitation room, Room 3, then abandoned, used for refuse deposition, and burned.

Fill

Three layers of fill (Figure 4.2, Table 4.3) were defined in the room from the initial test:

Layer 1 (Plate 4.3A). The uppermost deposit, about 17 cm thick, consisted primarily of loose rock (some with mortar attached), chunks of adobe, sandy loam, and fine gravel. Small fragments of burnt brush occurred in frequencies of 3-8 per 100 cm^2, a common density found throughout the unburned deposits of the site. There were 109 spalls and 32 large rocks in the west half of the room. Spall counts were not kept for the east half, which yielded 37 large rocks. About 28 percent of the large stones were burned, the highest frequency at the site. Most of the parts for three neck corrugated jars (Plates 8.7A, 8.8B, 8.8E) and a fire-spalled canteen (Plate 8.10B) were found between and under rocks from this layer.

Layer 2 (Plate 4.3B): Underneath Layer 1 was a 5- to 10-cm-thick deposit of charred brush and grass full of blackened artifacts and other cultural debris. This was sifted through 1/16 in. screen which yielded, besides the usual cultural material, bits of turquoise, charred twine, and macro-remains of corn, beans, cactus pads, and ricegrass. Pollen analysis (Cully 1985:165-167) revealed high frequencies of grass and corn pollen, along with some bulrush, purslane, and prickly pear cactus pollen, while flotation yielded ricegrass seeds, numerous weedy economic seeds, juniper twigs, and corn-tassel fragments that suggested that whole corn ears and non-ear parts were present (M. Toll, this report). Wall rubble was nearly absent. In profile, the charcoal frequency ranged from 10 to 30 pieces per 100 cm^2, a density consistent with burned deposits. At the bottom of this layer, in the north central part of the room, the fill was burned a dark, reddish brown and underneath it was a crude slab firepit set in clean sterile sands.

The charred material rested upon an irregular, soft, light-yellow sand oxidized to a red color in a few spots. Rare fragments of gray shale and clay, 5- to 10-mm-thick, were observed resting on the sand. Against the center of the west and south walls were small remnants of gray clay extending out over the sand and attached to the wall foundation stones. These two remnants were at a depth of 106 and 108 cm BSD (compare with depths in other rooms) and probably represent pieces of a prepared floor 30 cm below the site surface. Rodent activity was evident from numerous tunnels of dark fill that extended from the burned layer down into the yellow sand below.

Layer 3: Removal of the fill under Layer 2 revealed the yellow sand, mentioned above, mixed with lenses of gravel (1-13 mm in size) and sparse pieces of sandstone (5-15 cm in length). This deposit, however, was not sterile, although rodent activity from Layer 2 probably contributed most, if not all, the cultural material recovered from it. At a depth of 140 cm BSD, a compacted surface was discovered along the south side of the room. No cultural material was found on this surface and elsewhere, Layer 3 continued deeper as sterile alluvial deposits. Layer 3 and the surface extend under the wall foundations. Interestingly, the depth

Table 4.2. Ceramic frequencies from Rooms 1-4.[a]

Ceramic Type	Room 1		Room 2			Room 3					Room 4	
						E 1/2		W 1/2				
	All	%	Fill	Subfl.	%	Fill	Fl.	Fill	Subfl./ Const.	%	Fill	%
CIBOLA/CHUSKA CULINARY												
Lino Gray	-	-	-	-	-	-	-	-	-	-	2	1
Plain gray	30	40	222	10	40	76	17	32	3	32	89	64
Wide neckbanded	2	3	2	1	1	1	-	-	-	T	3	2
Narrow neckbanded	3	4	82	1	14	5	1	5	3	3	5	4
Neck indented corrugated	2	3	3	-	1	22	1	-	-	6	-	-
Unclassified indented corrugated	7	9	159	-	28	56	32	30	-	29	-	-
PII indented corrugated rim	-	-	-	-	-	7	5	2	-	3	-	-
CIBOLA WHITEWARE												
Unclassified BMIII-PI B/w	-	-	-	-	-	1	-	-	-	T	6	4
Red Mesa B/w	6	8	43	4	8	20	3	14	3	10	10	7
Puerco B/w	3	4	2	-	T	-	-	-	-	-	-	-
Gallup B/w	3	4	4	-	1	7	-	-	-	2	-	-
Unclassified PII-PIII B/w	6	8	20	-	3	9	1	11	1	5	12	9
UNCLASSIFIED WHITEWARE	11	15	21	2	4	22	4	8	2	9	9	6
UNCLASSIFIED CARBON B/W	-	-	-	-	-	-	-	-	-	-	1	1
CHUSKA WHITEWARE												
Chuska B/w	1	1	-	-	-	-	-	-	-	-	-	-
SMUDGED WARE	1	1	2	-	T	2	-	-	-	T	1	1
SAN JUAN REDWARE												
Unclassified redware	-	-	-	-	-	-	-	-	-	-	1	1
Totals	75	100	560	18	100	228	64	102	12	99	139	100
Time Period (A.D.)	1000-1050		975-1050			975-1050					875-925	

[a] T = trace (less than 0.5%).

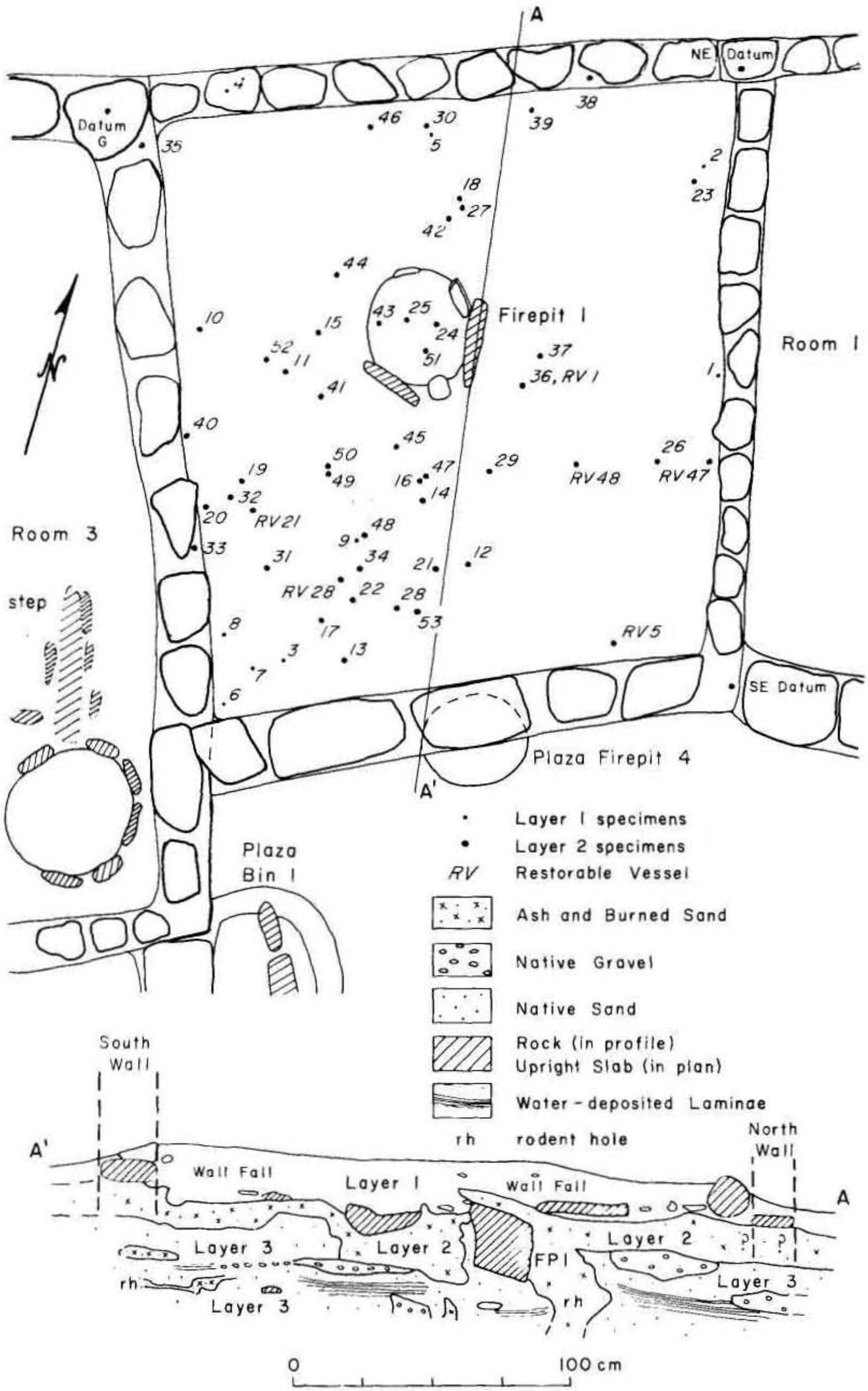

Figure 4.2. *Room 2, plan view, profile, and the distribution of cultural materials in Layers 1 and 2 (Table 4.3--specimen list). (NPS 310/82199 A).*

Table 4.3. Room 2, list of specimens in Layers 1 and 2. [a]

Artifact Number	Artifact Class	Lithic Material or Faunal Species	Depth BSD	FS No.
Layer 1	(76-97 cm BSD):			
1	Mano fragment	2000 (sandstone)	85	227
2	Metate fragment	2000 (sandstone)	89	228
3	Abrader/anvil (3629 g)	2000 (sandstone)	82	229
4	Pecked wall stone?	2000 (sandstone)	76	230
5	Pecked wall stone?	2000 (sandstone)	79	231
6	Pecked wall stone?	2000 (sandstone)	82	232
7	Jewelry debris	5300 (turquoise)	94	279
8	Mano blank? (2217 g)	2000 (sandstone)	86	311
9	Pot lid?	2000 (sandstone)	84	332
Layer 2	(98-144 cm BSD):			
10	Active abrader (203 g)	2000 (sandstone)	110	304
11	Anvil (reused firepit liner, burned, 26x20x2.5 cm; 2262 g)	2000 (sandstone)	103	305
12	Anvil?-burned (19x10x4 cm; 1033 g)	2000 (sandstone)	108	306
13	Metate fragment	2000 (sandstone)	109	307
14	Metate fragment	2000 (sandstone)	100	308
15	Mano fragment-burned (361 g)	2000 (sandstone)	107	309
16	Mano fragment-burned (390 g)	2000 (sandstone)	101	310
17	Mano (1384 g)	2000 (sandstone)	107	312
18	Mano (1195 g)	2000 (sandstone)	101	313
19	Mano fragment-burned (814 g)	2000 (sandstone)	106	365
20	Mano (2500 g)	2000 (sandstone)	102	366
21	Metate fragment	2000 (sandstone)	102	367
22	Mano fragment	2000 (sandstone)	108	374
23	Mano blank (4545 g)	2000 (sandstone)	104	375
24	Groundstone (lost)	2000 (sandstone)	123	376
25	Palette, bifacially chipped	2000 (sandstone)	129	460
26	Floor polishing stone/ hammerstone (1211 g)	4000 (quartzite)	104	237

Table 4.3. *(continued)*

Artifact Number	Artifact Class	Lithic Material or Faunal Species	Depth BSD	FS No.
27	Hammerstone (109 g)	4000 (quartzite)	101	296
28	Hammerstone/polishing stone (503 g)	4000 (quartzite)	108	303
29	Core (434 g)	2202 (quartzitic sandstone)	102	330
30	Polishing stone/manuport (81 g)	4000 (quartzite)	108	362
31[b]	Hammerstone/polishing stone (206 g)	4000 (quartzite)	105	363
32[b]	Hammerstone/polishing stone (197 g)	4000 (quartzite)	103	364
33	Flake tool, retouched (1.6 g)	1052 (clear chalcedony)[c]	110	368
34	Angular debris flake (6.8 g)	1110 (splintery silicified wood)	110	377
35	Hammerstone (116 g)	1112 (cherty silicified wood)	?	3348
36	Cactus pads (inside RV 1)	-	110	239
37	Bean[d]	-	?	240
38	Jewelry debris and pocket mouse skeleton	5300 (turquoise) - (Perognathus sp.)	110	258 258
39	Corncob fragments	-	114	259
40	Twine	-	103	281
41	Corn kernels	-	98	294
42	Beans[d]	-	107	295
43	Bean and corn kernel[d]	-	109	297
44	Bean and corn kernel[d]	-	105	298
45	Basket impressions	-	100	299
46	Jewelry debris	5300 (turquoise)	103	300
47	Seeds	-	105	331
48	Corncob fragment	-	106	358
49	Corn kernel and cactus bud	-	110	359
50	Jewelry debris	5300 (turquoise)	110	360
51	Cactus pad	-	-	378

Table 4.3. (continued)

Artifact Number	Artifact Class	Lithic Material or Faunal Species	Depth BSD	FS No.
52	Quid and twine	-	105	459
53	Unfired clay handle	- Cibola Whiteware	105	301
Partial/restorable vessels:				
RV 1	Tohatchi Banded jar	- Cibola Grayware	110	see Table E.1
RV 5	Red Mesa B/w bowl	- Cibola Whiteware	109	see Table E.1
RV 21	Coolidge Corrugated jar	- Cibola Grayware	106	see Table E.1
RV 28	Blue Shale Corrugated jar	- Chuska Grayware	108	see Table E.1
RV 47	Coolidge Corrugated jar	- Cibola Grayware	101	see Table E.1
RV 48	Early Gallup B/w canteen	- Cibola Whiteware	98	see Table E.1

[a] See distributions in Figure 4.2.
[b] Marginal hammerstone use. Specimen #32 is faceted, highly polished, and burned.
[c] High surface chert.
[d] All beans destroyed by a flood in the laboratory exhibit.

of the surface corresponds with the floor in Room 1, but it is assumed to be natural.

Floor

Only patches of a prepared floor were found between Layers 2 and 3, probably the remnants of a thin wash of plastered-over sterile sands.

Floor Features (Table 4.4). A crude firepit (Figure 4.3), lined on two sides with burned upright slabs, was found in the north center of the room. The surrounding sand was oxidized a dark, reddish-brown color, but the firepit fill contained only sand, a few bits of charcoal, and four pieces of unburned sandstone. A rodent tunnel extended down through the center of the firepit fill. Flotation results for a portion of the firepit contents were unlike results obtained from other firepits in the rincon and included an extraordinary number of unburnt seeds of Bahia-type and Cryptantha fendleri (87 percent of the total) and rat feces (M. Toll, this report). Undoubtedly, these seeds came from rodent activities, but otherwise the sample was uninformative.

Floor Artifacts (Figure 4.2 and Table 4.3). The absence of a prepared floor makes assignment of material to floor contact tenuous. The great number of items, however, were clustered in Layer 2, which overlies sterile fill. Most of this material appears to have been trash tossed into the room that was later burned at or after room abandonment.

Walls

The room walls consisted of 1-2 courses of irregular shaped, friable blocks of sandstone (Figure 4.4). Large blocks of friable, white sandstone were set as foundations for the west and south walls. The north wall foundation consisted of blocks of gray clay interspersed with small sandstone chunks, while the east side incorporated a variety of block sizes, although it is difficult to identify a definite foundation course. Despite the haphazard wall construction, the east and south walls appear to have been built as a single unit (Figure 3.1). The north and south walls abut the west wall (the east wall of Room 3). All walls rested primarily upon Layer 3 fill. A lens of burned fill (at a depth of 107 cm BSD) from Layer 2 extended under the east wall, but a wall block in the south wall and the attached piece of floor were oxidized red (depth 106 cm BSD). This lens was probably derived from rodent activity.

Plate 4.3A. *Room 2, fill. Layer 1 wall fall (NPS 10521).*

Plate 4.3B. *Layer 2 trash. Note the large vessel sherds (NPS 10530).*

Table 4.4. Rooms 1-4, list of features.[a]

Feature	Length (cm)	Width (cm)	Height/ Depth (cm)	Volume (liters)	Fill Type	Fill Period	Lining	Open/ Sealed	Comments
Rm. 1, Fl. 1									
Step 1	21	8	36	–	–	Occ.	–	-	Trough metate fragment set on end in an adobe footing. Provides step access to plaza.
Rm. 2, Fl. 1									
Firepit 1	38	32	32	29.8	14,27	Occ/PO	L-S	O	Mouth = 1022 cm^2. Rodent disturbance.
Rm. 3, Fl. 1									
Firepit 1	61	58	22	55.8	27,43	Occ/PO	L-SP	O	Mouth = 2665 cm^2. Partial adobe collar. Rebuilt once. Formerly Pit 1.
Heat. Pit 1	43	42	11	20.5	20-21	Occ.	U	O	Mouth = 1786 cm^2. Cuts Heating Pit 3. Formerly Pit 4.
Heat. Pit 2	36	20	7	4.3	20-21	Occ.	U	S	Mouth = 616 cm^2. Formerly Pit 5.
Heat. Pit 3	48	22.5	12	13.5	20-21	Occ.	U	O	Mouth = 1189 cm^2. Cut by Heating Pit 1. Formerly Pit 7.
Other Pit 1	42	34	23	29.0	30,43	PO	L-S	O	Mealing basin. Stone bottom. Attached to Other Pit 2. Four manos in line. Formerly Pit 3.
Other Pit 2	41	36	20	29.4	10	PO	L-S	S	Mealing basin. Stone bottom. Attached to Other Pit 1. Formerly Pit 6.
Posthole 1	22	22	30	11.4	52	Occ.	U	O	Four shims. Base stone. Lignite = 44 kg. Formerly Pit 2.
Posthole 2	34	30	53	41.5	52	Occ.	U	O	Base stone. Lignite = 12.3± kg. Formerly Pit 8.
mold	8.5	8.5	52						
Posthole 3	22	20	38	10.9	52	Occ.	U	O	Base stone.
Step 1	59	8	36	–	–	Occ.	-	-	Upright slab stabilized by five shims. Worn on top. Provides access to Room 2.
Rm. 3, Fl. 2									
Firepit 2	53	43	14	21.9	20	Occ.	L-SP	S-FP	Mouth = 1730 cm^2. Covered by Floor 1: former plaza firepit. Has bottom base stone. Formerly FP 1, Fl. 2.
Rm. 4, Fl. 2									
Other Pit 1	13	11	6	0.6	10	PO	U	O	

Table 4.4. (continued)

Feature	Length (cm)	Width (cm)	Height/ Depth (cm)	Volume (liters)	Fill Type	Fill Period	Lining	Open/ Sealed	Comments
Other Pit 2	14.5	12	9	1.1	10	PO	U	O	
Other Pit 3	10	10	9	0.6	10	PO	U	O	Numerous seeds in fill.
Other Pit 4	14.5	11.5	11	1.3	10	PO	U	O	
Posthole 1	20	16.5	22+	5.9+	13	PO?	U	O	Lignite = 7.3± kg. Truncated.
Posthole 2	24	21	12+	3.8+	13	PO?	U	O	Lignite = 3.3± kg. Truncated.

[a] See Tables 7.3-7.4 for an explanation of the feature and attribute codes.

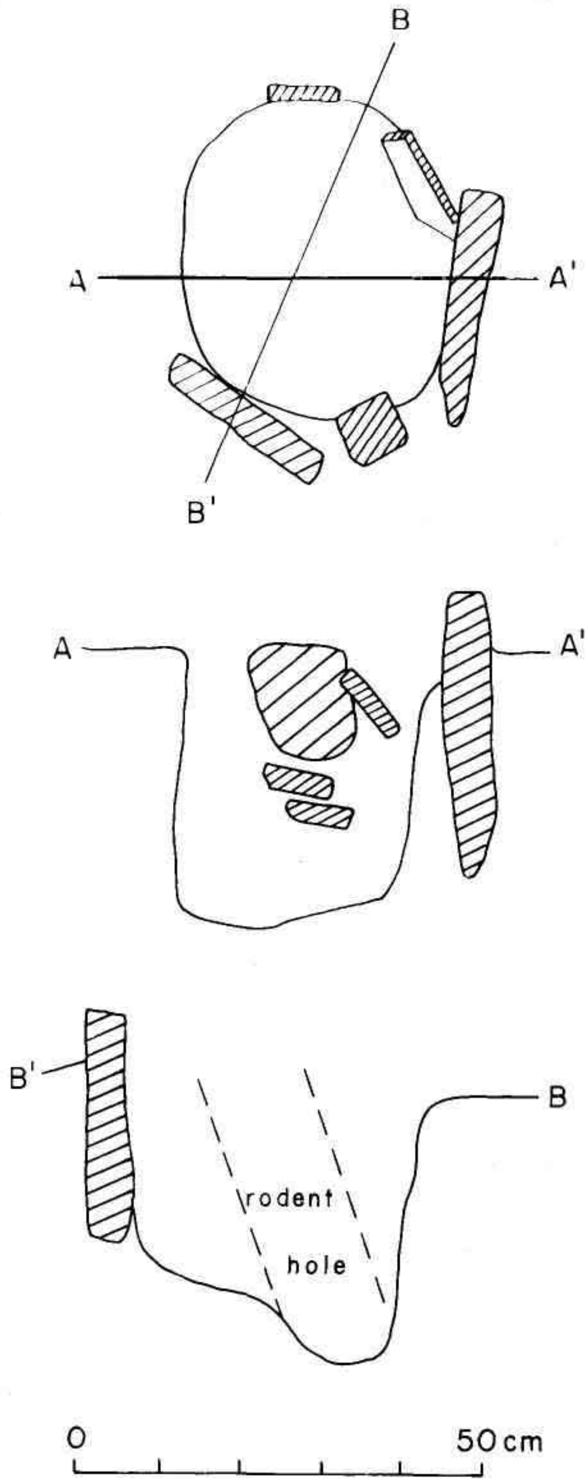

Figure 4.3. *Room 2, Firepit 1 plan and profiles (NPS 310/82197 A).*

Roof

Except for a single burned adobe chunk impressed with a 10-20 cm diameter beam, no roofing material was observed in Room 2.

Conclusions

Architecture. Several factors suggested that the room walls were not of masonry construction: 1) The quantity of the Layer 1 wall fall was barely sufficient to raise the present walls another 20-40 cm, 2) wall fall was absent from outside the room on the north and south sides, 3) the foundations were poorly suited for supporting full-height stone walls, 4) ash and burned sand were common inside and outside the room on the north side, as if the fire that swept through Room 2 was not hindered by mud or stone walls, and 5) the other two surface rooms with firepits were not fully enclosed by walls.

On the other hand, 1) the probable step in Room 3 next to Room 2's west wall indicated an entry through a barrier no longer visible and 2) the spatial arrangement of the cultural material indicated that the Room 2 space was bounded in some way. Sufficient ventilation for use of the firepit would have been difficult had the room been solidly enclosed. Therefore, Room 2 was probably enclosed by low walls supporting some sort of light, flammable superstructure and roof.

Cultural Material. Much of the room material was clearly refuse. There were few (11) faunal remains from the room but they suggested a mixture of refuse from before and after the room burned. An articulated skeleton of a pocket mouse found in the fill indicated that mice lived in the room after abandonment and caused much of the depositional disturbance. Other bones included a human rib fragment, a Canis phalanx, and rabbit and prairie dog parts (Gillespie, this report). Chipped stone debitage was dominated by silicified wood (material types 1112 and 1113), which comprised 34 percent of the 85 pieces recovered from Rooms 2 and 3, although silicified wood was common in all deposits at the site (Cameron, this report).

Ceramics in the room consisted of large sherds and crushed restorable vessels (Toll and McKenna, this report) indicating that they were recovered from

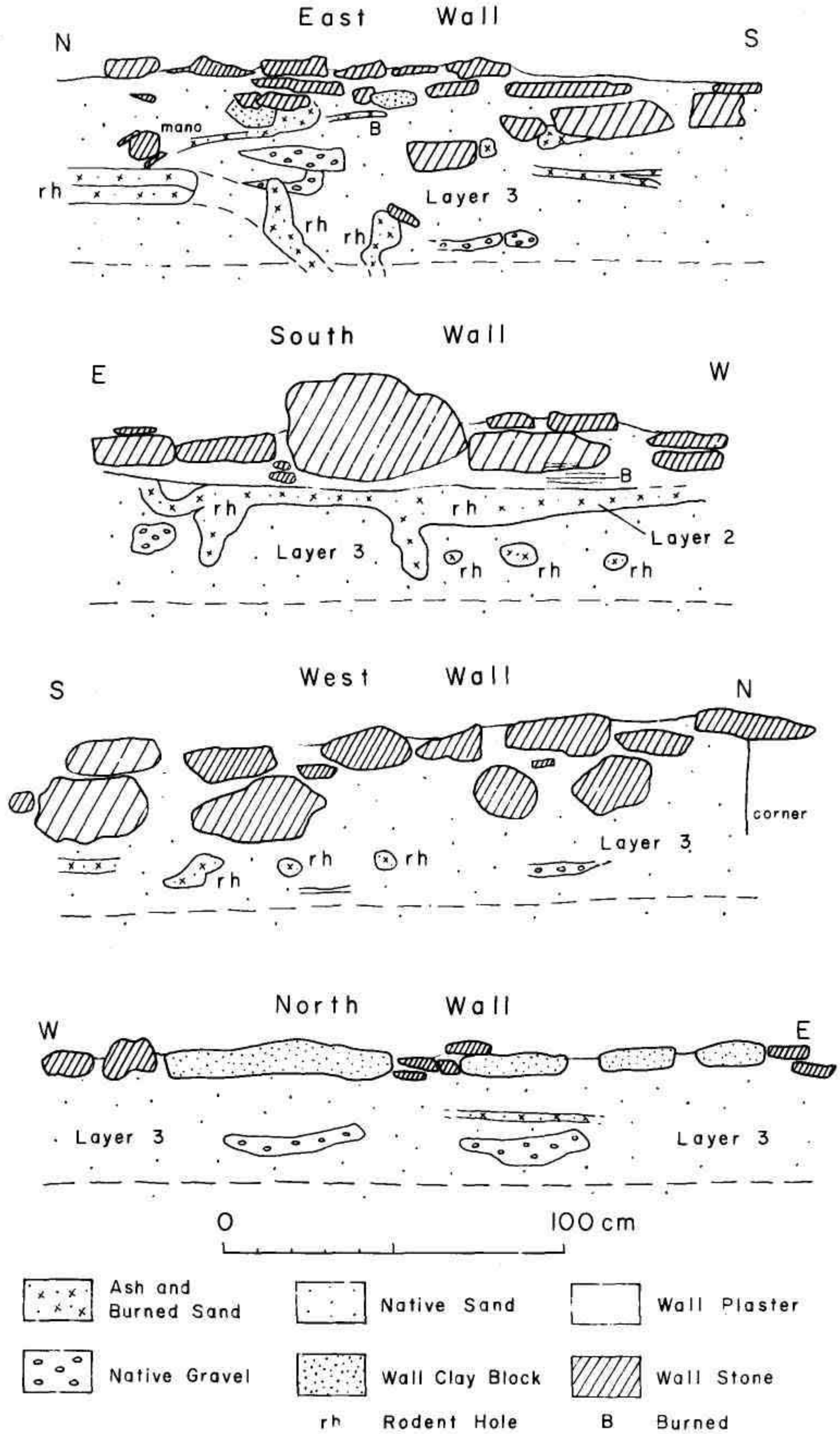

Figure 4.4. *Room 2, wall plans (NPS 310/82198 A).*

their original discarded contexts. None were intact. Most ceramics from Layer 2 were burned by the fire that swept the room, but none were burned in Layer 1. The restorable culinary jars were not burned, which indicates that they were discarded after the fire.

Most of the ground stone apparently was part of the construction debris, for as a class, it averaged a shallower location than all other classes (96 cm versus 104 cm BSD), it was unburned, and it was found generally with Layer 1 rubble. This assumption was strengthened by the average depth of mano and metate fragments at 99 cm BSD and all from Layer 1, compared to the intact, and, presumably, serviceable manos at 105.5 cm depth, all from Layer 2.

All vegetal remains were charred, and almost without exception, occurred near or at the bottom of Layer 2. Due to their small size, these remains were probably left from activities within the room when it was abandoned and later were consumed by the subsequent fire. The mass of burned material was composed of fine, delicate matter, identified as grasses in the field by Alden Hayes (personal communication 1975). This material may have been from a grass-covered floor that trapped bits of food during storage and food processing activities or, perhaps, represented tinder to start the fire. A high frequency of pollen grains from grasses and corn were identified in four Layer 2 samples (Cully 1985:165-167), which, together with the charred macro-remains (M. Toll, this report), indicated possible use of Room 2 for storage and food preparation. It was not possible, however, to distinguish the remains left in the room at abandonment from later refuse.

Charred macro-remains of corn, beans, and cactus pads appeared to cluster in and about the firepit (Figure 4.2; Table 4.3) as if scattered during food preparation. A nearest neighbor analysis (Hammond and McCullagh 1974) of these, however, indicated that the room distribution was random ($r=.815$, $z=.401$, $p<.689$, $n=11$). Mice probably consumed any food material and were probably responsible for much of the unburned economic seeds in the room. The mice feces were full of charcoal indicating post-fire consumption. Lack of wood charcoal within or around the firepit suggested that the firepit was not being used just prior to room abandonment. Instead, Layer 2 overlaid the firepit and might indicate the storage of wild plant foods during the last use of the room, that is, if the material was not refuse.

The lack of substantial economic plants in the room indicated that most food had been removed before the fire. Refuse was being deposited in the room, however, before and after the fire. Just over half of the artifacts plotted from Layers 1 and 2 came from the southwestern quarter of the room--the area suspected to be connected with Room 3 by a door. Parts of two vessels were found on the floors of both rooms, including Restorable Vessel 40 (Plate 8.8C). In contrast, there were no sherd matches from the areas adjoining Room 2: Room 1 (to the east), Test Trench 99 (to the north), and the plaza areas (to the south). Therefore, it is assumed that refuse was thrown into the room through a door from Room 3.

Room Function: Room 2's small size, its location next to Room 3, a habitation room, and the probable door connection between them suggested that Room 2 was built as a storage facility. Despite the rich ethnobotanical remains found in the room, it was not clear whether they related to use of the room or derived from refuse deposits. The nature of the inferred room superstructure suggested that materials within it would not have been well-sheltered from the elements.

It was not known when the firepit was built during room use. The firepit was deep, unplastered, and slab-lined like those typically found outdoors. Storage rooms with firepits were noted at nearby 29SJ 627 (Truell 1992) and 29SJ 1360 (McKenna 1984). Whatever function the firepit served, the overall use of the room must have been for food storage, processing, and/or drying.

Temporal Assignment: It is not known when Room 2 was built, although wall abutments indicate that it postdates Room 3 by an unknown span of time (Figure 3.1). Given the spatial arrangement and similar construction of Rooms 2 and 3, the probable door access between them, and the differences in floor feature density, it is probable that the two rooms were built as a single unit. Early refuse behind the room in Test Trench 99 (Chapter 6) and the partial firepit under the south wall indicated that the area under Room 2 was an outdoor activity area before the room was built. Thus, the room was built after the initial house construction, probably by the late A.D. 900s or later. Ceramic refuse within the room reflects material from the early A.D. 1000s, after the room was abandoned (Table 4.2).

Room 3

The east-west and north-south roomblocks were joined by Room 3, one of the two habitation rooms at the site. The room was nearly pie-shaped, 370 cm by 290 cm (7.6 m^2) and 70 cm deep. Except for a large upright slab projecting from the juncture with Room 5, a wall anticipated to have enclosed the plaza side of the room was not found, because the room opened directly into the plaza. A curving back wall connected the row of rooms running north-south with those running east-west. The junctures affected by the curving wall, however, were unusual because the wall connected the back wall of the east-west wing (Rooms 1-2) but joined near the plaza side, or front wall of the north-south wing (Rooms 5-9). This seemingly haphazard alignment may be indicative of a shift in the occupancy at the site (i. e., Chapter 9, house orientations). The room was built late in the occupation of the site, perhaps at the same time as the other habitation room (Room 9), and was one of the last used before primary site abandonment.

Fill

Surface clearing revealed an intact fallen wall in the western two-thirds of the room (Plate 4.4), fronting the curving back wall. The initial room test was placed along the eastern one-third of the room, next to Room 2, to avoid destruction of the fallen wall. An anticipated southern wall, aligned with the southern walls of Rooms 1 and 2, failed to materialize until the test was carried south an additional 80 cm. Three arbitrary levels in the test were removed before encountering the floor, although a fourth level was designated floor fill. The three main levels correspond with the three natural layers later removed from the room. Only the natural units of room fill are described below.

Layer 1: The uppermost unit, about 15-25 cm in depth, was almost entirely wall stone and mortar. A large part of this layer, except in the initial test, was a fallen wall of a single course thickness, 25 cm wide, which extended as a unit 141 cm out from the back wall (Plate 4.4). Stones along the top of the back wall tipped in the direction of the plaza, identifying the source of the wall fall. Overall, the toppled wall extended approximately 180 cm from the back wall. In profile, it rested 18-23 cm above the floor. Thin, tabular stones, 2-6 cm thick, set apart by 2-9 cm of copious layers of mortar comprised the 9-13 courses of toppled masonry. Seventeen percent of the stone from the test was burned, although little, if any, of the fallen wall was burned. Overall, charcoal was rare (1-2 pieces per 100 cm^2), as were artifacts, except in the southern half of the initial test.

Layer 2: The wall stone overlaid a 15-cm-thick, poorly compacted deposit of mortar and alluvial sand mixed with a scattering of stone, twigs, chunks of roofing adobe, and other fine, vegetal matter. The adobe was often smoked on one or more sides and exhibited brush and/or finger impressions. Several adobe chunks revealed impressions of poles 5-9 cm in diameter. Most adobe was recovered close to the back wall, but a second concentration occurred in the southwestern corner. Again, charcoal and artifacts were sparse.

Layer 3: This deposit was about 9 cm thick and resembled the overlying layer, except for the absence of vegetal matter. Adobe roofing fragments, wall plaster, and pockets of soft loam or sand dominated the fill. Finger and palm prints were located on the blackened sides of the adobe chunks of wall plaster. The chunks did not exhibit twig or pole impressions. The best-preserved hand print, made from a small right hand, was possibly made by a female or subadult during plastering of the walls. Stone, charcoal, and artifacts were scarce.

Floors 1 and 2

A 1- to 2-cm-thick layer of windblown sand partially covered the uppermost floor (Plate 4.5). It was concentrated in the southwestern corner of the room, extending eastward 60 cm before becoming intermittent. Cultural material from this floor fill was kept separate from material resting directly on the floor. Subsequent excavation revealed two floors resting upon natural sterile sand and gravels. Floor 1, the upper floor, was a partial replastering of the lower surface. Its most noteworthy attribute was a gentle rise creating a split-level floor in the western and northern parts of the room. This rise, covering 65 percent of the area, started at the west side of the

Plate 4.4. *Room 3, back wall fall, looking south. 30-cm north arrow (NPS 10496).*

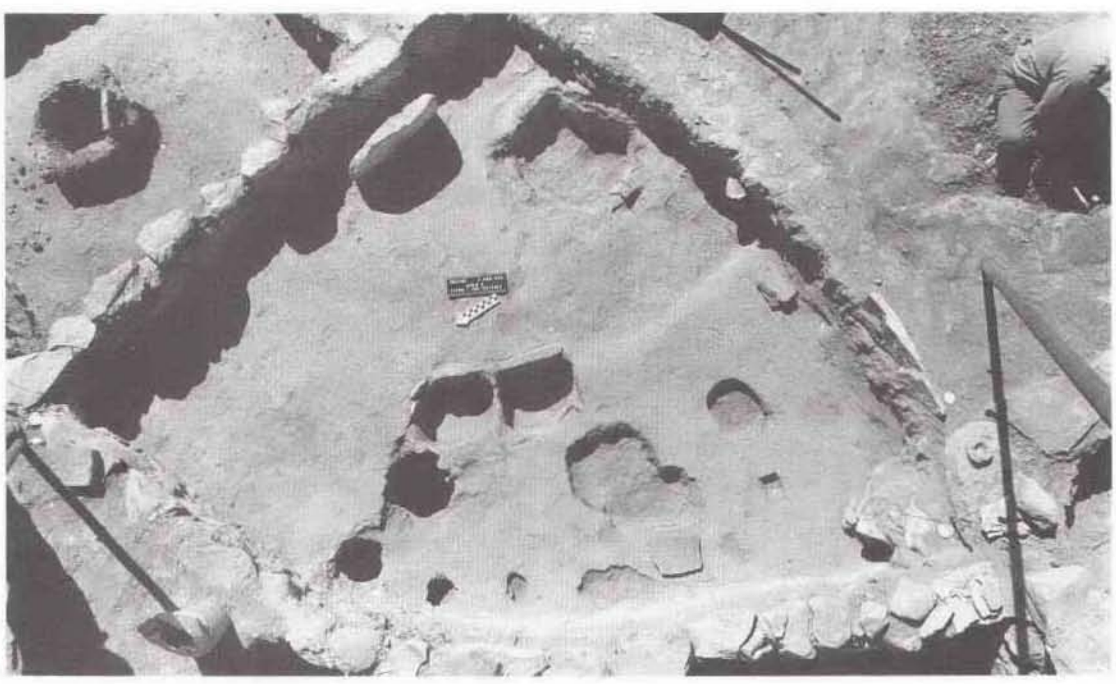

Plate 4.5. *Room 3, Floors 1 and 2 from above. Note firepit in Room 2 in the upper left corner. 30-cm north arrow (NPS 12023).*

entry into the plaza and continued north skirting the edge of two prominent centrally-located pits, and then east to a mid-point along the east wall, which it shared with Room 2. Replastering was not evident in the southwestern corner where there appeared to be only a single floor. In the eastern and southeastern areas, the reflooring was 1 cm thick, but the remainder was up to 7 cm thick. The lower floor, Floor 2, was 3.5 cm thick. Both floors were puddled adobe, similar to floors of the pitstructures, but contrasting with the native earth floors of most other site rooms.

Floor Features. More features (18) were present in Room 3 than in any other surface room on the site (Figures 4.5-4.6, Table 4.4). These features mark a number of different activity loci that relate to food preparation and processing. Feature types that may be unfamiliar to the reader are described in Chapter 7.

Firepits. Two firepits, one sealed over with plaster, were on the lower split-floor level. Firepit 1, the last used, was built against the south wall near the entry of small, upright, tabular stones and mortar, partially surrounded by an adobe collar that was added after initial construction. The firepit was filled with ash and pieces of charcoal covered by a layer of mortar from postabandonment collapse of the roof. A diversity of economic seeds, many of them carbonized, were recovered from the firepit fill (M. Toll, this report). The south room wall was oxidized from firepit use. Firepit 2, the earlier one sealed with plaster, was located in the southeastern corner of the room, and slightly overlain by Firepit 1's collar, the door step into Room 2, and the east room wall. It also was partially lined with small, tabular, upright stones. The western side was only lined with mortar, however; and a flat stone covered the bottom. The fill was mostly sand mixed with charred twigs and seeds of little economic interest. Both pits were sampled for archeomagnetic dating (Chapter 8). Firepit 2 yielded the earliest archeomagnetic date from the site, A.D. 684-942, although it was a statistically poor sample. Samples were also taken from the sides and floor of Firepit 1, which yielded very different results; they plotted on the archeomagnetic curve between A.D. 933 and 1058.

Heating Pits. Three shallow, unlined, burned, heating pits (HPs) were located in the southwestern area of Room 3. The features were like firepits but were smaller, unlined, poorly burned, and contained different fill (Chapter 7). All were excavated into the replastered floor after it became split-level. Each contained burned and unburned layers of sand, charred sagebrush, and saltbush or greasewood fragments (Welsh 1979). In contrast to the floor and Other Pit remains, these heating pits yielded no macrobotanical remains and a paucity of economic seeds (M. Toll, this report). Only HP 1 was in use at abandonment; this had partly destroyed HP 3 (Plate 4.6). The latter and a third, HP 2, had been sealed with adobe plaster. Archeomagnetic results from all three heating pits yielded large alphas and two plotted far off the known curve (Chapter 8). HP 1 plotted on the curve between A.D. 919 and 1054 and was little different when combined with HP 2 (A.D. 910-1023; 2σ). A radiocarbon sample (SI-3716) from HP 1 yielded a date between A.D. 986 and 1227 (2σ). Both dates spanned the expected temporal use of the room.

Other Pits (OPs). Two contiguous slab-lined pits were found centrally located within the room (Plate 4.7). Their location, contents, and morphology mark this pair as receptacles for corn processing (Chapter 7). Other Pit 1, the northern pit was lined with unbroken, unifacially ground manos along its north side and contained a shaped, ground stone for a bottom. Roofing material (from the room) and a few stones filled the upper 10 cm of the pit. The rest consisted of sand and small bits of sandstone, along with numerous pieces of charcoal and rodent parts. Also found in the pit were several fragments of an unfired clay pipe, bits of turquoise, and an inverted trough metate fragment 1-2 cm above the floor stone. The fill under the fragment yielded a hammerstone, and a high frequency of corn (11 percent of the total room count), grass pollen (75 percent) (Cully 1985:Table 4.4), and macro-remains of juniper twigs, saltbush fruits, ricegrass, and corn (M. Toll, this report). The pit seemed to contain both refuse and materials related to pit use.

Other Pit 2 was formed by four upright slabs, up to 5 cm thick, although those on the southern and western sides were covered with floor plaster and were not visible on the surface. A 3-cm-thick plug of adobe, identical to the floor plaster, sealed OP 2 and its contents, which included soft, humus-like material, sand, and refuse. Corncob and wood fragments, squash and other seeds, sherds, chipped

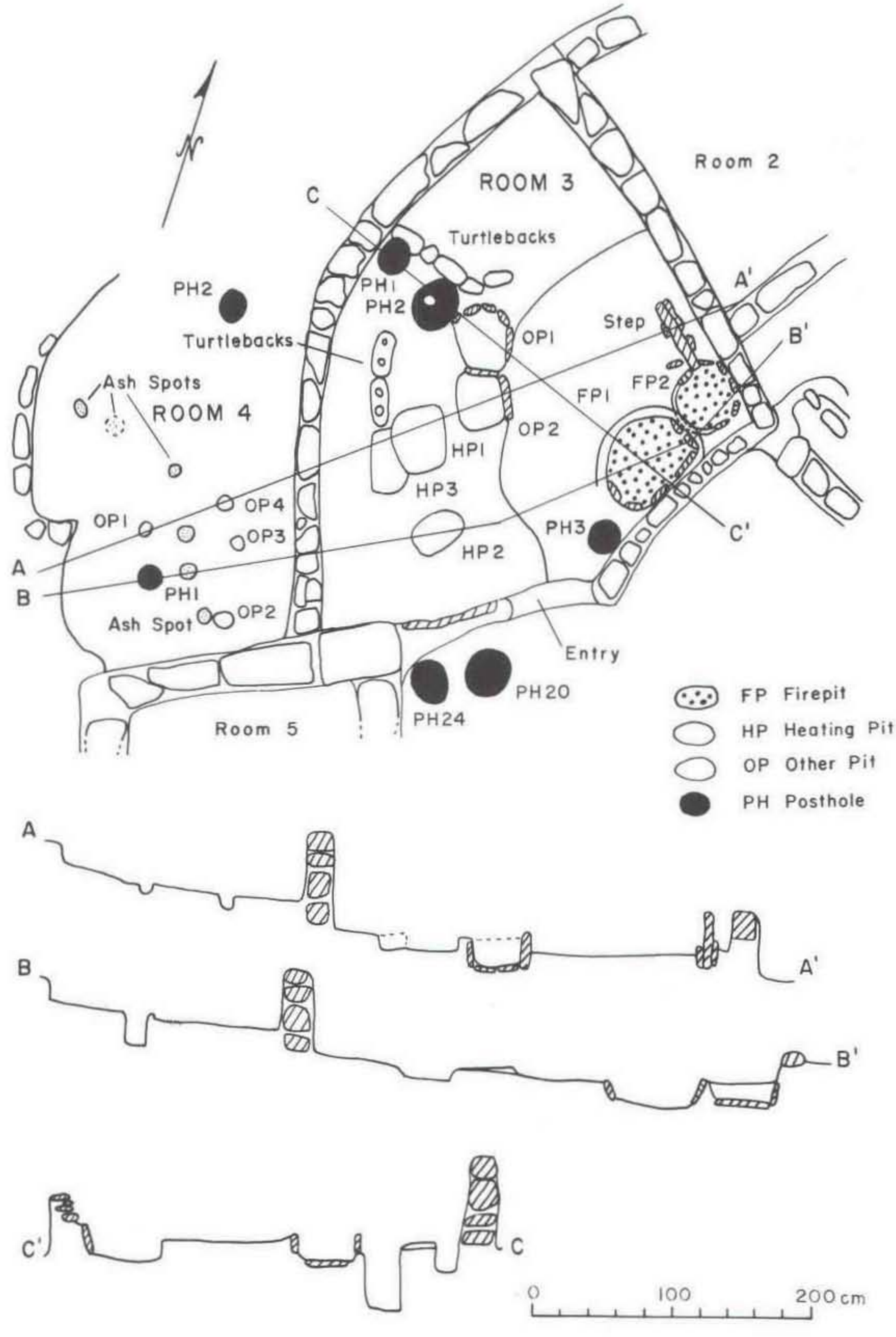

Figure 4.5. Room 3 and 4, floor plans and profiles (NPS 310/82200 D).

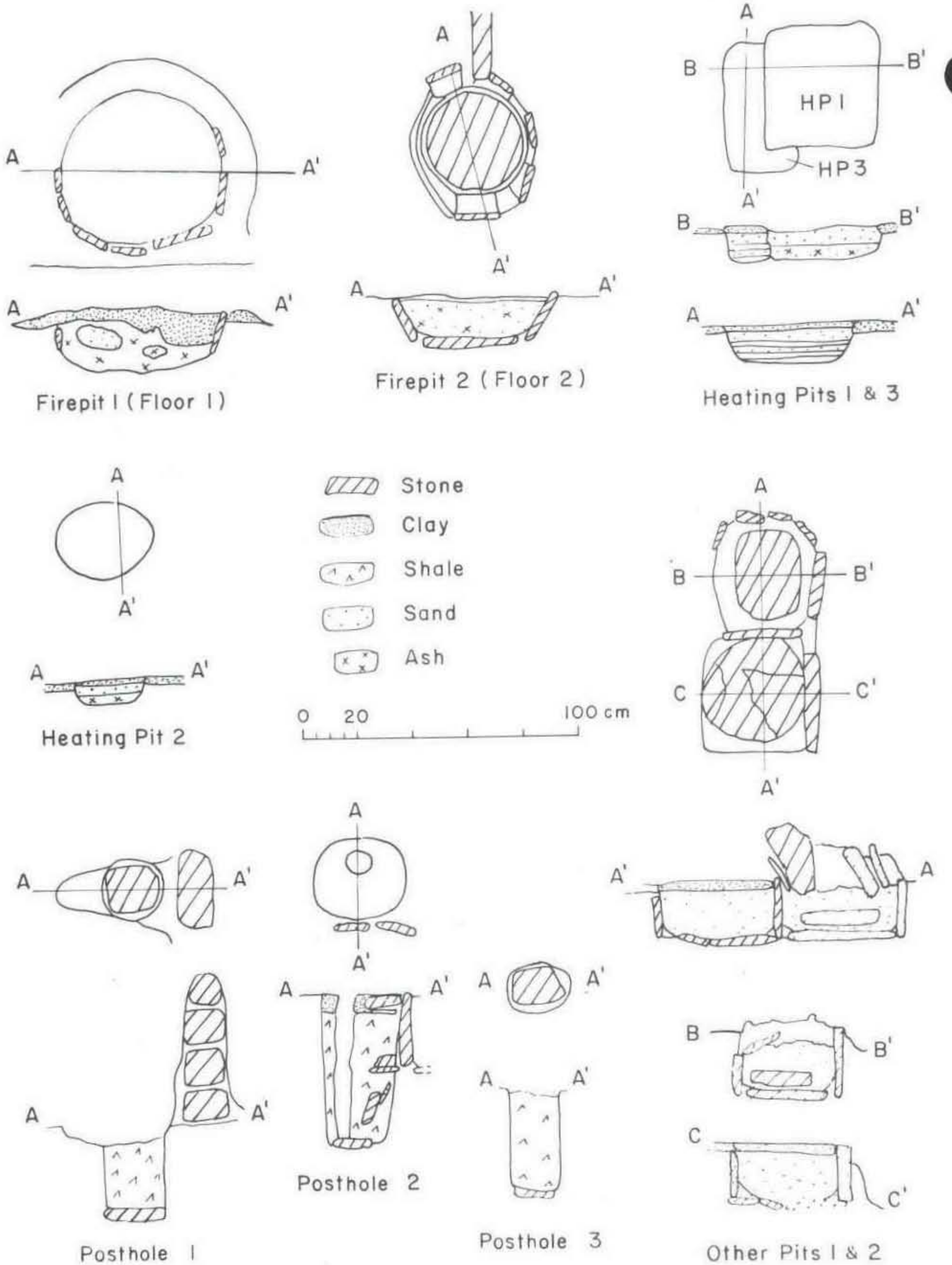

Figure 4.6. *Room 3, plans and profiles of features (NPS 310/82279 C).*

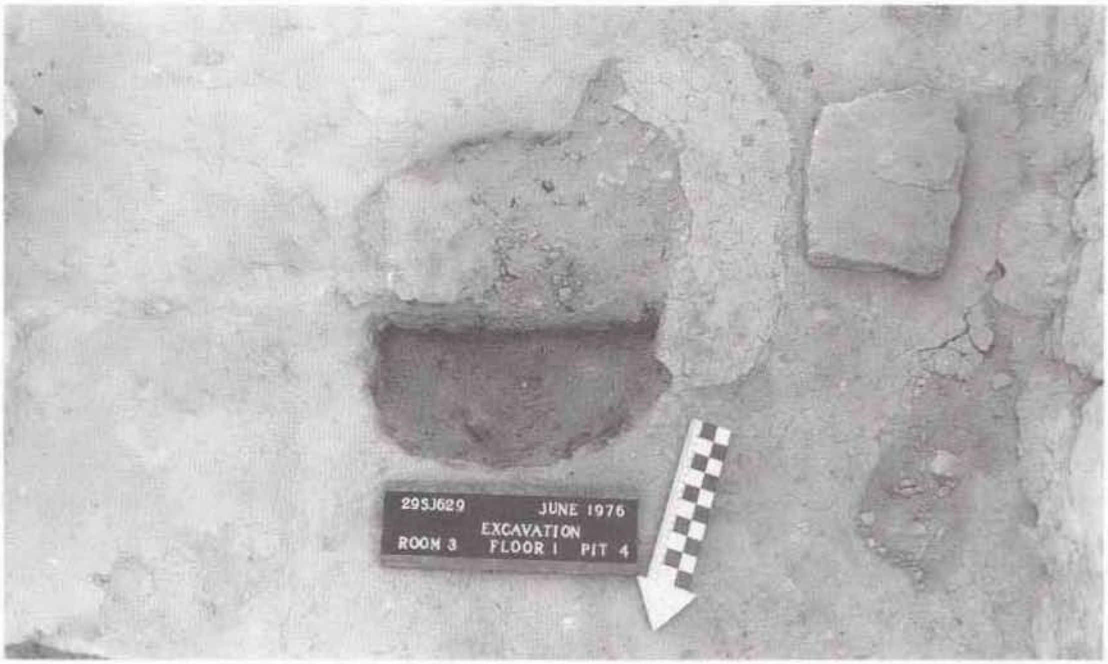

Plate 4.6. *Room 3, Floor 1, Heating Pit 1 (sectioned) and Heating Pit 3 (covered by plaster). Other Pit 2 in the lower left corner is also covered by floor plaster. 30-cm scale (NPS 11931).*

Plate 4.7. *Room 3, Floor 1, Other Pits 1 and 2--possibly mealing catchment basins. Note Posthole 2 in the lower left and Heating Pit 1 in the lower right. 15-cm north arrow (NPS 11940).*

stone, an abrader, and bits of turquoise came from the pit. A mass of corn pollen, some of it clumped, came from the pit (Dean, this report). Again, materials associated with pit use and refuse seemed to be present.

Turtlebacks. Removal of Floor 1 exposed two sets of adobe turtlebacks (shaped loafs of mud) stuck onto Floor 2 (Figure 4.5). A string of five ran along the east side of Postholes 1 and 2, possibly as reinforcement. These averaged 19 by 9 cm and 6 cm high. Two others, 44 by 16 by 5 cm and 37 by 12 by 3 cm, ran north of Heating Pits 1 and 3, and parallel to and 45-48 cm west of OP 1 and 2 (Plate 4.8). Each of the latter contained two shallow, cuplike depressions along the top, 5-10 cm in diameter and 1-2.5 cm deep. Their function is unknown, but they may have been knee rests for people grinding food on metates behind Other Pits 1-2 (Chapter 7). The space between the pits and turtlebacks, 45-48 cm, was a perfect match for the length of the metates recovered from the site.

Step. In the southeastern corner of the room was a large, upright slab (59 by 8 cm and 36 cm high), stabilized in the floor by 5 shims. Its smooth, ground top was parallel and even in height with the existing east wall top 20 cm away. Part of the slab extended over Firepit 2 but was not burned (i.e., it was placed after abandonment of Firepit 2). Placement and wear on the stone top suggested use as a step for entry into Room 2. Even now, the stone can support identical use without a tremor. The slab was positioned such that it extended slightly past where the Room 2 south wall meets Room 3's east wall, which would necessitate a postulated entry at the corner–an unusual location. An alternative function for the slab might have been for activitities associated with food preparation and use of nearby Firepit 1.

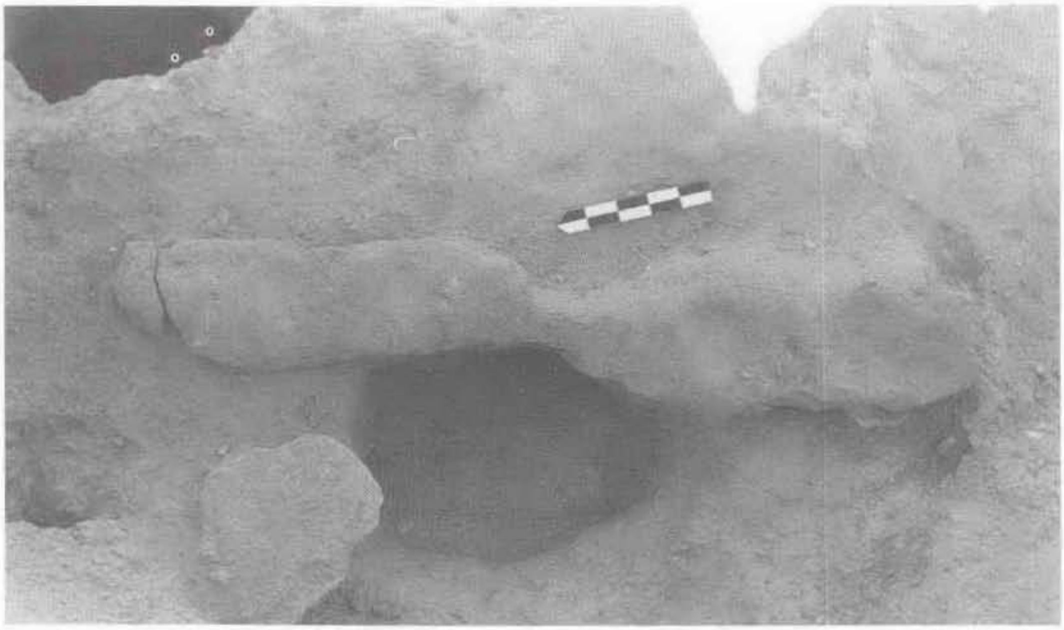

Plate 4.8. *Room 3, Floor 2 turtlebacks that might have been knee rests for women grinding food. 15-cm north arrow (NPS 12470).*

Floor Materials (Figure 4.7, Table 4.5). Aside from roofing debris and a few pieces of sandstone, cultural material was rare on the floor. A significant proportion, including all the sherds (dominated by plain gray, indented corrugated, and Red Mesa Black-on-white), came from the area cleared during the initial test (Table 4.2). The remaining area, mostly covered previously by fallen back wall, yielded a few abraders, manos, and hammerstones.

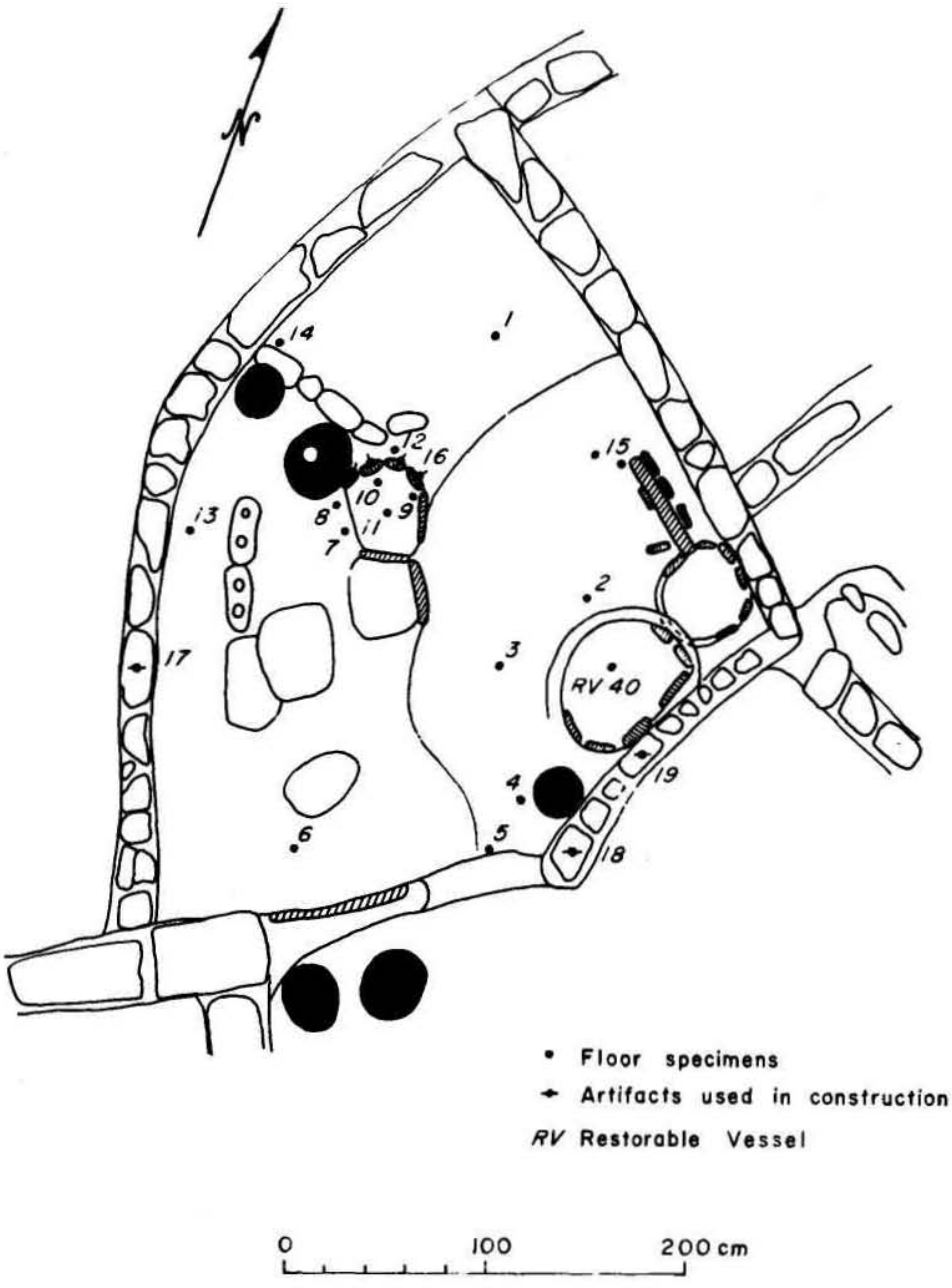

Figure 4.7. *Room 3, distribution of specimens on and under Floor 1 and in construction (Table 4.5--specimen list) (NPS 310/82200 E).*

Table 4.5. Room 3, lists of floor and construction specimens.[a]

Artifact Number	Artifact Class	Lithic Material or Ceramic Ware	FS No.
Floor 1			
1	Mano (1241 g)	2000 (sandstone)	823
2	Core (613 g)	2221 (quartzitic sandstone)	824
3	Lapidary abrader with grooves (burned, 29x17x1.5 cm, 1643 g)	2000 (sandstone)	813
4	Hammerstone (95 g)	2202 (quartzitic sandstone, Nacimiento)	1300
5	Active lapidary abrader (728 g)	2000 (sandstone)	1976
	Active lapidary abrader (1085 g)	2000 (sandstone)	1976
6	Hammerstone (154 g)	1112 (cherty silicified wood)	1301
7	Mano (2780 g)	2000 (sandstone)	2241
8	Other-shaped stone	2000 (sandstone)	2240
9	Hammerstone/abrader?	4005 (quartzite)	1282
10	Unworked slab with hematite	2000 (sandstone)	1283
11	Metate fragment (7750 g)	2000 (sandstone)	1284
misc.	Sherds, bones, chipped stone	-	-
Floor 2			
12	Corncobs	-	3454
13	Mano fragment (428 g)	2000 (sandstone)	3542
14	Projectile point, side notched (0.3 g)	1052 (chalcedony, clear)	2686

Table 4.5. (continued)

Artifact Number	Artifact Class	Lithic Material or Ceramic Ware	FS No.
15	Hammerstone (363 g)	4000 (quartzite)	2126
	Hammerstone (209 g)	4005 (quartzite)	2126
misc.	Sherds, bones, chipped stone	-	-
Used in construction			
16	Manos (4: 899, 1069, 1098, 1218 g)	2000 (sandstone)	2184
17	Metate fragment (4000 g)	2000 (sandstone)	1104
18	Mano (969 g)	2000 (sandstone)	3543
19	Mano blank?	2000 (sandstone)	3544
Subfloor			
-	Mano fragment (427 g)	2000 (sandstone)	3542
Restorable vessels			
RV 40	Coolidge Corrugated jar	- Cibola Grayware	see Table E.1

[a] See distribution in Figure 4.7.

The few artifacts generally clustered around the firepits and OP 1.

Ten of twelve floor pollen samples were analyzed, and nine yielded corn pollen together with high frequencies of economic plant species, including globemallow and prickly pear (Cully 1985:167). Flotation samples also yielded evidence of economic plants, including purslane, tansy mustard, stickleaf, spurge, winged pigweed seeds, and corn cupules (M. Toll, this report). Low seed densities under the wall fall probably reflected the floor's last use, in contrast to seed counts up to 22 times higher found in the exposed eastern area associated with the trash deposits. On the other hand, pollen was recovered in high frequencies under the wall fall, while all five samples beyond it, along the east wall, exhibited a paucity of pollen grains. Grid sections B, F, H, D_2, and D (Figure 3.1) were not reported by Cully (1985) because of low pollen counts (142 grains total), although all were dominated by corn pollen, particularly D_2 (80 percent of the grid total), H (28 percent) and F (20 percent). Pine pollen was also prevalent in these grids.

Walls

A linear south and west wall was apparent, but the north wall curved along a northeastern-southwestern arc forming an unusual three-sided room. The southern wall was made of a variety of materials and was quite low (17 cm). It was mostly mortar with a large, rectangular, upright slab set in the west end and irregular tabular stones and spalls in the east part. The section backing Firepit 1 was faced with spalls that had been oxidized on the surface from firepit use. Larger, friable, white-sandstone blocks, set in copious amounts of mortar, comprised the east and back walls, beginning 4-10 cm above the upper floor. Two courses remained in the east wall and four in the back. Both were covered with 3- to 6-cm-thick adobe plaster that graded into the floor plaster. Seven-centimeter-thick adobe "loaves" were affixed to the back wall exterior, along with a generous coating of mud.

The lack of associated rubble, the narrow width (15 cm maximum), and the style of construction indicate that the south wall was probably never much higher. It was too weakly built to withstand the weight of additional courses, while the cap stones on top and the lack of associated postholes attest to the absence of an upper light framework of brush or poles. Similarly, the east wall also appeared inadequate to have supported much more than its present height, particularly with the foundation stones set on end in sandy fill. Nevertheless, the composition of fill from the initial test was identical to that in the rest of the room. Enough stone from the initial test was recovered that if placed in the same fashion as that remaining in the east and eastern one-third of the back walls, those sections would reach an additional 129 cm in height or about 170 cm overall. Abundant use of mortar, of course, would have made it much higher. In contrast, there was no doubt of the existence of high-standing masonry for the remaining back wall. Approximately 141-180 cm height of back wall fell intact. Added to its present height of about 60 cm, that yielded an original wall height between 200 and 240 cm.

Wall Features. In the center of the south wall was a finished 80-cm-wide opening that allowed access, after a slight step up, from the room into the plaza. A second opening was postulated into Room 2 in the east wall above the probable stone step mentioned above.

Roof

Ample remains were recovered to accurately interpret the method of roofing. All three floor postholes were apparently in use until abandonment (none were sealed) and their arrangement suggested the basic structural framework was an extension of the plaza ramada. The size of the postholes, however, was not indicative of the post size, except to limit its maximum diameter. Posthole 2, 30-34 cm across, still contained the post mold, 8.5 cm in diameter. No wood was recovered, and evidently it was salvaged for use elsewhere. The size and shape of the room, coupled with structurally weak walls, dictated the need for additional support of a roof, if it was present. The post supports divided the room in half and were situated to support stringers that would have carried vigas resting at one end on the northeastern and southwestern wall tops. Adobe impressions indicated that room vigas were a maximum of 9 cm in diameter. Smaller poles might have been added above the vigas, but the basic framework was eventually covered with brush and twigs and sealed with adobe.

Two postholes located in "Room" 4 (behind Room 3) did not appear useful unless they contributed to the superstructure of Room 3. They form a trapezoid arrangement with those in Room 3. Possibly the roof of Room 3 overhung the back wall for a short distance to be supported by posts in "Room" 4.

Summary and Conclusions

Architecture and features. There was little doubt that Room 3 was once roofed and enclosed by walls, although the extent of this architecture was speculative. The alignment of the room postholes indicated that the plaza ramada once extended north before construction of Room 3. When Room 3 was constructed, the builders simply utilized the ramada for the room roof. Roof and wall adobe, blackened by soot from pit fires in the room, suggested enclosure of most of the room with mud and stone. The opening into the plaza through the structurally weak, low south walls, however, suggested that Room 3 was not fully enclosed on the south side. This would have allowed direct sunlight into the room during the cooler parts of the year but not during the summer.

The initial features belonged to the plaza. The room postholes were part of the initial plaza and associated with Firepit 2, which probably predated room construction. The possible step for access into Room 2 was placed after Firepit 2 was sealed. When first cleared, many of the floor pits were sealed with plaster. Only Firepit 1, Heating Pit 1, Other Pit 1, and the three postholes were functional at abandonment. All the heating pits (HPs) in Room 3, Firepit 1, and OP 1-2 were constructed after addition of the remodeled floor, which covered Firepit 2. HP 1, the last built and used, cut HP 3 in such a manner to suggest a hiatus between the sealing of HP 3 and the construction of HP 1. It would be expected that if the two events were immediately sequential in time, then the seal for HP 3 would have also formed part of the side for HP 1. Instead, the seal was cut through, leaving it suspended over the fill in HP 3. This left HP 2 as the likely candidate for use prior to HP 1 but after HP 3. This is not to say that HP 2 was not at least partially coeval with either of the others, but it suggested that contemporaneous use of one heating pit with one firepit was normal at the site (Chapter 7). The coeval use of a single firepit and heating pit was duplicated in Room 9, Pithouse 3, and Floor 1 of Pithouse 2.

Post-abandonment and deterioration of the room is a more complex story. There was a marked disparity between the density of artifacts from the initial test and those subsequently removed from under the back wall fall. Ceramics were particularly numerous from the initial test and perhaps were a later assemblage than those from the rest of the room. Sherd frequencies were likely to be misleading, however, and in this case, 27 percent of the 408 sherds came from just seven vessels (Appendix E). Two jars contributed 27 percent or more of all the culinary sherds and came from the floor and every level in the fill. Pieces of a Coolidge (neck) Corrugated jar (Plate 8.8C) were also found in Room 2, and other pieces came from the trash layers in Pithouse 3 and the ventilator tunnel of Pithouse 2. Nevertheless, almost all the matched sherds (113-130 pieces) came from the initial test trench, suggesting that roof and wall deposition within the room occurred at different times, a finding also supported by the stratigraphy.

The ceramic assemblage from the test trench reflected deposition of trash (e.g., large sherds and parts of restorable vessels were common), while the sparse assemblage in the remainder of the room did not (Table 4.2). One feasible explanation for this would be the rapid demise of the western two-thirds of the room, perhaps when the structural wood was removed, resulting in collapse of the back wall. This would have sealed much of the room and left it in the condition in which it was abandoned. The remainder of the room apparently disintegrated more slowly and was used for depositing refuse. Only in this fashion could the broadcast of trash have been so severely limited to that area not covered by the back wall fall.

Function. The paucity of floor cultural material helped little in interpreting room function, except for pollen and flotation remains and the material in the central pits. The number and diversity of floor features, however, marked the loci of a variety of activities within the room, including food preparation and cooking. Remains of economic plants, particularly corn, were common on the floor and in OP 1 and OP 2. The latter pits have been interpreted as catch basins for meal ground on portable metates (Chapter 7). The few hammerstones and manos recovered in the pits and from the floor were also notable for their association with food processing, particularly with corn reduction.

Firepit 1 yielded a diversity of seeds from 17 plant taxa (including corn), many of them burnt (M. Toll, this report), that indicated its use as a receptacle for vegetal refuse during food preparation and consumption. There was a noticeable absence of economic plant remains, however, in heating pits (M. Toll, this report), indicating a use different from firepits. Perhaps heating pits served as warming areas for sleeping or to keep food hot that had been removed from the firepit. Whatever use heating pits served, it was evident that fires in them were of short duration (Chapter 7).

Despite the range of activities that may have taken place in Room 3, it was assumed from the postulated superstructure that the room would not have been suitable for many of these activities during the more inclement months of the year because it was not fully enclosed. Seasonal use of Room 3 was, therefore, probable for a single nuclear or extended family.

Temporal Placement. Gallup Black-on-white sherds and the base sherds from two indented corrugated jars marked refuse from the mid-A.D. 1000s or later. Only one of these bases, however, came from under Layer 2 (under the back wall fall, but above roofing material), which might closely reflect material from abandonment. Material recovered from the initial test must be later than the fall of the back wall. Ceramics suggested last use of Room 3 until the early to mid-A.D. 1000s (Table 4.2). Additionally, despite the problems of archeomagnetic dating at the site (Chapter 8), the magnetic direction of the Floor 1 samples from Room 3 also suggested use from the late A.D.900s to early or mid-A.D. 1000s.

According to the pattern of wall abutments (Figure 3.1), construction of the room was after placement of Rooms 5-7. An estimated archeomagnetic date from Firepit 2, in the mid A.D. 900s (or earlier) agreed with the stratigraphic placement of the firepit as earlier than the Floor 1 features and Firepit 1.

Room 4

Initial surface stripping of the roomblock behind Room 3 revealed an arc, 220 cm long, of friable, white-sandstone blocks, ranging in size from 20 to 33 cm long, 9 cm wide and 4-17 cm thick. These five stones were set in a single course and were not joined by mortar, as if construction remained uncompleted. Stone rubble was not found in association. The stones nearly paralleled the back wall of Room 3, 180 cm to the east, and seemed to represent a room (Room 4), 230 cm by 170 cm (4.8 m^2), that filled the space left by the odd connection of Room 3 to Room 5. Despite excavation, an enclosed structure and prepared floors could not be verified. "Room" 4, then, seems to have been an outside work area, partly covered by a roof extending out from Room 3.

Fill

Room 4 was excavated in two arbitrary levels. No natural layers were delineated or excavated. The fill consisted of alluvial sands and fine, gravel deposits, probably deposited by flooding of the nearby gully. Cultural material was sparse throughout the room area, although two pot lids were recovered--a rare find at the site.

Level 1. The first unit of fill, 20-25 cm deep, was removed until reaching a slightly compacted surface, designated "Floor" 1.

Level 2. A second surface was reached 15 cm below "Floor" 1--the fill between the two surfaces was identical to that in Level 1, but designated as Level 2. Because Floor 2 seemed softer and more irregular in a strip articulating with the exterior of Room 3, to examine it more closely, a test trench 70 cm wide and 20-35 cm deep was placed along the Room 3 wall. Fill from the trench was identical to that in Levels 1 and 2, except for being devoid of cultural debris, but similar to deposits associated with other natural deposits under the site.

Floor 1

This was an unprepared, slightly compacted surface associated with several pits and unusual burned spots (Figure 4.5, Plate 4.9). No floor artifacts were recovered.

Plate 4.9. *Room 4, a line of black ashy spots across Floor 1. Room 3 wall to the left (NPS 10494).*

Floor Features. The surface was marked by a string of six black and blackish-red stains that were vividly evident against the light, tan-colored fill (Plate 4.9). Each stain was approximately 10 cm in diameter but was no thicker than a millimeter or two. Fire-reddened sand in association indicated oxidation took place at each one, as if the butt ends of small posts for a rack or enclosure had burned out. No other ash or cultural material was associated with the floor, however.

On the west side, close to Room 5, the fill became hard and adobelike in appearance, creating a small curving shelf. Although this feature was about 10 cm high and slightly curving, as if it once formed the edge of a large sunken pit or tub, taking up most of the floor like those in adjoining Rooms 5-7, nothing further developed. Its elusive form disappeared after removal of Floor 1.

Floor 2

This was a more promising use surface, yielding several unlined pits (Figure 4.5). Again the surface was unprepared and composed of native soil.

Floor Features. Six pits were evident in Floor 2. The four Other Pits were shallow and contained sterile fill identical to that surrounding them. Two postholes contained sand mixed with bits of lignite. Presence of the lignite confirms the pits as post supports. The tops of the pits were truncated by erosion, however, and they may all have originated with Floor 1.

Conclusions

Peter McKenna, the principal excavator of the room, has commented at length in his field notes on the problems and interpretation of Room 4. His ideas are paraphrased here. It is important to note that Room 4 cannot be considered in the context of a space bounded by walls. Although Floor 2 was at the same depth as the floors in Rooms 5-7, directly to the south, no corresponding tub feature was positively identified for Room 4. The arc of stone was the same material and shape as blocks employed for foundations in other rooms, yet the wall was only a single course in height. Possibly, the gully running alongside the back walls of Rooms 1-3 prompted construction of the wall for water diversion, or the wall had been robbed of stone.

The postholes may have been functionally associated with Floor 1, although first identified with Floor 2. Their position in relation to those in Room 3 would have enabled support of parallel vigas for a roof extending partly across Rooms 3 and 4. The roofing, if so constructed, would have sheltered an area behind the roomblock. Access to the area would have been awkward, being about equidistant from either end of the roomblock or necessitating a climb over the roof from the plaza. A single unlined hearth, in Grids 2 and 3, is the only other feature behind the roomblock. These features may mark extramural activity areas behind the house. The recovery of the two rare potlids in the room fill may suggest that storage jars were kept behind Room 3. The burnt spots may also suggest that some sort of enclosure had been built behind Room 3.

Initially, the Room 4 area might have been an extension of the ramada that fronted the three tub rooms and skirted the north end before Room 3 was built. If postholes in Rooms 3 and 4 supported the same roof, then contemporaneous later use of both areas would be expected. The ceramics suggest that the deposition of the majority of cultural materials was deposited prior to construction of Room 3. Sherds from Room 4 are few but of early vintage and typical of those associated with the earliest occupation in the early A.D. 900s (Table 4.2). Construction of Room 3 might be postulated to have acted as a barrier to the use of the Room 4 area, limiting the deposition of additional cultural material. The curvilinear roomblock arrangement would have forced the deposition of trash to the front, or east, of the pueblo, where the largest trash midden was located, preserving the ceramic integrity of Room 4.

Room 5

Rooms 5-7 exemplify a class of storage rooms that are sometimes referred to as "tub" rooms (e.g., see Gladwin 1945:20), the earliest rooms at the site. Tub-shaped rooms consisted of a large sunken depression, or pit, taking up the majority of floor space. This left a narrow floor-shelf at ground level near the base of the surrounding walls, much like modern bathtubs. This style probably derived from the outdoor Basketmaker storage cist, but was prevalent in Pueblo I and early Pueblo II sites in Chaco Canyon (e.g., see McKenna and Truell 1986; Truell 1986:241; Vivian 1965; Windes 1976b.). Although few materials were recovered from these rooms, some items suggest that craft and other activities took place on the roofs.

Room 5 was the northernmost of the three tub rooms at 29SJ 629. Overall, Room 5 was 278 cm by 172 cm (4.6 m^2), and 93 cm deep, but it is considerably reduced in size if only the sunken tub dimensions, 190 cm by 90 cm (1.6 m^2), are considered. The excavation strategy was to have been similar to the other rooms. The existence of an active harvester ant colony (Ant Nest 16) in the northern one-third of the room (Figure 4.1) and questions concerning their contamination and disturbance of the fill, however, modified procedures. The room was not systematically sampled for pollen and flotation, as in other rooms, nor was it excavated by the layers delineated in the 1975 test profiles. For profiles of the ant tunnels, the southern two-thirds of the room were hurriedly removed in three vertical slices, but the cultural material was retained as a single unit corresponding to the four levels in the rest of the room.

Ant Nest 16

Because of the abundance of turquoise at the site and the ants' proclivity for its collection, it was anticipated that a systematic excavation of a nest might yield clues pertaining to ant behavior regarding turquoise collection (Appendix D). Excavation of the nest, however, yielded just two fragments of turquoise (and numerous ant bites), although 16 more came from the undisturbed room fill. Ant tunnels extended throughout the entire northern one-third of the room fill, into the north wall, and down through the floor, 93 cm below the surface. Ant disturbance of the room probably affected the flotation analysis (see below). Considering the proximity of numerous turquoise scrap fragments in the adjacent plaza, it seems odd that more turquoise was not recovered from the nest. In this case, the paucity of ant nest turquoise may be related to its absence within foraging range.

Fill

Levels 1-4 may be construed as a single, 80-cm-thick, nearly homogeneous layer of mortar and building stone, mixed with some sand. Charcoal occurred as small flecks with less than 4 per 100 cm^2.

Levels 3 and 4 yielded chunks of adobe with stick impressions, 5-10 mm in diameter, and viga impressions, 6-7 cm in diameter, along with seven adobe turtlebacks from the center of the room. Over 282 stones came from the fill--the bulk apparently the result of collapse of the west wall. The lower part of the first four levels (the fifth was floor fill) was primarily adobe roofing material while the material above that was from collapsed walls.

Level 5 and the lower 10 cm of Level 4 consisted of tan sand, a few tabular stones, and 10-20 charcoal flecks per 100 cm^2. This extended to the bottom of the large, shallow, bathtub-shaped pit that took up most of the floor.

Floor 1

The floor consisted of the bottom of the bathtub-shaped basin and the top of the 20-30 cm elevated shelf, 36 cm wide, which surrounded the basin (Figure 4.8, Plate 4.10). The shelf and tub were excavated primarily into native fill, although areas of the shelf consisted of adobe chunks. When these chunks were removed, a loaf-shaped collar was left around the top of the tub leaving a trough between it and the room walls (Plate 4.10). The floor and shelf surface was of sandy adobe that appeared natural. Several lightly oxidized spots adjacent to the postholes and against the west side of the tub were sampled for dating, but the archeomagnetic placement was only tenuously assigned to the mid-A.D. 1000s (Chapter 8).

Floor Features. Two shallow pits, designated as postholes, were centered at each end of a longitudinal axis along the tub bottom (Figure 4.8, Table 4.6). Each had a small, tabular, sandstone piece resting in the bottom of an otherwise sand-filled hole. The northern pit also revealed a small, upright piece of sandstone stuck in the floor on its northwest side. These would not have supported free-standing posts.

Floor Materials. Only three artifacts were recovered from the floor: a piece of shell and two abraders (Figure 4.8, Table 4.7). Similar abraders recovered from the site were associated with turquoise jewelry production (Volume II, Chapter 4). Pollen analysis of two floor samples revealed predominantly non-economic plant species, probably from natural contamination, a small amount of corn pollen (2 percent of the floor total), and the highest percentage of willow pollen (4 percent) from the site (Cully 1985:160). Although willow pollen is wind-transported, its presence in Room 5 may be from traces of roofing materials. Flotation samples from the same two areas also yielded remains of corn, as well as seeds from Cheno-Ams, Portulaca and Descurainia (M. Toll, this report). Ant behavior may be responsible, however, for the high density (74 percent of 449 seeds) of pristine, unburned, Portulaca seeds found in the sample from the south half of the floor.

Walls

The standing architecture was composed of four walls of mud and unshaped blocks of sandstone, a single course wide. Generally, the thinnest tabular stones remained as the top course, underlain by soft white blocks of sandstone. Adobe mortar, or in one instance, shaped loafs of mud called turtlebacks (Vivian 1965:14, Figure 3), separated the masonry from the top surface of the tub shelf, 7-10 cm underneath. Adobe plaster, 8 cm thick, was applied over the interior masonry and on the east and west exteriors. The exterior wall facing the plaza (east) was covered with a series of small spalls, seldom exceeding 2 cm in length, which were pushed--in aesthetically pleasing horizontal rows--into the plaster while it was soft. These may have functioned to hold and stabilize the thick, plaster coat, particularly from the elements. An area in the center of the east wall, devoid of spalls, proved merely to be a fortuitous feature instead of a sealed door.

Two approaches were used to reconstruct the minimal original room height. Both rely on the assumption that stone in the room fill came from

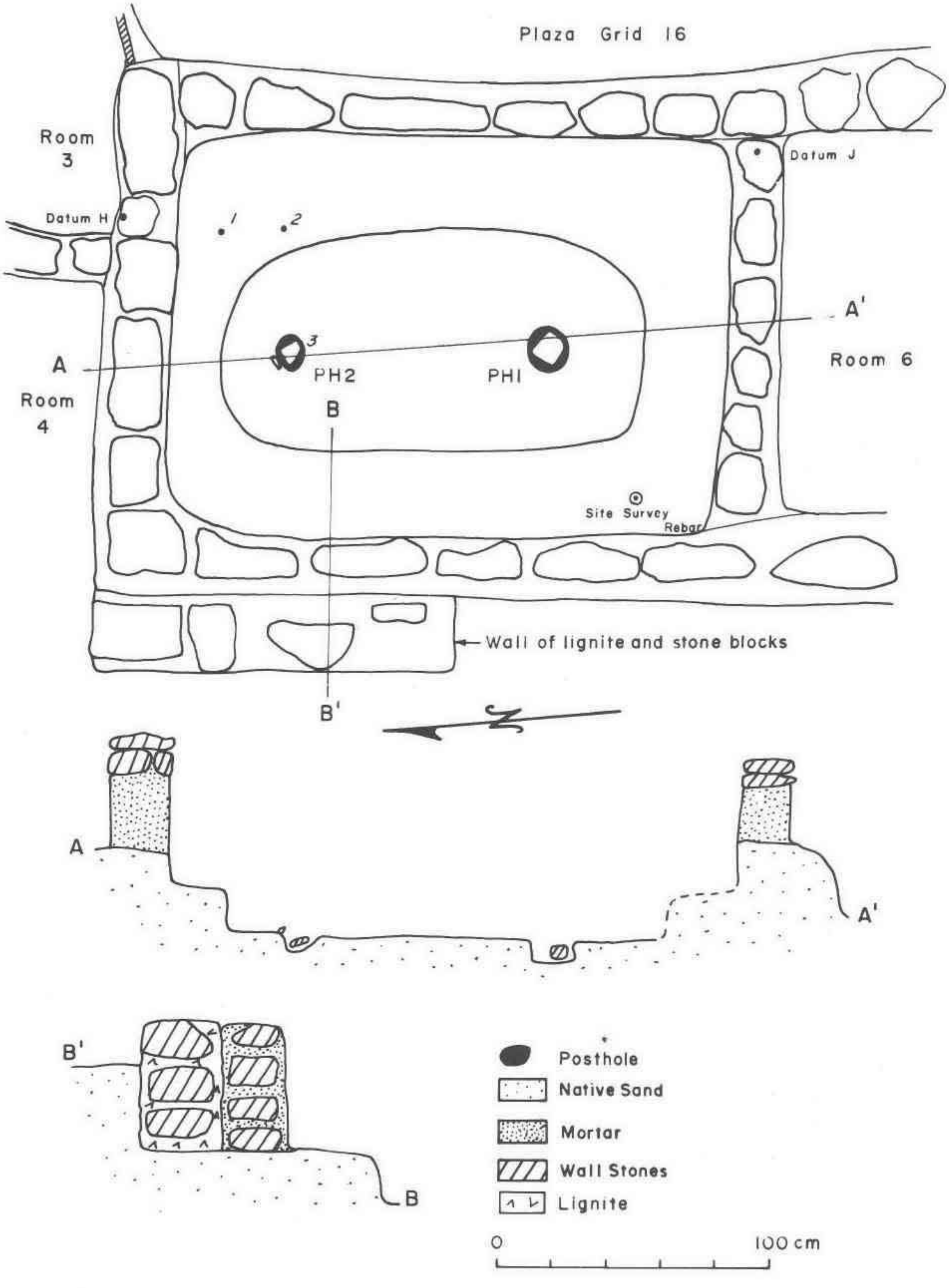

Figure 4.8. *Room 5, plan view, profile, and the distribution of floor specimens (Table 4.7--specimen list) (NPS 310/82201 B).*

Plate 4.10. *Room 6, looking north across Floor 1. Note the sectioned Room 5 tub shelf in the upper background. 30-cm north arrow (NPS 12361).*

Table 4.6. *Rooms 5 and 9, list of features.*[a]

Feature	Length (cm)	Width (cm)	Height/ Depth (cm)	Volume (liters)	Fill Type	Fill Period	Lining	Opened/ Sealed	Comments
Rm. 5, Fl. 1									
Posthole 1	20	18	10-13	3.3	10	PO	U?	O	Base stone (abrader). One shim?
Posthole 2	15	13	5-6	0.6	10	PO	U?	O	Base stone.
Rm. 9, Fl. 1									
Firepit 1	53	52	26	40.0±	27,30	Occ.	L-SP	O	Mouth = 1778 cm^2. Base stone.
Other Pit 1 top bottom	78 108	70 108	60	375.7	11,30	PO	U	O	Bell-shaped pit.
Bin 1	127	100	74-81	921 ±	11,42	PO	L-A/M	O	
Bin 2	80	76	36	231 ±	30	PO	L-M	O	Turkey pen?
Bin 3	93	82	32-52	331 ±	30	PO	L-M	O	
Rm. 9, Fl. 2									
Firepit 2	59?	51?	15±	57 ±	?	--	L-S	S	Mouth = 2376 cm^2. Same Firepit 1 base stone.
Heating Pit 1	61	57	8	23.9	27	Occ/PO	U	O	Mouth = 2922 cm^2.
Heating Pit 2	23	?	8-9	?	?	?	U	O	Under Bin 2 East Wall.
Posthole 1	36	34	21-31	25.0	52	Occ	U/L-S	O	Five shims and base stone. Partly under Bin 3. Lignite = 6.5 kg.
Posthole 2	25	19	25	9.5	13	Occ	U/L-S	O	Four shims and base stone. Partly under Bin 1.
Posthole 3	23	21	22	8.4	11	PO	U	O	Partly under Bin 1. Tenuous posthole.
Posthole 4	28	25	30	16.5	11, 52?	PO	U	S-FP?	Three shims (one a mano)? Tenuous posthole?
Posthole 5	20	20	27	8.5	11	PO	U	S-FP	Tenuous posthole.
Posthole 6	10	?	30	?	11.2	Occ/PO	U	S	Under Bin 2, E. Wall

[a] See Tables 7.3-7.4 for an explanation of the feature and attribute codes.

Table 4.7. Rooms 5-7, lists of floor specimens.[a,b]

Artifact Number	Artifact Class	Lithic Material or Ceramic Ware	FS No.	Depth BSD
Room 5				
1[e]	Passive lapidary abrader fragment (12x4x1 cm, 80 g)	2000 (sandstone)	1375	-
2	Glycymeris sp. ring fragment	-	1376	-
3[e]	Passive lapidary abrader fragment (12.5x12x1, 294 g)	2000 (sandstone)	1591	-
Room 6				
1	Red Mesa B/w jar sherd	- Cibola Whiteware	2244	-
2	Mano (1049 g)	2000 (sandstone)	2246	-
3	Plain gray jar body sherd	- Cibola Grayware	2244	-
4	Red Mesa B/w jar sherd	- Cibola Whiteware	2244	-
5	Metate fragment (1180 g)	2000 (sandstone)	3253	-
6	Passive lapidary abrader fragment	2000 (sandstone)	3261	-
7	Mule deer femur fragments (2)	(Odocoileus hemionus)	3250	-
8	Squash seeds	-	3259	-
9	Passive lapidary abrader (grooved, 10x8x1 cm, 146 g)	2000 (sandstone)	3260	-
10	Metate fragment (8300 g)	2000 (sandstone)	3262	-
11	Projectile point, side-notched (0.5 g)	1052 (chalcedony, clear)[d]	3252	-
-	Unutilized flake (1.4 g)	1140 (chalcedonic silicified wood)	3255	-
-	Unmodified stone	5110 (limonite)	3256	-

Table 4.7. (continued)

Artifact Number	Artifact Class	Lithic Material or Ceramic Ware	FS No.	Depth BSD
-	Passive lapidary abrader fragment (5.8x7x1 cm, 70 g)	2000 (sandstone)	3257	-
Room 7				
1	Dog vertebrae	- (Canis sp.)	760	123
2	Early Gallup B/w ladle (RV 52)	- Cibola Whiteware	761	122
3	Floor polisher/anvil/ chopper (2717 g)	4000 (quartzite)	763	132
4	Red Mesa B/w ladle (RV 51)	- Cibola Whiteware	762	117
-	Unutilized flake	1113 (cherty silicified wood)	758	120
-	Unworked mineral	5040 (gypsum)	759	120
-	Kiatuthlanna B/w jar sherd	- Cibola Whiteware (sooted)	825	125

[a] See distributions in Figures 4.8-4.10.
[b] Unnumbered specimens were recovered in the north half of Room 6.
[c] Fragments appear to be from the same tool, possibly a lapidary lapstone.
[d] High surface chert.

Room 5's walls, although it is unknown if all four walls collapsed into the room. These estimates are likely to be low if proportionally greater amounts of mud than that remaining comprised the upper walls (see estimates for Rooms 6-7).

1) The volume of the 282 pieces of stone from the fill was calculated to be 0.35 m^3. Only that from the northern half of the room had been measured (126 pieces). To get the total volume, the mean volume per stone was applied to the remaining 55 percent of the unmeasured sample. The interior walls were constructed of mud (52.8 percent) and stone. If only the courses above the large foundation stones are more realistically considered, then the extent of mud construction increases to 57.5 percent. Total area of the wall tops was 0.034 m^2. Thus, rock volume, plus estimated volume of mortar (0.82 m^3), would raise the present walls to a paltry 24.4 cm (0.82 m^3 ÷ 0.034 m^2).

2) A second approach utilized the surface area of the exposed interior masonry as representative of the collapsed masonry. The mud-to-stone ratio was calculated, as above, along with the face area of the recovered fill stone (length times thickness). This assumes that the wall stone was always set with its longest axis parallel to the wall. This method adds an additional 65.6 cm to the existing walls. Substituting width for stone length, an alternative masonry style, would add only 40.9 cm. Any of these reconstructed heights, added to the mean present wall height of 74.7 cm, would yield former minimum wall heights between 99.2 and 140.3 cm above the tub floor.

Wall Features. Initial surface-stripping exposed a short, linear, wall segment, 35 cm wide, of friable, white-sandstone blocks outlined by lignite. This was located next to the north end of the room's exterior west wall. Cutting a section through the west wall revealed that the feature was articulated with the 8-cm-thick, exterior west wall plaster and was built after the west wall. It matched the west wall in height (58 cm). In profile (Figure 4.8), the sandstone blocks were set in three courses, with abundant chips of lignite, not mud, filling the interstices. The surrounding fill was remarkable for its absence of lignite and stone rubble, indicating that the feature was essentially intact. Although its appearance was that of a wall, the feature exhibited little structural integrity or strength. Function of this unusual feature remained speculative, but the gully close by was suspected as a possible cause for its construction. Because the north end of Room 5 would have been initially most subject to flooding, the lignite and stone barrier could have served to protect the wall corner from erosion.

Conclusions

Architecture. Room 5 was comprised of two basic architectural components: a semisubterranean tub and a superstructure of masonry and mud walls. The tub was excavated into native earth and then masonry walls were added around it. From material found in the fill, the roof probably was constructed in the traditional manner: vigas of small diameter were placed on the longest wall tops to span the width of the room, then they were covered with brush or sticks (willow?) and finally, a coating of mud. The seven turtlebacks, associated with levels dominated by vegetal-impressed adobe chunks, suggest remains of a collapsed collar or coping around a roof-entry opening. A centrally located roof access might have been present, as well as one from the plaza side through the east wall.

Two postholes in the tub floor do not share many attributes common to other, more obvious, postholes in the site (lignite packing, use of shims, and some depth). Peter McKenna, therefore, believes they served in a non-structural or non-weight-bearing function, possibly for support of a storage rack. Their central location might also suggest auxiliary supports for a sagging roof. Normally, structural fatigue for such a small room roof would be unlikely unless it suffered from extensive roof activities, and there is evidence for the latter possibility. If such a problem arose, it would be difficult to place posts in deep holes under an existing roof. Instead, shallow holes would have had to suffice. As we found here, wedges were forced under the posts to stabilize them. The lack of planning exhibited by both holes suggests, with either explanation, that posts were added after the roof construction and that they could not have been free-standing because the pits were too shallow for vertical support.

Function. Few artifacts were recovered that could be directly associated with the floor. Scarcity of features and in-situ cultural materials is typical for rooms used for storage (Hill 1970:51-52). Two abraders and a shell ring fragment came from the floor. The ring was in an unusual location for a structure devoid of trash and it, along with the two abraders, hint at a different activity other than food storage. Materials from the fill, however, were particularly interesting in their potential for interpretation. Turquoise, micro-drills of siliceous stone (material type 1140), ground calcite, and two more small abraders in the fill (see analysts' reports, Volume II) suggested debris from roof activity. Although debris of more common materials at the site (sherds, debitage, bones, etc.) occurred in the room, their sparse numbers were overshadowed by those associated with exotic goods. Chipped stone debitage in Room 5 and the other tub rooms, however, revealed unusually high percentages of 1140 series material, which was associated with small abraders and turquoise workshop material in the adjacent plaza (Cameron, this report). It is postulated, therefore, that the roof of Room 5 served as the locus for the manufacture of ornaments and the tools used in their manufacture. The presence of economic seeds and pollens on the floor, however, suggests use of the room in the more traditional manner of food storage.

Temporal Assignment. Architecturally and spatially, the room was one of the earliest at the site. Abutment studies (Figure 3.1) revealed that the room was one of the first constructed, along with its two southern neighbors, Rooms 6-7. There was no direct evidence for date of its construction, however. The few ceramics recovered from the room at the time of abandonment indicated use of the room into the early A.D. 1000s (Table 4.8). Despite the tenuous nature of the archeomagnetic date in the early A.D. 1000s, which was obtained from a floor burn, it agreed with other evidence at the site of last room use.

Room 6

The middle of the three tub rooms, which are located in the north-south wing, is Room 6, 286 cm by 182 cm (4.6 m^2) and about 90 cm deep. Its central tub was 230 cm by 130 cm (2.8 m^2), the largest of the three tub rooms. Like its neighbors, Room 6 yielded few cultural remains and had no internal floor features. Remains from craft activities, however, suggest use of the roof as a work-place.

The southern one-third of the room was selected for initial testing. After 20 cm of Level 1 were removed, the test was further limited to the eastern one-half of the level. Here, two more levels of 20 cm each were removed until the floor was reached. Three natural stratigraphic events were defined after inspection of the remaining fill and each was removed separately.

Fill

Layer 1 (20-55 cm thick) was characterized by large stones and spalls, mortar, and fine, laminated, clayey sand. Except for the sand, most material came from the decomposition of walls. Organic material and cultural debris were rare. Both initial test Levels 1 and 2 belonged to this unit.

Layer 2 was formed from alluvial deposits up to 25 cm thick of sand and fine gravels with an occasional stone or chunk of roofing material. Organic and cultural debris were nearly absent. Level 3 cut through both this and the following layer.

Layer 3 was generally about 20 cm thick but reached a maximum of 35 cm depth along the west side. It was confined, as was Layer 2, to within the semisubterranean tub at the bottom of the room. This fill extended to the tub floor and was comprised of fine sand and clay, interspersed with numerous roof adobe impressions of brush and twigs. The latter was concentrated in the southern one-third of the room. Although rare, there was an increased frequency of charcoal flecks and artifacts over that from the layers above. The northern two-thirds (60 percent) of Layer 3 was a mixture of wall and roofing debris, including a few turtlebacks recovered in the northwestern corner. After the initial test, screening was limited to Layer 3.

Twenty-six roofing impressions were recovered from the southern one-third of the room. Only a single impression of a major support was noted--a beam over 5 cm in diameter. The rest contained twig or reed impressions, about 10 mm in diameter, set parallel to one another 3-10 mm apart. In two instances, grass or brush impressions were set on the

Table 4.8. Ceramic frequencies from Rooms 5-9.[a,b]

Ceramic Type	Room 5		Room 6		Room 7			Room 8		Room 9			
	All	%	All	%	Fill	Chink.	%	All	%	Fill	Floor	Const.	%
CIBOLA/CHUSKA CULINARY													
Plain gray	39	31	13	28	3	9	20	19	21	45	3	-	16
Wide neckbanded	1	1	1	2	-	-	-	2	2	5	-	-	2
Narrow neckbanded	12	10	-	-	3	1	7	6	7	30	1	-	10
Neck indented corrugated	1	1	-	-	1	6	11	5	5	4	-	-	1
Unclassified indented corrugated	6	5	3	6	1	3	7	17	19	74	2	-	25
PII indented corrugated rim	-	-	-	-	-	-	-	-	-	1	-	-	T
CIBOLA WHITEWARE													
Unclassified BMIII-PI B/w	-	-	-	-	2	-	3	1	1	-	-	1	T
Red Mesa B/w	4	3	11	23	6	5	18	17	19	43	2	4	16
Escavada B/w	-	-	-	-	-	-	-	-	-	-	-	-	-
Puerco B/w	-	-	-	-	-	-	-	1	1	-	-	-	-
Gallup B/w	7	6	-	-	1	6	11	1	1	6	1	-	2
Unclassified PII-PIII B/w	3	2	6	13	3	1	7	13	14	15	1	-	5
UNCLASSIFIED WHITEWARE	51	40	13	28	2	7	15	7	8	43	13	1	19
UNCLASSIFIED CARBON B/W	-	-	-	-	-	-	-	-	-	1	-	-	T
CHUSKA WHITEWARE													
Unclassified carbon B/w	-	-	-	-	1	-	2	1	1	-	-	-	-
TUSAYAN WHITEWARE													
Kana'a B/w	-	-	-	-	-	-	-	-	-	-	1	-	T
SMUDGED WARE	-	-	-	-	-	-	-	-	-	6	-	-	2
SAN JUAN REDWARE													
Unclassified redware	-	-	-	-	-	-	-	1	1	-	-	-	-
CHUSKA REDWARE													
Sanostee B/r	2	2	-	-	-	-	-	-	-	-	-	-	-
Totals	126	101	47	100	23	38	101	91	100	273	25	6	98
Time Period (A.D.)	975-1050		975-1025		975-1050			975-1025		975-1050			

[a] T = trace (less than 0.5%).
[b] Column percentages are from room totals.

opposite side of the adobe chunk perpendicular to rows of small twig impressions. All pieces of adobe roofing were between 2 and 5 cm thick. It was unlikely that any of the pieces were wall fragments, given their thickness and the type of impressions.

Floor

As with Room 5, a narrow shelf, 15-25 cm wide, encircled a shallow tub pit (24-41 cm deep) that was excavated into sterile sandy soils. The sloping nature of the shelf precluded its usefulness as a floor (Figure 4.9, Plate 4.10). Difficulty in defining the tub walls was only experienced for the east central margin. Here, several large rocks and a projectile point fragment were removed from what was, elsewhere, a sterile, natural, sandy, tub wall. This might mark an entry, although steps or modification of the adjoining east wall were not evident. Some preparation of the tub floor was accomplished by smoothing out irregularities, but it was not plastered.

Floor Features. None.

Floor Material. Like the adjoining rooms, cultural debris was rare on the floor and just above it (Figure 4.9, Table 4.7). Most of it could be associated just as easily with construction material as with use of the room. Material on the floor consisted of squash seeds, sherds, an artiodactyl femur, trough metate fragments, and shallow, grooved abraders. Cully (1985:161-162, 165) found traces of corn and some cattail among the more common non-economic plant taxa. The cattail and high Cheno-Am counts may have derived from materials used in roof construction. Flotation yielded very few seeds from the floor, which included those from Portulaca, Descurainia and Cheno-Ams (M. Toll, this report).

Walls

Walls were started with a 2- to 9-cm-thick layer of foundation mud which was laid directly over the tub shelf and extended under the walls. The largest pieces of sandstone, friable, white or yellow-orange blocks, were employed as the first course for the west wall. Subsequent courses, and those in the other walls, revealed a shift to harder, tabular pieces of sandstone. This is especially true of the east and west walls. The others exhibit a more haphazard construction and greater use of mud (57 percent versus 44 percent in the east and west walls). The cross walls were also thinner. Wall stones were not dressed nor were spalls evident on the interior faces. Only a small part of the exterior east wall, facing the plaza, was set with small horizontal spalls similar to Room 5. Inadvertent removal of most spalls during excavation was a possibility, however.

The cross walls were not tied to the main north-south walls except with mud. Engineering requirements would suggest that the east and west walls served as the main load-bearing components while the cross walls served merely as room dividers. The same holds true for the two adjoining tub rooms. The south wall contains the greatest proportion of mud, about 66 percent of the total volume. Despite its narrow 33 cm width, the opposite side (in Room 7) reveals a different style of masonry than in Room 6, which attests to later construction than the front and back walls.

Mortar in all walls is a mixture of sand and gray shale-derived clay. Wall plastering is absent, although it might have washed off. Walls show no evidence of remodeling.

Unfortunately, stone recovered from the room fill was not systematically counted or measured, despite the 208 specimens reported. The only instance of outward wall collapse for a tub room occurred with the west wall of Room 6. Thus, based on the stone volume from the west fall, estimates of the original wall height were most reliable. Forty-one stones were scattered up to 140 cm beyond the west wall. The volume of these stones (0.057 m^3), added to the predicted volume of mortar (0.036 m^3) present above the west wall foundation course, would add a mere 9.3 cm of height to the present 82 cm of west wall and tub height. The west wall must have been higher for the stones to have tumbled so far from the remaining wall. More likely, the wall was built primarily of mud. The extent of the wall fall, 140 cm, plus the depth of the room, yields a more realistic room height of about 200-220 cm.

Conclusions

Architecture. The room was filled primarily with structural debris, which contributed much to an understanding of the original structure. A large area was excavated into sterile soil, including the pit,

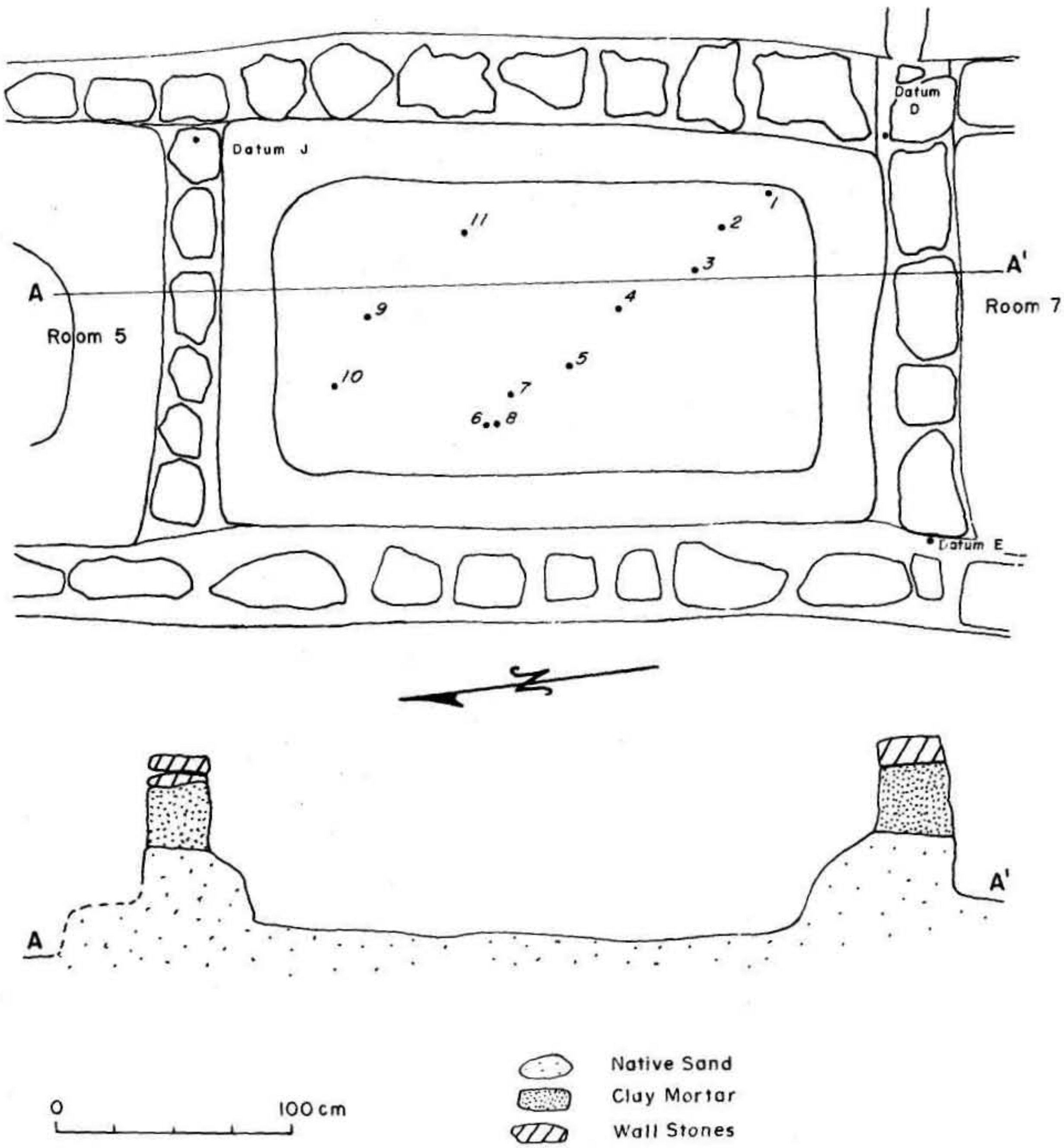

Figure 4.9. *Room 6, plan view, profile, and the distribution of floor specimens (Table 4.7--specimen list) (NPS 310/82202 B).*

which was surrounded by stone and mud walls. This probably provided a ceiling height about 200 cm above the tub floor. A few vigas, about 5-6 cm in diameter, probably spanned the room width and were covered by layers of brush and mud. Turtlebacks were again recovered from a layer of roofing debris, as in Room 5, strengthening the possibility of an adobe-lined roof entry. An entry into the plaza, however, was also possible through the east wall.

Function. Cultural debris was rare from the room, and floor features were absent. The room was not used for refuse disposal, and most of the artifacts probably could be attributed to roof debris and wall fall. Fragments of groundstone and pottery probably were used in the room construction. Ceramics from Layer 1 and Levels 1 and 2 were the most likely to be related to construction material, while those from other units of fill might have reflected articles left on the floor or roof at abandonment. The lack of wood suggested its curation at abandonment, causing swift deterioration of the room walls.

The principal artifacts associated with possible room activities were five grooved abraders similar to those recovered from a bell-shaped pit (OP 1) in the plaza, directly in front of the room. Vast quantities of turquoise scrap and abraders came from the pit, suggesting an association with jewelry making. A possible micro-drill, presumably used for perforating beads, was also recovered from the room fill, as well as a turquoise chip from Layer 2 and a projectile point fragment. More turquoise could have been easily overlooked due to its micro-size. Because of the small size of the turquoise, drill, and point, none of the artifacts would have been intentionally incorporated into construction; thus, they must be considered candidates left at abandonment--all came from the floor or were in association with roofing debris.

Most floor material was found in a linear arrangement diagonally across the floor. A roof that collapsed, at least partially intact, would cause roof articles to slide off onto the floor and could account for the observed distribution. Trash and material associated with construction debris were expected to be distributed more randomly.

As with Room 5, the sparse cultural and vegetal material (including several squash seeds grouped together on the floor) tentatively suggests use of Room 6 for storage of foods and a loci for jewelry materials. The association of materials associated with jewelry production in the fill of both Rooms 5 and 6 suggested that the materials either fell from shelves or were left on the roofs.

Temporal Assignment. Construction and placement marked Room 6 as one of the original rooms at the site. No chronometric dates marked the initial room construction, but the earliest site ceramics suggested that it occurred in the early A.D. 900s. The few ceramics (47) left at or after abandonment were generally the same as in Room 5, except for the insignificant absence of Gallup Black-on-white (Table 4.8). The similar artifact classes and the lack of refuse in Rooms 5 and 6 suggested contemporaneous abandonment of both rooms at the end of the main site occupation in the early A.D. 1000s.

Room 7

Room 7 was the southernmost of three contiguous tub rooms built as part of the initial room construction at the site. It was also remarkably similar to its two neighbors in postoccupational fill and architecture. It was 218 cm by 180 cm (3.7 m^2) and about 120 cm deep, with a small 140 cm by 100 cm (1.3 m^2) floor basin or tub. The southern half of the room was chosen for the initial test, and two, 15-cm-deep levels of fill were removed. Because a small shelf of sandy plaster was encountered at 65 cm BSD in the southwestern corner, and was thought to be the sole floor remains, the remaining fill to the north was then removed as Layer 1. Later it was discovered the floor had not been reached. The remaining deposits were then designated Layer 2.

Fill

Layer 1, for the most part, consisted of a homogeneous mass of mortar and stone, except for the bottom, 54-72 cm BSD, which was composed of numerous adobe chunks with vegetal impressions, presumably from the roof. Deposition within the room was typical of other canyon room deposits, with walls collapsing on top of the roof remains. The only chunk with beam impressions revealed that adobe had been forced between two, parallel, barkless timbers, which were set 1-2 cm apart.

Estimated diameters for the two vigas were 4.5 and 5.5 cm. Within this lower deposit, at 65 cm BSD, was one of the few intact trough metates recovered from the site, probably left on the roof.

Layer 2, a continuation of the lower deposit in Layer 1, also contained roofing debris but was mixed with soft, tan sand and occasional stones. Between 85 and 93 cm BSD, the outline of a tub pit became evident, although Layer 2 continued 20-30 cm more to the postulated tub floor. From the tub came another chunk of adobe pushed between two parallel timbers, 7 and 8 cm in diameter, set 11 cm apart. Just inside the tub was a concentration of 17 stones generally much larger (about 41 by 21 by 12 cm in size) than those present in the room walls or in the fill above. Remains of the roof-entry liner were probably indicated by these large stones. Overall, 485 spalls and 67 larger stones were recovered from the fill. Artifacts were scarce in the fill.

Floor

Despite excavation to a depth of 162 cm BSD, the tub floor was not found (Figure 4.10). It probably existed as an unprepared surface just under the last artifact recovered at 132 cm BSD. Fill below this depth, was sterile, natural, and clayey, followed at 133 cm BSD by soft sand and fine, gravel lenses. Floors of the adjoining tub rooms were found at 101 cm BSD in Room 6 and at 108-110 cm BSD in Room 5. As in the other tub rooms, the tub was constructed in clean, sterile sand, leaving a 32- to 40-cm-wide shelf of the same material around it. The tub walls were native earth.

Floor Features. Features were absent in the floor, except for a small, tabular shelf encountered in the initial test. It was constructed of hard, clayey sand, 5 cm thick, 25 cm long, and 15 cm at its widest, and was attached at a diagonal across the southwestern corner, similar to one found in Room 4. Nine grooves in the shelf pointed toward the corner and may have been from trowel excavation. No function could be ascribed to it. Another feature was marked by a slightly elevated piece of the floor, nearly centered at the base of the east wall. Opposite this in the plaza was another elevated feature (Plaza Wall 2) built against the room wall. These features probably marked step access through a former door in the east wall.

Floor/Floor Fill Material. Artifacts within the tub, including two restorable ladles (Plate 8.6B) and a possible polisher/anvil, were concentrated at depths between 117 and 132 cm BSD (Table 4.7). Probably the lowest depth marked the original floor. Otherwise, as in other tub rooms, cultural debris was exceedingly rare. Because of the problem of identifying a floor, no pollen or flotation samples were analyzed from Room 7.

Walls

Walls exhibit considerable variation in construction style, as they do across the site (Figure 4.11). The west wall was the most solid of the four, employing the largest amount of stone (55 percent) for its volume. The lowest 20-30 cm of all four walls (starting at 60-65 cm BSD) was sandy, residual soil left when the room was first constructed. Over this, the builders (as they did in Rooms 5 and 6) added an adobe foundation and then a course of unshaped stone. All walls, except the west, contain a single masonry course of large blocks laid at approximately the original ground surface. To the casual observer, this technique created the impression that the masonry walls "float" high above the room floor.

Although a single stone tied the four walls at each corner, the adobe foundations of the north and south cross walls merely butt the west wall without visible bonding (Figure 3.1). The west wall, like its companions in Room 5 and 6, contained a lower course of large, soft, white-sandstone blocks overlain by hard, smaller, tabular pieces of sandstone. The east wall butts the north and south walls. The north wall extends a short distance out into the plaza where it was designated Plaza Wall 3.

Wall Features. Both the east and south walls exhibited patches of chinking in the foundations, which extended into the sterile native fill below. Apparently, these patches filled holes perhaps made by rodents or unstable natural gravel deposits common under the site. Wall patches also occurred in Room 8.

In the east wall, opposite Plaza Wall 2 (the entry step), the 18 by 26 cm wall hole was filled with sherds--including Gallup Black-on-white--about 20 pieces of stone chinking (all less than 10 cm long),

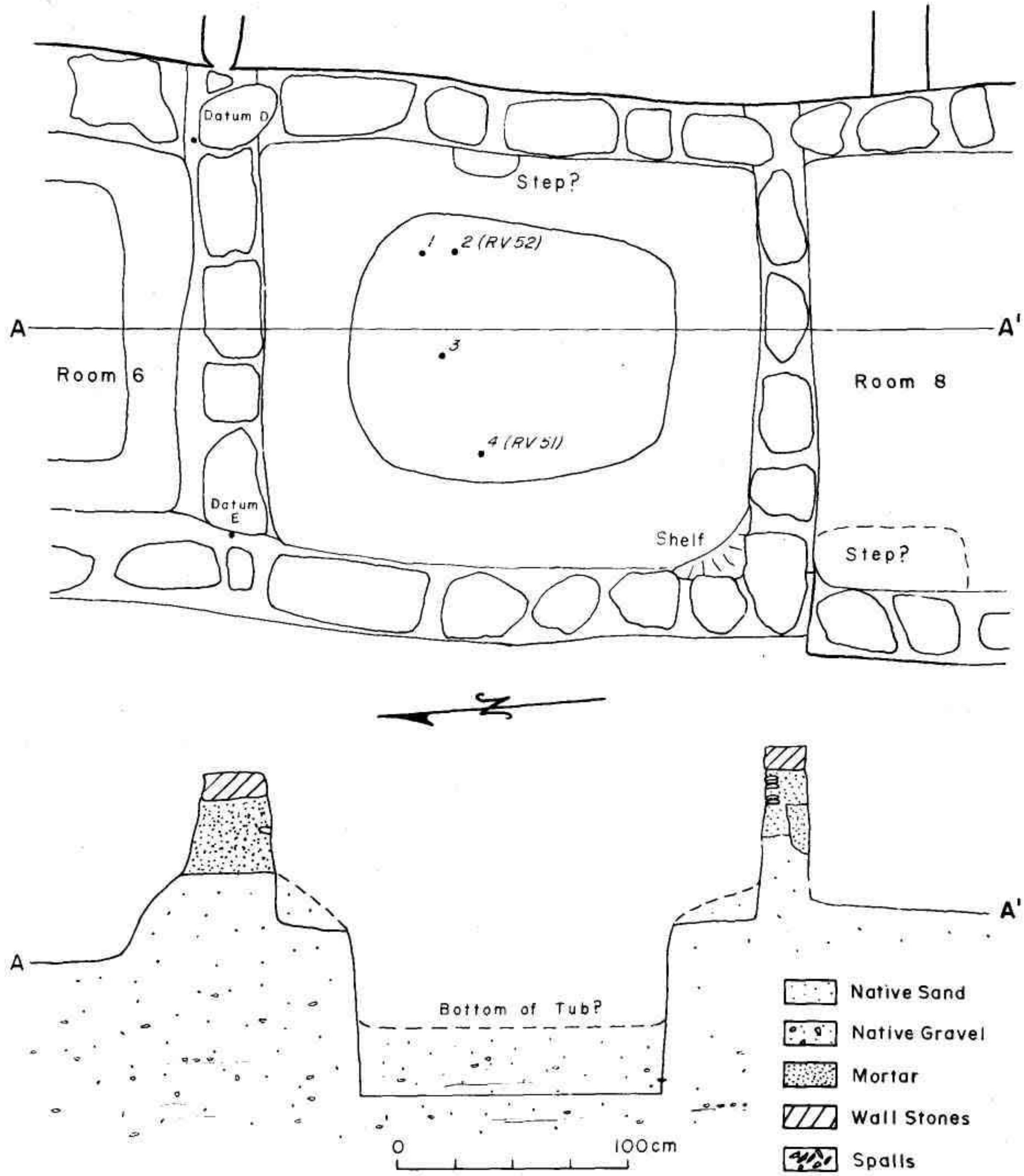

Figure 4.10. *Room 7, plan view, profile, and the distribution of floor specimens (Table 4.7--specimen list) (NPS 310/82203 B).*

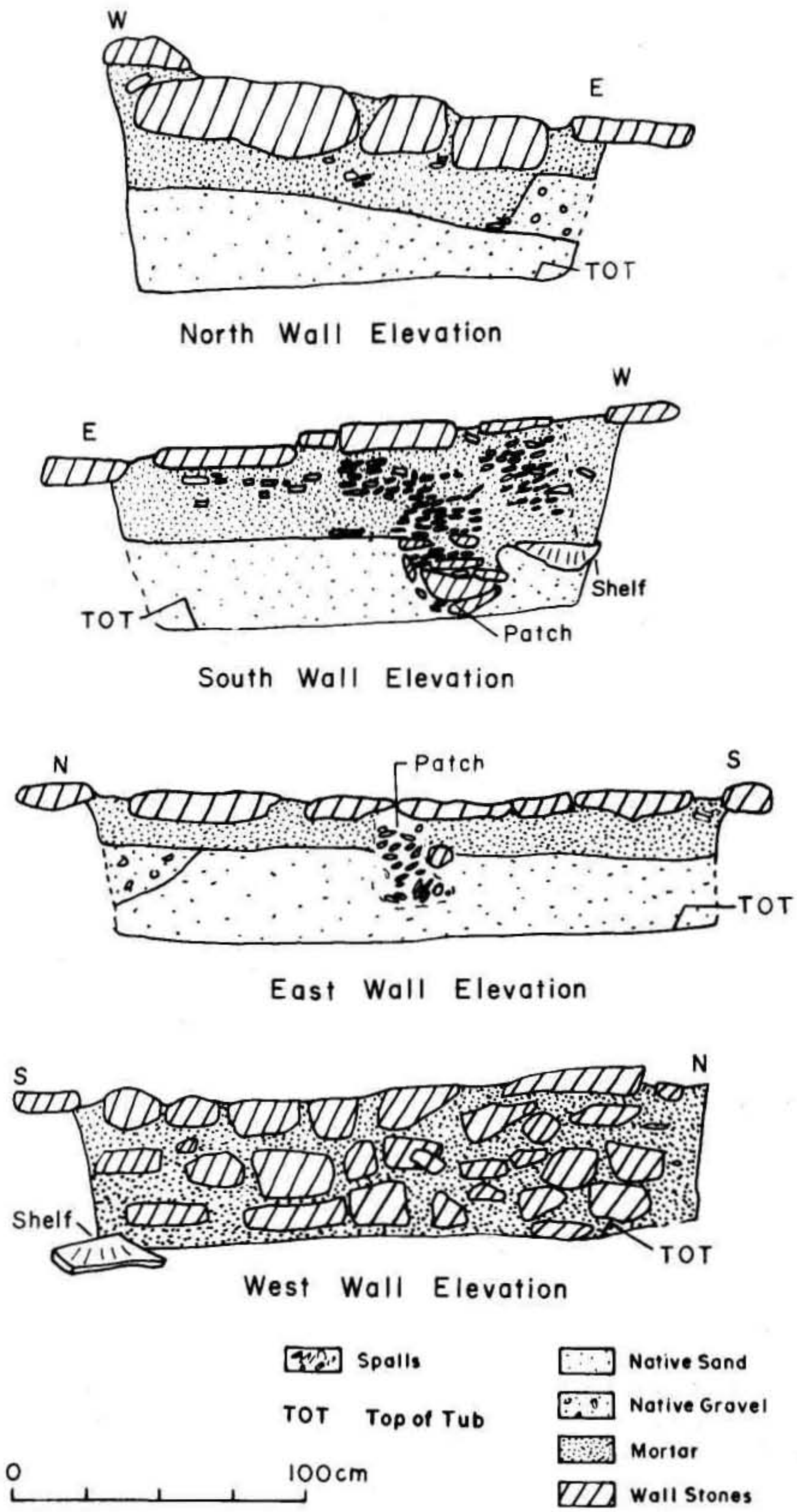

Figure 4.11. Room 7, wall elevations (NPS 310/82203 C).

and three hammerstones. These were set in adobe that began 4 cm below the single course of masonry. This hole might have resulted from tying the plaza wall to the exterior of the room. The wall was not torn out to confirm this, however.

A similar pit, 28 by 36 cm, was encountered directly below the south wall foundation; it too was filled with stone chinks and larger pieces set in adobe. Much of the south wall was covered with stone and sherd spalls, but the function of the veneer and pit were not apparent. Wall plastering was not evident.

Conclusions

Architecture. Evidence for the type of superstructure was identical to that found in the other two tub rooms. Basically, a roof supported by a few small-diameter vigas, covered by brush and mud, was envisioned. Entry into the room was postulated as through the roof and the east wall. Although the room fill was primarily wall mortar and stone, again, the stone volume was inadequate to increase the present walls more than a few centimeters. This suggests that the walls above the ground surface were built mostly of mud. The total wall debris (1.0 m^3 in Layer 1) would add only 43 cm to the present 90-110 cm height of the room from the tub floor.

It was puzzling that the adobe wall foundations were not carried down to connect with the top of the tub, as they were in Rooms 5 and 6. Corresponding depths for the foundation bottoms, the small corner shelf, and the whole metate in the fill might have supported challenges that the tub shelf was unintentionally destroyed during excavation; however, the presence of roofing material and at least one sherd below this depth (at 65 cm BSD), next to the walls, indicated otherwise.

Again, it appeared that the west wall was substantially stronger than the others, employing a greater mass of stone per equivalent volume, backed by natural sterile soils. This suggested that it was designed as the primary load-bearing wall, with the others built to withstand far lesser loads. This seeming anomaly could be explained if the primary beams extended into the plaza as part of a portico supported by the plaza post supports. This arrangement would have relieved the stress of roofing from the east wall.

The patched holes in the walls were an enigma. Unstable gravel pockets were common in the site, but such potential problems should have been corrected at the time of construction. But, it was surmised that the wall foundations would have been little affected by such holes. Evidence for rodents was commonplace throughout the site, however, and their presence must have been a source of concern to the former residents regarding food storage. During the winter of 1975-1976, for instance, when excavations at the site were suspended, a pack rat moved into Room 8. Prehistorically, such rooms, particularly if used for storing foodstuffs, must have been attractive to rodents and, if abandoned, quickly reoccupied. The Gallup Black-on-white sherds from one wall patch suggested repairs made late in the site occupation in the A.D. 1000s, perhaps after a temporary or seasonal abandonment when rodents could have caused extensive damage to the walls. No other changes could be attributed to repairs or remodeling in the room.

Room Function. All of the nearly intact artifacts occurred in association with chunks of roofing and could, therefore, be considered potential candidates resulting from roof top activities. There was no evidence of intentional use of the room for refuse. The whole metate would not be expected to have served as a building stone because of its large size and potential utility. Its central position in the fill suggested it dropped from the roof, perhaps through an entry. It was unlikely that such a heavy stone would have been carried to the roof just for disposal; thus, it may have been used on the roof. The lack of floor features and cultural debris in the room suggested that the primary function of the room was for storage.

Temporal Assignment. Room 7, together with Rooms 5-6, were the first built at the site. This event has not been directly dated, but the earliest site ceramics suggest construction in the early A.D. 900s. The latest ceramics recovered from the room--Gallup Black-on-white sherds used as chinking in a wall patch--mark use of the room in the early A.D. 1000s or later (Table 4.8).

Room 8

The largest and southernmost of the back rooms in the north-south roomblock is Room 8, 350 cm by 215 cm (6.7 m^2) and about 60 cm deep. Its construction was unusual at the site because the walls were mostly stone. Nevertheless, little was found in the room. It was paired with Room 9, one of two site habitation rooms. After removing the vegetation and loose fill from the room surface to define the room walls, the initial test was begun in the southern one-quarter of the room and expanded from there.

Fill

After four levels--each 15 cm deep--were removed, the homogeneous matrix of gray mortar and stone abruptly changed to sterile sand and gravel deposits, indicative of floor contact. Although the fill was 1/4 in. screened, little cultural material was encountered. Subsequent removal of the remaining fill was not screened, although the same proportion of sherds was recovered from the unscreened fill, as predicted from the screened sample. There were few bones and lithics, but 91 sherds came from the room, the majority from Level 1. Because the floor was difficult to discern, even in profile, all artifacts were plotted to assist in the identification of floor specimens. Upright stones were common in the matrix, which marked remnants of wall fall. The entire fill north of the test trench was designated Layer 1 but excavated in units equivalent to the four test levels.

Layer 1. The first 15 cm of fill was primarily stone and mortar, apparently from collapse of one of the walls. This was followed by a thin layer of sand and then 25 cm of wall mortar and stone. Below this mass and extending 151 cm north into the room was the stone remains of the south wall, which had fallen on the floor.

Overall, the room contained about 4.1 m^3 of mortar and building stone. It yielded the greatest density of stone for any room on the site: 762 spalls (10-15 by 10-15 by 0.5-3 cm) and 305 larger stones (12-35 by 15-25 by 3-10 cm in size). Roofing material was completely absent.

Floor

No plaster covered the sandy floor, and its uneven surface consisted of sterile, native earth. Test pits in the southeastern and southwestern corners revealed sterile strata of alternating natural sand and gravel deposits 60 cm or more below the floor. No artifacts could be definitely assigned to floor status. The floor sloped from 85 to 105 cm BSD.

Floor Features. Two oddities were notable on the otherwise featureless floor. A fire-reddened spot, 15 by 27 cm and 2 cm thick, was exposed at 100 cm BSD, just west of the room center, although there was no associated ash or charcoal. At 86 cm BSD, next to the north end of the west wall, was a hard mound of clayey sand level with the base of the wall foundation. It extended 65 cm along the wall, jutting 28 cm out into the room and 10 cm above the floor. It was handy, as the walls now stand, for step access out of the room; however, the wall was too deteriorated to confirm the presence of a door. A large hearth just west of Room 8, in Grids 2-3, was the only cultural evidence that might have justified unusual placement of a door opening to the back of the pueblo. A radiocarbon date from the hearth, however, was early, spanning A.D. 687 to 964 (2σ).

Floor Material. No artifacts could confidently be assigned to the floor. Because the floor was poorly defined, no pollen or flotation samples were analyzed from Room 8.

Walls

The north wall was distinctly different from its neighbors because it was mostly a thick layer of mortar capped by a single course of stone, initially built for Room 7. The earlier construction of the north wall was marked by a 22 cm dip of the foundation at the west end which was caused by the exposed butt end of Room 7's west wall (Plate 4.11). The remaining three Room 8 walls were clearly later additions to the first core of rooms built. Otherwise, construction in Room 8 exhibited far less variation for each wall than that observed for Rooms 5-7 (Plates 4.11-4.12). The amount of mortar employed was consistent from wall to wall (42-58 percent of the total surface area), and the bonded courses of

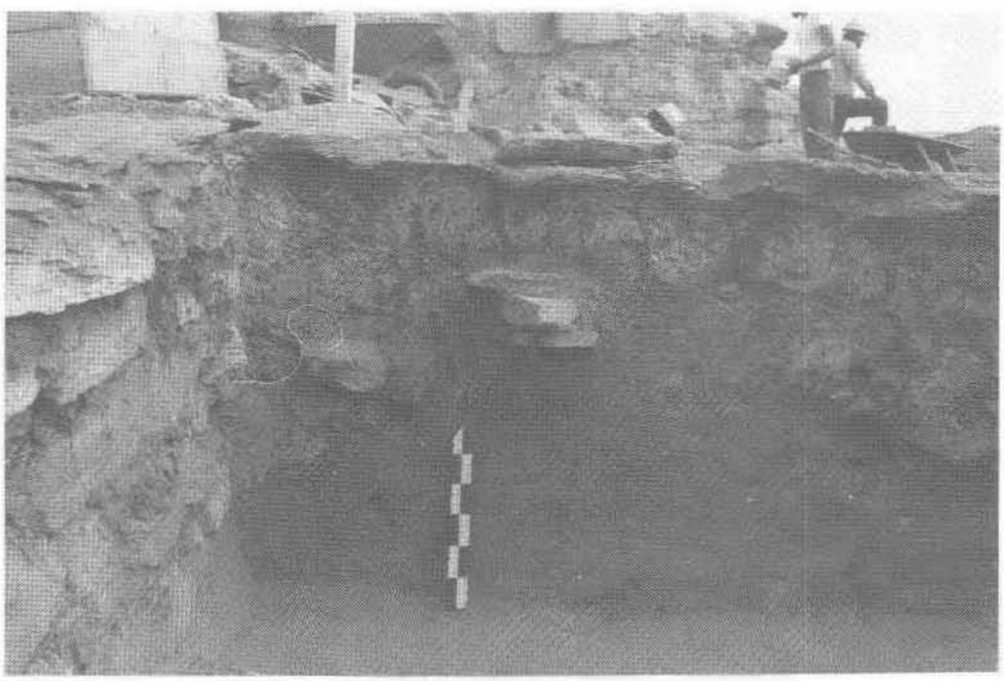

Plate 4.11. *Room 8, north wall. Note dip of wall foundation for the west wall of Room 7 at the left and a small plug of stones under the foundation. 30-cm scale (NPS 10622 and NPS 10614).*

Plate 4.12. Room 8, east wall. John Schelberg at left working in Bin 1 in Room 9. 30-cm scale (NPS 10618).

hard, unshaped, gray and tan sandstone blocks were similar.

The room walls (except the north) butted each other and against Room 7, resting upon a hard, gray, shale-derived clay, 4-12 cm thick. This, in turn, rested upon sterile sandy native fill (Plate 4.13). Little care was taken to set the foundation at the same depth: the south wall foundation rested at 78 cm BSD, the west wall at 79-93 cm BSD, the east wall at 95-98 cm BSD, and the earlier north wall at 46 cm BSD. Except for the unplastered north wall, a 10-cm-thick coating of gray clay had been applied to the interior walls to smooth the rough facing.

Wall Features. As in Room 7, small patches of spalls and adobe filled holes near the base or under the foundations of every wall. It must be emphasized that the foundations here, as in other rooms, did not terminate at floor level. Instead, they were elevated from 7 to 35 cm above the floor (e.g., the floors were slightly subterranean).

Three burned chinks were stacked 4 cm under the base of the east wall, but flush with its face. Centered directly under and touching the south wall foundation was a 40 by 20 cm patch of pink (as if oxidized) adobe and chinks. Part of this was removed to reveal a plug of adobe extending 19 cm horizontally under the wall and faced with 2 horizontal chinks. A similar patch took up an area 58 by 24 cm in the south end of the west wall that contained 42 horizontal chinks.

Finally, there were two irregularities under the foundation of the earlier north wall. An adobe blob, 26 by 18 cm, extended downward from the center, as if flowing out of the foundation. Between that and the butt end of Room 7's west wall there were three burned, tabular sandstones stacked on top of one another and projecting into Room 8. Each stone measured 18 by 18 by 3-4 cm. Because no attempt was made to set the patch stones flush in the north wall, the exterior wall of Room 7 was probably hidden by fill before Room 8's construction was anticipated. None of the patches appeared structurally useful; thus, they must have resulted from post-construction repairs.

Conclusions

Architecture. Room 8 was a substantial structure, utilizing a higher frequency of stone masonry than its neighbors, Rooms 5-7. Except for

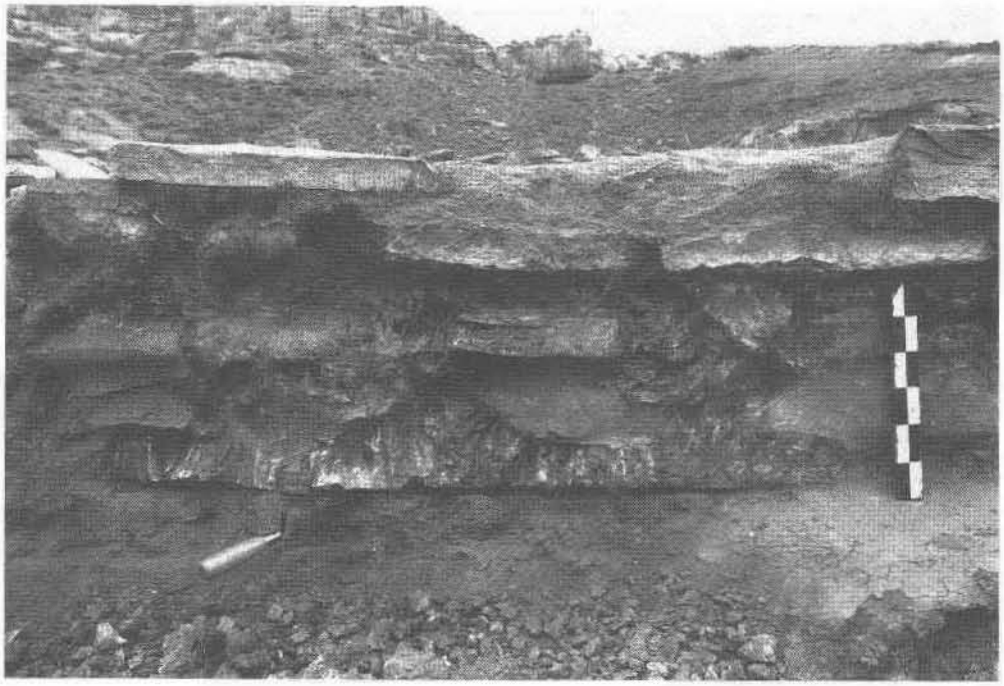

Plate 4.13. *Room 8, west wall foundation. Bottom marked by trowel. 30-cm scale (NPS 10608).*

the north wall, all walls appeared to have been suitable for supporting heavy loads. The mass of stone was considerable (1,067 pieces) and probably represented most of the original wall material. If the style of masonry (ratio of mud to stone) in the present walls was maintained throughout the wall construction, then the estimated wall heights might be reliable. Several methods were examined to derive the original wall heights:

1) The first method calculated the room volume and reapportioned it to the top of the present walls: 129 cm of wall height could be generated from the room fill volume + the present wall height average of 42 cm = 171 cm.

2) A second method took the mean area of individual stones in the present walls, proportional to the present wall height, and then used the number of large stones recovered in the fill to generate initial wall heights: 120 cm of height from fill stones + 42 cm of present wall height = 162 cm.

3) A third procedure calculated the volume of the west wall fall, assumed to be the total of Level 1 and the top part of Layer 1, and added it to the remaining west wall height: 109 cm + 50 cm = 159 cm.

4) A fourth way is but a facsimile of the third procedure, except for taking the volume of the south wall and associated wall fall (Levels 3 and 4 and the lower part of Layer 1) and adding it to the present south wall height: 206 cm + 30 cm = 236 cm.

5) Finally, a fifth estimate was made by subtracting the north wall (on the assumption it might have fallen into Room 7) from the results of the first method: total room fill volume minus north wall height (152 cm) plus average room wall height (42 cm), giving an average of 194 cm of height for the remaining Room 8 walls.

Surprisingly, the first three estimates were very close and yielded a reasonable mean height for the room walls of 164 cm. An overall mean for all alternatives indicated a wall height of 184 cm and an overall room height of about 202 cm.

Although a few pockets of sand were observed in the corners of the room during excavation, the mass of wall fall from the surface to the floor indicated rapid wall disintegration after abandonment. Perhaps this was accelerated by removal of a roof, for which no evidence was found. In view of the quantities recovered in Rooms 3, 5-7, and 9, it was strange that roofing material was absent, unless the roof was not sealed with mud or it was thrown to one side during dismantling. It was also disturbing that there was little evidence of burning, given the burned condition of adjoining Room 9.

At least one entry was postulated in the back wall of the room. The difficulty in reaching the room interior from outside the main traffic patterns (via a back door), coupled with the seemingly typical secular use of the room, suggested that a second access from either the roof and/or through the east wall from Room 9 would have been desirable.

Room Function. The sparse cultural material recovered from Room 8 was uninformative for interpreting room function. There was, however, an interesting dichotomy in the loci of some classes of material culture that might be meaningful. Sherds and ground stone concentrated in the upper levels of wall rubble (mean depth of 62 cm BSD), while bones and chipped stone occurred close to or on the floor at a mean depth of 96 cm BSD. Thus, the former can be attributed to use in construction or rooftop activities, while the latter were probably related to occupational activities within the room or postoccupational refuse.

Absence of a prepared floor, floor features, and associated quantities of artifacts infer probable use of the room for storage. A firepit directly outside a postulated back wall entry suggested, however, an association with the use of the room and its contents.

Temporal Assignment. Wall abutments revealed that Room 8 was added to Room 7. The lack of conformity between the two rooms in wall alignment, the rough exterior of Room 7's south wall (Room 8's north wall), and the difference in building materials indicated that a substantial hiatus occurred between the two room constructions. Room construction, employing masses of stone for walls, could be considered an achievement of the A.D. 1000s or later (Truell 1986). Because Room 8 was built behind Room 9, it presumably was built at the same time. Estimates for the Room 9 construction (see below) are for the late A.D. 900s or early A.D. 1000s. An indented corrugated jar base in the wall fall also hinted that construction or abandonment took place sometime after about A.D. 1025. The remaining few ceramics recovered from the room also marked occupation and abandonment in the A.D. 1000s (Table 4.8).

Room 9

Room 9 was one of two surface habitation rooms. Both rooms were built over earlier plaza features late in the primary occupation of the site in the late A.D. 900s. As such, a number of features exposed in Room 9 were associated with the underlying plaza, rather than use of Room 9. The enclosing walls of the room were generally low and unsuitable to support the many courses of mud and stone needed to fully enclose the room to ceiling height. Instead, Room 9 appeared to have been left partly open to the north, east, and south. Events occurring after abandonment of the room in the early A.D. 1000s were difficult to interpret but suggest burning of the wooden superstructure and subsequent trash deposition (Figure 4.12, Table 4.9). There also seemed to have been some secondary reuse of the room while it was accumulating refuse.

Strategy

Procedures for excavating Room 9 initially followed those practiced for other rooms. An east-west test was started across the highest end of the room (the north), but further testing was unexpectectedly frustrated by masonry cross walls of three bins built against the room's west wall. These bins and the main body of the room were then excavated as separate units, each with a similar, but unique, depositional history. All were excavated in arbitrary levels due to the architectural complexity of the room and the difficulty in recognizing distinct stratigraphic episodes.

Fill

Three levels were removed from the room before reaching the floor (Plates 4.14-4.15). Deposits in the main body of the room were deepest along the west wall (up to 60 cm) but rapidly became shallower as they sloped towards the east and southeast (10-20 cm

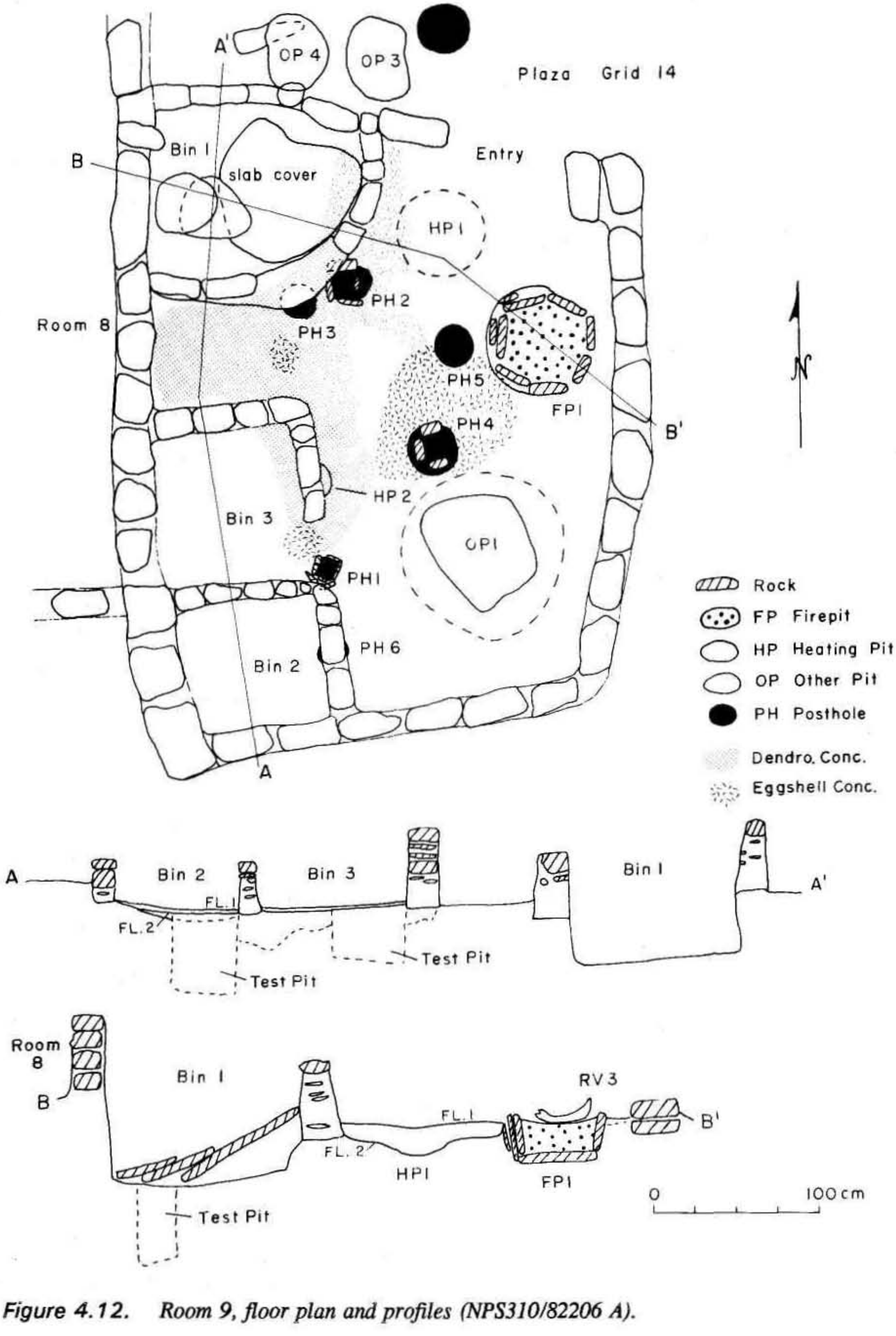

Figure 4.12. Room 9, floor plan and profiles (NPS310/82206 A).

Table 4.9. Room 9, lists of specimens in the fill, on Floor 1, and used in construction.[a]

Artifact Number	Artifact Class	Material or Ceramic Ware	Depth BSD	FS No.
Fill (Levels 1 and 2):				
1	Mano fragment (631 g)	2000 (sandstone)	87	383
2	Mano fragment (119 g)	2000 (sandstone)	62-77	382
3	Mano (928 g)	2000 (sandstone)	79	489
4	Mano (946 g)	2000 (sandstone)	60 surface	316
5	Mano (1101 g)	2000 (sandstone)	58 surface	317
6	Metate fragment (4700 g)	2000 (sandstone)	85	614
7	Core (244 g)	1072 (yellow-brown spotted chert)	86	601
8	Core (146 g)	1021 (chert, tan)	86	602
9	Jewelry debris (1)	5300 (turquoise)	66	486
10	Jewelry debris (1)	5300 (turquoise)	70	691
11	Jewelry debris (1) and earring (1)	5300 (turquoise) 5300 (turquoise)	77	488
12	Jewelry debris (1)	5300 (turquoise)	86	487
13	Mano/passive abrader (1567 g)	2000 (sandstone)	75	490
14	Trough metate (12.5 kg)	2000 (sandstone)	89	700
15	Mano (1423 g)	2000 (sandstone)	95	492
16	Ground palatte (19x13x1 cm, 459 g)	2000 (sandstone)	102	496
17	Mano (1030 g)	2000 (sandstone)	80 surface	315
18	Mano (1085 g)	2000 (sandstone)	86 surface	562
19	Axe bit fragment (237 g)	4526 (greenstone)	86 surface	320
20	Mano (343 g)	2000 (sandstone)	90 surface	314

Table 4.9. (continued)

Artifact Number	Artifact Class	Material or Ceramic Ware	Depth BSD	FS No.
21	Other-shaped stone (lost)	2000 (sandstone)	91 surface	319
22	Mano fragment (760 g)	2000 (sandstone)	79 surface	318
23	Mano (972 g)	2000 (sandstone)	75	493
24	Ground stone (225 g)	2000 (sandstone)	75	494
25	Door slab fragment	2000 (sandstone)	75	495
26	Potlid (lost)	2000 (sandstone)	88	497
27	Turkey? eggshells	-	87	564
28	not assigned			
29	not assigned			
Floor fill/floor:				
30	Metate fragment (964 g)	2000 (sandstone)	102	561
31	Mano fragment (886 g)	2000 (sandstone)	99	598
32	Mano (1394 g)	2000 (sandstone)	92	629
33	Mano (2087 g)	2000 (sandstone)	104	729
34	Metate fragment (3300 g)	2000 (sandstone)	107	731
35	Trough metate (in OP 1) (29 kg)	2000 (sandstone)	175	3307
36	Other-shaped stone (lost)	2000 (sandstone)	103	730
37	Seashell	-	101	692
38	Matting	-	90	728
39	Turkey? eggshell	-	-	607
40	Turkey? eggshells (118)	-	93-95	634
41	Red Mesa B/w jar sherd	- Cibola Whiteware	96	?

Table 4.9. (continued)

Artifact Number	Artifact Class	Material or Ceramic Ware	Depth BSD	FS No.
42	Tohatchi Banded jar sherd	- Cibola Whiteware	96	573
43	Mano (773 g)	2000 (sandstone)	99	826
44	Utilized flake (12.3 g)	1112 (chert silicified wood)	112	695
45	Door slab (82x75x6 cm)	2000 (sandstone)	140	?
46	Mineral	- (chalk)	105	694
47	Dendrochronology specimens	- 5.5 cm diameter	-	?
48	Passive abrader fragment	2000 (sandstone)	100	737
49	Red Mesa B/w and neckbanded sherd concentration	- Cibola wares	91-98	?
Used in construction				
50a	Mano (1814 g)	2000 (sandstone)	72	733
50b	Mano (2994 g)	2000 (sandstone)	81	732
51	Mano fragment (1383 g)	2000 (sandstone)	78	734
52	Metate fragment (7750 g)	2000 (sandstone)	-	3286
53	Metate fragment (1750 g)	2000 (sandstone)	-	2594
54	Mano blank fragment (1690 g)	2000 (sandstone)	-	3284
55	Mano fragment (600 g)	2000 (sandstone)	-	3283
56	Passive abrader/anvil (1690 g)	2000 (sandstone)	-	3288
57	Anvil (11 kg)	2000 (sandstone)	-	3344
58	Jewelry debris (1)	5300 (turquoise)	-	3282
59	Red Mesa B/w jar (1) and whiteware jar (1) sherds	- Cibola Whitewares	-	2330
60	Plain gray jar sherd	- Cibola Grayware	-	741

Table 4.9. (continued)

Artifact Number	Artifact Class	Material or Ceramic Ware	Depth BSD	FS No.
61	Red Mesa B/w jar (1) and whiteware jar (1) sherds	- Cibola Whitewares	-	3572
62	Red Mesa B/w jar sherd	- Cibola Whiteware	-	3285
63	Red Mesa/early Gallup B/w jar sherd	- Cibola Whiteware	-	3309
64	Red Mesa B/w jar (1) and culinary jar (4) sherds	- Cibola wares	-	696
Restorable/partial vessels:				
RV 2	Red Mesa B/w pitcher	- Cibola Whiteware	floor	see Table E.1
RV 3	Late Gallup B/w olla	- Cibola Whiteware	in Firepit 1	see Table E.1
RV 4	Red Mesa B/w bowl	- Cibola Whiteware	surf. to Floor	see Table E.1
RV 55	Red Mesa B/w ladle	- Cibola Whiteware	surf. to Floor	see Table E.1
RV 57	Chaco Corrugated jar	- Cibola Grayware	fill-floor	see Table E.1

Dendrochronological and charcoal concentrations (Levels 2-3, Floor 1)

Eggshell concentration (1178 fragments in Layer 3 and on Floor 1)

[a] See distribution in Figure 4.13.

Plate 4.14. *Room 9, Levels 1 and 2 removed. Nelson Trujillo in Room 8. 30-cm north arrow (NPS 10552).*

Plate 4.15. *Room 9, Floor fill (Level 3) partly removed. Note vessels RV2 and RV3 near the unexcavated firepit and the 30-cm north arrow. Looking southwest (NPS 10605).*

deep). Soft, brown, sandy loam, spotted with numerous pieces of charcoal and stone, filled the northern half of the room. Most of the charcoal was from pole fragments, 3-5 cm in diameter. Roofing impressions, ash, and concentrations of burnt brush were nearly absent until Level 3, just above the floor, where they were common. None of the roofing impressions were burned.

Wall rubble was present, but not in the quantities recovered from other rooms. Most of the 51 spalls and 58 larger stones came from the first two levels, and 46 percent of these were oxidized. In contrast, none of the 1,067 stones from adjoining Room 8 were burned. Trash, consisting of abundant quantities of ground stones, turkey eggshells, and ceramics, was common in the fill. Stone and cultural material, however, were noticeably sparser in the southern half of the room, which contained mostly sandy deposits.

Floor 1

The upper floor was marked by a darkly stained surface underlain by relatively clean sand (Figure 4.11, Plate 4.16). Parts of the floor revealed a thin (2 mm thick) layer of gray clay, but this could not be consistently followed. Most likely the "floor" could be attributed to use of an unprepared occupational surface or it was badly worn. In the southern half of the room, the surface was irregular and difficult to discern despite a few burned spots.

Floor 1 Features. Aside from the three masonry bins built against the west wall (discussed below), only a slab-lined firepit (FP 1, Floor 1) close to the east wall could be attributed to Floor 1 with certainty, although a large storage pit (Other Pit 1), Heating Pit 1, and some postholes found while clearing Floor 2 were also probably associated with Floor 1 (Table 4.9).

Firepit 1. A slab-lined firepit with a slab floor was attached to the east wall by mortar. It was filled with ash and charcoal. Flotation analysis of the firepit contents yielded corncob fragments, purslane seeds, and mustard seeds (M. Toll, this report). Because it had been remodeled, yielded archeomagnetic dates, and contained a late jar fragment, this firepit played a prominent role in efforts to determine the temporal use of Room 9. The floor fill (Level 3) just above the firepit yielded several large neckbanded and Red Mesa Black-on-white sherds. Just off the floor, on the east side of the firepit, was a restorable Red Mesa Black-on-white pitcher (Plate 8.5A) and at the same level within the firepit, overlying the firepit's ash and charcoal, was a whole mano and a large fragment of a Chaco or late Gallup Black-on-white olla (Plate 8.11B). It was thin-walled (4 mm thick) and of a fine, hard, gray paste, barely covered by a thin whitewash slip and decorated by fine-lined hachure. Its manufacture and style were distinctly different from the room's ceramic assemblage, which date it to the late A.D. 1000s or early A.D. 1100s.

When the firepit was dismantled for archeomagnetic sampling, an earlier firepit (FP 1, Floor 2) was exposed along its west side. Small, nearly vertical, tabular, sandstone pieces were set in a strip of fire-reddened, sandy adobe directly behind unburned plaster used to back the later firepit slabs. One of the small stone pieces was affixed with mortar to the large base stone that extended under the slabs of the later firepit. The latest burn plotted on the curve between A.D. 929 and 1067 (Chapter 8). The earlier burn plotted on the pre-A.D. 700 part of the curve but just off the A.D. 950 segment, where it dated between A.D. 899-1007, when shifted (Figure 8.1).

Other Pit 1 (Figure 4.13). Only a soft spot in the sandy floor marked the presence of the largest pit in the room, a bell-shaped affair similar to those in the plaza (Figure 4.14). The pit was discovered during the clearing of Floor 2, but the Floor 1 surfaces were so difficult to follow that it was missed earlier. OP 1 may have initially been a plaza feature, but its contents matched those in the upper fill of the room, attesting that it was used during the Room 9 occupation and then abandoned open. Despite its similarity to the other large plaza pits, it was smaller (108 cm in diameter at the bottom and 60 cm deep), lacked evidence of the center post, and was not quite aligned with the others. Additionally, it must postdate the plaza posthole (PH 4) above it because the closeness of the latter would have broken the soft OP 1 walls if a post had remained in PH 4.

The fill was removed in three levels of 20 cm

Plate 4.16. *Room 9, view of Floor 1 looking west. Note the masonry bins against the room's west wall. North end of the dark floor smear marks Posthole 4. The two stones next to Posthole 4 mark the mouth of unexcavated large bell-shaped Other Pit 1. 30-cm north arrow (NPS 10631).*

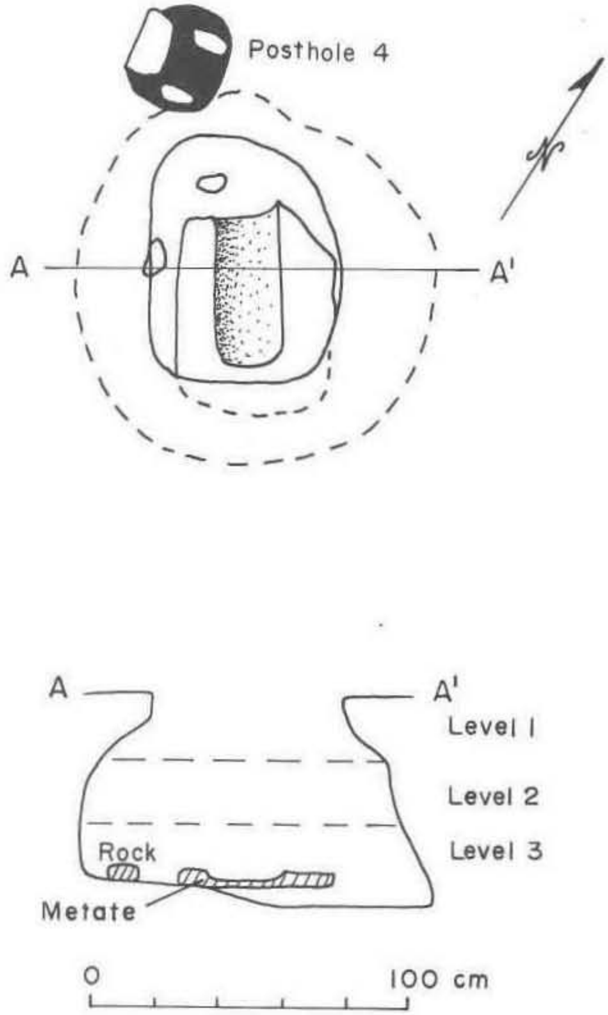

Figure 4.13. Room 9, Other Pit, plan and profile (NPS 310/82280 C).

depth each. OP 1 was filled with fine sand, which was difficult to distinguish from the native earth sides and floor, except for the presence of charcoal flecks, twigs, and hearth contents. Turkey eggshell was common in all levels of the pit, and sherds from the same vessels occurred both in the pit and in the upper room fill. At the presumed bottom lay an unbroken trough metate in a horizontal position, underlain by some corn pollen (Dean, this report). Its condition and placement suggested usable equipment left at abandonment. Postoccupational charred and weedy seeds, including four-wing saltbush fruits that probably came from hearths, dominated the sample from OP 1 (M. Toll, this report). Welsh (1979) identified charred wood from the pit as saltbush or greasewood, pinyon, and juniper--woods common to the site hearths.

Bin 1 (Feature 1; 118 by 90 cm, 0.84 m^2, and about 90 cm deep). Located in the northwestern corner of the room was a large pit that was excavated into sterile sand and gravels. It was partially enclosed around the top with masonry. Six levels of fill, each 15 cm deep, were removed from the bin. The upper four levels yielded considerable unburned stone (117 small and 46 large pieces) that probably came mostly from the east wall of Room 8, while wall stone was absent in the lowest deposits, Levels 5 and 6. Deposits of sand, adobe, and carbonized pinyon roofing remains extended from the pit floor up into Level 3. Many of the adobe chunks exhibited finger, brush, and timber (3-8 cm in diameter) impressions. Level 3 also yielded a large concentration of burned brush and an oxidized chunk of adobe that probably derived from a fire within the room. Although other cultural remains were scarce within the pit, several sherds from a diagonally-ridged, Blue Shale Corrugated jar were scattered in Level 3 and in adjacent Room 8. Manufacture of this jar postdates about A.D. 1025.

The floor and walls of Bin 1 were unplastered native earth. A large, shaped, sandstone slab (82 by 75 by 6 cm), overlain by two smaller slabs, rested on the floor and against the east bin wall (Figure 4.11:Profile B-B'). The larger slab may have been a cover to seal an opening into the bin. Only a few non-economic seeds were recovered from flotation analysis (M. Toll, this report) and were uninformative regarding the pit function. A 50-cm-deep test pit through the floor confirmed the natural deposition of the underlying deposits.

Bin 2 (Feature 2; 87 by 83 cm, 0.71 m^2, 30 cm deep). In the southwestern corner of Room 9 was a rectangular, masonry box filled with soft brown alluvial loam mixed with gray clay chunks and an abundance of scattered tiny pieces of burnt brush. It was removed in two levels of 15 cm each. Construction debris was absent, except for the clay chunks and 22 spalls and small stones. Burned roofing common to the main room was absent in the bin. Cultural debris was rare. No openings were present in the walls, indicating that access must have been from the top.

An ash-stained, 10-cm-thick layer of sandy adobe marked the functional floor of the bin. In its

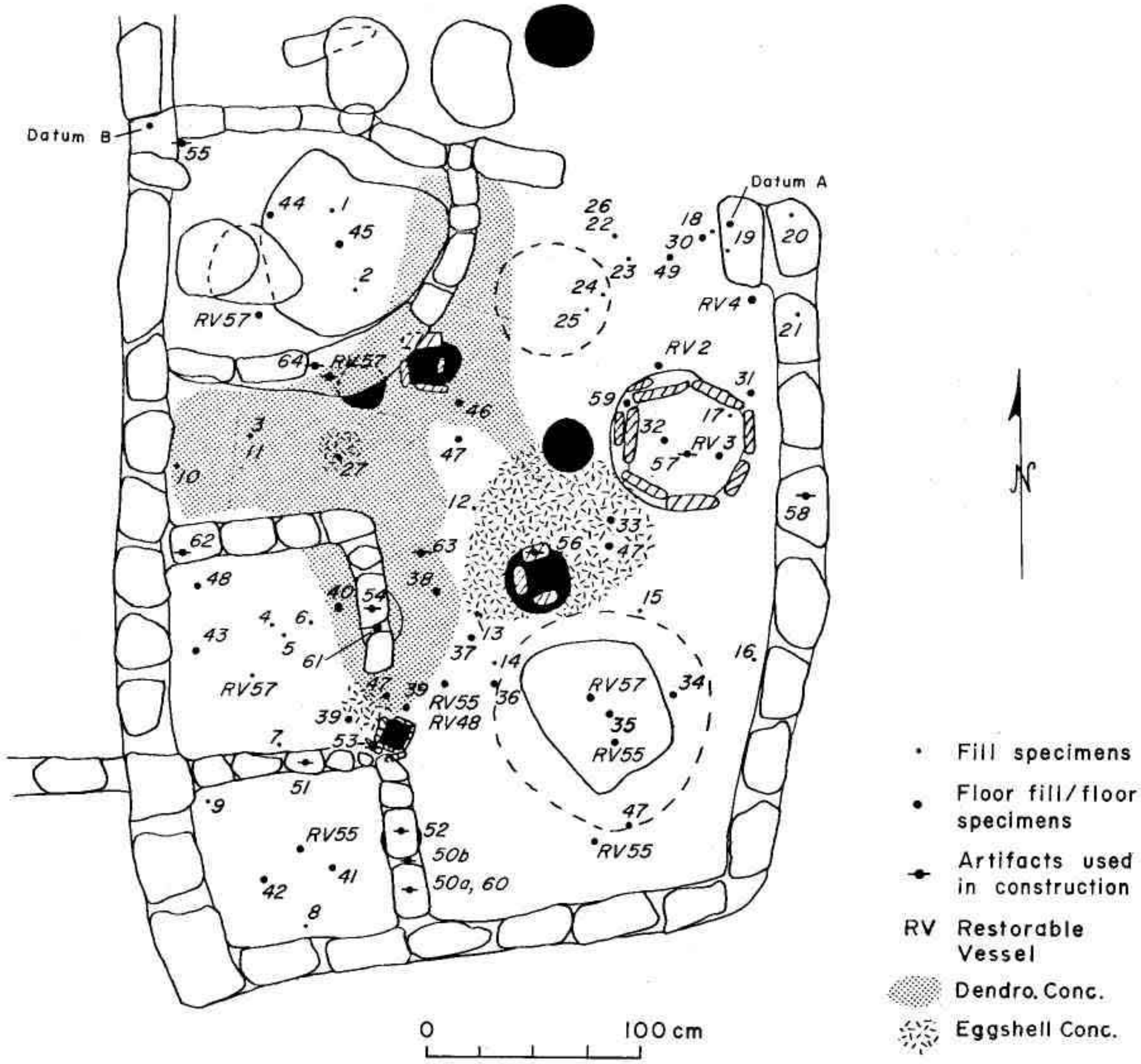

Figure 4.14. *Room 9, distribution of floor fill, floor artifacts, and artifacts used in construction (Table 4.9--specimen list) (NPS 310/82205 A).*

southwestern corner was a shallow, unburned depression filled with charred brush. More brush was found just above the floor in association with two sherds, evidently from an episode of dumping heating pit contents. Charred corn cupules, tansey mustard, charred saltbush, and bulrush seed came from the floor (M. Toll, this report), perhaps from heating pit contents dumped into the bin.

A 55-cm-deep test pit below the floor revealed natural alluvial deposits, except for irregular patches of refuse directly under the floor plaster. Additionally, a 10-by-10-cm pit, capped by a chunk of gray clay, was exposed under the west end of the north wall. A similar 30-cm-deep, 10-cm-wide pit, covered by clay and an oxidized stone, was observed in profile under the floor beneath the center of the east wall. Lignite filled the bottom 5 cm of the pit, while the rest was an "ashy" sand; thus, it was designated Posthole 6.

Bin 3 (Feature 3; 80 by 70 cm, 0.5 m^2, and 42 cm deep). Centered against the west room wall, and contiguous with, but north of Bin 2, was a second rectangular masonry feature. Unlike the others, a space 31 cm wide in the east wall provided side access to the bin interior. The two levels of fill, 20 cm and 12 cm deep, were removed from the bin and were identical to that excavated in the northern half of the room. Deposits of sand mixed with wall stone and roofing plaster dominated Level 1. Level 2 was similar but contained higher frequencies of brush, reed, carbonized pole fragments, and timber impressions in adobe. At least one adobe fragment revealed fingerprints opposite a beam impression 2.6 cm in diameter. A third side of adobe contained the impressions of reeds, 2-7 mm in diameter and set 1-2 mm apart, that had once overlain the beam. This unusual piece may be remains of the bin roof, which apparently burned and collapsed. Much of the charcoal was segments of small, pine timbers, ranging from 2.6 to 4.5 cm in diameter (eight pieces), but the largest two pieces were 6 to 6.4 cm in diameter, suggesting a mixture of room and bin roofing fragments. Seventy-nine spalls and 27 larger stones came from the fill, of which 10 percent were burned. Few artifacts were found, although two whole and apparently usable manos came from the top of the deposits.

An ash-stained surface of packed, alluvial deposits marked the bin floor. A 2- to 3-cm-thick layer of sand that had accumulated over the floor shortly after abandonment contained bits of roofing, charcoal, turkey eggshells, and a whole mano. The eggshell may mark secondary use of the bin as a turkey pen. Ethnobotanical analysis revealed few seeds, although some were burned (M. Toll, this report). A small amount of corn and abundant Cheno-Am pollen was found (Cully 1985:Table 4.3). A 30-cm-deep test pit through the northern half of the bin floor revealed a burned saucer-shaped heating? pit (unnumbered), 15 cm deep, under the northeastern corner. Another heating pit was discovered under the east wall (HP 2), while traces of refuse were found under the east wall and eastern half of the north wall. The remainder of fill under the floor was sterile alluvial deposits of sand and gravel that extended under the west wall.

Bin Walls. After completion of Room 8's east wall (Room 9's west wall), the three bins were built against it and over the former outdoor plaza. Mud was a primary ingredient in constructing the bin walls. Generally, the large, unmodified stones that spanned the width of the walls were found only along the existing top course. Below these there was only a sporadic use of smaller stones in the mud walls. The difference in construction suggests that the upper courses of large stones were near the original wall tops. All bin walls were covered with about 2 cm of gray clay.

Each bin contained mortar and stone, presumed to have come from collapse of the bin wall tops and of the east wall of Room 8, shared in common with Room 9. Pieces of room and bin roofing plaster, many marked by vegetal impressions, commonly occurred under the wall rubble. These, as well as the charcoal fragments found in the other bins and in the main room, were absent in Bin 2.

The volume and distribution of wall and roof debris within the bins indicates that all bin walls were little higher than present. Bins 1 and 3 evidently were roofed with small vigas covered with brush, reeds, and mud. The absence of identifiable roofing remains suggested that Bin 2 was either left uncovered or the roof was removed. Only Bin 3 had access from the side.

Floor 1 Materials (Figure 4.12, Table 4.9). Few artifacts were recovered from the bin and room floors. Excavation revealed a continuity of material from the floors into the fill above, which was confirmed by ceramic matches. Floor material, therefore, is difficult to separate from that left at abandonment, if any, and the subsequent deposition of trash. The greatest density of eggshell at 29SJ 629 occurred on the floor and in the floor fill of the room where many of the shells, some stuck to carbonized wood, were clumped together. The size and color of the shells indicate that they were turkey (Volume II, Chapter 11), although turkey bones at the site were rare and none were found in the room (Gillepsie, this report). Because the shells were clustered in the fill, they must mark the presence of a turkey pen after primary abandonment of the room.

Utilized flakes and exotic materials were more common in Room 9 than in the other surface rooms, but the majority were from refuse deposits. Forty-two pieces of debitage were recovered from the room, much of it (33 percent) 1140 series material that was often associated with turquoise at the site (Cameron, this report).

In the southwestern corner of the main room and in front of Bin 3 there was a trace of corn and high frequencies of Cheno-Am pollen (Cully 1985:171, Table 4.4). In the same area, seeds recovered from flotation were mostly weed species, although the charred specimens confirm that firepit contents were scattered about the room after abandonment (M. Toll, this report). Seeds from the floor in Bin 3 were also scarce, but 1,108 seeds came from a sample off the floor of Bin 2. These were mostly non-economic and possibly modern. A single bulrush seed from Bin 2, however, may have come from the bin roof construction.

Floor 2

An irregular, 10-cm-thick layer of alluvial deposits, directly under Floor 1, was removed above a surface designated as Floor 2. There was little to distinguish this second utilized surface except for the recovery of a few sherds, chipped stones, a broken turquoise bead, and the presence of several pits, not evident when Floor 1 was cleared. This surface marks the former plaza surface overlain by Room 9.

Floor 2 Features (Figure 4.12, Table 4.6). Four to six pits may have held former plaza post supports. Only Posthole 1 (PH 1) was exposed after clearing Floor 1, but it was partly covered by oxidized plaster and the Bin 2 wall. The outward bulging wall of Bin 1 overhung PH 2 and 3, seemingly blocking use of upright posts after the bin was built. There is some uncertainty of the true nature of PH 4 and 5, although PH 5 contained possible shims and aligns with a row of post supports in the adjoining plaza. PH 4 would not have been usable after the construction of OP 1, which expanded underneath it.

Midway between Bin 1 and Firepit 1 was a shallow, unlined, oval-shaped pit filled mostly with sand, but the fire-reddened bottom and sides were covered by a thin layer of carbonized twigs. These attributes identify it as a heating pit (HP 1). Two other saucer-shaped, burned lenses, found under the Bin 3 east wall, were probably heating pits associated with plaza activities. Other plaza features may have been removed by the Room 9 construction.

Walls

Walls constructed for Room 9 were poorly built, insubstantial, and made to support only minor weights. Only the west wall obtained any height (50 cm) and mass, presumably because it served as a primary load-bearing wall for Room 8. Large, unmodified blocks of tan sandstone and hard mortar comprised the west wall. In contrast, the south and east walls were constructed of a thick foundation course of adobe, capped by a single course of unmodified, friable blocks of white sandstone. These stones barely rise above the original ground level, obtaining a height of only 15-20 cm. It was difficult to assess if the latter walls were ever any higher than present. No other stones were found in association with the two walls, although they were possibly elevated almost solely with mud. If so, it would seem unlikely that they could support elevated walls and a timber roof. The relatively little cultural material directly outside the east and south walls, however, hinted that the broadcast of trash was physically restricted to the room by more than the mere 20-cm-high walls.

There is no north wall except that part of Bin 1, thus leaving an entry between the room and the plaza. Likewise, cultural debris in Room 9 continued unobstructed into the adjacent south plaza area (Grids 8 and 14).

Summary and Conclusions

Room Function. The poor condition of the two room floors, the matching of sherds from the same vessels found in some Floor 2 pits, and the fill far above Floor 1 indicated that precise field separation of the two floors was not achieved. Nevertheless, the space can be identified with three periods of use. Initially, the area was part of the adjoining plaza and ramada. Posthole 4, in particular, was in exact alignment with the front main ramada supports, although others were presumably removed when Room 9 was built. A slab-lined firepit, a number of heating pits and postholes, and possibly, a large, bell-shaped pit marked plaza activities prior to Room 9.

Use of the area was later modified by construction of Rooms 8 and 9; a suite of rooms devoted to a single residential group. Storage requirements were met by the construction of the three bins, OP 1 in Room 9, and of Room 8. Logical access to Room 8 would have been through a door in the west wall between Bins 1 and 3. While it was true that OP 1 resembles the other large plaza pits and may have predated Room 9, its smaller size, placement outside the initial ramada area, and construction partly under a ramada support (PH 4) suggested that it was built solely during the room occupation. The whole metate left in OP 1 and the mealing catchment basins located in the plaza, just outside the north room entry (Chapters 5 and 7), also suggested food preparation activities took place within the room and outdoors, nearby. A slab-lined firepit completes the room furniture. A large heating pit (HP 1) found on Floor 2, but near the firepit, may have been associated with Floor 1 activities because in the two pithouses and in Room 3 a firepit and heating pit appear spatially and temporally associated (McKenna 1984:Figure 2.1 reveals a similar arrangement at 29SJ 1360).

Finally, the mass of turkey eggshells in and around Bin 3 on the floor and in the floor fill suggested use of Bin 3 as a turkey pen. Its use as a pen would explain the presence of a side entry that was absent in the other bins. Turkey bones were not recovered from the room and were rare at the site (Gillespie, this report), except for several skeletons deposited in a large, bell-shaped plaza pit (OP 1).

A third use of the room area may have occurred after its primary abandonment. Refuse was deposited in the room, but it may also have seen limited use that left little archeological evidence (see below).

Architecture and Fill. Understanding the postoccupational sequence of events in Room 9 was difficult. It was not possible to delineate separate episodes of deposition within the main room, which was comprised primarily of refuse, burned and unburned pieces of roofing, and wall fall. This material was concentrated in the northern two-thirds of the room and in Bin 3, from the site surface to the floor. The homogeneous nature of the deposits are confirmed by the numerous sherd matches from the same vessels (e.g., Restorable Vessel 55) found scattered from the surface to the floor and down to the bottom of Other Pit 1 and Posthole 1. Of the 304 sherds recovered from Room 9, 135 (40 percent of the total) were matched to 11 vessels (Figure 4.13 and Appendix E). Additionally, carbonized roofing elements also occurred throughout the fill and into the floor pits.

The charcoal in the room may have derived from hearth contents and burned roofing. But no hearths at the site yielded large chunks of charcoal like those recovered in Room 9. The larger charcoal fragments matched the range of size impressions found in the associated adobe chunks. These impressions were made by poles 3-5 cm in diameter, with a few larger ones between 6 and 10 cm. The large charcoal was represented by a number of species (Table 8.2), which might infer elements derived from different structures. Yet roofs built in the A.D. 800s and 900s at Pueblo Bonito (Windes and Ford 1992) suggested that local procurement of a variety of local tree species for individual roofs was common building practice until a few specific species became the dominant choice after A.D. 1000. The presence of the adobe indicated that the roof was covered with plaster.

The structurally weak room walls suggested that much of Room 9 was not enclosed. No post supports were found along the stone wall foundations that would suggest jacal wall construction. Because the bins and other floor features replaced some of the earlier ramada roof supports when Room 9 was built, whether the ramada served to cover the room or if the room was roofed separately was unclear. The Room 8 walls could have supported a heavy roof that extended over Room 9, with posts in Room 9 supporting the eastern end. From these clues, two explanations were likely to cover the origins of the Room 9 deposits, although neither was wholly satisfactory:

1) The roof over Room 9 partially burned, and the room was abandoned and used as a dump for refuse while the charred roof parts slowly disintegrated. Conversely, the room may have been abandoned first, then used as a dump, and the roof burned at a later time. Usable timbers would have been salvaged. Room 8, which undoubtedly supported part of the roof, exhibited no evidence of burning, but its masonry walls may have protected it. Burned masonry recovered from Room 9 probably were the remains of Room 8's east wall. Oxidized spots on the Room 9 floor and in the room fill, some in contact with carbonized wood, attested to some in-situ burning that was unlikely due to hot coals from discarded hearth contents. Finally, the burned material was mixed with refuse rather than deposited as a distinct event from a burned roof, with subsequent refuse discarded on top.

2) Pithouse 2 produced a like assortment of charcoal, roofing, and cultural materials, and there was also evidence of fire on its floor and walls. Much of these materials were removed when the Kiva was placed in the pithouse fill. Redeposition could account for the mixed room deposits and their broadcast into the adjoining plaza. Nevertheless, despite the large sherd samples from the pithouse and room, only a single possible match between the two areas could be achieved. Additionally, the Pithouse 2 wood remains were primarily juniper and not comprised of the many species found in Room 9. Perhaps the mixed wood species and early date from Room 9 came from reused materials scavenged from the nearby Basketmaker III-Pueblo I site of 29SJ 628.

Although the second explanation provides a more complex set of circumstances, it is preferred because it resolves two important issues: the mixed room deposits and their spread into the plaza, and the absence of the pithouse materials that logically should have been deposited close by. It does not explain the whereabouts of the Room 9 roof, unless there was some truth to both explanations that materials were mixed from both structures.

Temporal Placement. Few chronometric dates were obtained for Room 9 (Chapter 8). Despite the numerous charcoal roofing fragments recovered, only a single one was datable--A.D. 792vv--by dendrochronology. Given its small diameter, it probably could not have lost more than a century's worth of rings since the tree died. Nevertheless, given the uncertain origins of the roofing, it did not assist temporal resolution of Room 9. Two archeomagnetic dates obtained from the initial and remodeled sections of the room firepit (FP 1), at about A.D. 950 (DuBois: A.D. 950±38) and A.D. 930-1070, respectively, reflected the correct stratigraphic situation but were not highly precise. Nevertheless, their plots suggest use of the firepit within the A.D. 950 to mid 1000s span.

Overall, the ceramics from the room reflected a single temporal assemblage (Toll and McKenna, this report) dating in the late A.D. 900s/early A.D. 1000s. The majority of these, however, were in refuse. More confidence can be attributed to the ceramics used in the room and firepit construction (Table 4.8) which temporally cluster in the late A.D. 900s/early A.D. 1000s. One temporally sensitive sherd encased in floor plaster, a late Red Mesa/early Gallup Black-on-white, suggested construction use in the early A.D. 1000s. An overall, indented corrugated jar bottom recovered from OP 1 (Level 2) and above Floor 1 represents a class of vessels that first appear in Chaco Canyon after about A.D. 1025. Finally, a large Chaco or late Gallup Black-on-white jar fragment (Plate 8.11B), found lying on top of the firepit, stood in sharp stylistic and technological contrast to the overall room assemblage, probably dating to the mid or late A.D. 1000s, or later.

Tentatively, Room 9 was probably constructed in the late A.D. 900s or, more likely, the early A.D. 1000s. The occupation duration appeared short due to the absence in the room and at the site of a new ceramic assemblage dominated by Gallup Black-on-white and overall indented corrugated jars, which appeared in Chaco Canyon about A.D. 1040/1050 (Toll and McKenna, this report; Windes 1987a). Fragments of a few late vessels were found in the room, though, which suggested that some activity took place in or around the room after A.D. 1050. Last primary use of the room, however, may be attributed to about A.D. 1040/1050, or earlier.

Room Summaries and Conclusions

The rooms at 29SJ 629 presented a varied class of structures influenced by intended function and temporal change. Wall abutments, architectural style, and spatial arrangement indicated that the original site rooms were Rooms 5-7. These were centered behind the earliest site pitstructure (Pithouse 2) and each contained a sunken floor that gave rise to their identity as tub rooms.

Little was left in the rooms, but a scattering of turquoise, tiny stone drills, and unusual abraders associated with roofing materials suggested rooftop craft activities. Remains from these activities were prominently evident in the adjacent plaza and in Pithouse 2. A whole metate, fallen from the Room 7 roof, also suggested food processing was conducted on the roofs. Immediately adjacent to the room, and in the Plaza, were a number of artifacts and features related to food processing that spatially tie the room and plaza activities together. Likewise, the craft materials from the roofs of Rooms 5 and 6 also spatially associated with plaza materials directly in front. Otherwise, the rooms appeared to have served for storage, although pollen and flotation analyses revealed only minimal presence of economic plants, primarily corn.

Each of the three rooms yielded evidence for roof entries. They also must have had direct access to the plaza, but only Room 7 had steplike features centered on both sides of the wall common to the plaza, indicating a side-entry. Dual entries into the small storage rooms seemed unusual but could facilitate closing options related to seasonal conditions and food preservation needs. Estimates made from existing walls and room-fill volume suggested that these rooms were built primarily of mud and covered by small poles that were covered by brush and mud. From the inside, these rooms were estimated to have stood about 2 m high.

Chronometric dates for room construction were not obtained. By inference, the earliest ceramic refuse at the site probably was coeval with these earliest rooms, unless the first rooms were not part of the initial site occupation, just the pithouse. The earliest ceramics (Chapter 8) temporally associate with the early A.D. 900s. Sherds recovered from the fill and floors and those used in minor wall repairs suggested last use of these rooms in the early A.D. 1000s.

A set of paired rooms (Rooms 2-3 and 8-9) were added to the ends of Rooms 5-7 to house separate habitation groups. The largest room in each set opened onto the plaza and contained a number of floor features that indicated multiple activity loci associated with habitation. Both had slab-lined firepits, unlined heating pits, and evidence of food preparation equipment or associated features. Pollen and flotation analyses revealed a variety of economic plant remains that further supported the inferred use of the rooms that was based on architectural and artifactual remains. Both rooms were only partly enclosed on the sides by low walls and exhibited complex post-abandonment deposition. The fallen back wall of Room 3, however, revealed a former height of 2 m.

There was a storage room attached to the habitation room in each pair. Room 8, built with Room 9, was the most substantial surface room at the site and was composed primarily of stone, but it yielded little but wall fall. Stone volume in this room indicated a former room height of about 1.8-2.0 m. On the other hand, Room 2 was filled with burned materials and refuse. It also exhibited a firepit and structurally weak wall foundations, indicating that it probably was not fully enclosed, like its companion, Room 3.

Both units were built over the existing ramada that fronted the early Rooms 5-7. Based on ceramics and a smattering of chronometric dates, both appeared to have been built at approximately the same time: the late A.D. 900s or, probably, the early A.D. 1000s and then abandoned before A.D. 1050.

Finally, Rooms 1 and 4 could not be neatly tied with the construction and use of the rooms discussed above. The perimeters of Room 4 were never defined, and it appeared to be an extramural storage area partly covered by an extended Room 3 roof. Room 4 was formerly part of the northern extension of the ramada prior to construction of Room 3.

Wall abutments revealed that Room 1 was added to Room 2, but the date is uncertain. A few sherds in the fill, dating from the middle to late A.D. 1000s, (possibly chinking associated with the wall rubble), suggested the late construction of the room. An overall indented corrugated sherd, a style that postdates A.D. 1025, was encased by the room wall, and also suggested construction by the mid to late A.D. 1000s or later. It may have been built in conjunction with the Kiva construction at about A.D. 1100 (Chapters 3 and 5). The room yielded few cultural remains, and flotation results suggested postoccupation floral contamination of the room. Based on the extent of a fallen wall, the room was estimated to have had an inside height of 1.8 m.

5

PITSTRUCTURES

Three pitstructures were found at the Spadefoot Toad Site (29SJ 629). Because of extensive scraping with a road grader around the site to the east, southeast, and south, all the site's pitstructures were probably discovered unless others had been placed in areas where they were normally not found (i.e., behind the roomblock to the west and north). The largest pitstructure, Pithouse 2, was located 8 m east-southeast from Rooms 5 and 6, in the location typical for the initial A.D. 900s pitstructure (Truell 1986). Another pitstructure, a kiva, was later placed in Pithouse 2, while a third structure, Pithouse 3, was located a few meters south of the others, next to Room 9. In 1974, Alden Hayes augured the kiva fill during reconnaissance for burned Pueblo I structures, producing the pit profile we later discovered during excavation (see below).

Kiva (Pithouse 1)

One of the first investigative goals at the site was to locate the pitstructure assumed to exist to the east and south of the rooms. There were no surface indications for a subsurface structure; therefore testing concentrated in Grids 20-21, 26-28, and 33-34. The eastern half of the structure was finally defined after considerable trenching had taken place. Fill from this, and all subsequent Kiva tests, was removed in 20 cm deep, arbitrary levels until reaching floor fill (Level 11). The latter was an arbitrary 10-cm-deep deposit covering the floor. The ten levels needed to remove the fill above floor fill were not always restricted to the actual perimeter because of the difficulty in defining the walls. After removal of the fill to the floor fill in the eastern half, the pit was winterized with plastic and work was completed during the following season.

In 1976, after profiling the north-south balk (A-A') left from the previous year (Figure 5.1), the northern half was removed and the remaining east-west balk face (C-C') was profiled (Figure 5.2). Because of the general sterility of the fill and depositional homogeneity, the fill left from the first season was also excavated (but not screened) in 20 cm units that corresponded to the initial levels. The final balk, in the southwestern quarter, was excavated in three units and was not screened, except for the lowest level. What would have been Levels 1-3 and part of Level 4 were removed as a single unit, followed by the rest of Levels 4 through 8 as a second unit.

The latter unit had less than expected volume because it rested upon a mass of stone and mortar, tilting from the south wall down to the center of the floor, and was designated as Layer 10. This was the only natural unit of fill to be excavated in the Kiva above the main floor. Within Layer 10 and stretching downward across the south end from the west wall and almost touching the floor on the east side was a Populus sp. timber, probably cottonwood. The badly rotted log, 21 cm in diameter and over 305 cm long, probably served as a roofing viga. Near the bottom of the layer, just over the deflector remains,

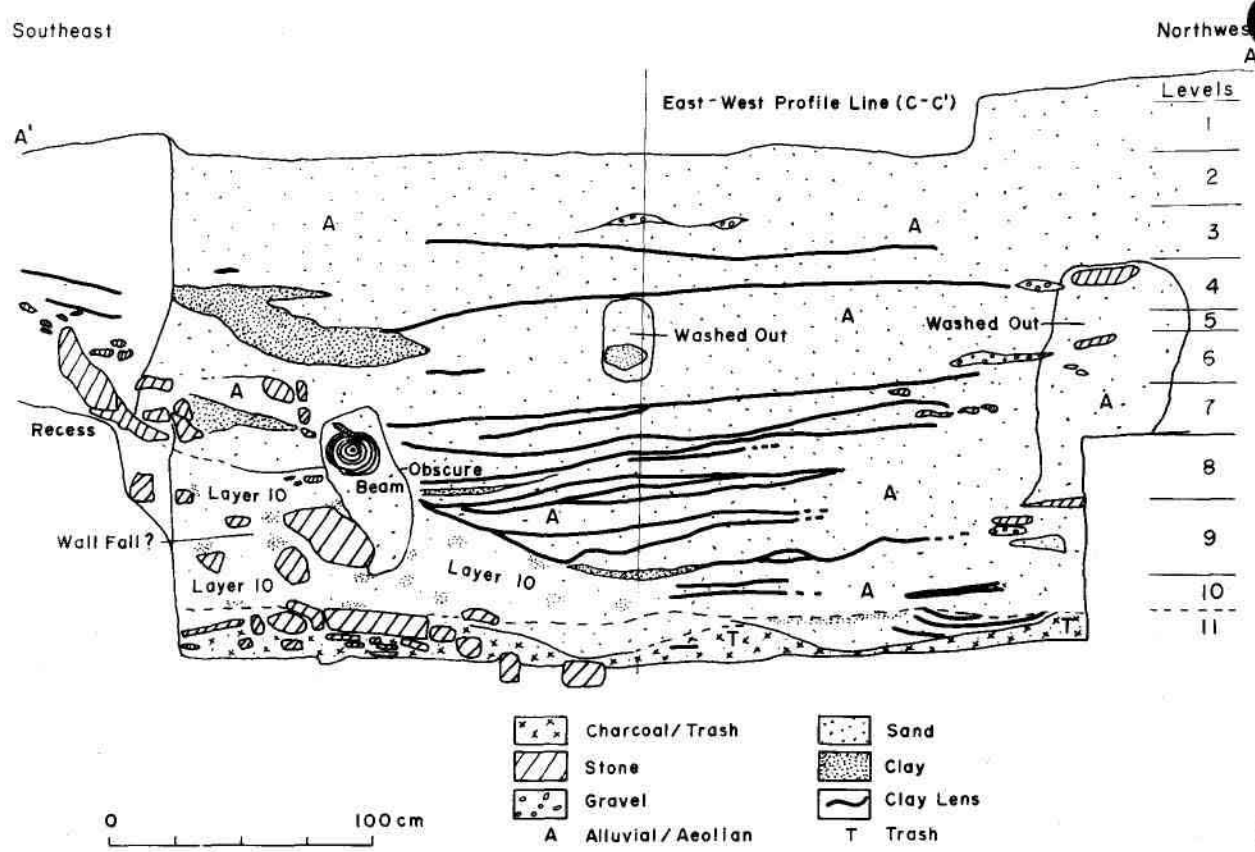

Figure 5.1. Kiva, northwest-southeast profile of the stratigraphy (NPS310/82210 C).

were two huge ground, tabloid blocks of sandstone: 99 by 41 by 9 cm and 75 by 32 by 7 cm. The larger stone had four incised lines, three parallel in the center on one side. These stones were probably remains of the roof entry liner.

Fill

Deposits in the Kiva were relatively homogeneous, consisting of gravel lenses, sand, and fine laminations of clay that were wind and water deposited. The process of alluviation had scattered cultural debris and specks of charcoal throughout the fill. Hal Malde, a U.S. Geological Survey Pleistocene geologist, inspected the north-south profile and confirmed our impressions of its origins but added that the deposition could have taken at least 100 years to complete (personal communication 1976). The fill near the east and west sides of the Kiva was peppered with small pieces of alluviated lignite, which we initially thought came from the disintegrated postholes in the fill. In a band around the structure's perimeter in Level 4 and deeper was a large number of soft, unmodified blocks of sandstone slanting down towards the floor. We observed 107 of these that were 20 by 10 by 5 cm or larger. The greatest concentration of stone and artifacts came from Layer 10. Although the character of the floor fill (Level 11) was similar to that above it, there was a noticeable increase in charcoal and refuse; thus, it was screened through 1/4 in. mesh. None of the fill, however, appeared to be free from intentional deposition of trash. Cultural material in the fill probably was mostly redeposited from erosion of the plaza surfaces. Ceramics were dominated by a Red Mesa Black-on-white assemblage but sprinkled with later intrusives of late A.D. 1000s-early A.D. 1100s age (e.g., Wingate Black-on-red, and McElmo, Chaco, Chaco-McElmo, and Sosi Black-on-whites).

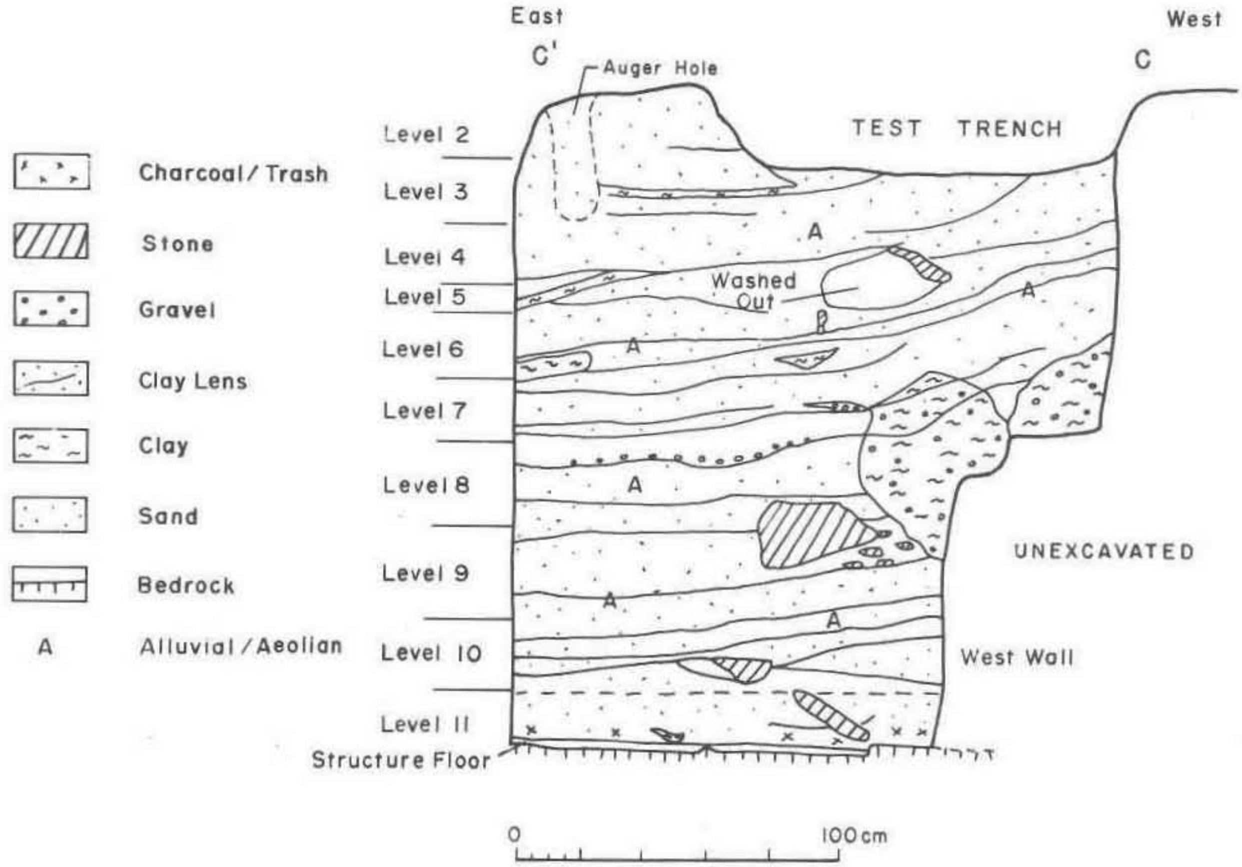

Figure 5.2. *Kiva, east-west profile of the stratigraphy (west half) (NPS 310/82211 C).*

Fill in the southern recess of the Kiva was identical to that encountered in the main chamber, however, it was removed inadvertently during pursuit of the wall contact line for Pithouse 2.

During clearing of Grids 20 and 21, an arc of 30 small stones, 14 by 14 by 5 cm or smaller, was found and appeared to approximate the predicted western perimeter of the Kiva. The rubble was thought to represent a disintegrated low wall, similar to one bordering the west side of Pithouse 3. Sosi Black-on-white and overall indented corrugated sherds, among others, were associated with the stones. Despite further testing, nothing else could be learned from it. Evidently, the feature had not been very substantial and consisted primarily of mud and a few spalls, aligned for a distance of about 230 cm.

Post Supports in the fill. Four features in the fill surrounding the Kiva exhibited attributes commonly associated with post supports. Their similar depth and placement merit attention. Post Support 6 was marked by an upright stone, 20 cm high, surrounded with lignite of all shapes and sizes (flecks to 10 cm^2 in size), averaging 15 pieces per 100 cm^2. These were concentrated in a conical-shaped area, 106 by 80 cm and 90 cm deep, in the pithouse fill at the east edge of the Kiva. The stone, near the top of this concentration, rested 136 cm above the Kiva floor. Nearby (to the south and 110 cm above the Kiva floor in the same concentration) was a 1-cm-thick, 11-by-11-cm piece of lignite, designated Post Support 15B. Its horizontal position and near-identical shape to Post Support 15A, 250 cm away at the northeastern side of the Kiva, suggested the remains of an identical feature. Of the four, PS 15A most closely resembled a post support (Plate 5.1), being nearly identical in size and shape to PH 5 in the plaza. It had two, thin, tabular pieces of sandstone that formed half of what appeared to have once been

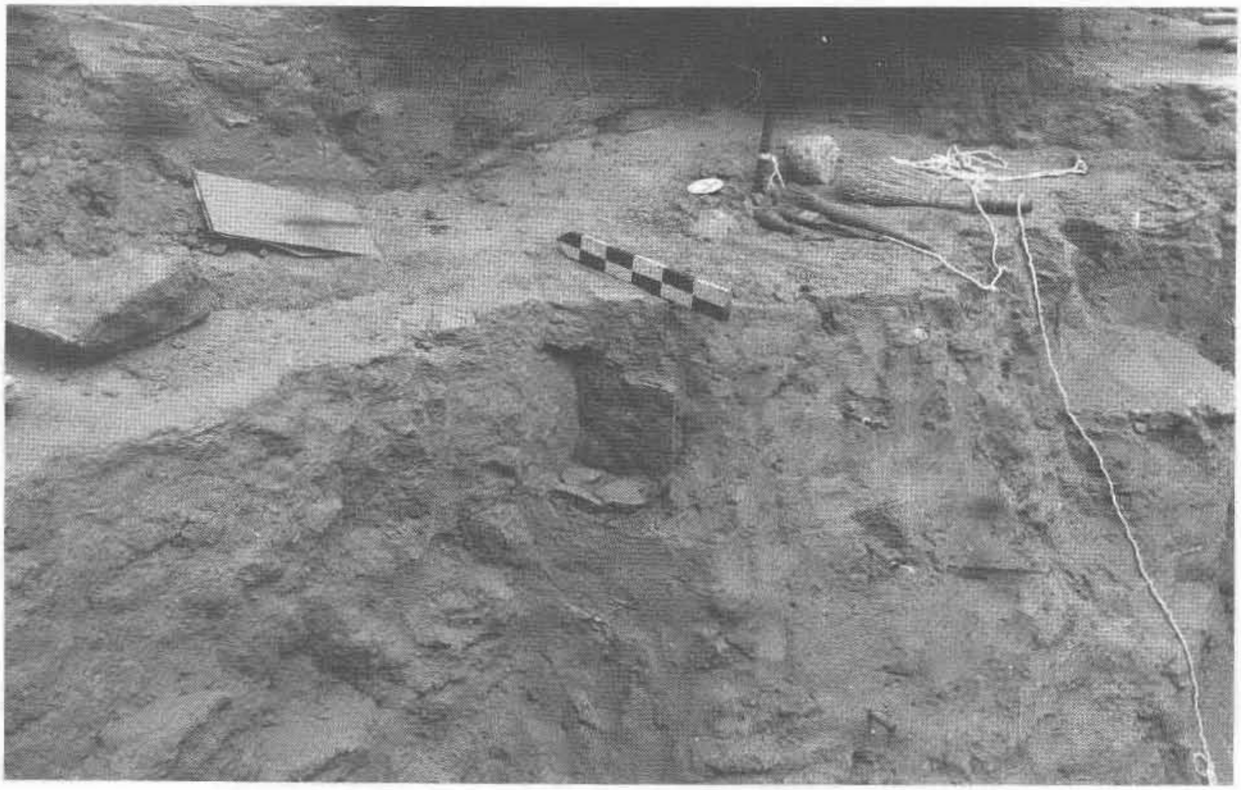

Plate 5.1. *Post Support 15A, in fill just beyond NE edge of Kiva under the 30-cm scale (NPS 10576).*

a rectangular box of shims floored with a thick, flat chunk of lignite. Height above the Kiva floor was 108 cm.

Finally, across from PS 15A, just beyond the northwestern side of the Kiva, was a concentration of charcoal and lignite and five thin shims or slabs in disarray; this was 119 cm higher than the Kiva floor. A fourth support must have existed to complete the framework for a ramada shade set over the Kiva.

Floor

Most of the Kiva floor represents reuse of the upper Pithouse 2 floor, except for an attempt to seal many of the floor features associated with the latter structure (Figures 5.3-5.4, Plate 5.4). About 30 percent of the floor was unique to the Kiva where it was offset to the west of Pithouse 2 and directly overlies bedrock. A flat, gray-stained, sandy, yellowish-brown adobe of varying thickness covered the floor and was not visually distinct from the earlier Pithouse 2 floor. The nearly circular floor was 384 cm (east-west) by 360 cm (north-south) and covered 11.2 m^2.

A curious concentric arc of bedrock, 30 cm wide, extended from the north and south ends of the western periphery of Pithouse 2's floor along the west side of the Kiva. Plaster leveled the floor with the top of this 2-3 cm high bedrock shelf, although the arc was not plastered over. There was no evidence of remodeling the arc, and it did not detract from the symmetry of the structure. Possibly this unusual feature was for stylistic effect, a reassessment of size or shape during the single construction episode postulated for the Kiva, or was the builder's solution for creating a solid tie between the floor plaster and the original bedrock slope encountered during construction. If the plaster had merged with the bedrock as it sloped downwards towards the east, foot traffic would have continually broken that thin fragile joint. The west edge of

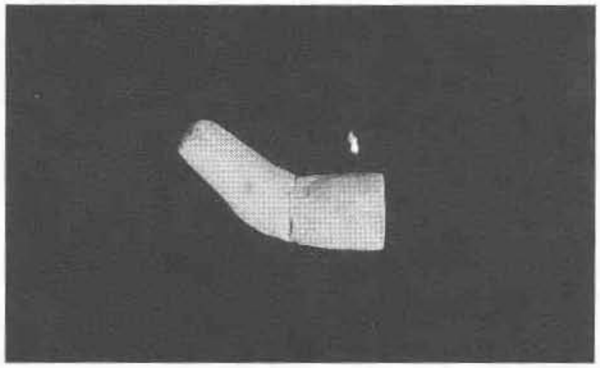

Plate 5.2A. *Ceramic elbow pipe left on top of masonry block in Kiva (NPS 15988A).*

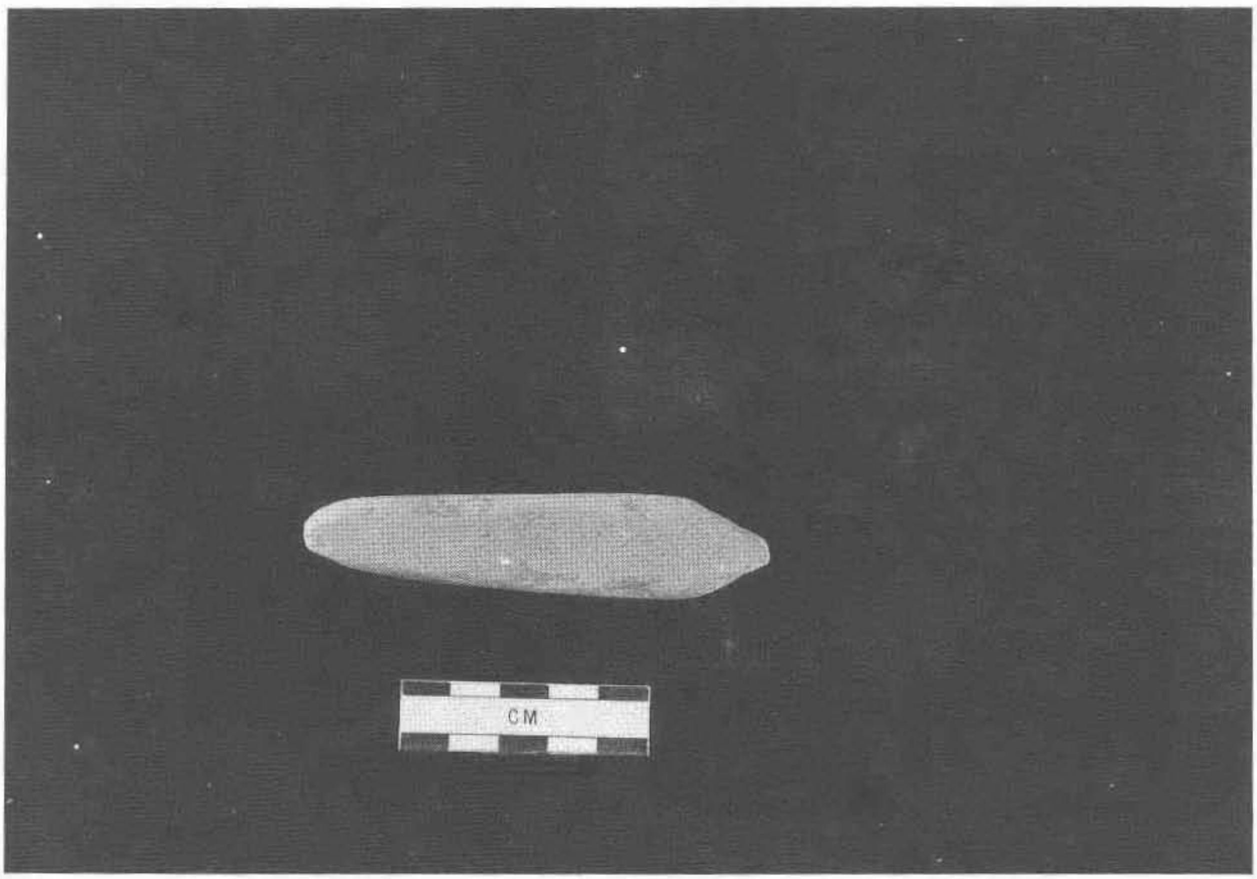

Plate 5.2B. *Sandstone file associated with turquoise jewelry debris from Pithouse 2, Layer 6 (NPS 14179B).*

Plate 5.3. *Sandstone lapidary lapstone found in fragments in Layer 6 and Floor 1 of Pithouse 2 (NPS 25679 A).*

Pithouse 2 was likewise marked by a low ridge of bedrock.

Floor Features. A number of features were discovered in the floor, although some of these were older pithouse pits that were sealed when the Kiva was built (Figures 5.4-5.5, Table 5.1). It is not always possible in some cases to be sure which structures and pits were associated.

Firepit 1. About one-third of the way into the Kiva from the ventilator, a traditional firepit was placed along the traditional alignment (Plate 5.5, Table 5.2). It was excavated into bedrock and lined with four closely fitted sandstone slabs, each about 4-9 cm thick, and extending slightly above the surrounding floor. An adobe coping was applied on all sides, except the north, from the floor level to the top of the slabs. Unburned mortar and spalls backed the west and south slabs where Firepit 1 was slightly offset from an earlier (probably the original) Kiva firepit. A thick, fire-reddened coping on the south side of the earlier firepit, underlain by spalls, was sampled for archeomagnetic dating, but with poor results.

Firepit occupational fill consisted of 8-10 cm of white and gray ash littered with small charcoal fragments. The remaining and lower 2-8 cm of firepit fill consisted of yellow sand, fire-reddened on top. Analysis of such ash contents revealed a lower density and diversity of seeds than the floor samples, but many were carbonized including sunflower, globemallow, tansy-mustard, ground cherry, and corn (M. Toll, this report). Unlike the other site firepits, Firepit 1 was full of carbonized, small, mammal bones (90 of 101 were burned) broken into tiny pieces. The majority were probably from prairie

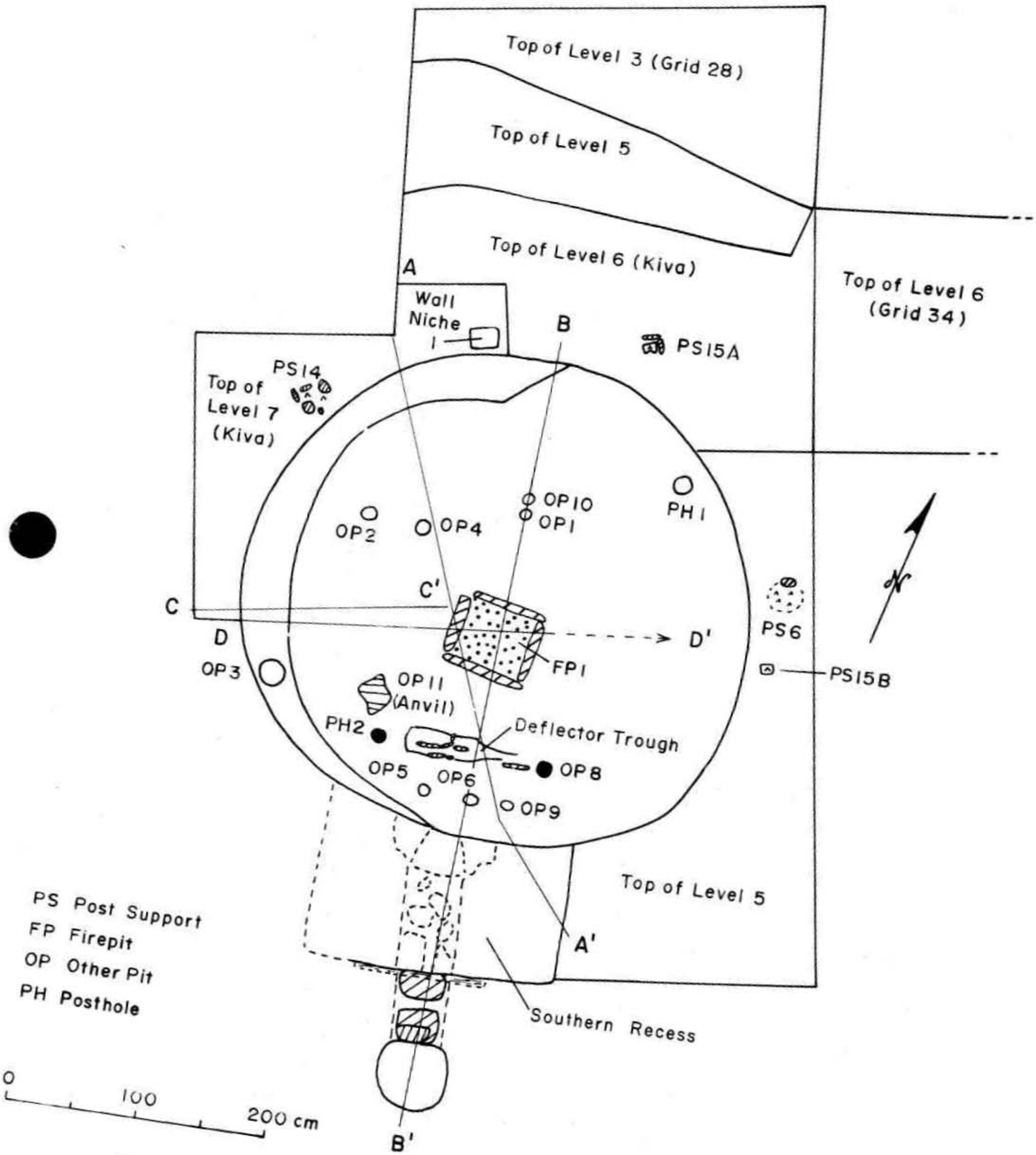

Figure 5.3. *Kiva, floor plan (NPS 310/82214 C).*

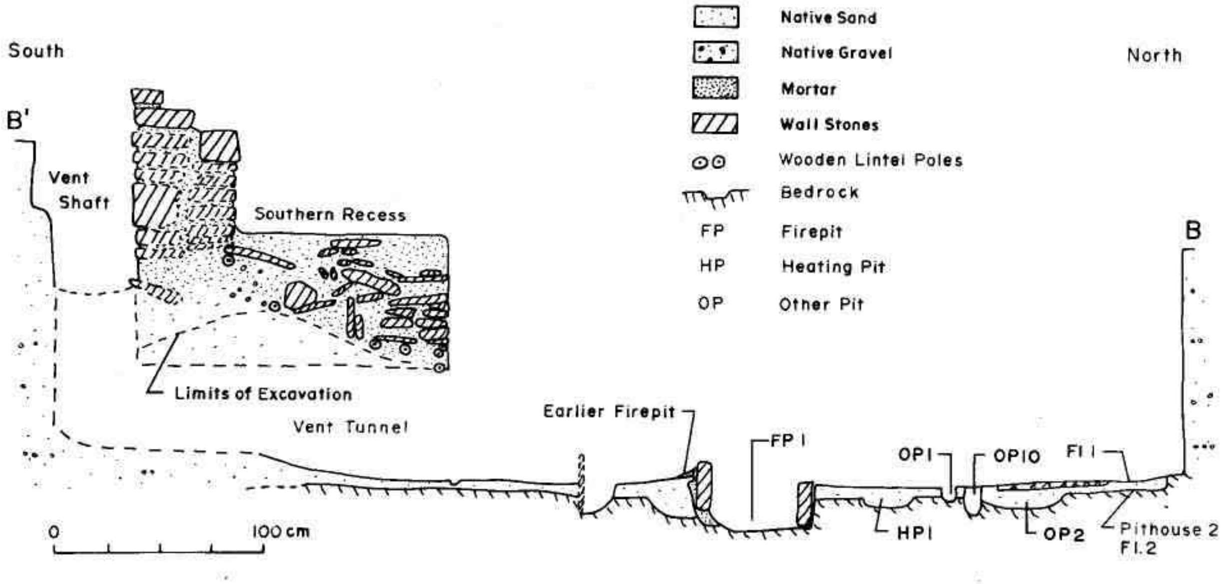

Figure 5.4. Kiva, north-south floor profile (NPS 310/82212 C).

dogs, jack rabbits, and cottontails (Gillespie, this report). These burned bones skewed the firepit means in Table 7.5.

Deflector. A shallow, irregular, east-west trench excavated into bedrock was located 56 cm south of Firepit 1 and 53 cm north of the ventilator tunnel along the ventilator-firepit-sipapu axis. Several upright fragments of thin, tabular stones, possibly shims, remained along the southern edge of the trench and in the floor nearby. One piece in the trench matched several others on the nearby floor and probably were from a single, large, upright slab. Two similar pits (OP 8 and PH 2), located at each end of the trench, probably held short posts but only OP 8 contained lignite flecks, a common hallmark of postholes. Thus, it appears that several shimmed upright slabs, perhaps reinforced with mud and stabilized at the ends by posts, served as the deflector. If the deflector was not a solid wall, the end posts might have supported a perishable screen.

The mass of stone found directly over the deflector trench may have destroyed much of the deflector. The irregularity of the deflector trench was partly the result of cutting across features associated with Pithouse 2.

Other Pits. Eleven amorphous pits, scattered about the Kiva floor (including two postholes), were excavated into bedrock. Except for OP 10, all were unsealed and filled with sand. Both OP 1 and OP 10, 3 cm apart, were cylindrical pits located 72 cm north of the firepit, a location that suggests a sipapu function. The clean sand in OP 1 was typical of pits in this location. Remodeling of the firepit raises the possibility that the "sipapu" was also relocated at the same time, with OP 1 replacing OP 10.

Four other sets of paired holes were found in the Kiva, each on an east-west alignment. OP 2 and OP 4, 27 cm apart and located west of the sipapus, were set along a true east-west line, but their function is uncertain, although they are similar to paired ladder-rest holes. Directly in front of the ventilator 18 cm, were a row of three pits, OP 5, 6, and 9, respectively 29 cm and 21 cm apart, that could mark placement of a three-pole ladder or a shift in location of a two-pole ladder. Historically, ladder rests were located in the latter area for roof entry. Two huge stones, possibly entryway liners, and a mass of smaller stones piled between these pits and the firepit, supports the inference that an entry existed almost directly above in the traditional position.

A shallow, basin-shaped pit (OP 3) was found in the southwestern corner in the arc of bedrock and

Plate 5.4. *Kiva, looking down at Floor 1. Southern recess only partly cleared (top of photo). 30-cm north arrow (NPS 12131).*

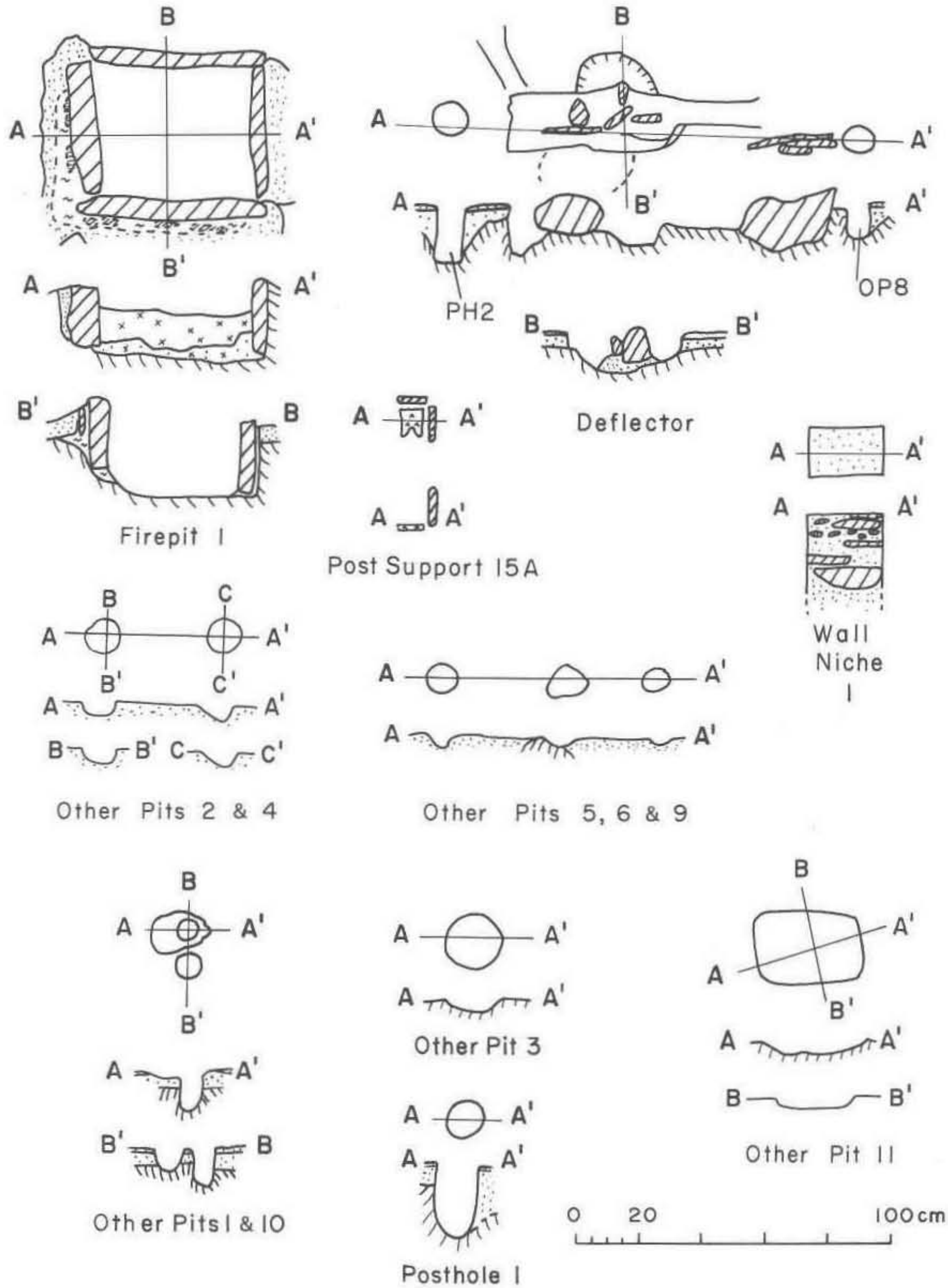

Figure 5.5 *Kiva, feature plans and profiles (NPS 310/82281 C).*

Table 5.1. List of features in the Kiva (Pithouse 1), Floor 1.[a,b]

Feature	Length (cm)	Width (cm)	Height/ Depth (cm)	Volume (liters)	Fill Type	Fill Period	Lining	Open/ Sealed	Comments
Firepit 1	55	53.5	20-26	51.1	25	Occ.	L-S	O	Mouth = 2174 cm^2. Four-slab box.
Other Pit 1	9.5	9	8	0.5	10	Int.?	L-P	O	Yellow sand fill. Sipapu?
Other Pit 2	10.5	10.5	4	0.3	12	PO	L-P	O	Ladder rest.
Other Pit 3	19	18	3.5	0.7	11	PO	L-P	S	
Other Pit 4	11	10	4.5	0.3	12	Int.?	L-P	S-FP?	Ladder rest?
Other Pit 5	10	10	4	0.2	11	PO	U	O	Ladder rest?
Other Pit 6	12	12	3	0.2	11	PO	U	O	Ladder rest?
Other Pit 7									Not a feature.
Other Pit 8	12	10	8	0.6	13	Occ.?	U/L-P	O	Posthole for deflector post--E end.
Other Pit 9	8	8	2	0.1	11	PO	U	O	Ladder rest?
Other Pit 10	7.5	7	13	0.5	10	Int.?	U	S-FP	Sipapu?
Other Pit 11	35	24	4	3.1	12	Int.?	U	O	Seating pit for anvil set in floor.
Posthole 1	11.5	10.5	22.5	1.9	11	PO?	L-P	O	Former Pithouse 2 sipapu. Unlikely posthole.
Posthole 2	11	11	15	1.4	11	PO	U	O	Posthole for deflector post--W end.
Posthole 6	?	?	?	?	?	?	U	O	On surface, E side.
Post Support 14	29	28	12	?	13, 46	Unk.	L-S	O	Located 119 cm above floor just beyond walls.
Post Support 15A	11.5	8.5	13	0.7	10	PO	L-S	O	Located 108 cm above floor just beyond walls.
Post Support 15B	11	11	0	?	13	Unk.	Unk.	O	Square chunk of lignite set flat 110 cm above floor just beyond walls.
Wall Niche 1	33	19	24	?	10	PO	L-M?	O	Base of masonry niche; rest missing. Located 84 cm above floor.
Deflector	104	6-16	15	?	11	PO	L-S	O	Remnants of five upright slabs still evident.

Table 5.1. (continued)

Feature	Length (cm)	Width (cm)	Height Depth (cm)	Volume (liters)	Fill Type	Fill Period	Lining	Open/ Sealed	Comments
Vent. shaft	53	33	175	–	30, 41	PO	U/L-M	O	Unlined except for masonry on north side.
Vent. tunnel	185	19-22	53	–	30, 41	PO	U/L-M	O	Unlined except for masonry at mouth on east and west sides.
Recess	183	104	60+	–	14, 30, 42	PO	L-P	O	Placed 120-160 cm above floor.

[a] See Figure 5.3 for the distribution of features.
[b] See Tables 7.3-7.4 for an explanation of the feature and attribute codes.

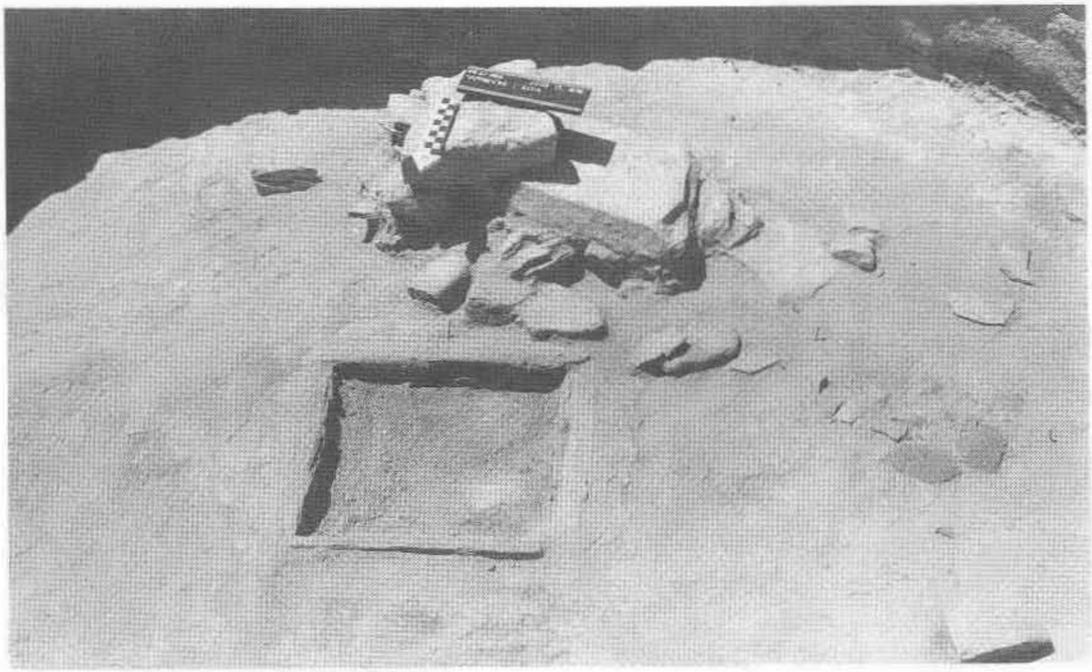

Plate 5.5. *Kiva, possible hatchway debris behind firepit. Note the crushed fragments of a Hunter Corrugated jar west of the firepit. 30-cm north arrow (NPS 12084).*

might have served for holding a vessel (Restorable Vessel 29, a Hunter Corrugated jar, was found nearby). A short distance away was OP 11 which contained an anvil flush with the floor.

None of the 11 pits had sufficient volume to have been useful for storage. All were less than a liter in capacity and probably marked a variety of incidental uses not associated with storage.

Postholes. Few postholes were found in the Kiva, and most were either part of the deflector or ladder rests. Although tentatively designated PH 1, the pit on the northeastern side was puzzling. It was found unsealed but would not have been useful as a roof support without three others in similar positions. It was on a direct line, splitting the firepit and ventilator of Pithouse 2, and contained turquoise flecks that were numerous in the pithouse floor fill nearby but were beyond the perimeter of the Kiva. Its original construction, therefore, was inferred as the Pithouse 2 sipapu, but it was utilized later for some other purpose by the Kiva inhabitants.

Floor Material. There was relatively little cultural cultural debris left on the floor (Figure 5.6, Table 5.3), and its distribution reflected no observable activity areas except for that directly around the embedded floor anvil (OP 11). The cautious observer will note that almost nothing was recovered in the northeastern half of the Kiva, a situation thought to reflect a lack of communication with a laborer clearing this area rather than to prehistoric activity. Inadvertent removal of floor material would have resulted in the specimens being added to the floor fill category (Level 11) instead.

A few materials might reflect the non-secular nature of the Kiva, including a ceramic pipe found in a possible wall niche, a worked mountain lion phalanx, and a part of a canine tooth near the firepit. Although a turquoise chip was recovered, the probability was high that it came from the pithouse occupation. Turquoise was scattered throughout the fill on the west side, undoubtedly alluviated from concentrations in the plaza. Lithic debitage on the floor and in the floor fill were dominated by material type 1140, associated with turquoise production at the site, and silicified woods of the 1112-1113 series

Table 5.2. Firepit-ventilator orientations of 29SJ 629 pitstructures.[a]

Pitstructure	Period of Use	Orientation	Features Aligned
Kiva (Pithouse 1)	A.D. 1100-1140	4°/184°	Vent. tunnel-firepit-sipapu (Other Pit 1 or Other Pit 10)
Pithouse 2	A.D. 875-1050	162.5°/342.5° 171.5°/351.5°	Vent. tunnel-firepit-sipapu (Other Pit 4) Vent. tunnel-firepit-sipapu (Kiva Posthole 1)
Pithouse 3	A.D. 975-1025	0.5°/180.5° 1.5°/181.5°	Vent. 2 tunnel-firepit-sipapu (Other Pit 6) Vent. 3 tunnel

[a] All orientations from true north.

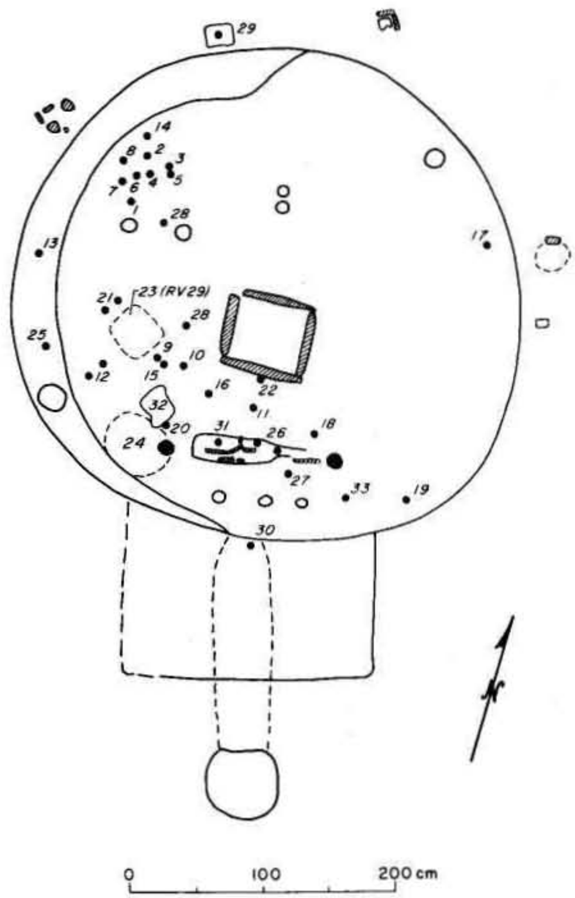

Figure 5.6. *Kiva, distribution of floor specimens (Table 5.3--specimen list. (NPS 310/82214 D).*

(Cameron, this report). The majority of lithics were probably postoccupational.

Nine articulated rodent skeletons in the northwestern area of the Kiva were an interesting find. These were on or just above the floor (1 cm) in an area 43 by 53 cm, while two more were found in a rodent hole near the floor ventilator--a total of seven kangaroo rats and four pocket mice. Their presence indicated complete abandonment of the site because the rat species (Dipodomys) are particularly susceptible to human interference (William Gillespie, personal communication 1976).

Despite a fill dominated by early ceramics, sherds on the floor were late (Table 5.4). While few ceramics were found on the floor, these were enough to immediately disavow the Kiva's association with the main site occupation. A Pueblo III Hunter Corrugated jar with a sharply everted rim (Plate 8.9D) comprised 88 percent of the sherds from the floor and was scattered southwest of the firepit. On the bedrock arc nearby was a quarter of a classic Chaco-McElmo Black-on-white bowl (Plate 8.11C). Elsewhere, there were fragments of Forestdale Smudged and Chuska Black-on-white bowls. This assemblage is similar to the contemporary sherds on the Kiva 15 floor at Pueblo Alto (Windes 1987b:Table 3.9, Plate 3.45). The few remaining sherds all belong to a similar temporal assemblage in the early A.D. 1100s.

Flotation samples from all floor quadrants contained a variety of unburned plant types, including economic species of purslane, stickleaf, saltbush,

Table 5.3. Kiva distribution of floor materials.[a]

Artifact Number	Artifact Class	Lithic Material, Ceramic Wares, or Faunal Species	FS No.
1	Kangaroo rat skeleton	- (Dipodomys ordii)	2019
2	Kangaroo rat skeleton	- (Dipodomys ordii)	2020
3	Kangaroo rat skeleton	- (Dipodomys ordii)	2021
4	Kangaroo rat skeleton	- (Dipodomys ordii)	2022
5	Pocket mouse skeleton	- (Perognathus sp.)	2023
6	Kangaroo rat skeleton	- (Dipodomys ordii)	2024
7	Kangaroo rat skeleton	- (Dipodomys ordii)	2025
8	Kangaroo rat skeleton	- (Dipodomys ordii)	2026
9	Potlid, bifacially chipped (lost)	2000 (sandstone)	2028
10	Mano/firedog (977 g)	2000 (sandstone)	2029
11	Mano/firedog	2000 (sandstone)	2030
12	Pot lid fragment, bifacially chipped (342 g+)	2000 (sandstone)	2031
13	Passive lapidary abrader/paintstone (127 g)	2000 (sandstone) reveals ground hematite	2032
14	Anvil/abrader (1600 g)	2000 (sandstone)	2033
15	Passive lapidary abrader (84 g)	2000 (sandstone)	2034
16	Dog? incisor	- (Canis sp.)	2036
17	Mountain lion phalanx pendant	- (Felis concolor)	2037
18	Polishing stone (254 g)	4000 (quartzite)	2039
19	Hammerstone (424 g)	1042 (chert, red/gray)	2040
20	Core (67 g)	1053 (chalcedony, black spots)[b]	2041

Table 5.3. (continued)

Artifact Number	Artifact Class	Lithic Material, Ceramic Wares, or Faunal Species	FS No.
21	Utilized flake (0.3 g)	1140 (chalcedonic silicified wood)	2042
	Unutilized flake (1.1 g)	1140 (chalcedonic silicified wood)	2042
22	Jewelry debris (1 chip)	5300 (turquoise)	2043
23	Hunter Corrugated jar (RV 29)	- Chuska Grayware	2044
24	Plain gray body sherd	- Cibola Grayware	2045
	Indented corrugated sherds (21)	- Cibola Grayware jar (sooted)	2045
	Showlow Smudged bowl sherds (2)	- Mogollon Brownware	2045
25	Chaco-McElmo B/w bowl sherd[c]	- Cibola Whiteware	2046
26	Indented corrugated sherd	- Cibola Grayware (sooted)	2046
	Indented corrugated sherd	- Chuska Grayware	2046
27	Concentration of Chuska, McElmo, and Gallup B/w sherds	- Chuska, Mesa Verde, and Cibola Whitewares	2046
28	Plain gray body jar sherds (2)	- Cibola Grayware	2046
29	Undecorated elbow pipe (unfired)	- Cibola? Whiteware	410
30[d]	Metate fragment (850 g)	2000 (sandstone)	2741
31	Unutilized flake (1.2 g)	1112 (cherty silicified wood)	2746
	Unutilized flake (0.4 g)	1140 (chalcedonic silicified wood)	2746
32	Anvil embedded in floor (9979 g)	2000 (sandstone)	2258
33	Flake (lost)	?	?

[a] See Figure 5.6 for the distribution of features.
[b] High surface chert.
[c] Half a bowl ground on the broken edge from use as a scoop.
[d] Part of ventilator construction. Matches piece recovered from Pithouse 2, Layer 5.

Table 5.4. Ceramic frequencies from the Kiva and Pithouse 3.[a,b]

	Kiva					Pithouse 3			
	Fill					Fill			
Ceramic Type	Grid	Pitst.	%	Floor	%	Grid	Pitst.	Floor	%
CIBOLA/CHUSKA CULINARY									
Lino Gray	1	1	T	-	-	-	1	-	T
Plain gray	327	193	26	3	3	174	1112	2	31
Wide neckbanded	9	1	T	-	-	-	39	-	1
Narrow neckbanded	153	72	11	-	-	65	501	-	14
Neck indented corrugated	9	7	1	-	-	9	16	-	1
Unclassified indented ocrrugated	304	205	25	79	85	152	414	-	14
PII indented corrugated rim	8	6	1	-	-	-	34	-	1
PII-PIII indented corrugated rim	-	2	T	-	-	-	1	-	T
PIII indented corrugated rim	-	-	-	2	2	-	-	-	-
CIBOLA WHITEWARES									
Unclassified BMIII-PI B/w	7	-	T	-	-	-	2	-	T
Red Mesa B/w	78	105	9	-	-	58	791	6	21
Escavada B/w	-	-	-	-	-	-	4	-	T
Puerco B/w	4	2	T	-	-	-	6	-	T
Gallup B/w	7	13	1	1	1	13	38	-	1
Chaco B/w	1	2	T	-	-	-	-	-	-
Chaco-McElmo B/w	2	4	T	1	1	-	-	-	-
Unclassifed PII-PIII B/w	91	49	7	-	-	58	187	1	6
UNCLASSIFIED WHITEWARE	184	104	14	2	2	80	334	-	10
UNCLASSIFIED CARBON B/W	2	4	T	-	-	3	2	-	T
CHUSKA WHITEWARE									
Tunicha B/w	3	-	T	-	-	-	-	-	-
Newcomb B/w	-	-	-	-	-	1	6	-	T
Chuska B/w	-	4	T	1	1	-	-	-	-
TUSAYAN WHITEWARE									
Kana'a B/w	-	-	-	-	-	-	1	-	T
Black Mesa/Sosi B/w	1	-	T	-	-	-	1	-	T
LITTLE COLORADO WHITEWARE									
Holbrook B/w	-	1	T	-	-	-	-	-	-
MESA VERDE WHITEWARE									
McElmo B/w	2	-	T	1	1	-	1	-	T
Mesa Verde B/w	1	-	T	-	-	-	-	-	-
SMUDGED WARE	14	21	2	3	3	6	4	-	T

Table 5.4. *(continued)*

Ceramic	Kiva: Fill Grid	Kiva: Fill Pitst.	Kiva: %	Kiva: Floor	Kiva: %	Pithouse 3: Fill Grid	Pithouse 3: Fill Pitst.	Pithouse 3: Floor	Pithouse 3: %
SAN JUAN REDWARE									
Unclassified redware	7	1	T	-	-	1	4	-	T
CHUSKA REDWARE									
Sanostee B/r	-	-	-	-	-	1	1	-	T
WHITE MOUNTAIN REDWARE									
Wingate B/r	1	-	T	-	-	-	-	-	-
Totals	1216	797	97	93	99	621	3500	9	99
Time Period (A.D.)	975-1050+			1100-1150		975-1050			

[a] T = trace (less than 0.5%).
[b] Grid fill ceramics from grid tests above the pitstructures: Grids 21, 26-28 for the Kiva, and Grids 19, 202-203 for Pithouse 3.

corn, and squash (M. Toll, this report). Most pollen samples yielded little, including a low percentage (2 percent) of corn (Cully 1985:178). Only the northeastern quadrant yielded a high number of pollen grains, including corn, cucurbit, and cactus. Cucurbits were not originally listed by Cully (1985). The remaining quadrants and the central area revealed poorly preserved, non-economic pollen (18 grains total from 4 samples). Because of the rodent activity in the Kiva, however, ethnobotanical results must be treated with caution.

Walls

Two or three thin layers of plaster, totaling about 1 cm thick and not smoke-stained, coated parts of the native earth, Kiva walls, except on the sides exhibiting Pithouse 2 fill. Little remained of the plastered walls that were present only 10-80 cm above the floor, although the highest section of Kiva wall rose 120-190 cm above the floor at the south end. There were no indications of a Kiva bench.

The unplastered sides and short distance (4.5 m) from the tub rooms were the first clues that suggested the presence of a second pitstructure which architecturally should have existed contemporaneously with the early rooms. On the northeastern side of the Kiva, at the junction of the Kiva and Pithouse 2 walls, a clay buttress had been placed behind the lower section of the Kiva wall, evidently to support the unstable Pithouse 2 fill.

Wall Features.

Ventilator. The Kiva exhibited the traditional ventilating system, containing the majority of the masonry construction for the Kiva. A trench extended south 185 cm from the Kiva wall and then turned upward to the surface. After the trench was dug, the builders lined the tunnel walls, up to 34 cm back from the mouth, with roughly-shaped block masonry covered with adobe plaster. This was footed on the Pithouse 2 floor. At the mouth, the plaster thickened to 9 cm, restricting the narrow, rectangular opening to 19-22 cm wide and 53 cm high (Figure 5.7, Plate 5.6). The southern half of the ventilator walls and floor were left of native earth, except for that part of the floor that was originally part of the pithouse floor. Next, a series of at least six poles, 2-3 cm in diameter and up to 80 cm long, spanned the trench, 56 cm above the Kiva floor at the mouth and raising higher towards the back. All the poles were badly decayed; thus, others that were not recognized might have existed. These supported the fill and construction material that became the tunnel roof and part of the southern recess floor. Although much of the tunnel roof had collapsed, partial dismemberment revealed its construction. Directly above the tunnel mouth, several poles supported a triangular-shaped stack of masonry, eight courses high, set flush with the Kiva's south wall. Less care was taken with the remaining intentional fill--clay, trash, and haphazardly set stones were placed over the tunnel roof. Several stones were burned: a mano, two metate fragments, and an anvil. One of the metate fragments probably was encountered by the Kiva builders during removal of the Pithouse 2 fill because it matched a fragment recovered in Pithouse 2.

The ventilator shaft was formed by building a wall to the surface with a rectangular column of scabbled stones and mortar, leaving a hole that extended down to meet the tunnel. Except for the north side of the shaft, the other walls were unlined, native earth. The opposite side of the column was visible and flush with part of the southern recess south wall. Two footing stones, slightly overlapping the trench sides and projecting northward under the recess floor, supported the column. The stones, in turn, were supported by a 4.5 cm diameter pole that extended horizontally well beyond the tunnel trench sides across the top. Trash filled the lower 30 cm of the shaft and tunnel, followed by alternating layers of sterile sand, clay, and trash. A few burned spots on the sides of the shaft indicated a fire of short duration occurred before the shaft was filled to the top.

Southern Recess. The recess was similar to those associated with other keyhole-shaped kivas (Truell 1986:197-198): 183 cm wide and 104 cm deep (north-south), covering 1.8 m^2 (Figure 5.7). The elevated recess widened slightly towards the south, although it was damaged while tracing the perimeter of Pithouse 2. No trace of floor or walls could be found on the west side, the area most likely to be affected by postabandonment flooding. Likewise, the east wall was also indistinct, but marked by termination of the ash-stained floor plaster and patches of wall plaster. The south wall of the recess is the highest remaining part of the Kiva, rising 190

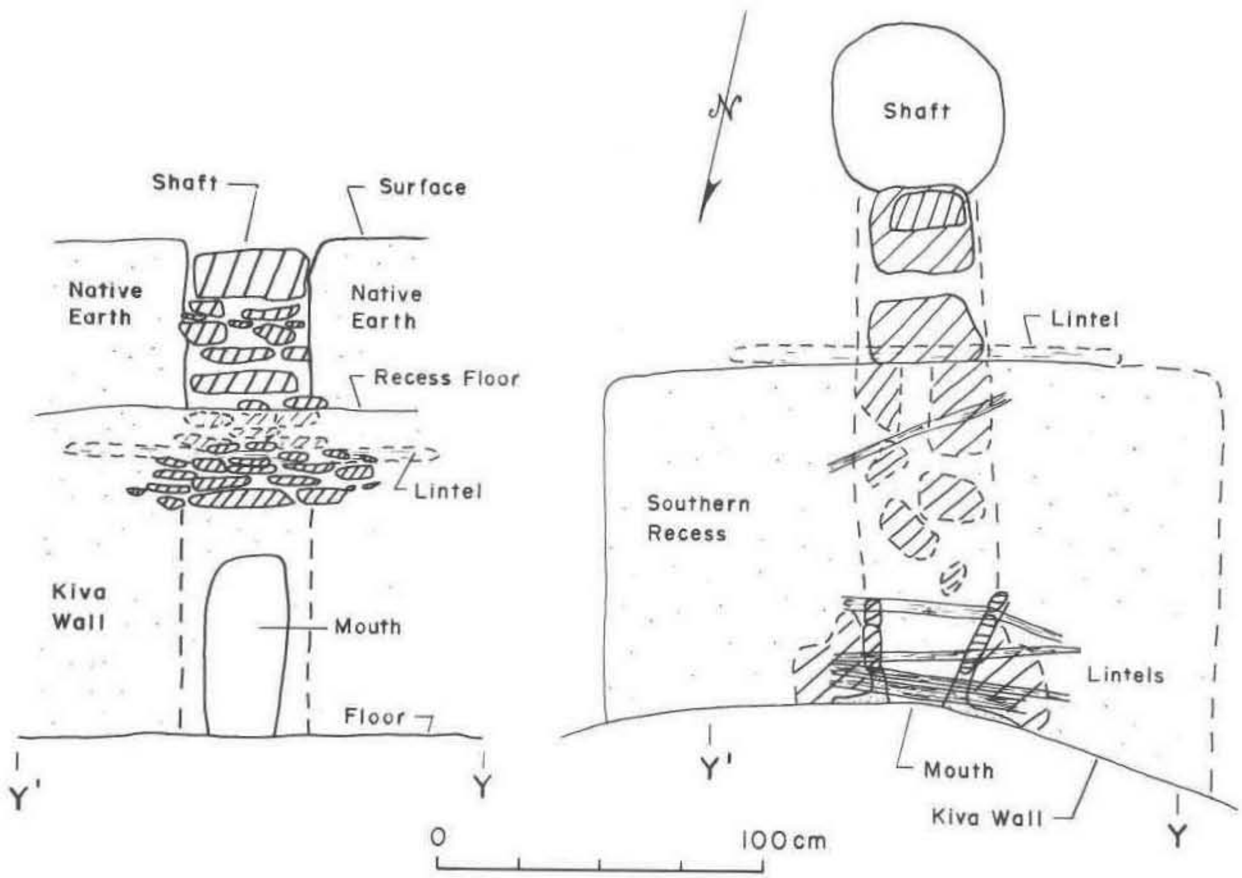

Figure 5.7. Kiva, plan and profile of the ventilator and the southern recess (NPS 310/82213 B).

cm above the Kiva floor. It consists of a masonry column, enclosing the north side of the vent shaft, flanked on both sides by plastered, native-earth walls. The recess floor was slumped due to collapse of the ventilator tunnel ceiling. A fallen block of masonry, at least 11 courses high, was uncovered where it was lying across the front of the recess and tipping into the Kiva fill. This may have been a masonry column that once existed at the northeastern corner of the recess where it joined the Kiva wall. There was no evidence for a similar column in the northwestern corner.

Wall Niche 1. The only other wall feature encountered was a block of masonry resting in alluvial fill about 5 cm beyond the Kiva perimeter on the north side. It revealed careful workmanship, being faced on the side exposed to the Kiva interior, plastered on top, and with four tabular courses of stone and mortar. There was no reason to suggest a pilaster function for the feature, despite its location 84 cm above the floor. It might have been a wall repair or any number of things, however, an intact elbow pipe (Plate 5.2A) was found resting on the plastered top. The rarity of this type of artifact and its location in sterile fill suggested an item left by the Kiva occupants on a small shelf or at the bottom of an otherwise native earth-lined niche. Niches are commonly found in the same location in other Chacoan kivas (Truell 1986:Table 2.21).

Roof

Because of the poor wall remains, the lack of pilasters, bench or feasible roof support floor features, and the near absence of identifiable roof material, aside from the multitudes of stone and the one solitary beam present in the fill, there was little definite evidence for the type of roofing. The most logical roof construction, therefore, would seem to be beams supported at the surface of the ground. The one long beam found east-west in the fill across the

Plate 5.6 *Kiva, view of ventilator mouth, southern recess (partly removed), and the ventilator shaft masonry. 30-cm north arrow (NPS 12142).*

southern one-quarter of the Kiva tentatively indicated such an arrangement. Its east end nearly rested on the floor and probably was deposited shortly after, if not at, abandonment. Several vigas were probably initially laid east-west across the Kiva with smaller poles set perpendicular to these, as in historic analogues, and then covered by an addition of brush and mud.

The lack of pilasters or a bench might represent more than a stylistic variation in kiva construction. It could reflect an awareness of wood scarcity that prevented construction of the more elaborate cribbed-style roof. The lack of remaining wood indicated salvage of the roof, although the absence of identifiable roofing plaster was difficult to explain.

The function of the ..ass of stone found around the inner periphery of the Kiva, which had obviously tumbled in from above, suggested an erosional retardant coping around the edge. Dismantling a roof would require, however, that these stones be removed first and disposed of beyond the structure. The majority of these large stones appeared to have come from the east or downslope half of the Kiva, except for the concentration between the ventilator and firepit. The same situation was strikingly evident for the pithouse at 29SJ 724, where almost all of the huge stones were on the downslope side of the structure. Problems of erosion would normally be more severe on the upslope side, but to level a roof for a structure placed on a slope, it would be necessary to lower the higher ground surface or artificially raise the lower side. It is suggested, therefore, that the stones represented a masonry wall that was used to level and elevate the roof in a fashion observable at Hopi today (i.e., Mindeleff 1891).

With this in mind, it follows that the lack of roof plaster can be attributed to either 1) destruction by the elements during slow structural deterioration or 2) the removal of the plaster first during salvage work and depositing it on the ground beyond the structure. It is obvious that structural wood was curated, thus the latter explanation is favored. Probably the stone wall was left in place around the Kiva periphery, later to tumble in as the upper walls of the Kiva slumped off. The linear concentration of stone near the surface, paralleling the southwestern edge of the Kiva, suggested a low retaining wall, perhaps placed for erosion control.

Roof Entry. A typical roof entryway was postulated for the Kiva. Appropriate features were present which lend support for interpreting a hatch approximately above the deflector remains. Ladder support pits were thought to be present in a position expected for entry above the deflector. Also, the density of fill-stone above the deflector area, including two huge stones suitable for sills, suggested a collapsed masonry feature that lined the entryway. The amount of stone could have originated from an elevated, masonry-lined entrance like those seen historically at Hopi.

Conclusions

Structure Function. The architecture and obvious paucity of floor storage and thermal features marks the structure as a kiva. Artifacts on the floor revealed little, although a few were rare and may indicate non-domestic use. Historically, pipes were often employed in kiva activities, and archeologically, they are often found in pitstructures as well. Parts of large predators were also commonly used in historic kiva ceremonies, as well as in prehistoric kivas. At 29SJ 629, canine parts were observed near or in firepits in all three pitstructures, which might mark ceremonies at the abandonment of the structures. Finally, the floor anvil and hammerstones suggest the remains of a specific work activity exclusive to the Kiva.

There is little evidence at 29SJ 629 for other site activities related temporally to the Kiva. Apparently, domestic habitation and other types of activities took place elsewhere, perhaps at nearby 29SJ 630.

Temporal Assignment. Ceramics indicate use of the Kiva was during the latest occupation at the site. The southern recess and floor sherds suggest construction and abandonment in the late A.D. 1000s and early A.D. 1100s. The scarcity of trash coeval with the use of the Kiva suggest either a short occupancy or activities that generated little refuse.

Pithouse 2

By the second field season, there was little doubt that a pitstructure that would conform architecturally to the surface rooms existed east of the Kiva (Figures 5.8-5.12, Plates 5.7, 5.9). At this point, the Kiva had not been totally defined nor was the floor removed. While work in the Kiva progressed, definition of the Pithouse 2 perimeter was conducted. Two to three meters east of the Kiva, in Grid 33, a curving fire-reddened contact was discovered and followed to the southeast and northeast, where it was lost. In an attempt to redefine this contact, tests were extended to the west on either side, removing the fill from the Kiva recess in the process. The reddened contact line is worth extra attention, at this point, because it suggested that Pithouse 2 had burned.

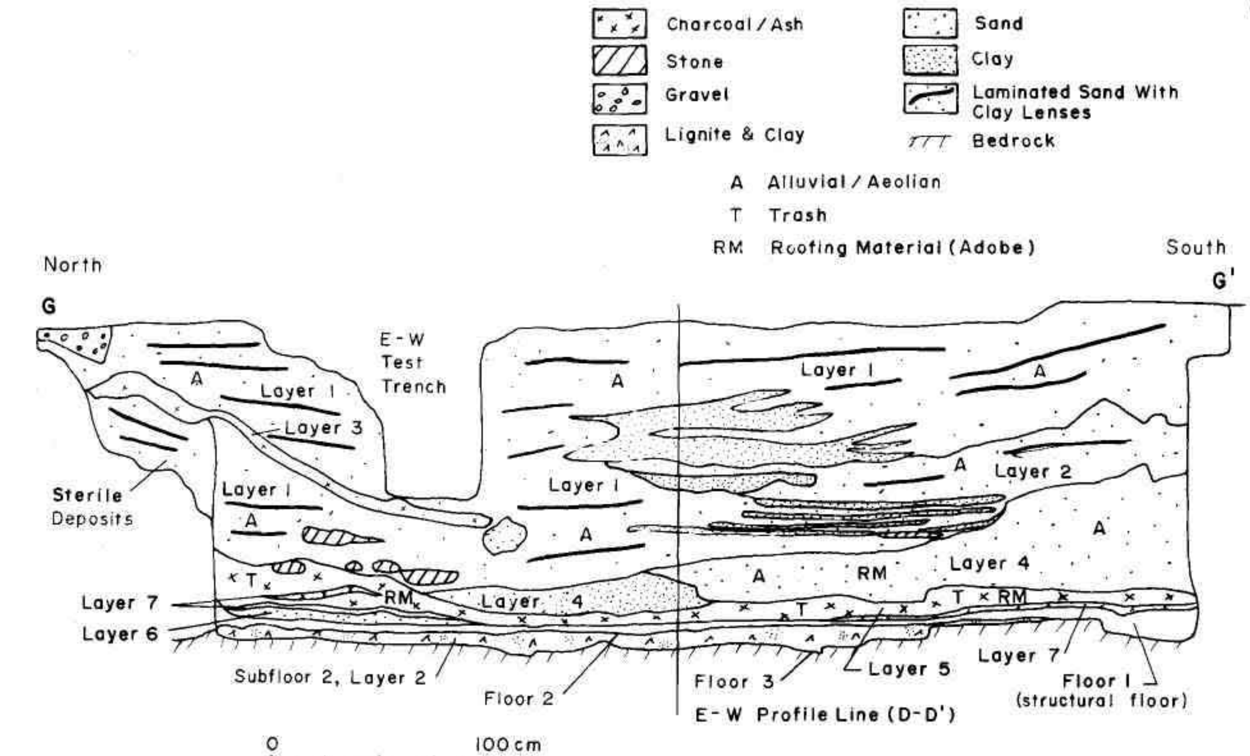

Figure 5.8. Pithouse 2, north-south profile of the stratigraphy (NPS 310/82215 C).

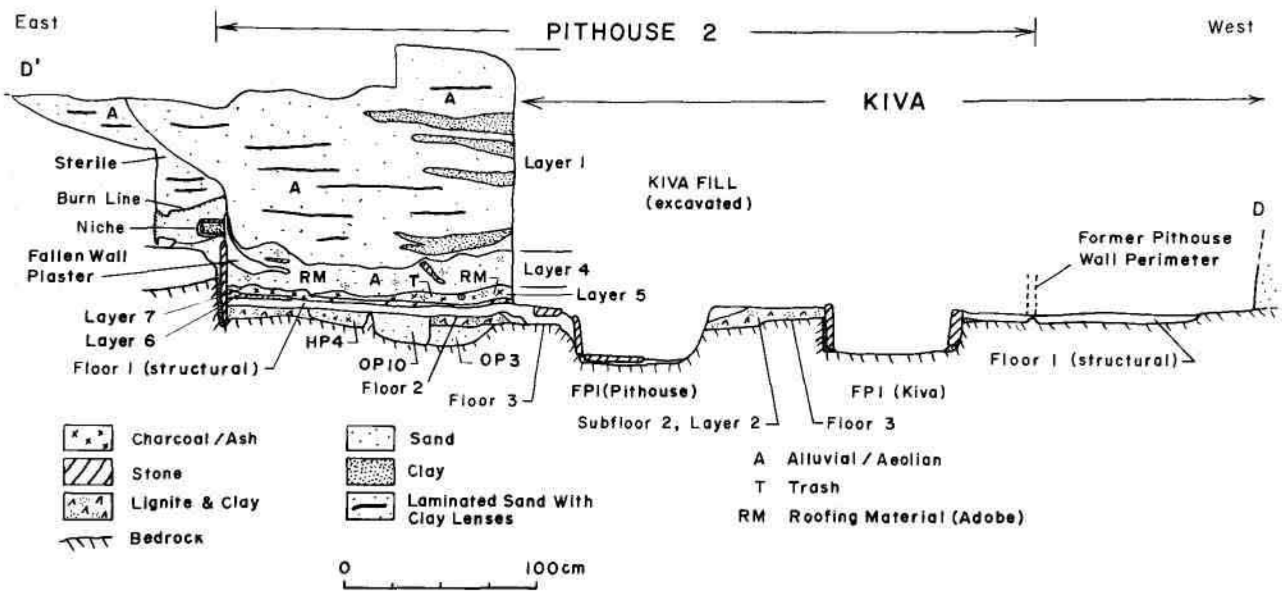

Figure 5.9. Pithouse 2, east-west profile of stratigraphy (east half) and of the Kiva floor (NPS 310/82217 C).

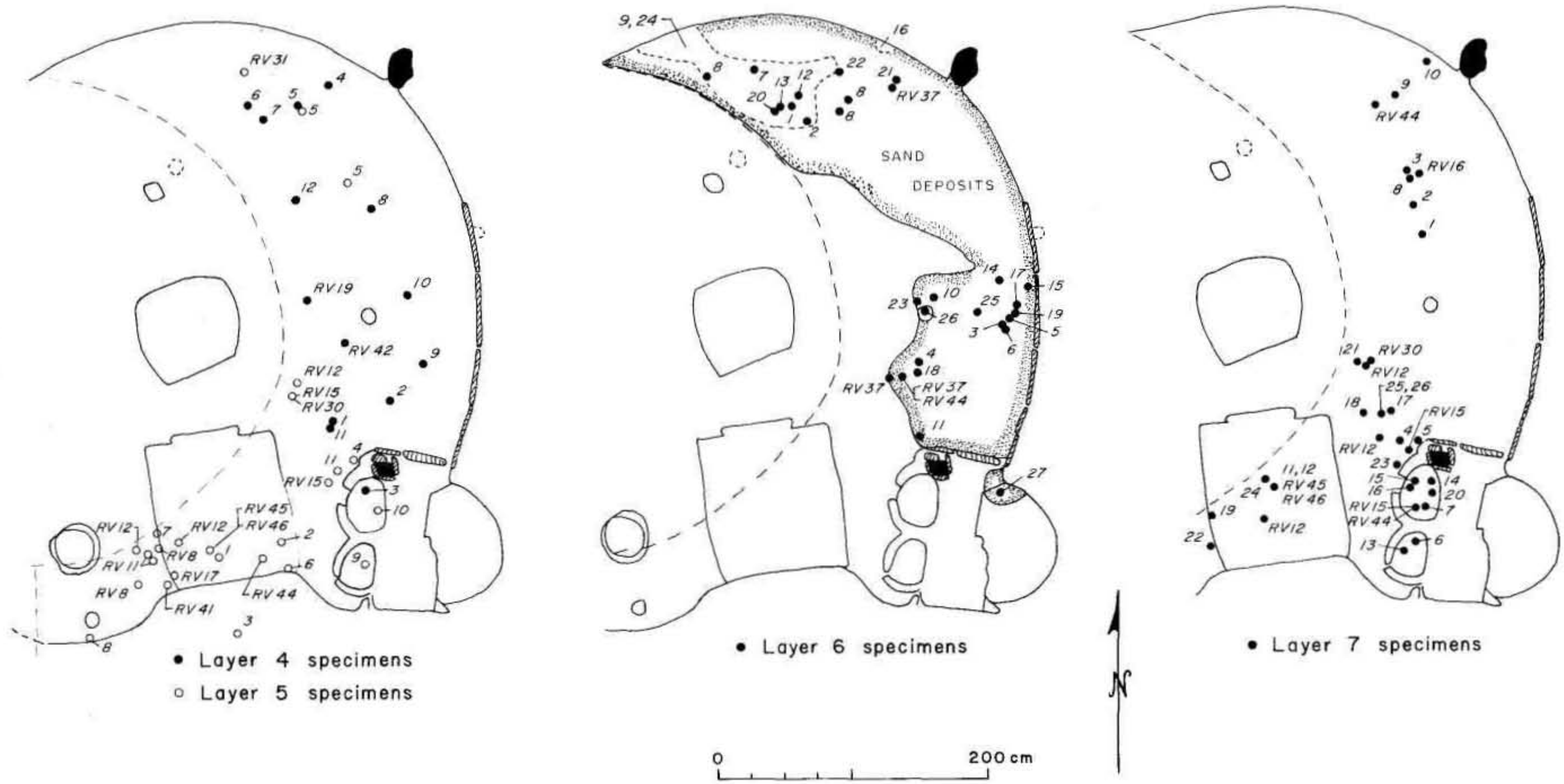

Figure 5.10. Pithouse 2, distribution of artifacts in Layers 4-7 (Tables 5.5-5.7--specimen lists) (NPS 310/82227 B).

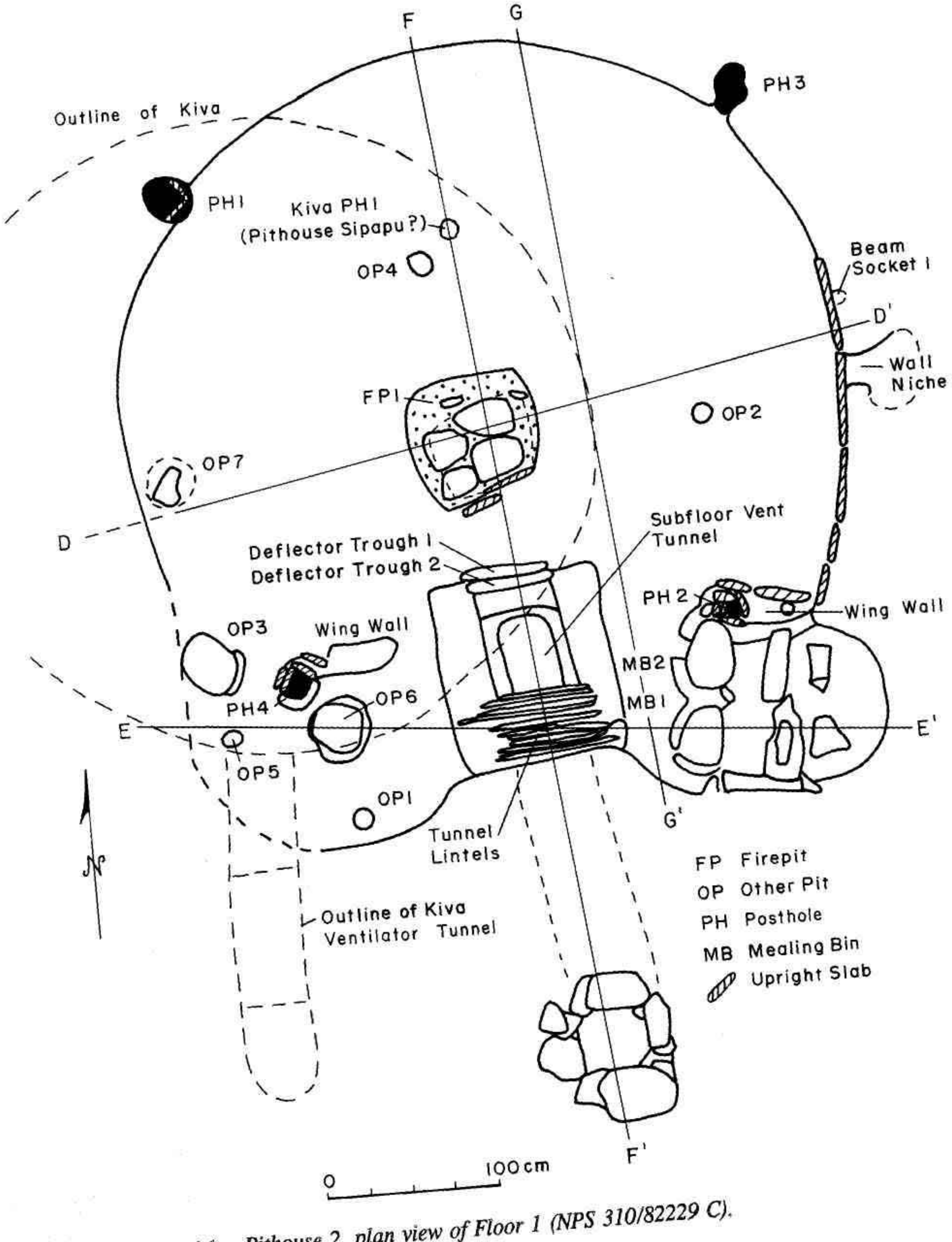

Figure 5.11. Pithouse 2, plan view of Floor 1 (NPS 310/82229 C).

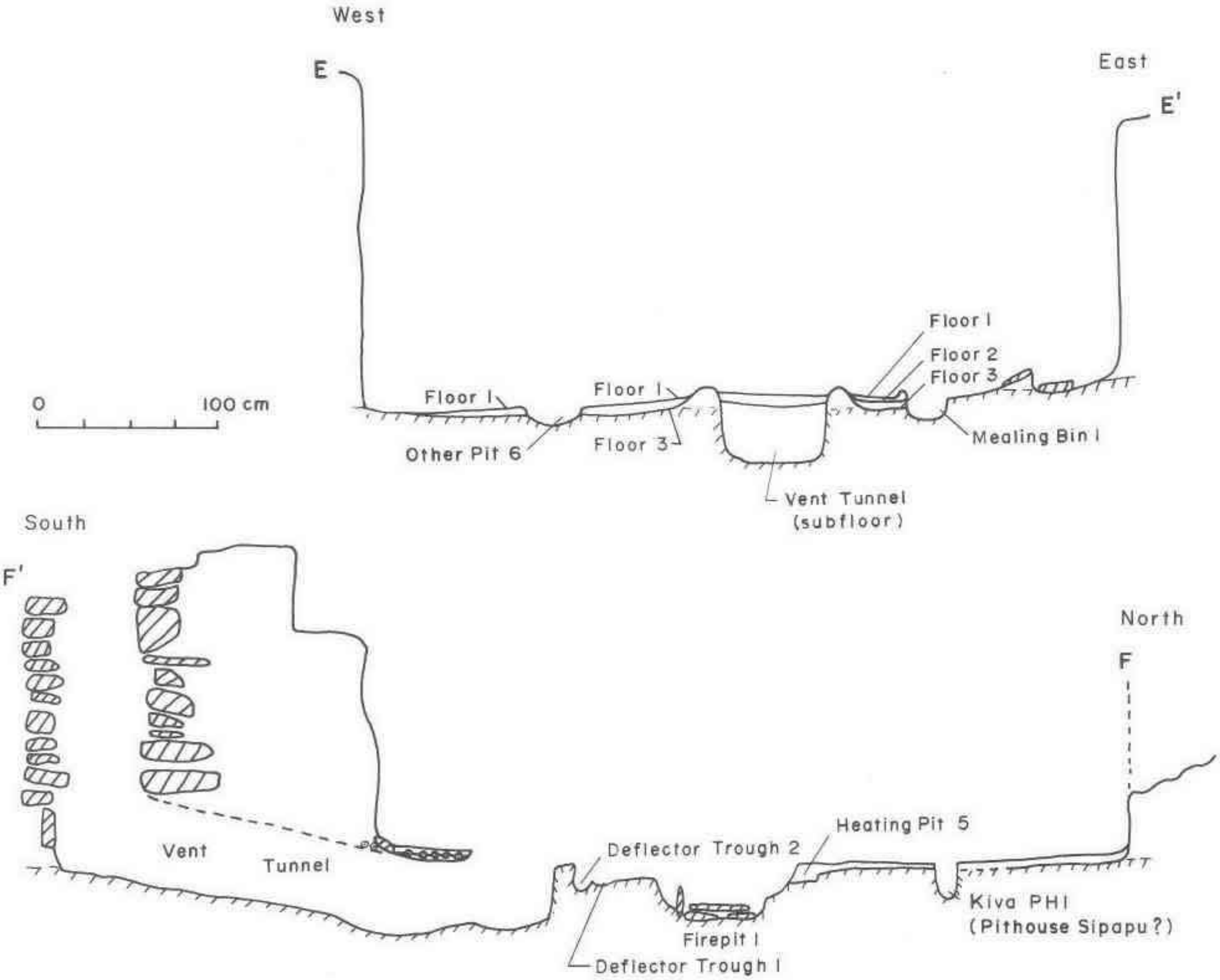

Figure 5.12. Pithouse 2, north-south and east-west floor profiles (NPS 310/82220 C).

Later, it was found that the contact was about 50-100 cm east of and running parallel to the actual pithouse wall. Part of the pithouse appeared burned, but a relationship between that and the contact line was not discovered. Perhaps there was a fire in the structure after the east wall had slumped.

To provide a clean face of stratigraphy of Pithouse 2 fill for profiling and excavation, the general Pithouse 2 outline was determined, and a north-south backhoe and hand-shovel trench was placed to cut just the eastern arc of the excavated Kiva. Later, this material from the trench was screened (as "Layer 1-to-Floor" or "general fill") because the backhoe bucket made contact with the floor at the south end of the trench. Next, the profile balk was subdivided, an east-west face profiled, and the north half removed. The first three layers, as defined from the profiles, were removed by backhoe; the rest were excavated with shovel and trowel in the more traditional manner. The same procedure was followed for removal of the southeastern balk. Finally, the small remaining balks in the southwestern and northwestern areas of Pithouse 2, which were not removed by the Kiva construction, were excavated with hand tools. In all cases, fill an arbitrary 10 cm above the floor was left until removed as a single unit. All the Pithouse 2 fill was removed in natural layers, except for those grid levels cleared during initial testing (4 levels).

Plate 5.7 *Pithouse 2 and the Kiva, view of upper floors (NPS 2326).*

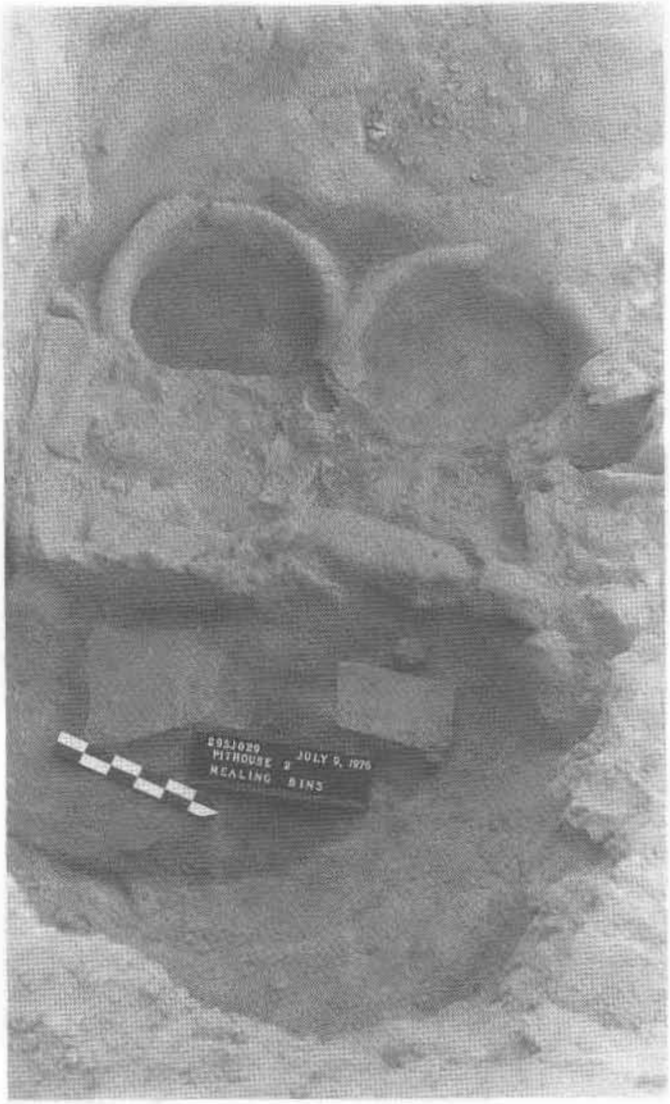

Plate 5.8A. *Pithouse 2, Mealing Bin complex. 30-cm north arrows. Looking southwest (NPS 12319).*

Fill (Figures 5.8-5.9)

Layer 1. The largest volume of fill was composed of natural sand and clay lenses of varying thicknesses that had washed or blown into the structure. Charcoal speck density was low (2-5 per 100 cm^2), as were artifact frequencies. The layer was generally 100-110 cm deep but reached depths of only 40 cm at the walls. Another 80 cm could be added to that from grid levels removed before the structure was defined. Most of Layer 1 was removed by backhoe, as was Layer 2, and neither were screened.

Layer 2 consisted of a block of sterile, clayey sand (adobe) in the southern half of the structure. It was well-compacted and homogenous, with no trace of cultural material. Layer 2 was only 15-35 cm deep and may have represented melted roofing adobe. It represented an event that occurred during deposition of Layer 1.

Plate 5.8B. Pithouse 2, Mealing Bin Complex. Looking southeast (NPS 12325).

Layer 3, 6-10 cm deep, yielded poorly consolidated chunks of clay and adobe, small stones, and up to 30 charcoal specks per 100 cm^2, all primarily in sand matrix. It sloped steeply into the pithouse from the northeastern side. It was removed by backhoe and not screened, but no artifacts were observed.

Layer 4. For the most part, Layer 4 was composed of sand and structural remains. It was 15-25 cm deep, except in the south and southeastern corners, where it thickened to 40-50 cm. Charcoal density was low (4-5 specks per 100 cm^2) and there were moderate numbers of artifacts (Table 5.5). Structural rubble was particularly common, consisting of 42 unmodified stones, 7 groundstones (including 4 metate fragments), over 100 pieces of roofing adobe (many smoke blackened), six rotted juniper poles (3-5 cm in diameter), and wall plaster. Pieces of some restorable vessels in the fill fit those in deeper layers (Figure 5.10, Table 5.5, Appendix E).

Layer 5. Much of Layer 5, 7-13 cm deep, consisted of structural debris like that in Layer 4. Scarcely a half dozen stones were noted, but the density of roofing adobe chunks and charcoal specks (5-10 per 100 cm^2, occasionally increasing to 75-100 flecks per 100 cm^2) was greater than the previous layer. The marked increase in charcoal reflects the presence of burned deposits. Six, short, juniper(?) pole fragments, 2.5-4.5 cm in diameter and probably from roofing remains, were recovered, along with considerable cultural material. Part of Layer 5 rested upon Floor 1, and thus was considered "floor fill," although Layers 6 and 7 generally underlaid the deposit. Most artifacts from Layer 5 were on, or nearly on, Floor 1 (Figure 5.10, Table 5.5).

Layer 6. A relatively clean, tan sand deposit covered the floor in the northeastern quadrant (Figure 5.10). For the rest of the house, it was restricted to a narrow strip along the east wall, terminating at the mealing bin/southeast wingwall complex. The deposit was 5-7 cm thick (never exceeding 10 cm) and did not contain charcoal, except in small quantities (1-10 per 100 cm^2) when in contact with Layers 5 and 7 that lay above it. This sand was probably intentionally deposited on the floor to protect and cushion it during occupation. Similar behavior was practiced in other Anasazi pithouses (Bullard 1962:151) and in Chaco Canyon, particularly at nearby 29SJ 628 (McKenna and Truell 1986:52), which predates Pithouse 2.

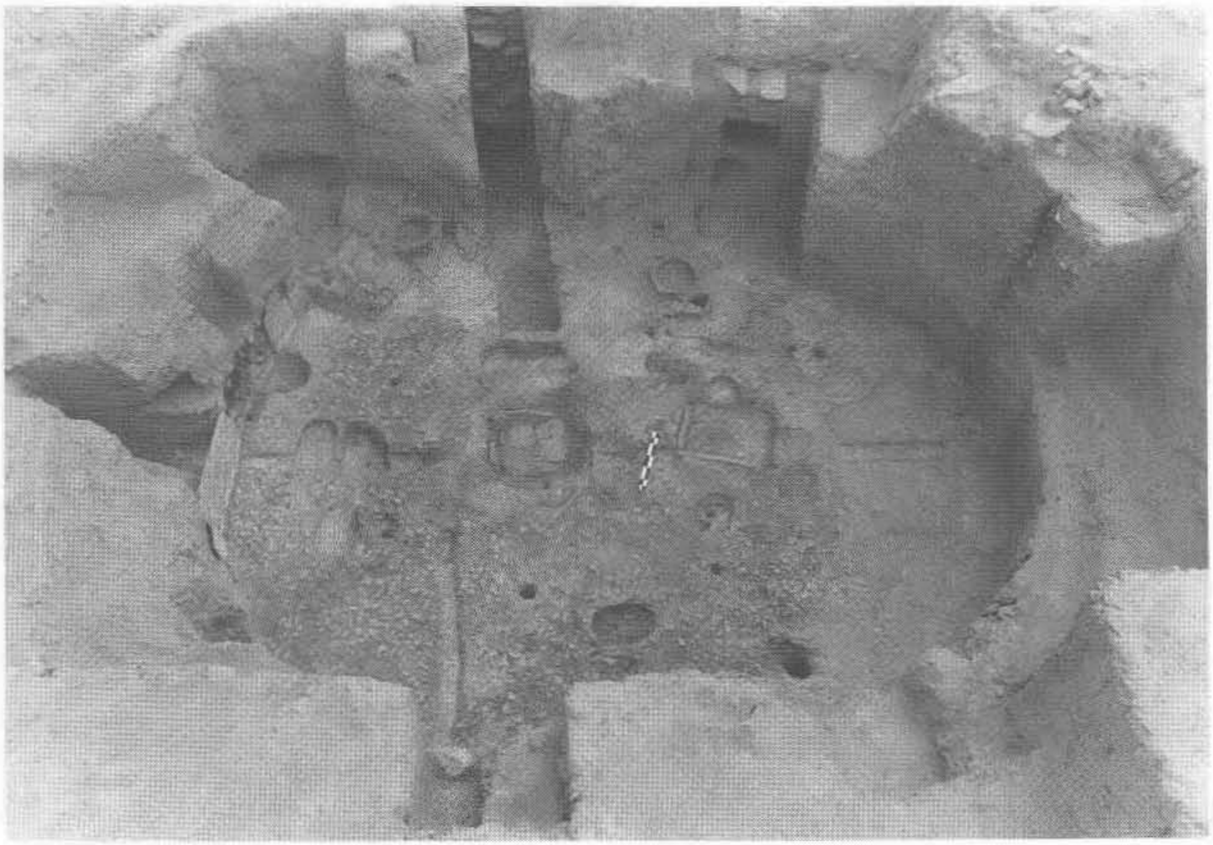

Plate 5.9. *Pithouse 2 (left) and the Kiva, showing Pithouse floor 2 construction of adobe chunks and lignite. Looking south. Long north-south groove near bottom of photo is backhoe damage. Ventilators in both structures have have partly removed. 50-cm north arrow (NPS 12434).*

Cultural materials associated with this deposit (Table 5.6) can be assumed to reflect in situ artifacts left at abandonment. Although parts of Layer 6 were sterile, others yielded concentrations of chipped stone and some other debris, including three bone tools. The largest concentration of 23 flakes and a micro drill was uncovered in an area 115 by 10-40 cm in the western part of the northeastern quadrant. Quantities of minute turquoise flecks and a few turquoise beads, broken during manufacture (Mathien, this report), were associated with the chipped stone, as well as several abraders, including a file (Plate 5.2B) and a lapidary lapstone (Plate 5.3). Two other flake concentrations were located in the northeastern quadrant, but without turquoise refuse (Figure 5.10, Table 5.6). Overall, 71 pieces of chipped stone, mostly utilized flakes, were recovered from this deposit (Cameron, this report), dominated by silicified wood of the 1140s series (55 percent) and 1112-1113 series (21 percent). There were only

Table 5.5. Pithouse 2 distribution of materials in Layers 4 and 5.[a]

Artifact Number	Artifact Class	Lithic Material or Ceramic Ware	FS No.
Layer 4			
1	Metate fragment (25 kg)	2000 (sandstone)	2827
2	Metate fragment (16 kg)	2000 (sandstone)	2828
3	Metate fragment (6500 g)	2000 (sandstone)	2829
4	Metate fragment 4250 g)	2000 (sandstone)	2830
5	Passive abrader fragment	2000 (sandstone)	2832
6	Passive lapidary abrader (402 g)	2000 (sandstone)	2837
7	Passive lapidary abrader/pot cover fragment? (15x6x0.5 cm, 107 g)	2000 (sandstone)	2838
8	Bifacially chipped cover fragment (discarded)	2000 (sandstone)	2833
9	Bifacially chipped cover fragment (discarded)	2000 (sandstone)	2841
10	Mano (531 g)	2000 (sandstone)	2834
11	Mano (729 g)	2000 (sandstone)	2842
12	Hammerstone (286 g)	1110 (splintery silicified wood)	2835
-	Projectile point fragment, side-notched (0.4 g)	1052 (chalcedony, clear)[b]	2840
Misc.	Sherds, turquoise, shell, anvil, active lapidary abrader, bones, sherds from RV 8, 11, 12, 15, 30, and 41	-	-
Layer 5			
1	Metate fragment (840 g)	2000 (sandstone)	2938
2	Metate fragment	2000 (sandstone)	2942
3	Metate fragments (1000 g, 4600 g)	2000 (sandstone)	3372
4	Hammerstone	1110 (splintery silicified wood)	?

Table 5.5. (continued)

Artifact Number	Artifact Class	Lithic Material or Ceramic Ware	FS No.
5	Unutilized flake (3.9 g)	1053 (chalcedony, black inclusions)[b]	2861
	Unutilized flake (2.6 g)	4000 (quartzite)	2861
6	Basket fragments	-	2962
7	Misc. sherds (12)	- Cibola wares	2945
8	Red Mesa B/w ladle sherd	- Cibola Whiteware	2950
9	Active abrader (400 g)	2000 (sandstone)	3167
10	Active abrader (668 g)	2000 (sandstone)	3186
11	Core (21 g)	1142 (chalcedonic silicified wood)	2937
Misc.	Sherds, bone, bone awl[c], chipped stone, turquoise, and sherds from RV 12, 16, 44, and 46	-	-

[a] See distribution in Figure 5.10.
[b] High surface chert.
[c] Bone awl was from an unidentified medium- to large-sized mammal.

Table 5.6. Pithouse 2 distribution of materials in Layer 6.[a]

Artifact Number	Artifact Class	Lithic Material, Ceramic Ware, or Faunal Species	FS No.
1	Active lapidary abrader (37 g)	2000 (sandstone)	2887
2[b]	Active lapidary abrader fragment (9x8x1 cm, 121 g)	2000 (sandstone)	2888
3	Hammerstone? (335 g)	1110 (splintery silicified wood)	2889
4	Polisher (66 g)	4000 (quartzite)	2890
5	Passive abrader (423 g)	2000 (sandstone)	2891
6	Hammerstone (337 g)	4005 (quartzite)	2892
7	Mano (1814 g)	2000 (sandstone)	2893
8[b]	Passive lapidary abrader fragment (3 pieces: 527 g)	2000 (sandstone)	2894
9	Utilized flake (10.9 g)	1053 (chalcedony, black inclusions)[c]	2875
	Unutilized flakes (2) (8.1, 32.7 g)	1110 (splintery silicified wood)	2875
	Utilized flakes (2) (3.6, 10.9 g)	1110 (splintery silicified wood)	2875
	Unutilized flakes (2) (4.0, 17.1 g)	1112 (cherty silicified wood)	2875
	Utilized flakes (2) (4.5, 21.4 g)	1112 (cherty silicified wood)	2875
	Retouched flake (9.6 g)	1112 (cherty silicified wood)	2875
	Utilized flake (5.1 g)	1113 (cherty silicified wood)	2875
	Unutilized flakes (2) (0.5, 0.5 g)	1140 (chalcedonic silicified wood)	2875
	Utilized flakes (17) (222.0 g)	1140 (chalcedonic silicified wood)	2875
	Retouched flakes (4) (3.6, 5.8, 7.4, 10.3 g)	1140 (chalcedonic silicified wood)	2875
	Flake micro-drill (0.3 g)	1140 (chalcedonic silicified wood)	2875
	Utilized flakes (2) (6.2, 22.0 g)	1141 (chalcedonic silicified wood)	2875
	Unutilized flake (33.0 g)	1142 (chalcedonic silicified wood)	2875
	Utilized flakes (2) (5.1, 10.0 g)	1142 (chalcedonic silicified wood)	2875
	Unutilized manuport	5100 (limonite)	2875
	Bone tool fragment	- Unidentified medium-to-large mammal	2875

Table 5.6. *(continued)*

Artifact Number	Artifact Class	Lithic Material, Ceramic Ware, or Faunal Species	FS No.
10	Unutilized flake (0.2 g)	1021 (chert, dull red)	2877
	Utilized flake (1.3 g)	1112 (cherty silicified wood)	2877
	Unutilized flake (1.3 g)	1113 (cherty silicified wood)	2877
	Utilized flake (1.0 g)	1113 (cherty silicified wood)	2877
	Utilized flake (2.5 g)	1140 (chalcedonic silicified wood)	2877
11	Unutilized flake (1.5 g)	1053 (chalcedony, black inclusions)[e]	2878
12	Retouched flake (8.1 g)	1140 (chalcedonic silicified wood)	2879
13	Retouched flake (13.8 g)	1113 (cherty silicified wood)	2880
14	Utilized flake (1.0 g)	1021 (chert, dull red)	2884
	Unutilized flake (18.3 g)	1112 (cherty silicified wood)	2884
	Utilized flake (7.1 g)	1112 (cherty silicified wood)	2884
15	Unutilized flake (3.4 g)	1112 (cherty silicified wood)	2885
16	Utilized flake (7.8 g)	1054 (chalcedony)[e]	2886
	Unutilized flake (3.0 g)	1110 (splintery silicified wood)	2886
	Unutilized flake (0.7 g)	1141 (chalcedonic silicified wood)	2886
	Unutilized flake (1.5 g)	1145 (chalcedonic silicified wood)	2886
17	Bone awl	- Unidentified artiodactyl	2904
18	Bone awl	- Felis rufus (bobcat)	2906
19	Bone tool fragment	- Unidentified artiodactyl	2907
20	Jewelry inlay	5300 (turquoise)	2909
21	Jewelry debris (1)	5300 (turquoise)	2910
22	Jewelry debris (1)	5300 (turquoise)	2914
23	Unmodified mineral (1)	5414 (sepiolite)	2911

Table 5.6. (continued)

Artifact Number	Artifact Class	Lithic Material, Ceramic Ware, or Faunal Species	FS No.
24	Jewelry debris (1000s: 8.2 g)	5300 (turquoise)	2908
	Bead blank and two bead fragments	5300 (turquoise)	2908
	Bead	2551 (shale, black)	2908
25	Red Mesa B/w bowl fragment (2)	- Cibola Whiteware	2900
26	Jewelry debris (4)	5300 (turquoise)	2913?
27	Utilized flake	1052 (chalcedony, clear)[c]	2996
-	Core (56 g)	1140 (silicified wood, white chalcedony)	-
Misc.	Sherds, chipped stones, bones, turquoise, sherds from RV 70	-	-

[a] See distribution in Figure 5.10.

[b] Fragments of a lapidary lapstone 24x13x1 cm, weighing approximately 849 g. Several areas on one side are ground smooth, perhaps from smoothing the sides of beads. Note that abrader analysis classified the fragments as both passive and active abraders. See Plate 5.3.

[c] High surface chert.

31 sherds, and, of the 14 classified painted sherds, all were Red Mesa Black-on-white. Much cultural material in this deposit was clearly related to the production of turquoise jewelry.

Layer 7. A thin deposit, 0.5-2.0 cm thick, of ash and carbonized twigs overlaid the floor in the southeastern quadrant and on Layer 6, which may have been the remains of an attempt to burn the structure at abandonment. Several carbonized, small-diameter, pole fragments were also recovered in the southeastern wing wall area. Layer 7 contained some refuse, although most of the cultural material was resting on the floor (Figure 5.10, Table 5.7) and difficult to physically separate during excavation. Despite its limited volume, cultural material was common and much of it may have been left at abandonment. Much of the chipped stone material resembled the assemblage recovered from Layer 6, which was associated with turquoise jewelry production. Ceramics were common (152 sherds) and dominated by Red Mesa and Gallup Black-on-whites. A porcupine foot and a Gallup Black-on-white bowl fragment (Plate 8.10A) containing burned selenite were recovered from the deposit but were also associated with Layer 6. The selenite could have been used as a turquoise polishing agent. The porcupine foot may have come from a robe (Gillespie, this report). Experiments drilling turquoise beads, however, did not suggest the use of porcupine quills for bead production.

Floor 1.

The upper pithouse floor was plastered with yellow-brown adobe, 2-5 cm thick, and stained a gray-brown (Figure 5.10-5.12, Plate 5.7). It was relatively flat but rose 4-5 cm around the edges to meet the walls. This same floor partly served inhabitants of the Kiva, although in one spot it had been replastered twice. The floor was 425 cm (north-south) by 415 cm (east-west), covering 15.6 m^2. Removal of the firepit, mealing bin area, and the ventilator tunnel left an effective floor area of 13.1 m^2. Several sherds were extracted from the floor plaster when it was removed.

Floor 1 Features. There were surprisingly few floor pits for the house type (Figures 5.11, 5.13; Table 5.8). Except for post supports, firepit, and deflector, there were only three to four other pits (OP 2, 4, 7, and Kiva PH 1), evenly distributed, in the area north of the wing wall area. Four more clustered in the southwestern corner around a roof support. There was an unusual lack of heating pits. All of the features listed as sealed were located in the floor, later utilized for Kiva activities. Thus, it is likely that most, or all, were left open when the pithouse was abandoned but later sealed when the Kiva was built.

Firepit 1. A firepit filled with burned sand and charcoal was located along the axis of the ventilation system (Table 5.2). Thin, upright slabs lined the south and part of the east side but the remainder appeared dismantled, perhaps during the Kiva construction. Two layers of blackened, unmodified stones covered the firepit bottom, but little oxidation remained; therefore, it was not suitable for archeomagnetic sampling. Few seeds were recovered from a flotation sample but many were carbonized (M. Toll, this report).

Deflectors. At a time when there was probably an above-floor ventilator, two contiguous grooves between the ventilator and firepit probably served to support upright deflector slabs affixed with mortar. It is not known if two non-contemporary deflectors or just one are represented by the remains, although the former is suspected. With the installation of a subfloor ventilating system, the deflectors were probably removed and the slots sealed.

Postholes. Four pits containing lignite and shims, and spaced in a rectangular arrangement, supported the main roof support posts. Two were set in the wall on the north side, slightly angled towards the firepit, and the others were placed vertically in vestigial adobe and stone wing walls on the floor. Each pit held a post about 15 cm in diameter. These were much smaller than expected for carrying the weight of the roof, unless the larger end of the posts were used for supporting the main cross beams, as they were in the Dolores region (Richard Wilshusen, personal communication 1992). Flecks of turquoise were found in both northern holes.

Other Pits. Seven other pits, not readily identifiable regarding function, were situated in a

Table 5.7. Pithouse 2 distribution of materials in Layer 7.[a,b]

Artifact Number	Artifact Class	Lithic Material Ceramic Ware, or Faunal Species		FS No.
1	Polishing stone	?	(quartzite?)	2920
2	Unutilized flake (2.2 g)	1141	(chalcedonic silicified wood)	2919
3	Utilized flake (21.8 g)	1112	(cherty silicified wood)	2919
4	Unutilized flake (8.7 g)	1140	(chalcedonic silicified wood)	2967
5	Utilized flake (4.7 g)	1142	(chalcedonic silicified wood)	2968
6	Unutilized flake (1.3 g)	1140	(chalcedonic silicified wood)	3168
	Utilized flake (6.4 g)	1052	(chalcedony, clear)[c]	3168
	Utilized flake (17.8 g)	1150	(silicified wood, jasper)	3168
	Core (134 g)	1112	(cherty silicified wood)	3168
	Core (140 g)	1053	(chalcedony, black inclusions)[c]	3168
	Core (178 g)	1120	(silicified wood, red)	3168
7	Unutilized flakes (2) (3.5 g total)	1052	(chalcedony, clear)[c]	3177
	Unutilized flake (0.1 g)	1112	(cherty silicified wood)	3177
	Utilized flake (19.0 g)	1113	(cherty silicified wood)	3177
	Unutilized flakes (7) (44.2 g total)	1120	(silicified wood, red)	3177
	Unutilized flake (6.1 g)	1142	(chalcedonic silicified wood)	3177
	Unutilized flake (10.5 g)	2202	(quartzitic sandstone, Nacimiento)	3177
	Unmodified mineral	5100	(limonite)	3177
8	Early Gallup B/w bowl frag.;[d]	-	Cibola Whiteware	2929
	Burned selenite cake in bowl	-	Polishing compound for jewelry?	2930
9	Articulated right front foot	-	(Erethizon dorsatum) Porcupine	2924
10	Bone flesher	-	Unidentified artiodactyl	2925
11	Antler tine resting on RV 45	-	Young deer	3367
12	Metate fragment on RV 45	2000	(sandstone)	3368

Table 5.7. (continued)

Artifact Number	Artifact Class	Lithic Material Ceramic Ware, or Faunal Species		FS No.
13	Corncob fragments (3)	-		3171
	Squash seeds	-		3171
14	Beans (12)	-		3172
15	Sandal fragments	-		3175
16	Twine, beans, prickly pear	-		3176
17	Tree-ring sample (pinyon, 4.4 cm dia.)	-	Tree-ring date: A.D. 813vv, CNM-347	2981
18	Tree-ring sample (pinyon, 3 cm dia.)	-	Tree-ring date: A.D. 943vv, CNM-348	2982
19	Jewelry debris (1)	5300	(turquoise)	2969
20	Herpetofaunal bones (2)	-	(*Spea* sp.) Spadefoot toad	3179
21	Tree-ring sample	-	No date	2921
22	Tree-ring sample	-	No date	2978
23	Tree-ring sample	-	No date	2979
24	Tree-ring sample	-	No date	2980
25	Tree-ring sample	-	No date	2983
26	Tree-ring sample	-	No date	2984
Misc.	Sherds, bones, chipped stones, and sherds from RV 12, 15, 16, 30, 44, and 46	-		-

[a] See distribution in Figure 5.10.
[b] FS 3171-3368 recovered from the mealing bin basins or Layer 2 in the ventilator tunnel.
[c] High surface chert.
[d] RV 16; Remainder found in Plaza Grid 16, Level 1 (see Plate 8.10A).

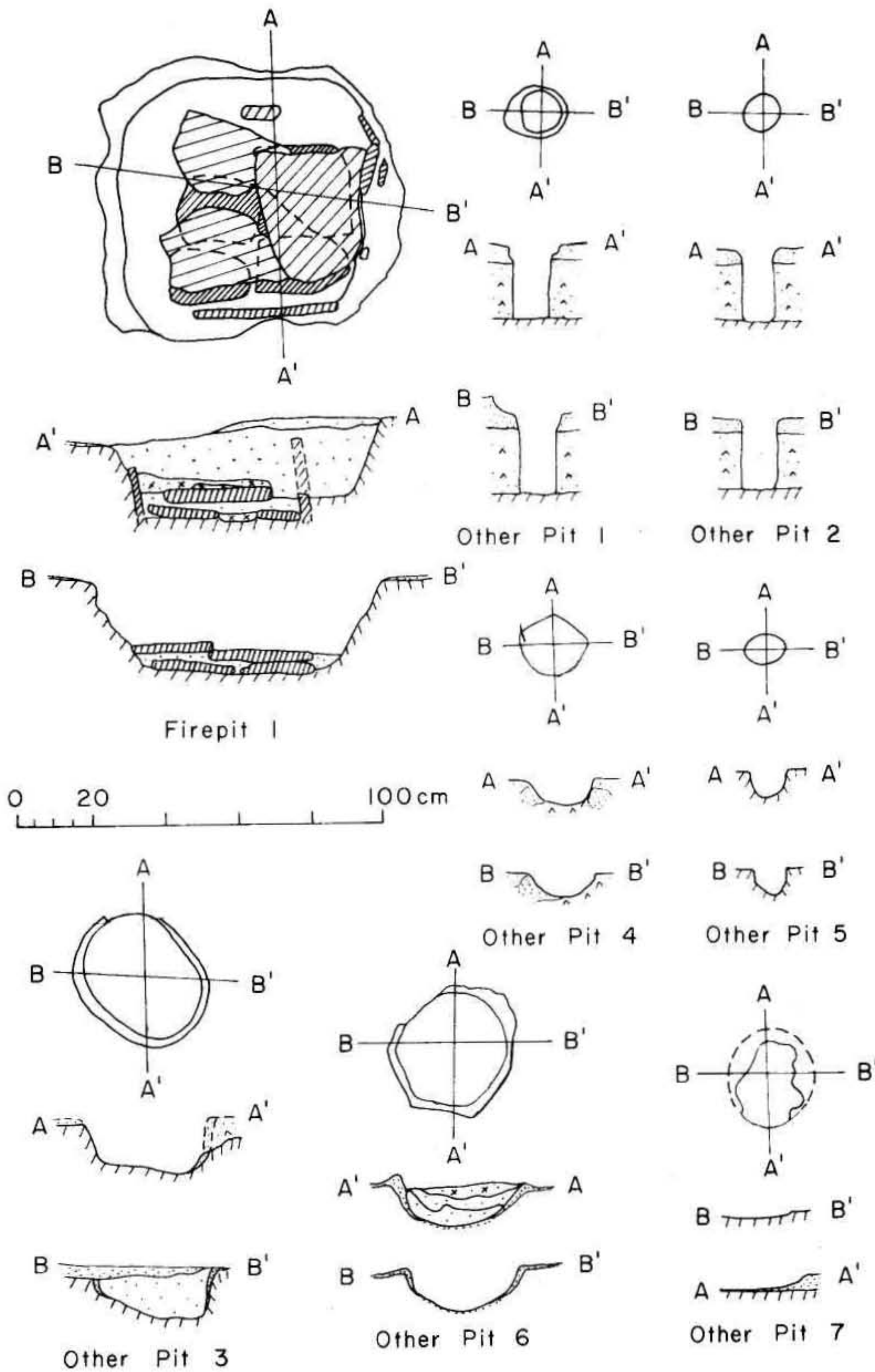

Figure 5.13A. Pithouse 2, Floor 1 feature plans and profiles (NPS 310/82282 C).

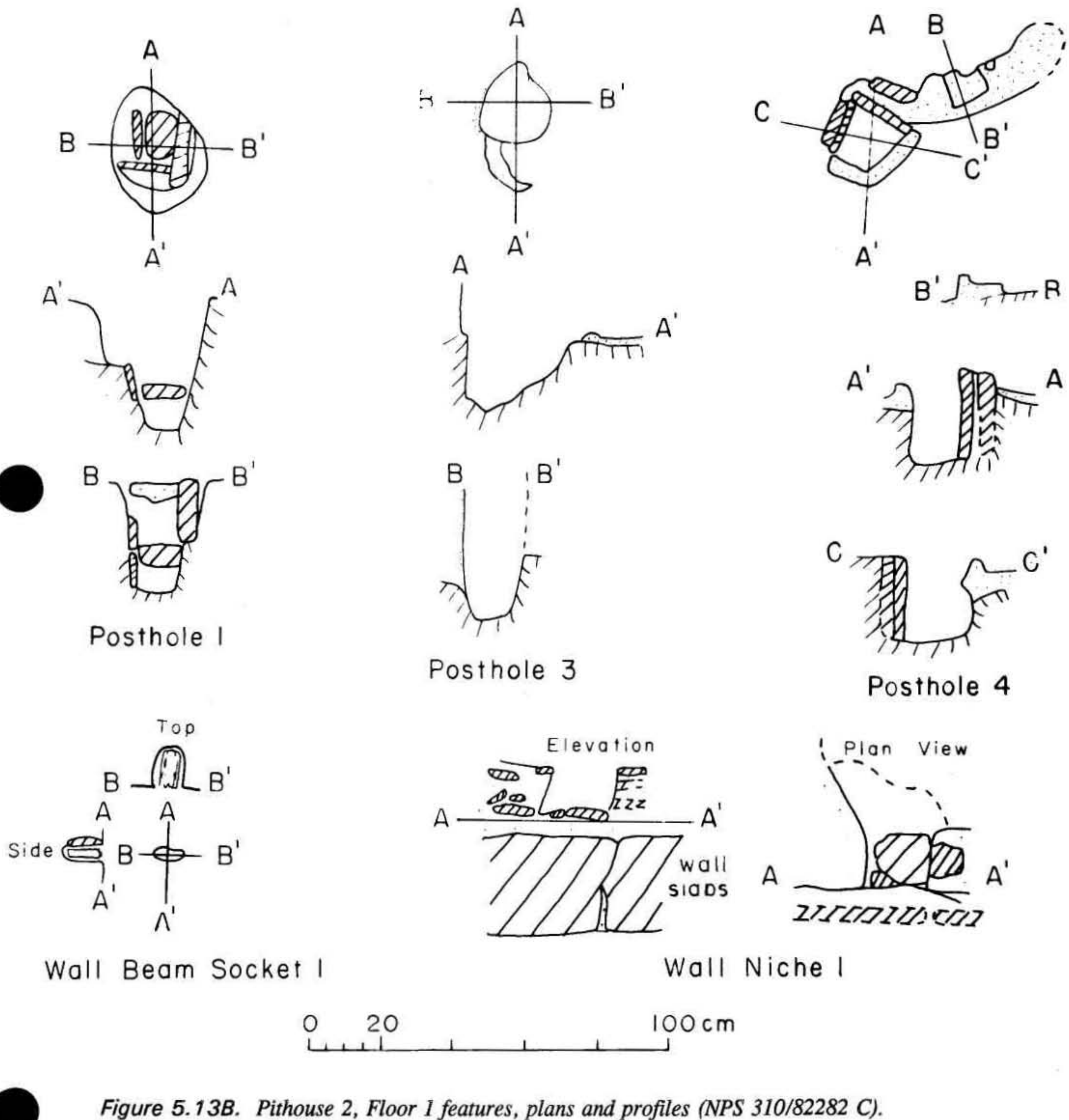

Figure 5.13B. Pithouse 2, Floor 1 features, plans and profiles (NPS 310/82282 C).

Table 5.8. List of features in Pithouse 2, Floor 1.[a]

Feature	Length (cm)	Width (cm)	Height/ Depth (cm)	Volume (liters)	Fill Type	Fill Period	Lining	Sealed[b]	Comments
Firepit 1	70	44	23	89.0	27, 30,50	Occ/Int	L-S	S	Mouth = 4619 cm^2. Lined on three sides. Two layers of stone on bottom.
Other Pit 1	11.5	10-15	11	1.2	11	PO?	L-P?	O	
Other Pit 2	10	10	20	1.6	11	PO?	L-P	O	Cuts Other Pit 10 (Floor 2).
Other Pit 3	33	30	6-14	8.9	11,45	PO	L-P	S-FP	Cut by kiva deflector. Mealing basin?
Other Pit 4	16	16	6	1.0	13	Int?	U	S-FP	Sipapu?
Other Pit 5	11.3	9.2	7	0.5	10	Unk.	U	S?	
Other Pit 6	30.5	30.5	13	6.5	11,14	Unk.	L-P	S-FP	Mealing basin? Turquoise pendant in fill.
Other Pit 7	23	21	3	1.5	10	PO	L-P	S-FP	Cut by Kiva firepit. Pot rest.
Beam Socket 1	8	4	11	0.3	17	Occ.	L-P	O	One shim. 35 cm above floor.
Wall Niche 1	20	14	30±	9.0±	14	PO	L-P/M	O	Burned. 35 cm above floor.
Posthole 1	30	26	33	14.5	13,14	Occ/PO	L-S	S-FP	Three shims. NW corner.
Posthole 2	14	13	42	2.5	13,16	Occ.	L-S	O	Five shims. In E wingwall.
Posthole 3	20	10?	44	7.5	13,14	Occ/PO	U	O	Shims removed? NE corner.
Posthole 4	26	17	25	8.1	41,52	Occ/PO	L-S	S-FP?	Four shims. In W wingwall.
Mealing Bin 1	80	57	-	--	42	PO	L-A/S	O	
catch basin	43	31.5	14.5	10.8	25,30	PO	L-P	O	Rimmed by a 5 cm high adobe collar--burned.
metate rest	46	57	-	--	27	PO	-	O	19° incline for metate.

Table 5.8. (continued)

Feature	Length (cm)	Width (cm)	Height/ Depth (cm)	Volume (liters)	Fill Type	Fill Period	Lining	Sealed[b]	Comments
Mealing Bin 2	70	44	-	--	42	PO	L-A/S	O	
catch basin	36	28	12	7.9	27,30	PO	L-P	O	Rimmed by a 4-6 cm high adobe collar--burned.
metate rest	36	44	-	--	27	PO	-	O	38° incline for metate.
Deflector Slot 1	49	5-7	15	--	51	Int.	U	S-FP	
Deflector Slot 2	48	8	8-9	--	51	Int.	U	S-FP	
Ventilator shaft	39 top	33	169	--	42,30	PO	L-M	O	
	62 bot.	60	-	--		-	-	-	
Ventilator tunnel	280	41-43	40-52	--	30,42	PO	L-S	O	Roof of lintel poles.

[a] See Tables 7.3-7.4 for an explanation of the feature and attribute codes.
[b] Sealed pits covered by Kiva floor plaster.

symmetrical fashion on the floor. Several were too small to have served for storage. The largest two pits, OP 3 and OP 6, were located in the southwestern corner and may have been mealing catchment basins similar to the pair in the southeastern corner (see below and Chapter 7).

North of the firepit were two small pits in the area that historically has been the position for a pit opening (sipapu) to the underworld. OP 4 was a shallow, irregular pit; nevertheless, it was on an axis that splits the firepit and ventilator tunnel. Nearby was Kiva PH 1, a deep-plastered, bullet-shaped hole, which shows greater care in construction and which also lies on an imaginary line dividing the two features. Each contained sterile, yellow sand, although OP 4 also revealed tiny lignite flecks. The clean, yellow sand in each pit suggested that it was intentional fill because of its contrast to the tan-colored sand (Layer 6) covering the floor. Either one or both pits might have served as sipapus. All the remaining pits were filled with tan sand and sparse charcoal flecks that resembled the intentionally-placed sand covering the floor (Layer 6).

Mealing Bins. Behind the southeastern roof support hole and wing wall, tucked partly into a bulbous expansion of the pithouse wall, were the remains of two mealing bins (Figure 5.14, Plate 5.8). These were set on bedrock, each with an egg-shaped basin at one end and partly enclosed by an adobe collar set on the pithouse floor. The basins would have served as catchments for the material being ground. Basin collars were 4-6 cm high and 3-5 cm wide. The northern basin had an opening 14 cm wide blocked by a ground "pestle" when found. The southern collar was two pieces that did not quite join evenly, possibly because of poor repairs. Both were joined to the upper floor plaster (Floor 1), although the initial construction of the bins seems to have been with Floor 2.

An intense fire had completely heat-hardened the adobe collars to an orange color. Despite the excellent burned material, archeomagnetic samples initially produced poor results. When the pithouse was re-excavated the following year and resampled, the burn yielded the best archeomagnetic date from the site: A.D. 1001-1093. The greatest temperatures appeared to have centered at the juncture of the two collars and the adjoining pithouse floor, producing a dark, red-brown color.

Behind (east of) each basin was an inclined ramp of adobe that rose sharply at the east end. Where the basins and ramps joined, the basin collar was absent. An adobe turtleback (45 cm long and 12 cm high) formed the high east end of the northern ramp. This was apparently reconstructed in two layers or remodeled, because a 3-cm-thick layer of adobe was removed easily from the east side, leaving a second chunk at the north end. The wing wall formed the north side of the ramp and a clay ridge formed the south side of the northern unit.

At the east end of the southern ramp, the rise was formed by a clay wall, 42 cm long and 14 cm high with an inset tabular piece of stone on top. Clay ridges formed the north and south sides of the ramp. At the west end of the south side was a slot that once might have held a small upright slab.

The size and construction of these ramps were perfect for metate rests, although the metates were gone. Behind each was a small stone affixed to the bedrock, perhaps marking the kneeling position of those engaged in grinding. About 40 cm remained between the ends of the metate rests (or ramps) and the pithouse wall, an adequate but tight squeeze for those (probably females) engaged in grinding. Based on a small sample of Chacoan burials (not from the site), this space appears too small for adult males to have done the food preparation (Chapter 7, mealing basins).

A second pair of mealing bins, which were removed during Kiva construction, probably also once existed in the southwestern corner. The basins for these, OP 3 and OP 6, remained and were sealed under the Kiva floor. Both basins yielded corn pollen (Dean, this report). Although we cannot be certain, these bins probably were used with both Floors 1 and 2.

Mealing Bin Fill. Layer 5, within the main chamber, covered the entire southeastern mealing complex. It included some stone and roofing adobe, which was underlain by a 5-to 7-cm-thick deposit (designated Basin Layer 1) of soft, brown sand and a little charcoal (Figure 5.14). Under this was Basin

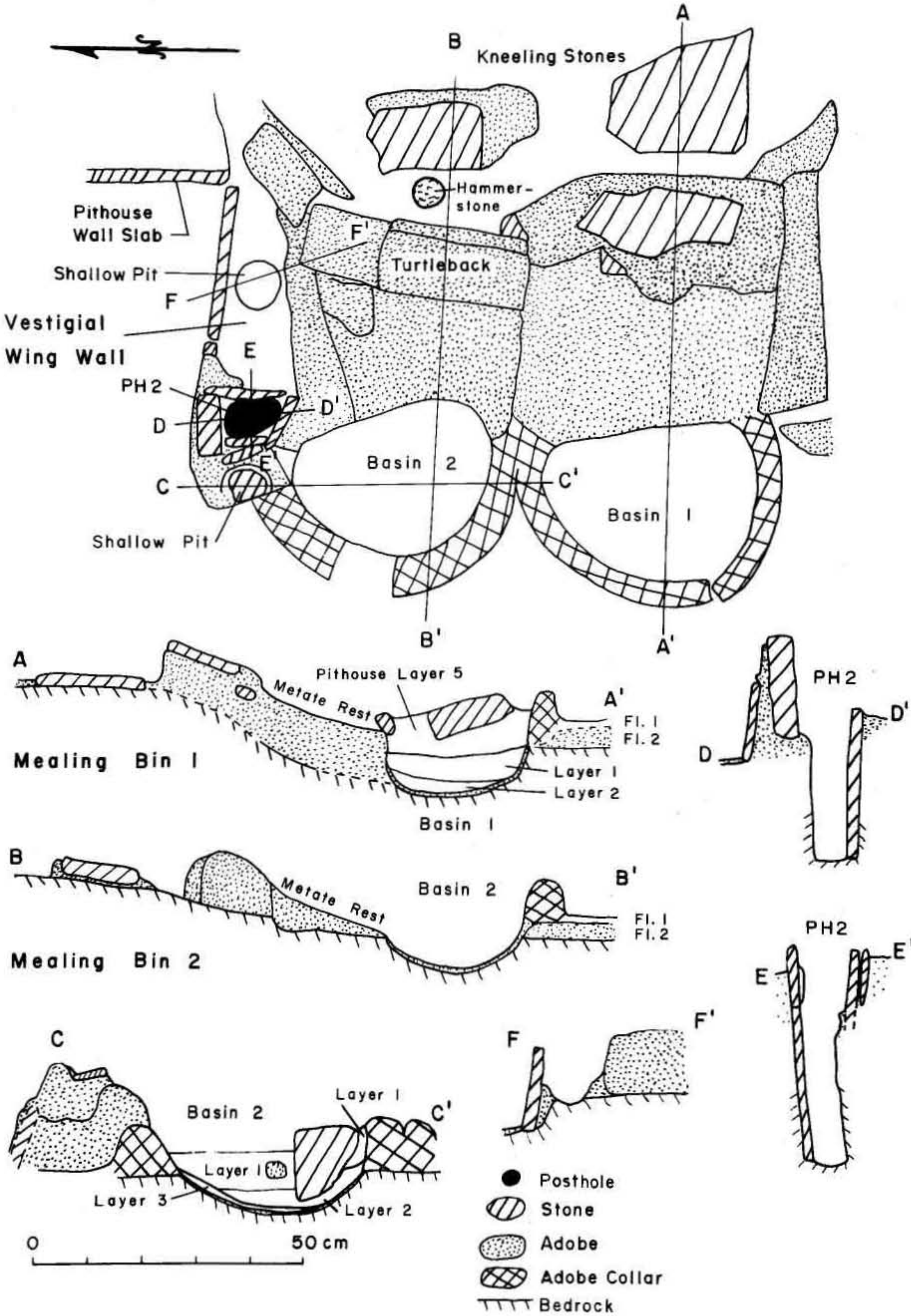

Figure 5.14. Pithouse 2, Mealing Bin complex, plan and profiles (NPS 310/82235 C).

Layer 2, 2-3 cm deep, which contained ash, charcoal, and partly burned trash. A core, burned red, in Basin 1 had been fractured by heat, leaving the matching spall nearby. Layer 2 was similar, if not identical, to Layer 7 in the main chamber and constituted material used to partially burn the pithouse after abandonment. Basin 2 also yielded a 2-cm-deep layer of sand (burned on top; basin Layer 3) that covered the northeastern section of its floor, probably part of the pithouse sand covering the floor (Layer 6).

Flotation samples from the two southeastern catchment basins yielded a variety of ethnobotanical materials that were similar to the materials analyzed from the burned deposits in Room 2 (M. Toll, this report). Over half of the plant taxa were burned, which establishes that they were present when the fire was started, after the pithouse was abandoned.

Wing Walls. Two vestigial wing walls (Figure 5.11), with post supports inset, separated the main floor from specialized work areas on the south side of the chamber. Domestic activities were marked by the mealing complex in the southeastern corner, with perhaps another set located in the southwestern corner. The southeastern wing wall extended 63 cm from the post support to the pithouse wall corner, where the wall bulged out to accommodate the mealing equipment (Figure 5.14). The wall was constructed of pink and gray mortar, 14-24 cm high and 20-24 cm wide, and was lined on the north side with tabular upright slabs. Small shallow pits, possibly for supporting small, upright posts, had been placed at both ends of the wing wall.

The southwestern post support was connected to a low ridge of adobe, 54 cm long, and contained a stone set in it and the flat impression of a second stone evident on top. Instead of extending to connect the west pithouse wall, it ran in the opposite direction towards the southeastern wing wall. The ridge remains appeared to be part of a wing wall, but evidently, all elevated features, including this one in the southwestern corner, were razed during Kiva construction. The wing walls were probably first built with Floor 2.

Floor 1 Materials (Figure 5.15, Table 5.9). The first floor encountered was littered with cultural debris except for the area reused by kiva inhabitants. Chipped stone, abraders, micro-drills, and broken beads in and under Layer 6 and on the floor appeared related to the making of turquoise jewelry–these were left at the time of abandonment. Additionally, a large, early Gallup Black-on-white bowl fragment (Plate 8.10A), fire-blackened on the exterior, was associated with Layers 6 and 7 in the northeastern corner but rested on the floor sands. It contained a cake of burned selenite that would have provided a fine material for polishing turquoise. The remainder of the bowl was found in the plaza.

Ceramic matches reveal considerable horizontal and vertical separation of parts of restorable vessels, a number of which littered the floor and may have comprised much of the pithouse equipment broken at abandonment. Clearly, some trash was thrown into the pithouse after abandonment to be mixed with materials left behind. For example, an overall indented corrugated jar (Plate 8.11A), which was atypical of the culinary assemblage of neckbanded and neck indented corrugated jars from the fill and floor, yielded pieces from Layers 4-7 and off Floor 1, in the bottom of the Mealing Bin 1 basin, in both layers of the ventilator tunnel fill and in Room 8, Level 3.

Bones were relatively sparse on the floor and in the floor fill. The majority (37) of the 45 bone elements came from rabbits and 10 partial mice skeletons. Probably these were postoccupational remains. A partial dog skeleton, however, was one of several dogs recovered from the site that attested to the common presence of this domestic animal (Gillespie, this report).

Distribution of artifacts, particularly restorable vessels, in the fill and on the floor (Plates 8.3D, 8.4E, 8.6A, 8.7C, 8.8A, 8.8D, 8.9C, 8.10A, 8.10E, and 8.11A; Appendix Table E.1) were restricted mostly to an area around and in the subfloor ventilator trench. If the pithouse had been dismantled at abandonment, it would seem logical that the trash would have entered from the sides closest to the rooms. Instead, the pithouse roof probably was left intact for a time after the structure's abandonment, with some refuse being tossed through the pithouse roof entry, such as the two typologically late, indented corrugated jars (Plates 8.9C and 8.11A). At the same time, the ventilator shaft served as a convenient pit to dump refuse. Only Layer 6 (and

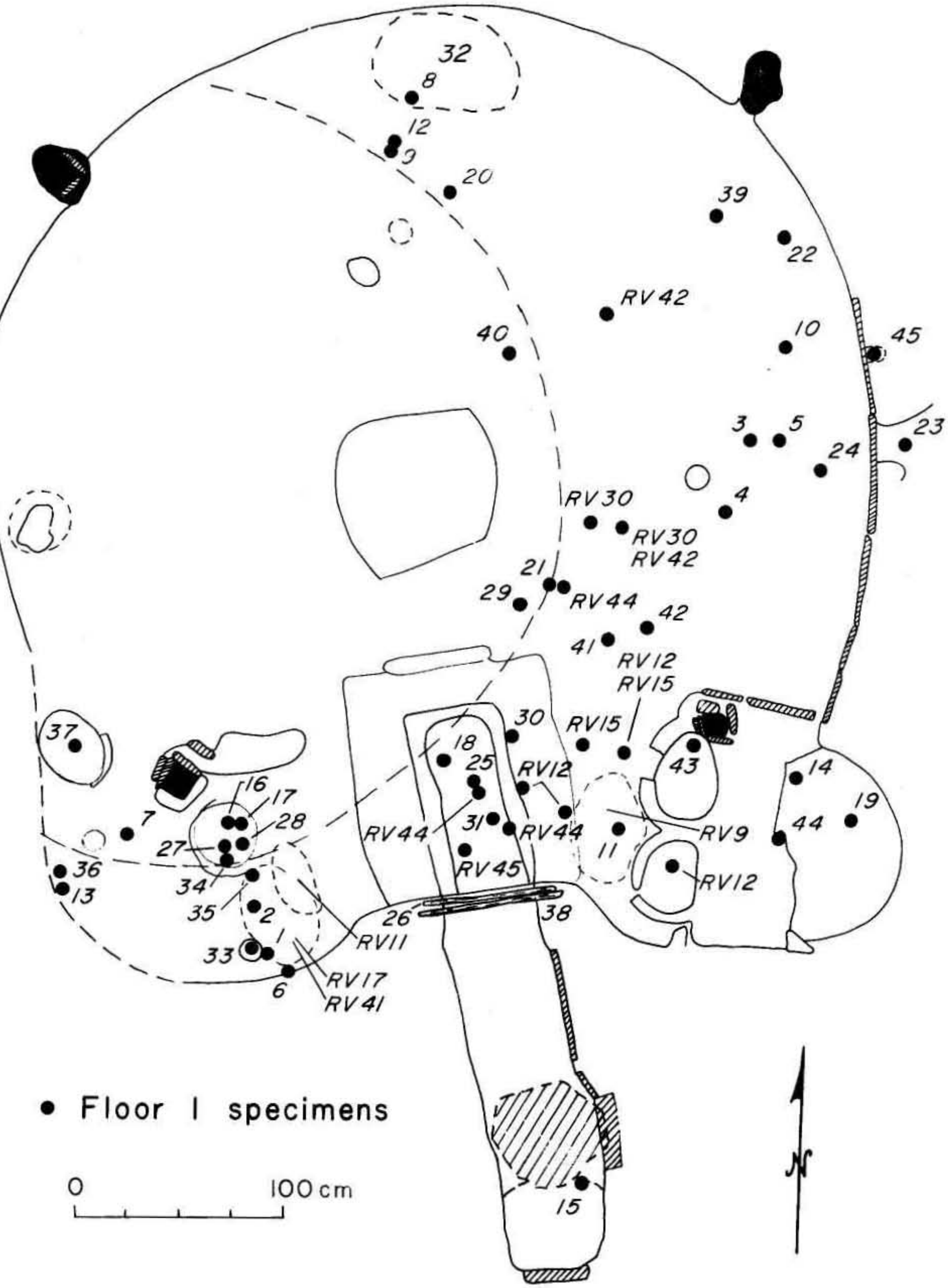

Figure 5.15. Pithouse 2, distribution of Floor 1 specimens (Table 5.9--specimen list) (NPS 310/82230 B).

Table 5.9. Pithouse 2 distribution of Floor 1 materials.[a]

Artifact Number	Artifact Class	Lithic Material, Ceramic Ware, or Faunal Species	FS No.
1	Utilized flake (12.9 g)	1070 (chert, jasper)	2993
2	Utilized flake (7.6 g)	1113 (cherty silicified wood)	2994
3	Unutilized flake (3.6 g)	1021 (chert, dull red)	3020
4	Unutilized flake (0.4 g)	1142 (chalcedonic silicified wood)	3025
5	Unutilized flake (17.4 g)	1112 (cherty silicified wood)	3026
6	Utilized flake (3.9 g)	1070 (chert, jasper)	3398
	Unutilized flake (1.6 g)	1112 (cherty silicified wood)	3398
	Utilized flake (0.4 g)	1142 (chalcedonic silicified wood)	3398
	Unutilized flake (2) (8.1 g)	1142 (chalcedonic silicified wood)	3398
7	Unutilized flake (4.9 g)	1053 (chalcedony, black inclusions)[b]	3399
8	Lapidary file (6 g)	2000 (sandstone)	3021
9	Passive lapidary abrader (23 g)	2000 (sandstone)	3022
10	Mano (1239 g)	2000 (sandstone)	3023
11	Passive abrader/anvil (2812 g)	2000 (sandstone)	3024
12	Polishing stone	? (quartzite?)	3027
13	Floor polisher (874 g)	? (granite; San Juan River cobble?)	3216
14	Hammerstone (187 g)	1112 (cherty silicified wood)	3233
15	Mano fragment (407 g)	2000 (sandstone)	3363
16	Pendant blank	5300 (turquoise)	3205
17	Jewelry debris (1 chip)	5300 (turquoise)	3207
18	Hammerstone (178 g)	1110 (splintery silicified wood)	3361
19	Potlid, bifacially spalled (233 g)	2000 (sandstone)	3187

Table 5.9. (continued)

Artifact Number	Artifact Class	Lithic Material, Ceramic Ware, or Faunal Species	FS No.
20	Prairie dog mandible	- (Cynomys gunnisoni)	3029
21	Partial dog skeleton	- (Canis) immature dog > 1 yr. old	3029
22	Bone awl	- Unidentified artiodactyl	3032
23	Reptile	- (Spea sp.) Spadefoot toad	3228
24	Unmodified mineral	5041 (selenite)	3028
25	Firedog (526 g)	2000 (sandstone)	3362
26	Ventilator tunnel lintel (pinyon)	- Tree-ring date: A.D. 987vv (CNM-350)	3384
27	Plain gray jar sherds (sooted) (2)	- Cibola Grayware	2991
28	Whiteware jar sherd (sooted)	- Cibola Whiteware	2992
29	Plain gray jar sherd	- Cibola Grayware	3007
30	Plain gray jar sherd	- Cibola Grayware	3009
31	Red Mesa B/w jar sherd	- Cibola Whiteware	3014
32	Jewelry debris (540 flecks/chips)	5300 (turquoise from flotation sample)	3001
33	Partial mouse skeleton	- (Peromyscus cf. maniculatus)	3147
34	Unutilized flake (0.1 g)	1052 (chalcedony, clear)[b]	3206
	Unutilized flake (0.1 g)	1113 (cherty silicified wood)	3206
35	Corncob fragment (burned)	- Floor 2 specimen	3462
36	Lapidary lapstone fragment (469 g)	2000 (sandstone)	3217
37	Unutilized flake (2.2 g)	1150 (chalcedonic silicified wood)	3157

Table 5.9. (continued)

Artifact Number	Artifact Class	Lithic Material, Ceramic Ware, or Faunal Species	FS No.
38	Ventilator tunnel lintel (juniper)	- Tree-ring date: none (CNM-351)	3385
39	Pole fragment (unknown species)	- Tree-ring date: none	2985
40	Pole fragment (carbonized pinyon)	- Tree-ring date: none (CNM-349)	3034
41	Pole fragment (carbonized pinyon)	- Tree-ring date: A.D. 813vv (CNM-347)	2981
42	Pole fragment (carbonized pinyon)	- Tree-ring date: A.D. 943 vv (CNM-348)	2982
43	Worked Red Mesa B/w sherd	- Cibola Whiteware	3235
44	Metate fragment (854 g)	2000 (sandstone) Used in bin construction	3234
45	Horizontal pole fragment (niche)	- Tree-ring date: None	3232
Misc	Sherds, turquoise, and sherds from RV 70	-	-

[a] See distribution in Figure 5.15.
[b] High surface chert.

the associated floor artifacts, primarily of chipped stone and turquoise) appeared undisturbed and contained little, if any, trash.

A number of unburned squash seeds were found on the floor, while a few burned seeds were recovered from the burned materials in the southeastern corner. Otherwise, a number of economic plant taxa were recovered from floor samples (M. Toll, this report). Large numbers of unburned portulaca seeds (1,536 of a total of 1,883 seeds; 82 percent) were recovered from the floor in the northeastern quadrant under the clean sand (Layer 6) that contained turquoise manufacturing material. Associated pollen, however, was practically absent, consisting of a mere four grains, including one of prickly pear cactus. A pollen sample from the southeastern quadrant yielded 37 grains, including corn and weedy species, but not portulaca. The context of the seeds and other botanical remains suggest that they were associated with pithouse activities.

Floor 2

Several deposits found under Floor 1 were difficult to associate with specific construction events and use (Figure 5.16, Plate 5.9). The nature of these, described below, was confusing, but there was no doubt that earlier use of the pithouse had occurred. Adobe floor plaster, 2-3 cm directly under Floor 1 and resting on bedrock, was discovered just southeast of the firepit between the mealing bin basins and the subfloor ventilator tunnel. It was designated as Floor 2 but was absent from the rest of the pithouse. No artifacts were recovered from it, although several features found under Floor 1 must have been associated with it.

Floor 2 Features. Numerous pits were scattered directly under the Floor 1 plaster (Figure 5.17, Table 5.10). Some of these were sealed during the use of Floor 2 and the rest were sealed by the Floor 1 plaster. Nine pits clustered in an area east of the firepit, with at least two being plugged and subsequently cut by newer pits. Four others were located midway between Firepit 1 and the wall to the northwest. Despite the ample floor space, the use and reuse of areas east and west of the firepit indicated continuity in the use of floor space. Unlike Floor 1, the large number of pits, their distribution about the floor, and the presence of heating pits are in accord with other contemporary pithouses in the region. The main features of Floor 1 (roof supports, wing walls, mealing bins, firepit, and ventilating system) were probably first used with Floor 2, although when first built with Floor 2, the ventilating system was probably an above-floor system.

Heating Pits. Four heating pits (Plate 5.10A-B) were spaced along a northern arc, extending east and north to the northeast about midway between the pithouse walls and the firepit in the typical location (e.g., Bullard 1962:163-166). A fifth (HP 5), however, lies along the north side of the firepit and was partly cut by that feature. When discovered, it had been sealed with a layer of lignite, like HP 3, and filled with crushed fragments of bedrock. Its partial destruction by Firepit 1 indicates that initially the firepit was smaller, leaving space for an intact pit. Nevertheless, HP 5's location, at best, could only have been a few centimeters from the firepit, a unique and awkward position that hampered easy access to the north side of the firepit.

All of the heating pits revealed partial oxidation and were filled with clean sand and a thin layer or isolated pieces of burned brush. Burned stones were absent. Archeomagnetic samples were taken from HP 2 - HP 4 but were undatable because of poorly oxidized, sandy samples (Table 8.4). Three radiocarbon dates from HP 3 and HP 4 (Table 8.3) processed by Beta Analytical yielded a mean date of A.D. 938-1031 (2σ). Turquoise flecks were recovered from HP 1 and HP 2. Only HP 2 was not sealed prior to floor abandonment. Both HP 1 and HP 4 had been plugged with adobe, and HP 3 and HP 5 were plugged with lignite, suggesting use and abandonment of the pits in pairs. A flotation sample from HP 3 was practically devoid of seeds but did yield evidence of juniper-twig fuel (M. Toll, this report). Otherwise, economic botanical remains were seldom recovered from heating pits (M. Toll, this report).

Other Pits. Fifteen Other Pits were exposed directly under Floor 1. Most were sunk into bedrock, unlined, and of unknown function. Most were somewhat cylindrically-shaped and resembled post supports (e.g., Plate 5.10C), but they lacked the

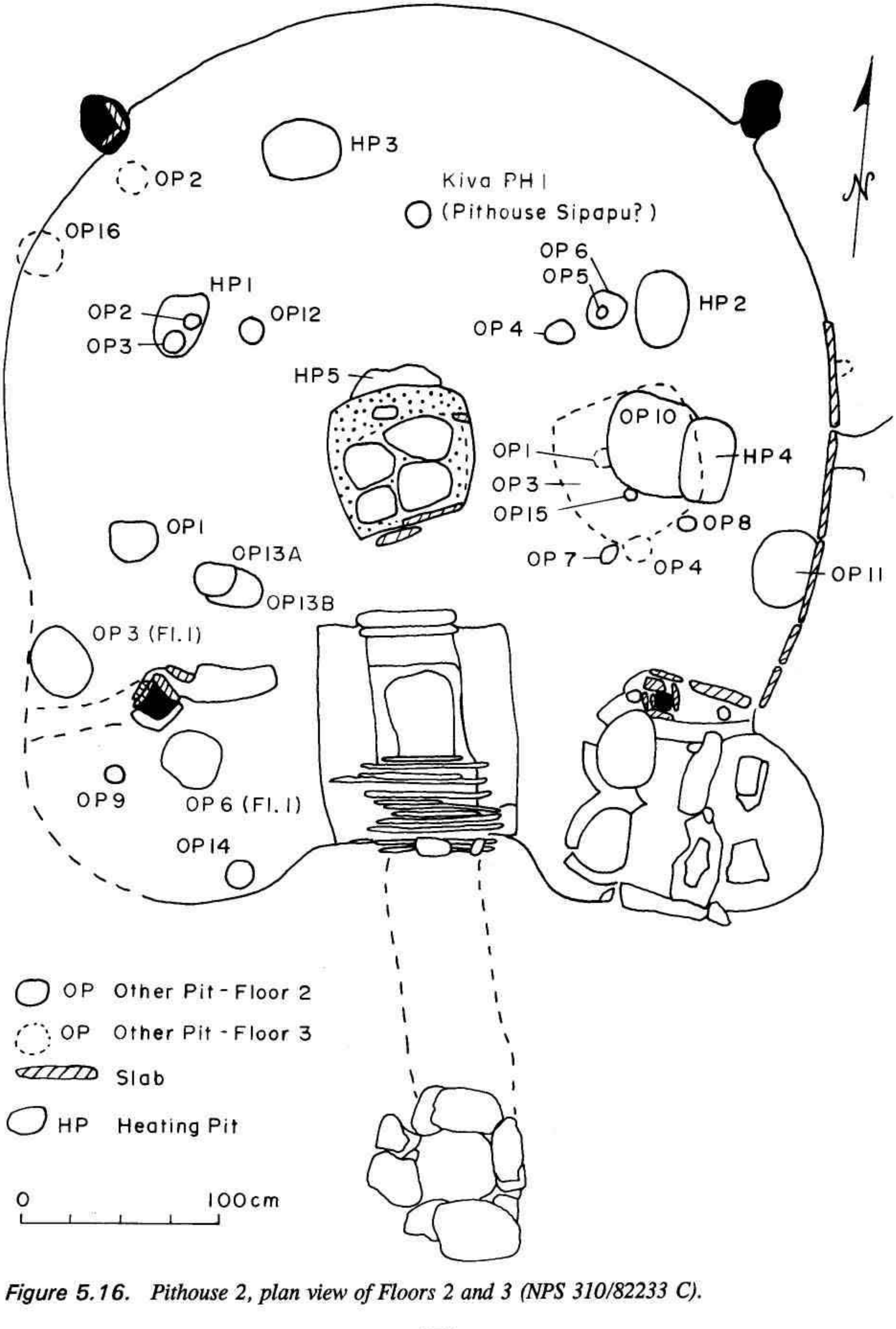

Figure 5.16. Pithouse 2, plan view of Floors 2 and 3 (NPS 310/82233 C).

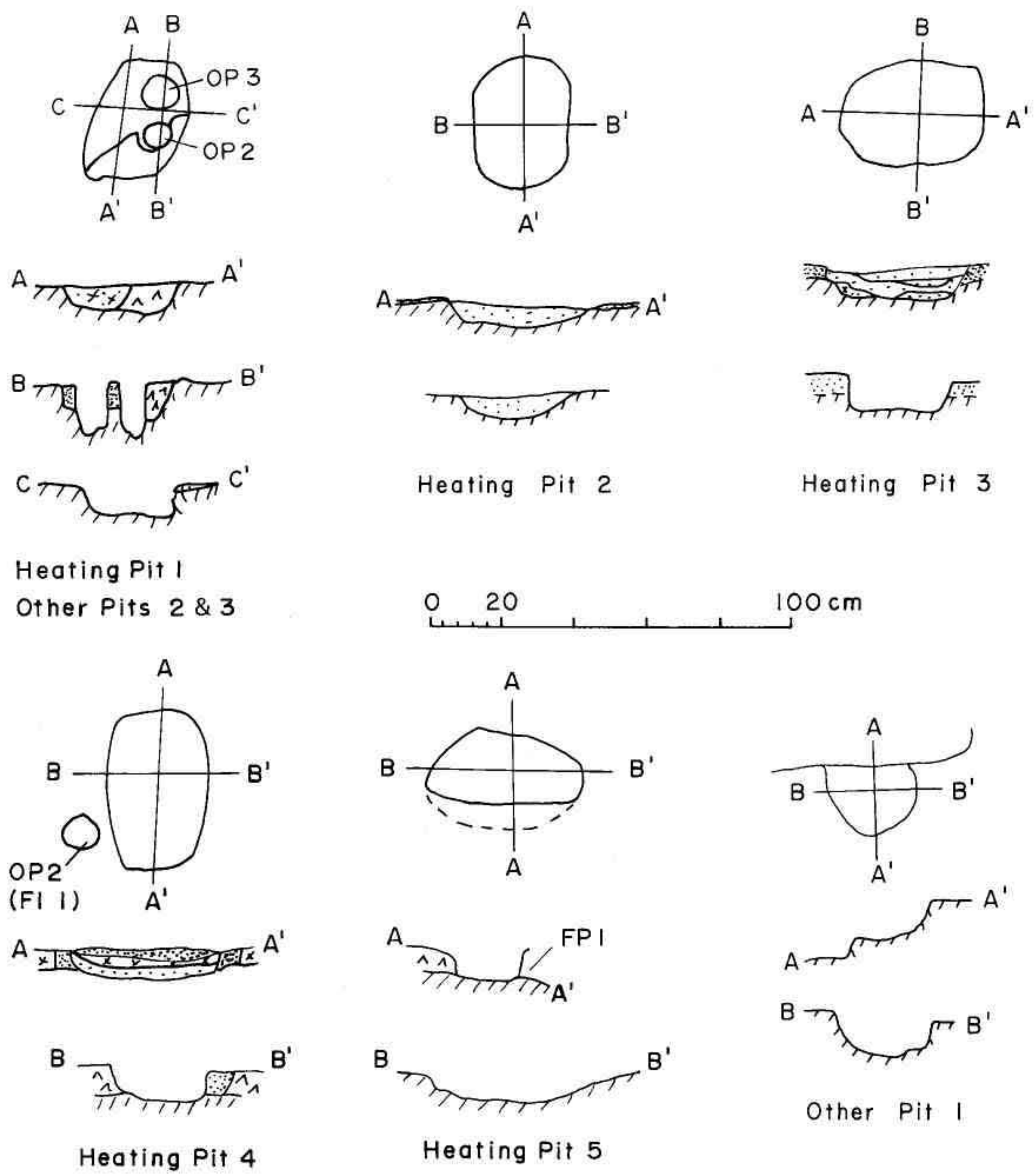

Figure 5.17A. Pithouse 2, Floor 2 feature plans and profiles (NPS 310/82285 C).

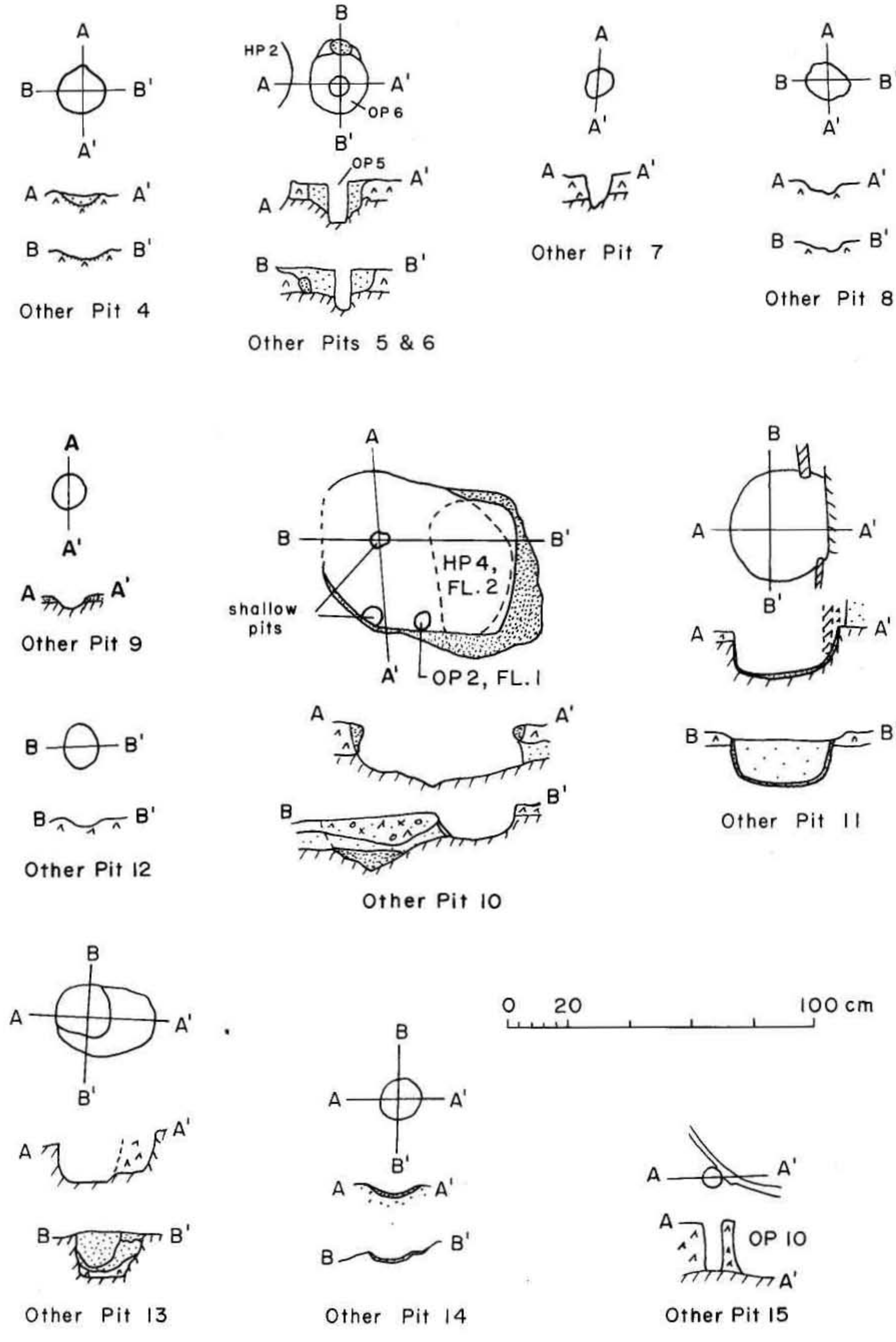

Figure 5.17B. *Pithouse 2, Floor 2 feature plans and profiles (NPS 310/82286 C).*

Table 5.10. List of features in Pithouse 2, Floors 2 and 3.[a]

Feature	Length (cm)	Width (cm)	Height/ Depth (cm)	Volume (liters)	Fill Type	Fill Period	Lining	Open/ Sealed	Comments
Floor 2:									
Heating Pit 1	30	26	8	4.3	21	Occ/Int	U	S-FP	Cut by Other Pit 2 (Floor 2). Mouth = 702 cm^2.
Heating Pit 2	38	26	5	3.4	11	Int.	U	O	Mouth = 780 cm^2.
Heating Pit 3	39	28	10	7.4	21	Occ/Int	L-P	S	Sealed with lignite. Mouth = 933 cm^2.
Heating Pit 4	42	25	12	7.5	20	Occ/Int	U	S	Cuts Other Pit 10 (Floor 2). Mouth = 1016 cm^2.
Heating Pit 5	37+	18+ (est. 28)	7	5.9±	12	Int?	U	S	Sealed with lignite. Cut by Firepit 1; present volume = 4.7 liters. Mouth = 902 cm^2.
Other Pit 1	23	25?	10	3.6	10	Int?	U	O?	Cut by Kiva firepit. Pot rest?
Other Pit 2	8	7.5	14	0.6	11	Int	U	S	Cuts Heating Pit 1. Posthole?
Other Pit 3	10.5	10	8	0.7	11	Int	U	S	Cuts Heating Pit 1. Posthole?
Other Pit 4	15.5	13	3.5	0.4	13	Int?	L-P	O	Posthole?
Other Pit 5	5.5	5.5	13	0.3	10	Int?	U	O	Cuts Other Pit 6 (Floor 2). Posthole?
Other Pit 6	20	19	9	3.4?	50	Int	U	S	Cut by Other Pit 5 (Floor 2).
Other Pit 7	9	8	10	0.4	11	Int?	U	O	
Other Pit 8	14	13	3.5	0.4	11	Int?	U	S?	
Other Pit 9	11	11	4	0.5	11	Int?	U	O	
Other Pit 10	60?	50	19	32.6	13, 14, 27	Occ?/ Int.	L-P?	S	Cut by Other Pit 2 and Heating Pit 4 (Floor 2). Heating pit? Mouth = 2540 cm^2.
Other Pit 11	36	33	17-18	12.6	10,13	Int?	L-P	S?	Extends under wall.
Other Pit 12	15	11	2.5	0.1	10	Int?	U	O	
Other Pit 13A	19	17	14	2.6	10/50	Int	U	S	Cuts Other Pit 13B.
Other Pit 13B	34	20	14-16	7.3	12,13	Int	U	S	Cut by Other Pit 13A.

Table 5.10. (continued)

Feature	Length (cm)	Width (cm)	Height/ Depth (cm)	Volume (liters)	Fill Type	Fill Period	Lining	Open/ Sealed	Comments
Other Pit 14	14	13	2.5	0.5	11,12	Int?	L-P	O	
Other Pit 15	6	5	17	0.5	13	Int	U	O	Cuts Other Pit 4 (Floor 3).
Floor 3:									
Other Pit 1	9.5	8	10	0.7	11	Int?	L-P?	O	Cut by Other Pit 10 (Floor 2). Cuts Other Pit 3 (Floor 3).
Other Pit 2	18	15	5	0.7	12,13	Natural?	U	O	Not a feature?
Other Pit 3	76	75	11	31.8	11,13	Int	L-P?	S?	Cut by Other Pit 2 (Floor 1?). Cut by Other Pit 10, Other Pit 15, and Heating Pit 4 (Floor 2). Cut by Other Pit 1 and Other Pit 4 (Floor 3). Mixing pit?
Other Pit 4	15	14	6	0.5	12	Int	U	S	Cuts Other Pit 3 (Floor 3).
Other Pit 16	21	21	2	0.8	12,14	Int	U	O	Pot rest?

[a] See Tables 7.3-7.4 for an explanation of the feature and attribute codes.

Plate 5.10A. *Pithouse 2, Floor 2 pits. 15-cm north arrow. Heating Pit 4 (signboard is incorrect). Chunks of adobe and lignite surround the pit and Other Pit 2 (a Floor 1 pit) (NPS 12421).*

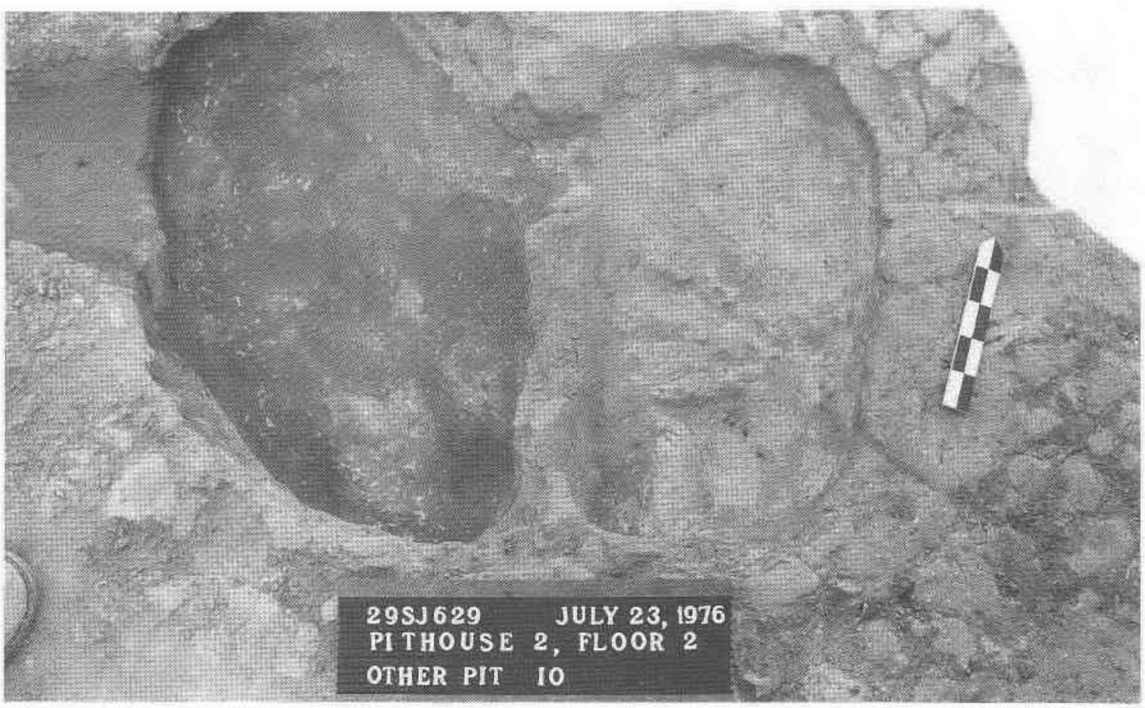

Plate 5.10B. *Pithouse 2, Floor 2 pits. 15-cm north arrow. Heating Pit 4 (right; after further excavation--Heating Pit 4 (right) and Other Pit 10 (a possible heating pit?) (NPS 12429).*

Plate 5.10C. *Pithouse 2, Floor 2 pits. 15-cm north arrow. Other Pit 5, a possible posthole (NPS 12404).*

lignite packing and shims common to postholes. A few flecks of lignite occurred in OP 13 and OP 15, but their function remains unclear. Although many might have held auxiliary roof supports or poles supporting perishable room features, there was no supportive evidence. The six remaining pits (OPs 4, 8, 10-12, and 14) are either irregular or too shallow to have held posts. OP 1 and OP 8, however, were positioned under the rectangular framework that supported the roof and may have held auxiliary posts.

All the pits were filled with non-sterile, tan sand, perhaps intentionally filled before placement of Floor 1. Several were plugged prior to floor abandonment (OPs 6, 8?, 9, 10, 11?, and 13). OP 6 and OP 10 were subsequently cut by OP 5 and HP 4, respectively. Both OP 2 and 3 were built into a plugged HP 1.

The middle layer of sandy fill, mixed with charcoal in OP 10 (Plate 5.10B), was oxidized red at the bottom, possibly marking it as a heating pit before it was plugged. The remaining layers in OP 10 were clayey sand and, in Layer 1, gravel, lignite, and charcoal. OP 13 was once a larger pit (OP 13B) that was filled with clay and lignite and then sealed with a hard sandy plug. A second smaller pit (OP 13A) cut the western margins of the earlier pit, but this in turn was abandoned and plugged with a hard sand.

Floor 2 Materials. No artifacts were recovered from the small patches of floor that were present. Pits yielded only two, plain gray, utility sherds, a single eggshell, and numerous turquoise flecks. The latter occurred in five pits, all in the northern half of the pithouse. These were plugged before and at Floor 2 abandonment; therefore, jewelry making can be assumed to have also occurred during the earlier floor use.

A pollen sample from under Floor 1, but above the lignite layer in the southeastern quadrant and the mealing bin area, contained a little corn and prickly pear pollen (Cully 1985:168, 174). A second pollen sample from the northeastern quadrant yielded only 23 grains of non-economic species. The flotation sample from the northwestern quadrant yielded primarily unburned portulaca seeds and some weedy annuals (M. Toll, this report).

Subfloor 2, Layer 2

Aside from the small area described above as Floor 2, Floor 1 was underlain by a 5-10 cm thick, tightly-compacted layer of lignite and roofing adobe chunks (Figures 5.8-5.9, Plate 5.9). Many of the latter were smoke-blackened and exhibited impressions of poles, 3-5 cm in diameter. A few contained both beam impressions (10-15 cm in diameter), and also reed impressions (1-1.5 cm in diameter). In general, the adobe remains were similar to those recovered from Layers 4 and 5 in the fill above Floor 1. For the most part, this layer did not exhibit any traces of floor plaster that was expected to have once covered its rough surface.

Floor 2 pits were made of bedrock and Layer 2 material. Otherwise, plaster-lined pits stood in sharp contrast to the surrounding mottled, purple-gray and tan layer. Because of its physical nature, Layer 2 was not designated a floor, being highly irregular and subject to rapid deterioration from foot traffic. Yet it is difficult to explain the general absence of Floor 2, without extensive disturbance to the associated features, if it was removed. Either the floor would have been in good condition at abandonment, necessitating extreme but unwarranted care in its removal or, if in poor shape, it still must have been less irregular than Layer 2 underneath. So why remove it? Nevertheless, unless one perceives a flooring of chunks of lignite and adobe as being suitable for a living surface, Floor 2 must have been removed, except for the small remnant in the southeastern corner.

Layer 2 contained very little cultural material (bone, jet, and eggshell). Charcoal flecks were present only in the adobe chunks.

Subfloor 2, Layers 3 and 4

An area about 50 by 100 cm, in the southeastern quadrant of the pithouse, underlying Layer 2 and nearly filling a 5-10 cm deep depression in the bedrock, was filled with deposits not encountered elsewhere. These deposits occurred side by side and were designated Layers 3 and 4. Layer 3 was composed of a 50 by 50 cm area, 1-3 cm deep, of sand mixed with burned clay chunks and twigs. Charcoal was common, averaging about 50 pieces per 100 cm^2. An unworked bone, two burned corn kernels, and nine sherds of Red Mesa Black-on-white came from the top of the layer. A radiocarbon date from these twigs yielded a date of A.D. 776-1185, with a mean of A.D. 981 (2σ). Layer 4, contiguous and east of Layer 3, was 50 by 60 cm, 3-8 cm deep, and contained pieces of wall plaster, adobe chunks, and scattered bits of charcoal. These layers have not been illustrated.

Floor 3

When subfloor Layers 2-4 were removed from the bedrock, a third series of pits were exposed (Figures 5.8-5.9, 5.12, 5.16). Again, there was no associated prepared surface. Thin spots (1.2-2.5 mm thick) of clayey sand, incorporating lignite and charcoal flecks, formed a layer and covered the bedrock under Layer 2. This might mark the use surface associated with the pits. The undulating and friable condition of the bedrock is unsuitable for permanent foot traffic; thus, it is inferred that Floor 3 was only used during the initial stages of house construction.

Floor 3 Features. Only five ambiguous Other Pits were assigned to Floor 3 (Figures 5.16 and 5.18, Table 5.10). These were crudely fashioned and most might have been natural. Even if they were man-made, their use was undoubtedly short and associated with the house construction.

Other Pits. Three of these pits clustered east of Firepit 1 in an identical location as those found in Floor 2. The most impressive was OP 3, a large, deep, squarish pit filled with clay and sand that morphologically resembled the firepit, but its adobe sides suggested use as a mortar mixing pit. OP 1 and OP 4 intruded into its fill, as did three others from Floor 2. The remaining two pits, OP 2 and OP 16, were located along the northwestern margin of the pithouse. Morphologically, OP 16 resembled a shallow potrest, while OP 1-2 and OP 4 resembled postholes. All the pits contained sand, usually in conjunction with lignite, clay, and/or charcoal that appeared to be have been added after the pits were no longer used.

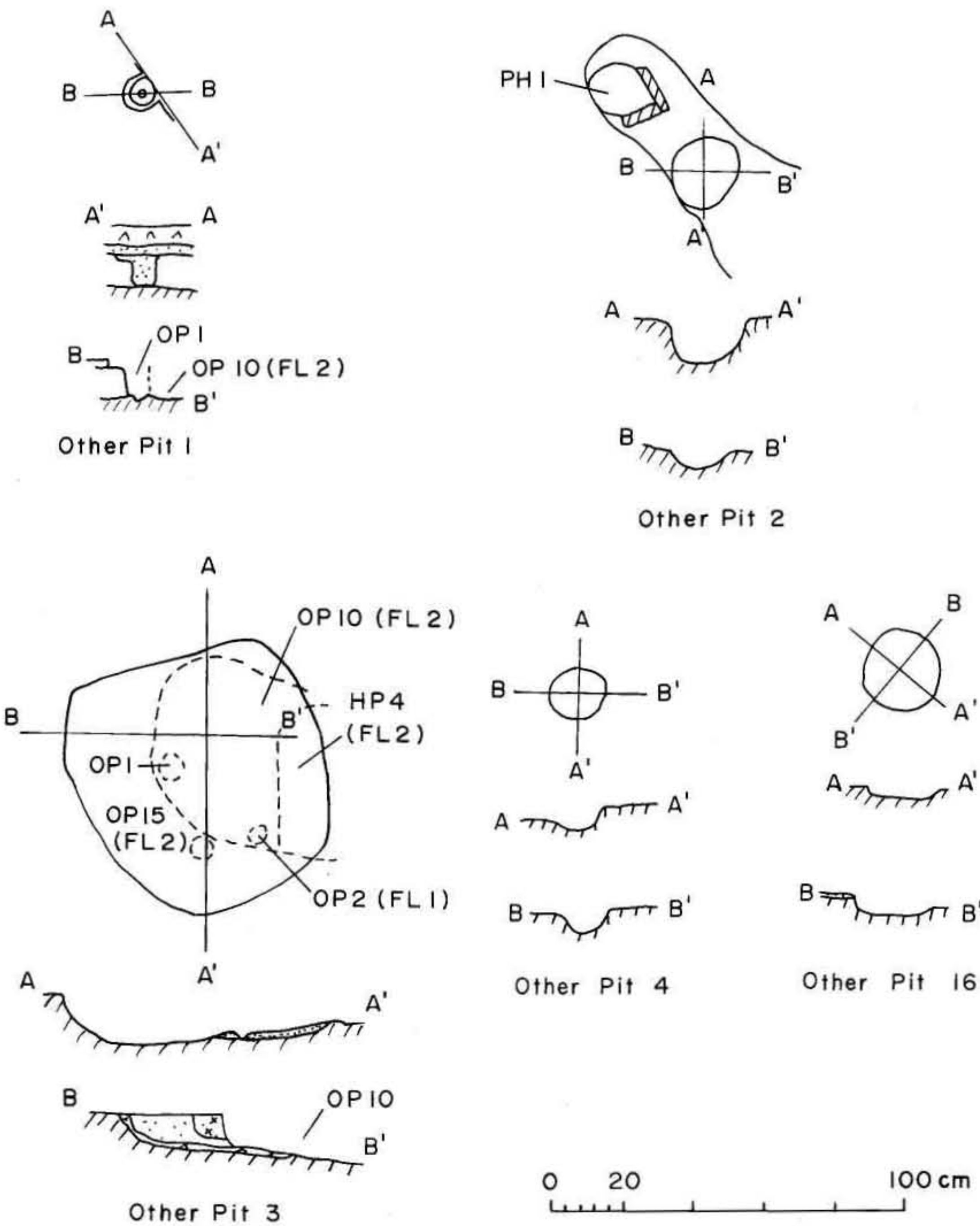

Figure 5.18. Pithouse 2, Floor 3 feature plans and profiles (NPS 310/82287 B).

Floor 3 Materials. The only artifacts present were a polished black bowl sherd under the postulated west wing wall and a siliceous flake.

Walls

The pithouse was nearly circular, except for the south side. There were pronounced outward bulges at the southeastern and southwestern sides, adjacent to an inward bulge, where the ventilator entered the chamber. What little remained of the walls indicated that they were nearly vertical with a slight overhang in the southeastern and southwestern corners. No evidence for a bench was found. Kiva construction destroyed the western wall of the pithouse, but the remainder revealed several episodes of adobe plastering, extending a maximum of 75-100 cm above the floor. At first, native-earth walls were covered with 5-10 mm of adobe plaster, which later became sooted. In the southeastern area, where the pithouse had been excavated 30 cm down into the bedrock, the rock also was plastered. The only wall masonry was employed directly above the ventilator tunnel (Plate 5.11).

Prior to construction of Floor 1, five, thin, rectangular slabs about 40 cm high, were placed end to-end along the east wall. These were set in a shallow, bedrock groove, 10 cm below Floor 1, which extended north from the wing wall. About 3-4 cm of crushed lignite had been packed behind the slabs and then the slab wall was set with mortar. Placement of the slabs disturbed OP 11 of Floor 2, which ran under a slab to meet the original east wall. A second coat of plaster was applied over the slabs and walls upon completion of Floor 1. Sometime during the last occupation, a third and last coat was applied. None of the wall plaster had been burned.

Wall Features. Two cavities were located in the east wall, 35 cm above the floor and just above the slabs (Figure 5.13). A small hole, perpendicular to the wall, contained a rotted pole tightly plastered within. A small stone formed the top, but the rest of the cavity, designated Beam Socket 1, was lined with native earth. Its location and lack of possible associated floor features suggest tentatively that it served as a wall peg for hanging articles.

A rectangular feature, 23 cm south of the beam socket, was lined with small stones on the sides and bottom and then covered with plaster. The cavity bells outward behind the stone lining, revealing burned, plastered, native earth, suggesting an association with the fire-reddened contact line discovered during initial testing. There was no definable top or back, allowing sterile deposits to fill the cavity. It seems likely that the feature was once a wall niche, which had fallen apart.

Ventilator

The Pithouse 2 ventilator was of the subfloor variety (Figure 5.19, Plates 5.11-5.12). Except for the two, plugged, deflector grooves that normally would have been part of an above-floor system, there was no evidence for an earlier above-floor ventilator. It was expected that construction of the subfloor tunnel, however, would have effectively removed evidence for an earlier system. The ventilator was sectioned to provide details of its construction.

Tunnel. It was uncertain if construction of the ventilator system required a trench from the main chamber south to where the shaft was joined. No cultural material was recovered in the balk above the tunnel during excavation. The style of wall facing above the tunnel (Plate 5.11) was similar to that in Pithouse 3, where a tunnel, rather than a trench was employed to connect the shaft. If a tunnel was used, it probably would have been enlarged at the mouth to allow room for digging. It was then partially blocked, resulting in the masonry facing observed in all three ventilator tunnels at 29SJ 629. Inside the house, about 100 cm from the south wall, a trench was sunk into bedrock 40 cm below the upper floor. This was extended 280 cm to the south and was raised sharply just beyond the main chamber to culminate 32 cm higher under the shaft. For the first 150 cm south, the tunnel floor was unplastered bedrock, but as it rose in elevation, the floor changed to unplastered native earth.

The tunnel was then lined along the east side with a double row of upright slabs set in copious amounts of mortar. At a point directly under the south pithouse wall, a column of masonry was incorporated into the east (tunnel) lining. The west

Plate 5.11. *Pithouse 2, masonry capping above the subfloor ventilator tunnel. 15-cm scale (NPS 12377).*

liner had collapsed, but the remains indicate it was mainly of mud without slabs, except for a matching masonry column under the south wall and a slab set under the ventilator shaft. Each column supported a mud-and-masonry facing in the south pithouse wall that rose above the tunnel roof. This sealed the original enlarged cavity that was above the tunnel roof. On completion, the cavity was filled with dirt. This masonry plug was 15-20 cm thick, 45 cm high and spanned 105 cm. The base of the plug was rounded over the ventilator roof out into the main chamber by leaning a row of three stones along the base, backed by several juniper slats and a covering of mud.

Shaft. A large pit was sunk 169 cm below the original surface to intersect with the tunnel. At the base and the south end of the tunnel were several 30 cm high, upright slabs. On these slabs, the shaft liner of large, unmodified blocks (40 by 15 by 20 cm), which were set in mortar, was carried to the surface (Figure 5.19, Plate 5.12). The mouth of the shaft was oval, but as it descended the walls it flared outward slightly terminating in a square at the juncture with the tunnel.

Ventilator Fill. Two deposits were distinguished in the shaft and tunnel:

Layer 1 contained alluviated deposits of sand and clay mixed with refuse and structural rubble. Thirty-nine unworked pieces of stone, seven metate fragments, six manos, and two architectural slabs, derived from collapse of the shaft mouth and from trash, were concentrated at the shaft-tunnel connection. Much of the tunnel contained adobe chunks from collapse of the ventilator tunnel roof. Charcoal was sparse, occurring in frequencies of 10-15 flecks per 100 cm^2. At least two culinary jars and two turquoise fragments were found scattered along the bottom of the layer, which filled most of the ventilator. The 48 faunal elements representing rabbits, mice, and one prairie dog were probably postoccupation remains (Gillespie, this report). This layer was the same as Layers 4 and 5 in the main chamber.

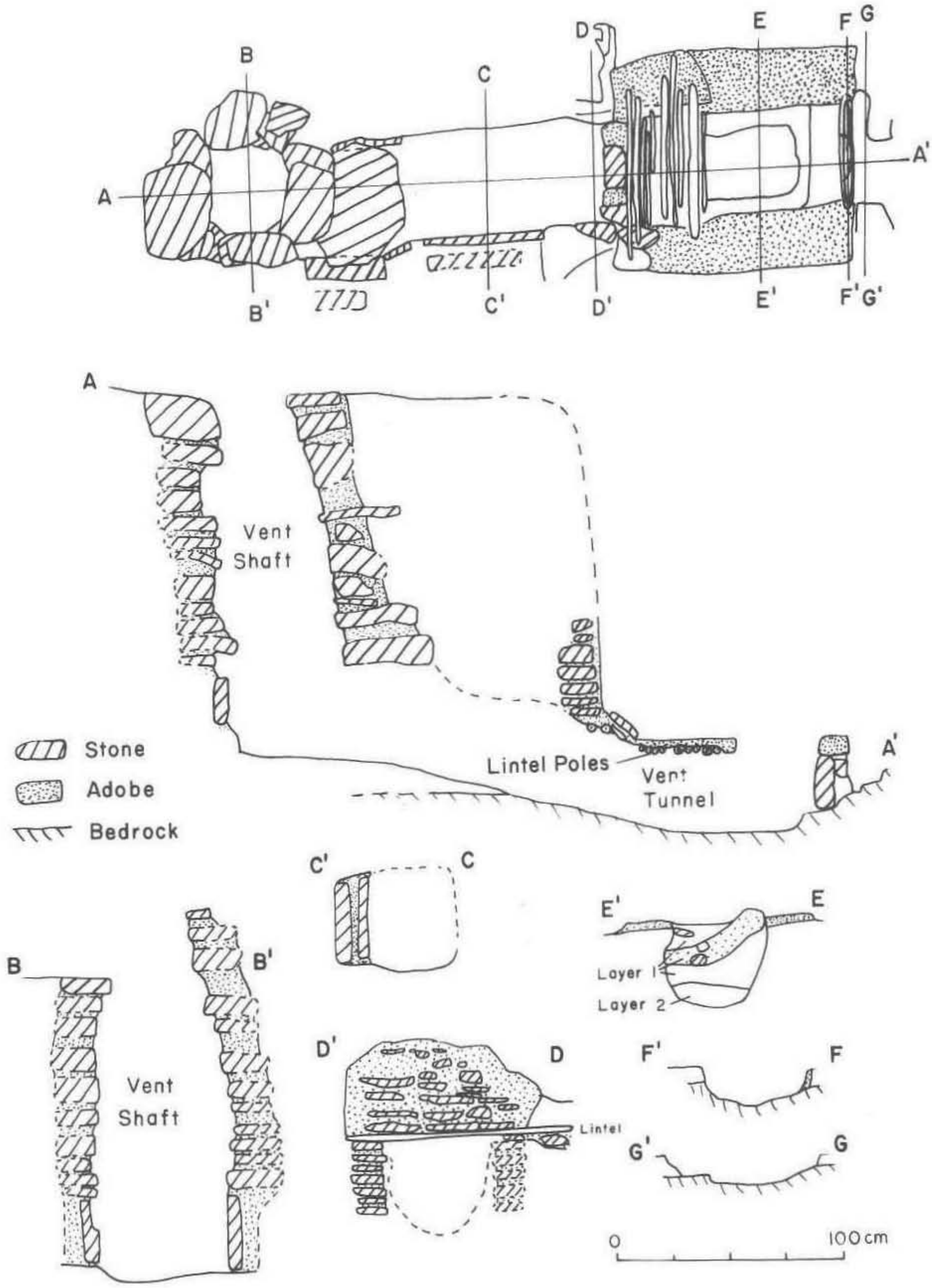

Figure 5.19. Pithouse 2, Ventilator complex plan and profiles (NPS 310/82221 C).

Plate 5.12. *Pithouse 2, north exterior masonry of ventilator shaft with the ventilator tunnel removed. 30-cm north arrow (NPS 12407).*

Layer 2 covered the tunnel floor and was about 5 cm deep. Its composition was brown sand mixed with charcoal and burned twigs. Charcoal flecks averaged 50 or more per 100 cm^2. For the most part, the deposit was devoid of stone and cultural material, except where the tunnel opened into the pithouse. This layer appeared identical to Layer 7, which covered much of the pithouse floor and contained material that may have been used to partially burn the pithouse after its abandonment.

Roof

Although little remained of the roof, it is not difficult to ascertain the general plan of construction.

The top of the ventilator shaft was probably close to the original ground surface; its height, 201 cm above the Pithouse 2 upper floor, probably was about the same height as the roof.

A trapezoid framework was probably supported by four main posts, two set vertically in the wingwalls and two incorporated partly into the north wall and angled towards the center. The size of the postholes suggested the posts were about 10-15 cm in diameter with the larger two set at the north side. Two parallel stringers spanning the posts would have supported most of the roof weight. Two other stringers would have completed the main framework with the spaces between them spanned by several smaller beams. Adobe impressions of reeds, pine needles, and possibly bark and brush that were found in the fill indicate these were a final covering before application of the exterior roof plaster. The final mud covering may have come from the material removed during construction of the pithouse, although most of it probably was used for construction of the surface room walls (Wilshusen 1989:Table 2).

Commonly, the space between the stringers and pithouse walls were spanned by rows of small poles resting against the stringers and a high bench that partially encircled the structure (e.g., at 29SJ 299, 29SJ 628, 29SJ 724, and 29SJ 1659; i.e., McKenna and Truell 1986). No evidence for a bench was found; therefore, it must be assumed that the roof leaners rested on the surrounding surface, less than a horizontal 100 cm away. Fewer than a dozen rotted poles, 2-4.5 cm in diameter and 110 cm or less in length, were associated with the roofing remains in Layers 4 and 5 and might have represented some of these poles.

As with the other two 29SJ 629 pitstructures, a large number of unmodified stones (about 50) were found in the Pithouse 2 fill, within Layers 4 and 5. To maintain a level roof, the slope of the ground would have required a wall on top of the ground along the east side. Considering the association with roof material, the stones must have served as part of the roof architecture, perhaps from an eastern wall, or stone coping around the roof perimeter.

Many of the adobe impressions recovered were smoke-blackened on the side opposite the impressions, indicating at least partial plastering of the ceiling or the underside of the surrounding leaners. Robert Powers, the principal pithouse excavator, believed that this plastering might indicate an attempt to lessen the fire danger for a dry, wooden roof.

Hatchway. Entry into pitstructures is often assumed to be from the roof, and this one is no exception. Unfortunately, there were no floor pits evident for ladder rests, unless one considers the deflector grooves. The fill between the firepit and ventilator, which once might have contained hatch remains, was removed by Kiva builders. Thus, it can be assumed that some form of entry existed from the roof, because there were no indications of a side entry.

Conclusions

Fill. Several episodes of deposition were evident in Pithouse 2. An intensive, but short period trash discard commenced at or shortly after abandonment of the pithouse. Much of the Floor 1 material, particularly the concentrations of turquoise, chipped stone, and materials associated with Layer 6 (an intentional layer of sand placed over the floor), probably reflect de facto debris from specific house activities that was covered with secondary refuse.

The large number of restorable, but mostly unserviceable, sooted, culinary vessels on the floor and in the floor fill was not duplicated in other site trash deposits. This suggests that a cooking assemblage was discarded at the time of site abandonment, perhaps in anticipation of leaving 29SJ 629 and of replacing the old jars quickly for newer, cheaper ones. The assemblage, however, was not temporally similar; the balance was upset by two overall indented corrugated jars (Plates 8.9C, and 8.11A), which did not appear to belong temporally with the neckbanded and neck indented corrugated jars. One of them, a Chaco Corrugated jar (Plate 8.11A) was not sooted or blackened, unlike the others, including the painted forms. Both the late jars were also concentrated in the ventilator, although the clean one was scattered about the floor, indicating broken vessels thrown into the abandoned pithouse. These late, corrugated jars continued a distinct pattern found in two other sites (29SJ 626 East and 29SJ 1360), which were excavated in the Fajada Gap Community and abandoned in the early A.D. 1000s.

At 29SJ 1360, a similar early vessel assemblage was recovered from Pithouse B (McKenna 1984:Figures 3.4-3.5). In each case, the latest vessels consisted of Chuskan jars of Blue Shale Corrugated, all broken in the vicinity of the pitstructure firepit.

Associated with the trash was a thin layer of charred vegetal matter (Layer 7) that covered much of the ventilator and main chamber floors. It was associated with evidence of an intensive fire in the southeastern part of the structure and probably marked tinder and fuel deliberately placed to burn the pithouse after its abandonment (i.e., Schlanger and Wilshusen 1990). It was clear from the trash deposits that the roof remained intact for some time after the pithouse was abandoned, but the fire seemed to have done little damage to the superstructure. Although a few carbonized poles, evidently from the roofing, were found on the floor, there was little evidence for the wooden roofing remains, and they must have been salvaged. It was unclear, however, whether the fire or the removal of the roof came first.

Soon after the fire, the greater mass of adobe roofing material was deposited directly over the refuse and charred matter by natural means, probably due to wall slumpage. Finally, alluviation of the surrounding area filled the remainder of the pithouse with nearby sterile sand and clay.

Function. Extensive remodeling was evident for Pithouse 2, suggestive of lengthy occupation similar to Pithouse B at 29SJ 1360 (McKenna 1984:101). The lowest floor (Floor 3) probably was used during the initial construction, while Floor 2 probably served as the original floor for occupation. Source of the adobe roofing chunks comprising the base of Floor 2 was unknown, however. Either the pithouse roof was replaced early in its life or roofing from some other structure was used.

The profusion and type of floor pits reflect use of Floor 2 for habitation and domestic activities. The method and type of material used to plug abandoned heating pits on Floor 2 might indicate a succession of use and abandonment of paired heating pits. This, coupled with the superimposition of many pits clustered in a few areas, suggested a long use of Floor 2 for similar activities localized in a few areas. A division of floor space was marked by the wing walls. South of the wing wall to the southeast was the mealing complex, the location that commonly yielded evidence of grinding activities and storage in similar structures of the region (e.g., Bullard 1962). A second mealing complex probably existed in the southwestern corner, although it apparently had been removed during construction of the Kiva.

Because there were probably two similar grinding areas and paired use of heating pits in the pithouse, there may have been two residential units. These units occupied separate aboveground living quarters in Rooms 3 and 9. In addition, the frequency of turquoise flecks found in the sealed pits of the floor suggests that jewelry making began sometime during the initial occupation.

With abandonment of Floor 2, the firepit was enlarged, the deflector was possibly shifted, the mealing bin basin collars were added in conjunction with a new floor that covered most of the Floor 2 pits, the east wall were slabs added, and the house was replastered. There was no indication of work in the ventilator complex (although it probably was modified to a subfloor variety) or of reroofing (the same post supports were used throughout use of the pithouse). The final floor contained few pits, although loci for grinding activities were still maintained in the southeastern and, perhaps, the southwestern corners. The lack of heating pits, in particular, seem to reflect a shift in function from a primarily domestic use to a ceremonial use. The overall appearance of Floor 1 is an early kiva, placed in an antiquated house. Historically, chipped stone and turquoise craftsmanship are male-related activities, which are in accord with an interpreted kiva function. The mealing complex, on the other hand, infers that the shift was not total because the space left for kneeling behind the metates was just big enough for women, but not men.

Temporal Assignment. The architectural style of the pithouse was consistent with a structure built between the eighth and tenth centuries (Truell 1986:Figure 2.6-2.7). The earliest ceramics on the site undoubtedly related to the initial site occupation of about A.D. 875-925, but no absolute dates could be obtained from the pithouse for this early period, even though it must have been one of the first structures built. Pithouse 2 exhibited some traits, however, which betrayed its early appearance. It lacked a bench common to Chacoan houses in the eighth century, while its subfloor ventilator tunnel was a late innovation, which first occurred in the Chaco area about A.D. 1000 (Truell 1986:194). A tree-ring date of A.D. 987vv (with minimal ring loss--Chapter 8) from a Pithouse 2 tunnel lintel indicates that the subfloor ventilator was built at about A.D. 1000. The ventilator must have been rebuilt some time after the initial house construction because the plugged deflector grooves suggested that initially an above-floor ventilating system once existed.

Archeomagnetic samples taken from Kiva F at 29SJ 627 and Kiva 1 at the 3-C Site nearby also suggested construction or use of both kivas in the late A.D. 900s or early A.D. 1000s. Both have subfloor ventilators. Taken with the A.D. 987vv date from Pithouse 2, the dates suggest that subfloor ventilators were first built in Chaco at about A.D. 1000.

The lowest floor was covered with roofing impressions used as a base for Floor 2. The origin of these impressions was not determined, but the impressions may have marked reroofing of Pithouse 2. A recent analysis of four radiocarbon dates from Floor 2 and underneath (Chapter 8) yielded a tight cluster of dates that were averaged to reduce the standard error and then recalibrated against the tree-ring record (Stuiver and Reimer 1987). These indicate use of Floor 2 between A.D. 947 and 1029 (2σ), which is in agreement with other lines of evidence.

Ceramics on the upper floor were mostly Red Mesa Black-on-white, neckbanded and neck indented corrugated, as well as a few Gallup Black-on-white and overall indented corrugated sherds and vessels (Table 5.11). The overall indented corrugated jars were thrown into the pithouse after its abandonment, although the neck-decorated culinary jars appeared to have been part of the pithouse cooking assemblage (cf., Toll and McKenna, this report, regard all the restorable vessels as a single pithouse-related assemblage). Additionally, an early Gallup Black-on-white bowl fragment that was probably associated with the jewelry production, tied the abandonment to at least the early A.D. 1000s (the remaining half of the bowl was recovered from the plaza). At the time of abandonment, Gallup Black-on-white and overall indented corrugated vessels (including Chuskan wares) were just entering the site inventory. Introduction of these new wares took place in the early A.D. 1000s at about A.D. 1030 or 1040 (McKenna 1984:117, 119; Windes 1987a:247). These new wares, however, were not present in the small sample of sherds recovered from under the uppermost floor.

Pithouse 3

Pithouse 3 (Figures 5.20-5.22, Plate 5.13) was discovered during exploratory clearing along the southern part of the site. To further test and define the southern perimeter of the plaza and the presence of an upright stone outside the initial grid system, a new 200 grid series (Figure 4.1) was expanded to the south. Subsequent surface stripping and removal of two 20-cm-deep levels in Grids 13 and 202 revealed the tops of two stone-lined ventilator shafts less than a meter apart. For coding purposes, these were designated Ventilators 2 and 3 (Ventilator 1 is associated with Pithouse 2). Just beyond Ventilator 3 and extending northeast into Grid 13 was a segment of collapsed wall that postdated Pithouse 3 and later fell into the pithouse depression.

After two more 20-cm-deep levels in the appropriate grids failed to yield signs of pitstructures, an unrewarding backhoe trench, about 160 cm deep, was placed in the eastern third of Grids 19 and 203, along the suspected pithouse perimeter. A second backhoe trench, 60 cm deep and perpendicular to the first, was dug across the north third of Grid 203. Refuse was uncovered at the west end of the trench and along with it, the discovery of Pithouse 3's east wall. The backhoe trench, which removed parts of Levels 3-6, was later extended by hand and served for the east-west stratigraphic profile for the house (Figure 5.21). Material recovered from these two trenches was not screened.

Fill

Further testing within the pithouse eventually resulted in 10 levels being removed before floor was reached. The first five levels were each 20 cm in depth, followed by two 30-cm-deep and two 20-cm-deep levels, and finally, an arbitrary 10-cm-deep level of floor fill. Due to the slope of the terrain, actual depth from surface to floor ranged from 190 to 220 cm. Profiles of the fill exhibited three major

Table 5.11. Ceramic frequencies from Pithouse 2.[a,b,c]

	Fill							Fill				Fl.
		Layers						Total	Floors			Total
Ceramic Type	Grid	1	4	5	6	7	Feat.	%	1	2	Const.	%
CIBOLA/CHUSKA CULINARY												
Lino Gray	1	1	-	-	-	-	-	T	-	-	1	T
Plain gray	303	169	42	126	2	47	113	34	71	2	2	32
Wide neckbanded	2	4	-	3	-	-	2	T	-	-	-	-
Narrow neckbanded	138	31	18	46	-	26	31	12	6	-	5	5
Neck indented corrugated	30	3	-	1	-	-	2	2	4	-	-	2
Unclassified indented corrugated	152	110	15	49	5	45	158	23	29	-	1	13
PII indented corrugated rim	6	9	1	4	-	2	10	1	2	-	-	1
CIBOLA WHITEWARE												
Unclassifed BMIII-PI B/w	-	3	-	-	-	-	-	T	1	-	1	1
Red Mesa B/w	79	37	11	41	14	8	46	10	31	9	3	18
Escavada B/w	1	-	-	-	-	-	-	T	-	-	-	-
Puerco B/w	9	-	-	-	-	-	-	T	-	-	-	-
Gallup B/w	28	5	2	2	-	15	-	2	23	-	-	10
Chaco-McElmo B/w	2	-	-	-	-	-	-	T	-	-	-	-
Unclassified PII-PIII B/w	69	7	-	4	6	2	16	4	17	-	1	8
UNCLASSIFIED WHITEWARE	103	25	15	18	4	7	28	9	23	-	6	12
UNCLASSIFIED CARBON B/W	6	-	-	-	-	-	-	T	-	-	-	-
CHUSKA WHITEWARE												
Tunicha B/w	2	1	-	-	-	-	-	T	-	-	-	-
Newcomb B/w	1	-	-	-	-	-	-	T	-	-	-	-
Chuska B/w	2	1	-	-	-	-	-	T	-	-	-	-
TUSAYAN WHITEWARE												
Kana'a B/w	1	1	-	-	-	-	-	T	-	-	-	-
Black Mesa/Sosi B/w	-	1	-	-	-	-	-	T	-	-	-	-
MESA VERDE WHITEWARE												
McElmo B/w	1	-	-	-	-	-	-	T	-	-	-	-
SMUDGED WARE	1	-	-	-	-	-	-	T	-	-	-	-
SAN JUAN REDWARE												
Unclassified redware	1	3	-	-	-	-	1	T	-	-	-	-
CHUSKA REDWARE												
Sanostee B/r	1	-	-	-	-	-	-	T	-	-	-	-
Totals	939	411	104	294	31	152	407	97	207	11	20	102
Time period (A.D.)	975-1050								1025-1050			

[a] T = trace (less than 0.5%).
[b] Grid fill ceramics from grid tests above Pithouse 2: Grids 32-34.
[c] Layer 1 includes the backhoe trench from Layer 1 to Floor 1, while the feature fill includes the ventilator fill.

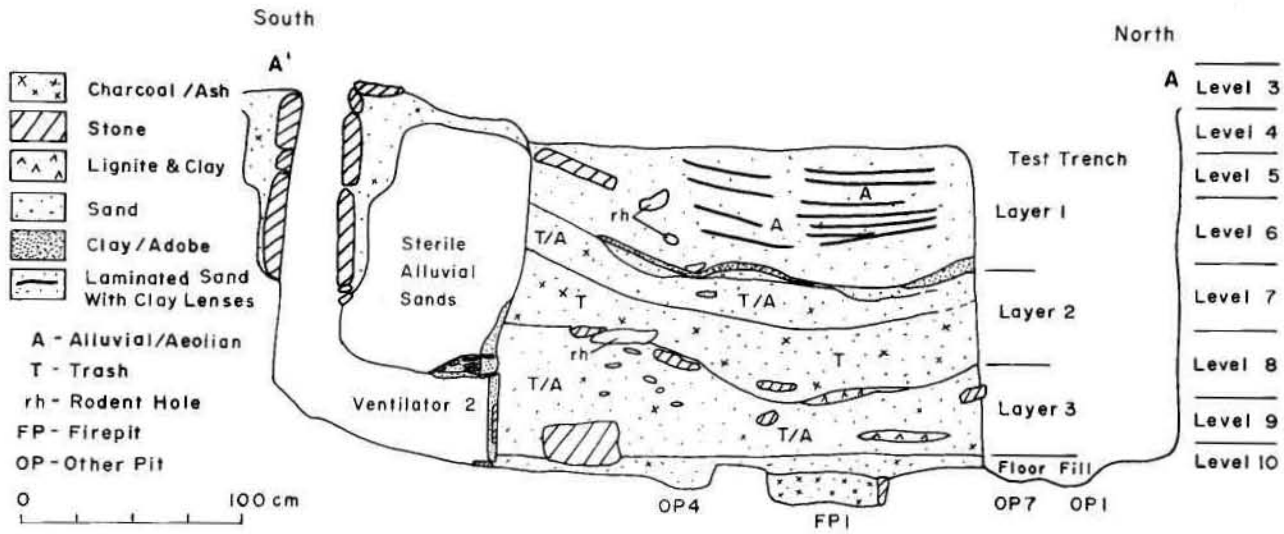

Figure 5.20. *Pithouse 3, north-south profile of stratigraphy (NPS 310/82236 C).*

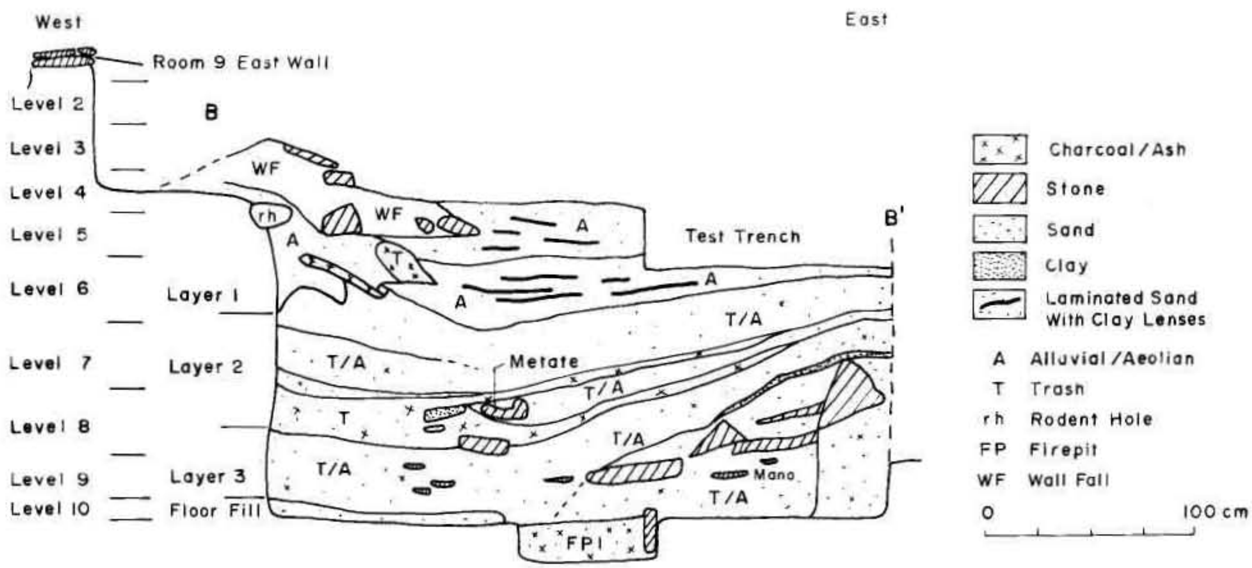

Figure 5.21. *Pithouse 3, east-west profile of stratigraphy (NPS 310/82237 C).*

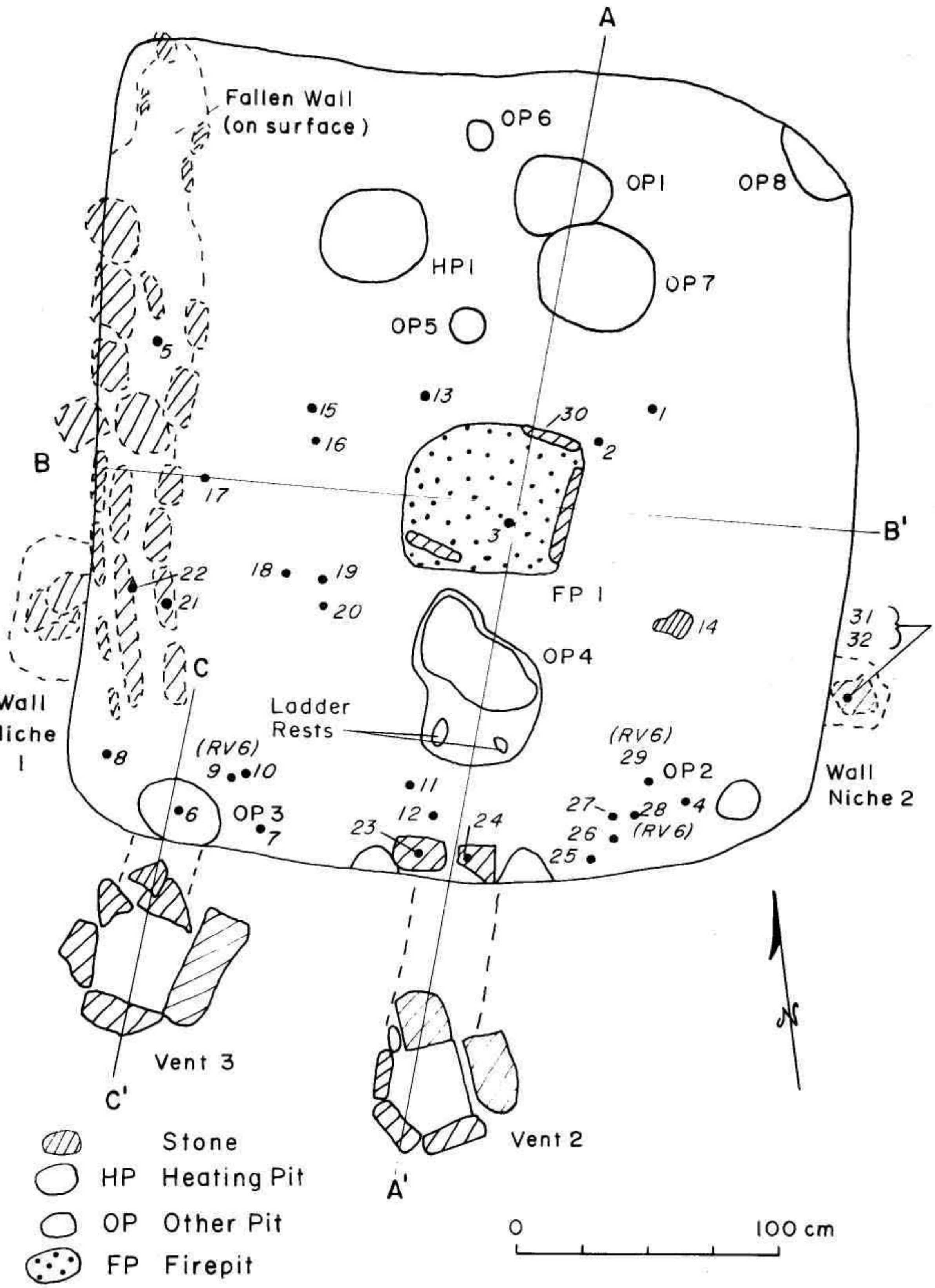

Figure 5.22. Pithouse 3, plan view and distribution of floor specimens (Table 5.13--specimen list) (NPS 310/82241 C).

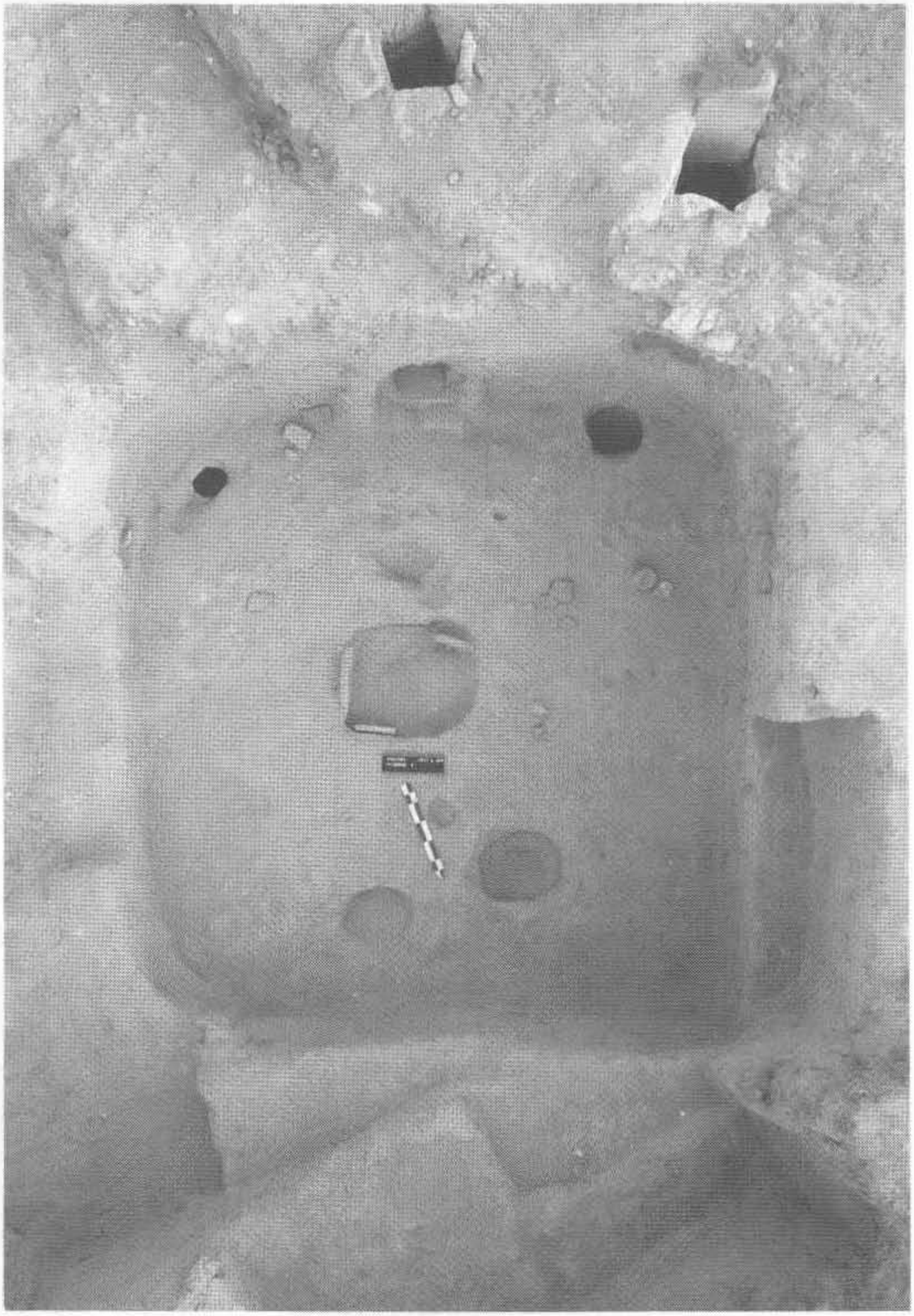

Plate 5.13. *Pithouse 3, view of floor. Note the two ventilator openings at the top of the photo. 50-cm north arrow (NPS 12289).*

episodes of deposition, which comprised about 41 percent of the fill left after completion of testing.

Layer 1. The latest deposit extended from the surface 60-100 cm down into the pithouse. It was deepest in the center, about 100 cm above the floor and sloped sharply upward 35-40 cm to the pithouse sides. For the most part, Layer 1 was characterized by clean, laminated sand, silt, and clay, alluvial deposits with a few small, sandstone fragments aligned with the slope of deposition. Cultural debris and charcoal was noticeably absent; consequently, screening was abandoned for this unit.

In the upper western part, however, the wall first observed during surface stripping marred the uniformity of the fill. It had been built along the western margin of the pithouse during Layer 1 deposition and later toppled east into the pithouse depression. It was stratigraphically clear that the wall was built after the majority of the pithouse had filled. Perhaps the wall served as a safety barrier to allow safe passage between Room 9 and the pithouse depression. The wall was composed of nine courses of friable, white-sandstone blocks, averaging 28 by 18 cm by 3-8 cm and interspersed with spall chinks and a very hard mortar. The remains indicated that the wall had been 310 cm long, about 50 cm wide (80 cm wide in a slumped condition) and 50 cm high.

Layer 2, directly under Layer 1 and cut by Levels 6-8, was primarily trash. It was thickest in the western half of the pithouse (75 cm) and thinnest in the east (20 cm), averaging about 45 cm depth. Charcoal, large fragments of painted and sooted vessels, discarded tools, fire-reddened lenses, etc., were densest in the lower and western part of the layer. A thick, black lens of ash and charcoal at the bottom center of the layer marked a pile of burned trash or firepit debris. Although trash was evident throughout, the remainder was mixed with cleaner alluvial deposits, reflecting the spatial variability of the layer. Principal deposition of trash appeared to have been from the west, from Room 9, with concurrent natural deposition occurring primarily from the east.

Layer 3. Under Layer 2 and extending to the floor were deposits of alluviated sand mixed with a little trash. This was designated Layer 3 except for the lower arbitrary 10 cm of floor fill. The deposits were 40 cm deep on the northern and western sides and 60-80 cm deep on the eastern and southern sides. Although less dense than in Layer 2, trash was again concentrated in the center and western half of the pithouse, while the eastern half was basically alluvium. Clustered along the periphery of the structure were many building stones of friable, white sandstone, predominantly 20-30 by 10-25 by 5-10 cm. A rotted timber (7 cm in diameter and 67 cm long) that was probably thrown into the structure, lay next to the north wall.

There was no discernable difference between Layer 3 and that separated from it as floor fill, except for a 1-cm-deep layer of clean, yellow-tan sand, possibly used as a cushion, resting on the north side of the floor. Elsewhere, the floor was covered by a thin layer of cracked clay, 1-15 mm deep, that apparently washed in soon after the structure was abandoned.

Floor

A centimeter or less of yellow-brown clay comprised the present single floor surface (Figure 5.22, Plate 5.13). It was best preserved in the center of the structure and rested upon sterile alluvial deposits of sand and gravel which were exposed in a 50 cm band along all but the south walls. Numerous shallow depressions and humps, undulating 2-3 cm, marred the highly irregular surface. The squarish floor was a maximum of 280 cm (east-west) by 300 cm (north-south), covering 8.2 m^2. There was a small burned spot just southwest of the firepit; otherwise, there was no evidence that the structure may have burned.

Floor Features. Twelve pits of various shapes and sizes were found on the floor (Figure 5.22, Table 5.12), a relatively small number when compared to contemporary structures of larger size. Most were too small to be useful for storage and a function could not be assigned to many of them.

Firepit. The firepit was located slightly south of the center of the floor. It was burned only along the south side and was unsuitable for archeomagnetic dating. This pit was dug into native soil and left unlined, except for three slabs placed next to but not incorporated into the sides. The north slab was a passive abrader; the rest were unmodified

Table 5.12. List of features in Pithouse 3.[a]

Feature	Length (cm)	Width (cm)	Height/ Depth (cm)	Volume (liters)	Fill Type	Fill Period	Lining	Open/ Sealed	Comments
Firepit 1	73	58	15	40.1	27	Occ	U/L-S	O	Bottom unlined. Mouth = 3253 cm^2.
Heating Pit 1	40	35	12	12.4	20	Occ	U	O	Mouth = 1126 cm^2.
Other Pit 1	34	27	7	4.8	10	Int?	U	O	Mouth = 745 cm^2. Similar to a heating pit.
Other Pit 2 top	16	13	53	30.1	31	PO	U	O	Bell-shaped pit.
bottom	41	38	-						
Other Pit 3	30	27	36	17.6	30	PO	U	O	Slightly bell-shaped.
Other Pit 4	46	26	12	9.8	14,25	Occ	U	O	Unburned ash-pit with ladder rests at south end.
Other Pit 5	13	13	6	0.7	11,14	PO	U	O	
Other Pit 6	12	11	10	1.0	10	Int	U	O	Sipapu?
Other Pit 7	42	38	7	5.0	10,50	Int?	U	S	Not a feature?
Other Pit 8	24	15	30	6.0	11,12	Int	U	S	In NE corner.
E Ladder Rest	5	4	3±	0.1	11	PO	U	O	In Other Pit 4.
W Ladder Rest	12	6	3±	0.1	11	PO	U	O	In Other Pit 4.
Wall Niche 1	50	23	25	27.3	11	PO	U	O	85 cm above floor. In W wall.
Wall Niche 2	27	27	23	11.1	30	PO	U	O	5 cm above floor. In E wall. Rodent disturbance.
Vent. 2 shaft	34	30	130-140	--	30	PO	U/L-S	O	
Vent. 3 shaft	33	32	70-76	--	30	PO	U/L-S	O	
Vent. 2 tunnel	100	32	37	--	30	PO/Int	L-PS/M	S	
Vent. 3 tunnel	66	28	44	--	30	PO	U/L-S	O	80 cm above floor.

[a] See Tables 7.3-7.4 for an explanation of the feature and attribute codes.

stones. There were three distinct layers of fill from use of the firepit, and all contained fragments of burned brush. The upper layer was white ash, followed by oxidized sand mixed with gray ash and finally, a layer of yellowish sand.

A flotation sample from the firepit yielded only four plant taxa, all with burned seeds: purslane, mustard, corn, and an unidentifiable species (M. Toll, this report). Only a single unburned prairie dog bone and eight sherds came from the firepit fill, while a dog mandible was found on top. The latter suggests placement as part of an abandonment ritual (Emslie 1978).

Heating Pit 1. An oval-shaped, straight-walled pit, slightly oxidized on the bottom and sides was 60 cm north of the firepit. Most of the unlined pit was filled with clean, yellow sand, except for a 3-cm-thick layer of charred sagebrush resting on a bottom of native earth. Again, the burn was unsuitable for archeomagnetic sampling, although a sample of the brush yielded a mean radiocarbon date of A.D. 960 $\pm$ 80, corrected to A.D. 1050 (Chapter 8). Presumably, this unsealed pit was in use up until abandonment of the pithouse. In contrast to the firepit, HP 1 yielded almost no seeds (six), and none were burned. This poor yield is typical of small-house heating pits (M. Toll, this report).

Other Pits. A variety of unlined pits, dug into native soil, were situated in three of the four corners or clustered close to an axis bisecting the firepit and main ventilator. Just one, OP 7, had been plugged prior(?) to abandonment of the house. Most of the rest were filled with deposits of tan sand and charcoal flecks that probably derived from the floor sand or had blown in after abandonment. OP 1 was filled with sterile, yellowish sand, but its size, shape, and location suggested construction as a heating pit (Plate 5.14). Two other pits, OP 2 and OP 3, were bell-shaped in profile and filled with sand and a little refuse, while OP 8 was filled with decomposed clay. These latter three were the deepest and were located in the corners. Although their position at first suggested a post support function, other attributes reflected more likely use as small storage pits. There is no evidence for a pit in the northwestern corner, which would have been necessary if the three mentioned above had been roof supports.

OP 4, a large, irregular, basin-shaped pit was filled with refuse-stained sand overlain by 1-6 cm of fine white ash that spread out onto the surrounding floor. The latter appeared to have been contents from the nearby firepit. Often, the OP 4 location is a formal pit for depositing firepit ash (Bullard 1962:159-162). Just beyond the southern edge of this ash pit were two shallow depressions, 17 cm apart, that might have marked the seatings for a roof-entry ladder.

Two cylinder-shaped pits (OP 5 and 6) north of the firepit, 35 cm and 104 cm respectively, were situated in an area commonly reserved for the sipapu in historic kivas. Yellowish sand filled both, but only that in OP 5 was sterile. This sand, however, contrasted in color with what has been noted in the other pits. Finally, two, shallow, oval-shaped and contiguous basins filled with tan sand, were located between the firepit and the north wall. OP 7 was sealed with an adobe plug, and it might have simply represented a patching of the floor (Plate 5.14).

Floor Specimens (Figure 5.22, Table 5.13). Although refuse was scattered about the floor, there was no indication of use of the floor or floor fill for intensive or prolonged trash deposition. Faunal remains consisted of seven bone items, including a tiny deer mouse skeleton and an articulated turkey wing and foot that were possibly butchering remains. Domestic dog was represented by a mandible overlying the firepit ash and two articulated vertebrae. A golden eagle talon in the southeastern corner and a deer bone fragment exhibiting polish completed the bone inventory. The turkey, dog, and eagle remains are an unusual combination, given their overall rarity at the site (Gillespie, this report). Dogs and turkeys, at least, were often left in pitstructures at abandonment, which suggests an abandonment ritual (Emslie 1978; Gillespie 1976; Hibben 1937a; Windes 1987d).

Ceramics were represented by eight sherds from four vessels. Five of these and two others from the floor fill formed a complete Red Mesa Black-on-white cup or vase without a handle (Plate 8.5F). The sherds were widely scattered; thus, they probably reflected breakage elsewhere and deposition at or shortly after the house was vacated. Sherds from two other vessels matched counterparts in the floor fill.

Plate 5.14. *Pithouse 3, Floor 1. Other Pit 1 (left), a possible heating pit, and Other Pit 7 (right), a dubious feature. 15-cm north arrow (NPS 12298).*

Twelve stone artifacts were scattered over the floor. Seven were hammerstones or chunks of petrified wood that exhibited battering. Flakes were nearly absent, indicating use of the hammerstones elsewhere or for non-percussion or soft percussion tasks within the pithouse. Three ground stones were recessed into the floor; two in front of Ventilator 2, as part of the construction, and a third southeast of the firepit. The latter might have been used as an anvil. The "anvil," and a second piece nearby, were originally part of a shaped door or vent cover. An abrader 1 cm above the floor was the only other "floor" artifact, besides an unworked concretion and a stone.

The paucity of material on the floor might indicate debris left behind from last use of the structure. The high number of hammerstones, relative to other artifact classes, was not duplicated for floors elsewhere within the site, perhaps marking the loci of maintenance activities for manos and metates (e.g., Windes 1987c). A large number were also found in the floor fill above the floor; thus, those on the floor might have simply represented the first load of discarded hammerstones dumped into the vacated structure. If so, these may have come from the nearby plaza, where there was ample evidence for grinding activities and for sharpening grinding tools.

Macrobotanical floor remains were sparse but dominated by spurge, mustard, and purslane seeds (M. Toll, this report). The former may have been a modern contaminant, but the burned seeds of the latter species found in the firepit suggested their presence from food-preparation tasks. Masses of corn pollen (910 grains) were found in the center and the southern half of the structure, some of it clumped together, along with 52 grains of prickly pear cactus. The northern quadrants yielded a paltry 65 pollen grains (Cully 1985:174). Differential preservation of the pollen seems striking; nevertheless, all four quadrants were dominated by corn and prickly pear pollen, which suggests that corn and cactus pollen was once widespread across all of the floor. Both

Table 5.13. Pithouse 3 distribution of Floor 1 materials.[a]

Artifact Number	Artifact Class	Lithic Material, Ceramic Ware, or Faunal Species	FS No.
1	Bird wing (articulated)	- (Meleagris gallopavo) Turkey	3036
2	Bone tool	- Deer or elk	3037
3	Mammal mandible	- (Canis familiarus) Dog	3038
4	Bird talon (pendant?)	- (Aquila chrysaetos) Golden eagle	3039
5	Partial skeleton	- (Peromyscus maniculatus) Deer mouse	3040
6	Bird foot	- (Meleagris gallopavo) Turkey	3041
7[b]	Mammal vertebrae (2)	- (Canis familiarus) Dog	3042
8	Hammerstone (199 g)	1011 (chert, fossiliferous)	3043
9	Red Mesa B/w cup/vase sherd (RV 6)	- Cibola Whiteware	3044
10	Hammerstone (208 g)	4005 (quartzite)	3045
11	Hammerstone (349 g)	1110 (splintery silicified wood)	3046
12	Chopper/utilized flake (103 g)	1110 (splintery silicified wood)	3047
13	Hammerstone (311 g)	1110 (splintery silicified wood)	3048
14	Unmodified burned slab (discarded)	2000 (sandstone)	3049
15	Hammerstone (108 g)	1110 (splinter silicified wood)	3050
16	Red Mesa B/w cup/vase sherd (RV 6)	- Cibola Whiteware	3051
17	Core (36 g)	1112 (cherty silicified wood)	3052
18	Plain gray jar sherd (sooted)	- Cibola Grayware	3053
19	Red Mesa B/w jar sherd	- Cibola Whiteware	3054
20	Plain gray jar sherd (sooted)	- Cibola Grayware	3055

Table 5.13. (continued)

Artifact Number	Artifact Class	Lithic Material, Ceramic Ware, or Faunal Species	FS No.
21	Unmodified concretion	2000 (sandstone)	3056
22	Red Mesa B/w bowl sherd	- Cibola Whiteware	3057
23	Mano (in floor) (2268 g)	2000 (sandstone)	3058
24	Passive abrader (505 g) (in floor)	2000 (sandstone)	3059
25	Lapidary abrader (441 g) (in floor)	2000 (sandstone)	3060
26	Active abrader (925 g)	2000 (sandstone)	3061
27	Hammerstone (129 g)	4005 (quartzite)	3062
28	Red Mesa B/w cup/vase sherd (RV 6)	- Cibola Whiteware	3063
29	Red Mesa B/w cup/vase sherd (RV 6)	- Cibola Whiteware	3064
30	Passive abrader (1393 g) (in firepit)	2000 (sandstone)	3079
31	Mano-like stone	2000 (sandstone)	3074
32	Active abrader (48 g)	2000 (sandstone)	3075

[a] See distribution in Figure 5.22.
[b] Joins a piece in Layer 3.

must be considered components of some special activity, probably food preparation. Although no metates or manos were recovered in association, the high frequency of hammerstones suggests that at least some were associated with the masses of corn pollen. Greasewood pollen was high in the southwestern quadrant but may have been from fuel remains. Cattail and prickly pear pollen also came from the floor.

Walls

The walls were unplastered native earth and were difficult to discern during our excavation. They were irregular, like the floor, and met the latter at a right angle. Much of the walls' shabby appearance may be attributed to postoccupational weathering, which may have removed the wall plastering. The house was square, with abruptly rounded corners. Both the north and south walls slightly overhung the floor while the others were nearly vertical.

Wall Features. Two niches and two ventilators were cut through the walls and comprised the total wall features (Figures 5.22-5.25).

Wall Niches. The unlined niches, cut into native earth, were set just beyond the south wall. Wall Niche 1, in the west wall, was filled with postoccupational sand. Three unmodified tabular stones were stacked in the center towards the front of the hole, each about 20 by 15 by 3 cm. This niche was elevated 85 cm above the floor, at about the same height as the Ventilator 3 tunnel, 50 cm away. Directly across the floor in the east wall was Wall Niche 2. It was 5 cm above the floor and contained sand, refuse, and two tabular abraders. Rodents, however, had tunneled through the rear of it.

Ventilators. Two ventilators provided fresh air to the structure; one was at floor level south of the firepit, in traditional style, and the other was 110 cm to the west and 80 cm above the floor in the southwest corner.

Ventilator 2 displayed complex masonry construction, similar to those in the other two pitstructures at the site (Figure 5.2, Plate 5.15). Like the others, its construction comprised the majority of masonry found in the pitstructure.

Shaft. Several stages of construction were deduced after sectioning the ventilator. Initially, an 80-cm-wide cylindrical pit was dug from the original site surface to a depth of 60 cm. Its size undoubtedly enabled the excavator to proceed with a smaller, 40 cm diameter pit, reaching an additional 70-80 cm in depth, and intersecting the ventilator tunnel.

To facilitate the seating of large tabular slabs that reduced the upper shaft to the size below, the upper 30 cm of the latter shaft was expanded to 60 cm in diameter. Two, perhaps three, courses of upright slabs, joined by adobe mortar, were set to form a squarish shaft, 30-34 cm wide on the inside. A number of small chinks helped to stabilize the bottom northern slab. At the top of both ventilator shafts were several horizontal slabs, which probably fell over. Although these might have capped the top edges, it appeared more likely that they once elevated the shaft another 20-30 cm before collapse. Upon completion of the slab liner, the surrounding hole was intentionally filled with charcoal-flecked sand devoid of refuse.

Tunnel. Like the shaft, the inner half of the oval-shaped tunnel, 37 cm wide and 32 cm high, was unlined, native earth. The remainder was squared off, 28 cm wide and 38 cm high, to accommodate a slab liner. Upright slabs, one on the east and two on the west side, were backed primarily by 3-10 cm of adobe and several small stones. The western outermost slab was a trough metate fragment. After installation of the side slabs, an adobe layer 2 cm thick was laid down between the sides on the floor. Inset in the adobe, at the front of the tunnel, was a door-slab fragment that projected onto the house floor, almost touching a mano and unmodified stone set flush in the floor. From the tip of the door slab, 5 cm above the house floor, the tunnel floor gradually ascended until it was 13 cm above the house floor, directly beneath the ventilator shaft--a style reminiscent of the Pithouse 2 tunnel construction.

To facilitate the original excavation of the tunnel and/or to enable placement of the lintel at the front, the native earth was removed in a low semi-circular arch above the side slabs. An oval lintel

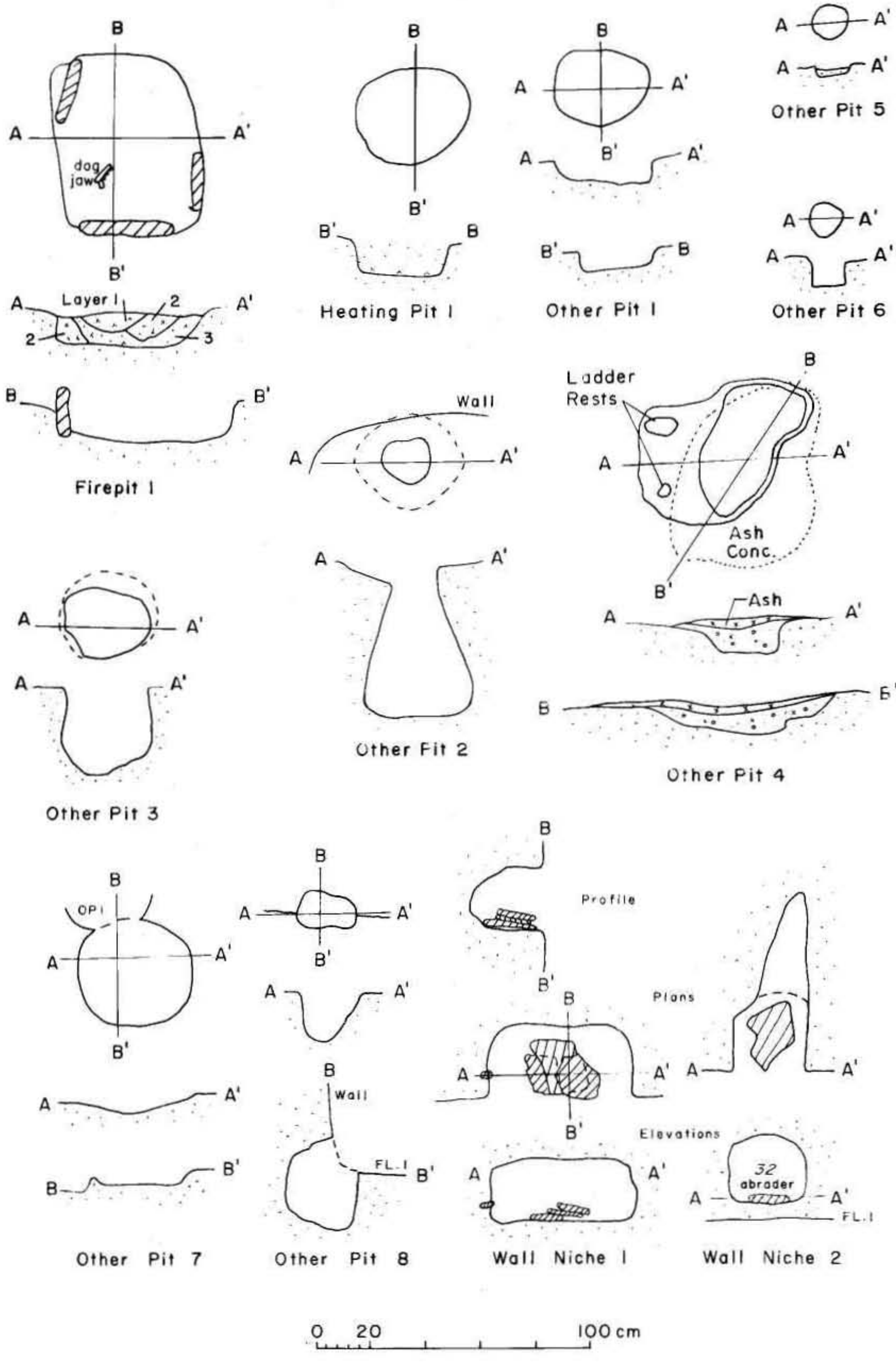

Figure 5.23. Pithouse 3, feature plans and profiles (NPS 310/82288 C).

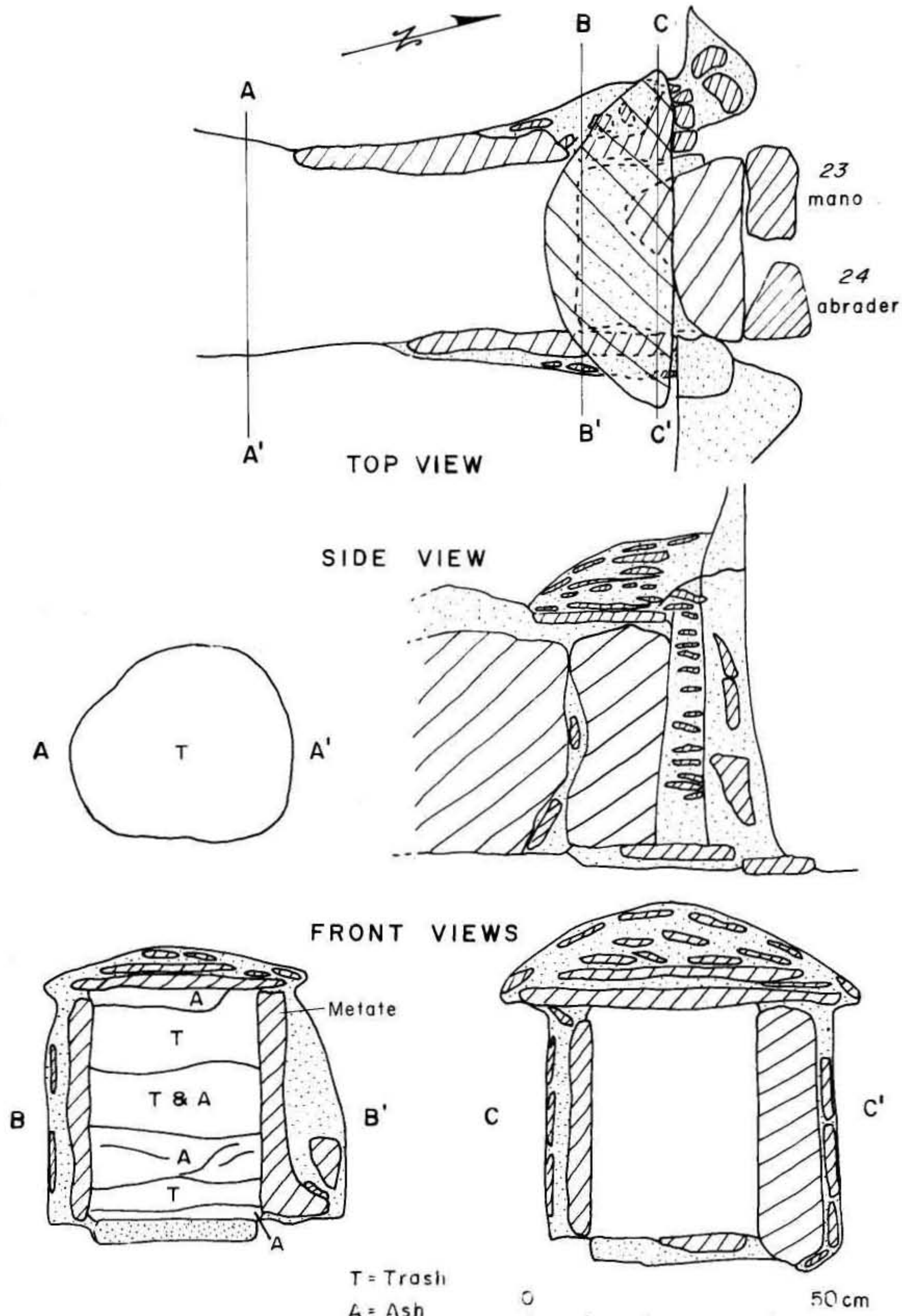

Figure 5.24. Pithouse 3, Ventilator 2 complex plan and profiles (NPS 310/82242 C).

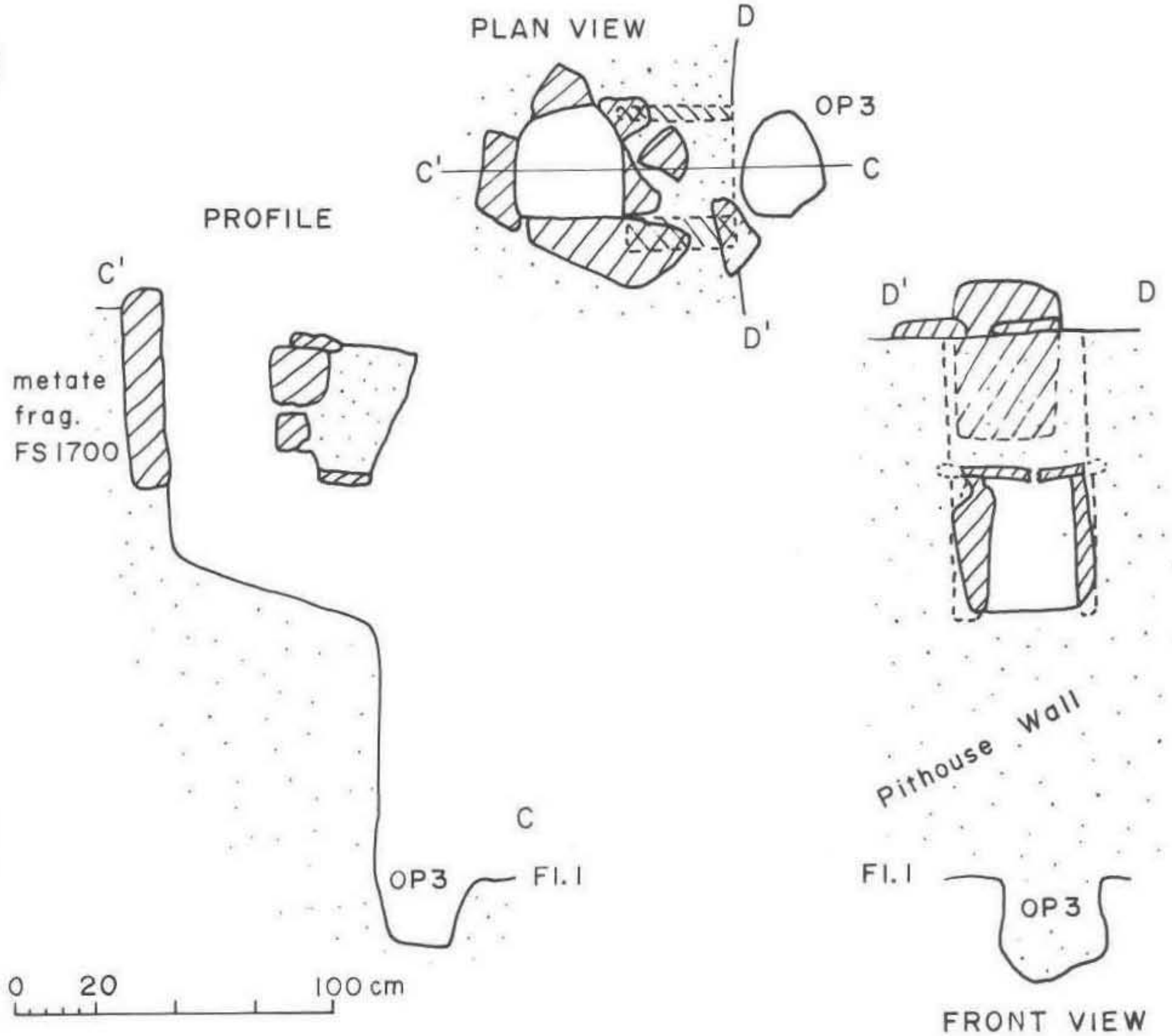

Figure 5.25. Pithouse 3, Ventilator 3 plan and profiles (NPS 310/82243 C).

stone, bifacially spalled on the front edge, was set over, but barely touching, the side slabs. Adobe along the top and behind the side slabs were primarily for supporting the lintel. A copious amount of adobe, sandwiched by thin stones, filled the arch above the lintel stone (Figure 5.24, Plate 5.15A). This extended 6 cm beyond the lintel to overhang the floor.

Finally, in front of each exposed side slab, the architects pillared a column of adobe set with small chips of stone. Each rested partly upon the door-slab flooring and then rose to meet the lintel. The ventilator opening was then finished by a hemispherical collar of stone and adobe that flared out onto the main floor at the bottom and tapered flush with the south house wall at the top, next to the columns (Figure 5.24, Plate 5.15b). In all, considerable effort and planning went into the construction of Ventilator 2.

Fill. The upper half of the Ventilator 2 shaft was filled primarily with alluviated sandy deposits, followed by sand and trash that extended 45 cm into the tunnel. The remaining tunnel fill was laminated sand that apparently was deposited naturally. The ventilator mouth was plugged with a 10- to 15-cm-thick seal that blocked the ventilator mouth. Two slabs, about 15 by 15 by 3 cm, were set flush in the plug.

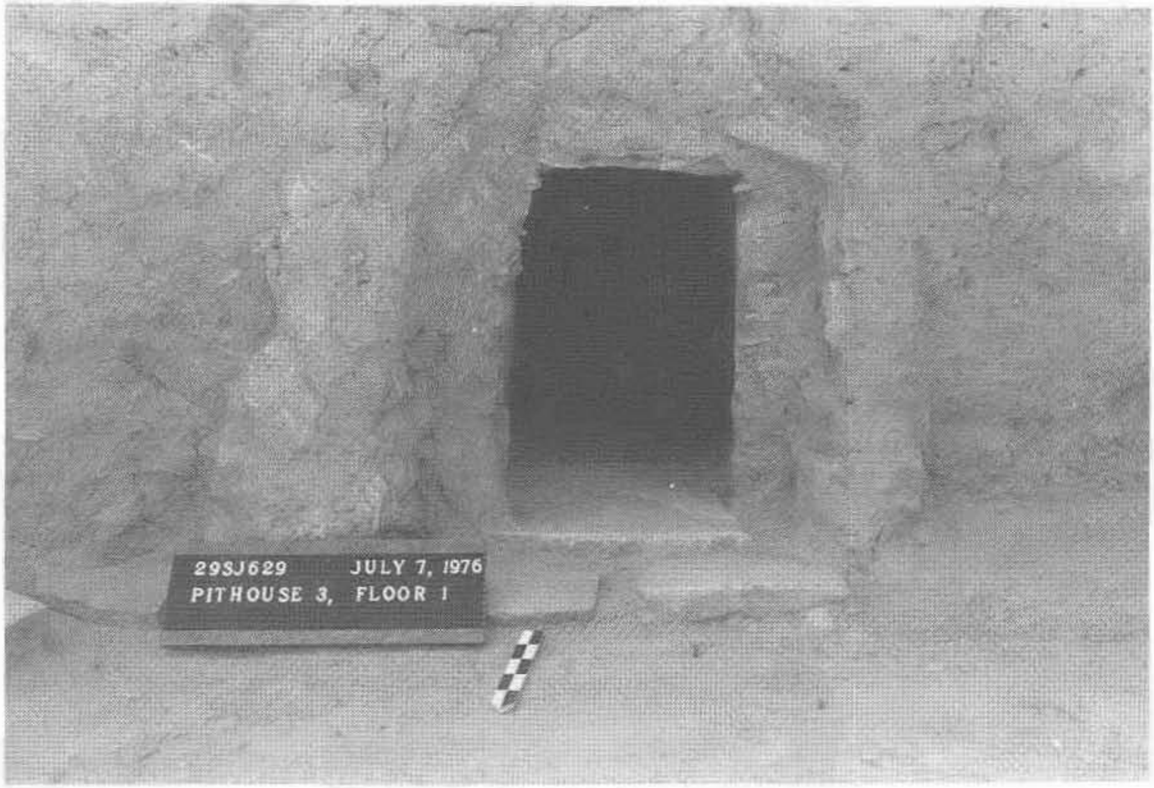

Plate 5.15A. *Pithouse 3, Ventilator 2 mouth before it was dismantled. 15-cm north arrow (NPS 12293).*

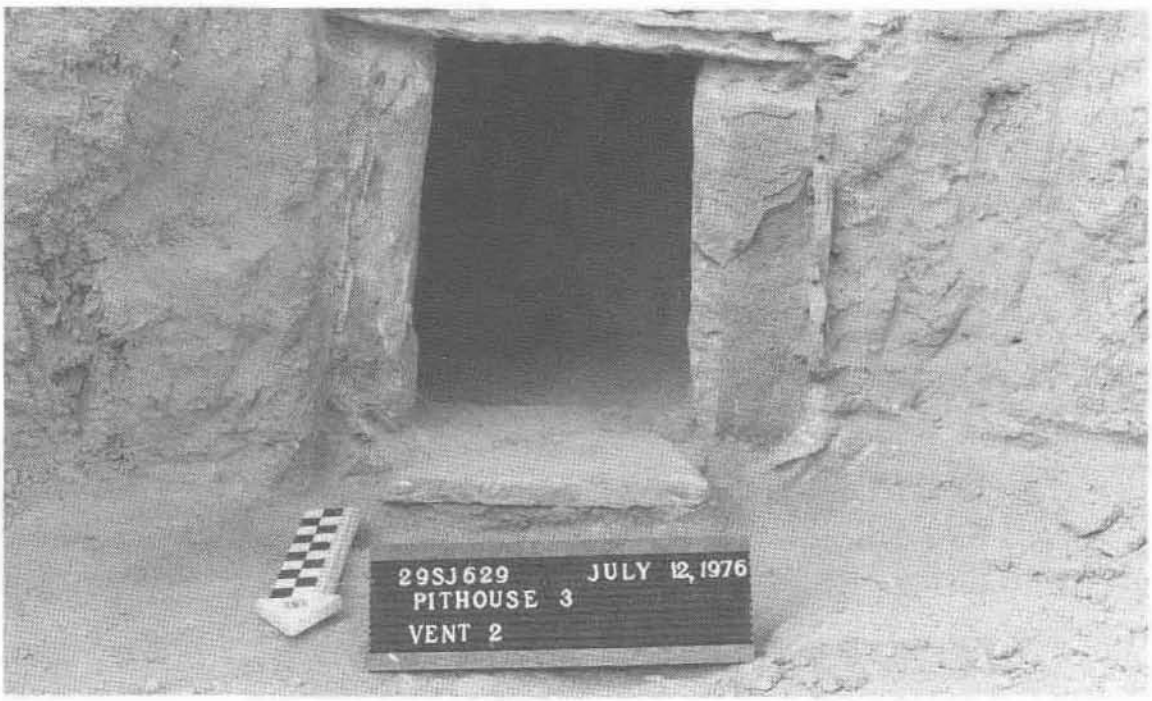

Plate 5.15B. *Pithouse 3, Ventilator 2 mouth after it was dismantled. 30-cm north arrow (NPS 12321).*

Ventilator 3. Located 110 cm west of the main ventilator (center to center) was a second ventilator, 80 cm above the floor, and OP 3 (Figures 5.25, Plate 5.16). It was not sectioned; therefore, precise constructional details are lacking. Its general appearance, however, was similar to Ventilator 2, although a simpler design.

Shaft. Thick (about 10 cm) upright slabs of white sandstone lined the upper 40 cm of the shaft, leaving a sub-rectangular opening 33 by 33 cm. A trough metate fragment, projecting an additional 16 cm above the present surface, formed the south side, while two to six courses of slabs lined the others. The lower 32 cm of the shaft were unlined native earth.

Tunnel. Unlike its neighbor, Ventilator 3 was apparently formed by excavation of a short trench out from the pithouse that reached to the surface. The trench stretched south from the main chamber 66 cm, rising 12 cm under the shaft. Two large slabs lined the tunnel sides just behind their juncture with the pithouse wall. A stone lintel was laid across the tops of these, forming a rectangular mouth 28 by 43 cm high. The tunnel floor was native earth. The shaft was then added and finally, charcoal-flecked sand was dumped over the lintel and filled the remaining trench to the surface.

Fill. Like Ventilator 2, this was filled primarily with alluviated sand deposits mixed with sparse trash.

Roof

There was a general absence of roofing material and roof support features, such as post supports and pilasters, in the pithouse. A few pieces of wood on the floor and the clusters of stone in the fill may be attributed to roof remains, but otherwise reconstruction must be entirely speculative. Probably the roof rested upon several beams laid across the house and supported at or near the original surface. The presence of large stones in the fill around the periphery suggested that the slightly lower downslope (east) side of the structure was elevated by a low masonry wall to level the roof. With the removal of all roofing, except those pieces recovered, it was assumed that access was gained to the superstructure by ripping and throwing aside the protective plastering, leaving none to be recovered in the fill. Wilshusen (1989:Table 2) suggests that the earth-fill, from digging out the pithouses, supplied the majority of material used in the final roof plastering and in surface room construction--in this case, the rooms built approximately coeval with it were Rooms 2, 3, and 9.

Hatchway. Location of an entryway must be hypothetical due to the lack of physical remains. A few large stones were recovered from the fill over the ash-pit area but not in greater quantities than elsewhere. Two small pits, possibly ladder rests, were situated in front of the ventilator. Thus, it was suspected that entry was gained in the traditional fashion through the roof, slightly north of the two pits, in an area above the firepit.

Conclusions

Fill. There were two basic methods of infilling--purposeful trash dumping and alluvial deposition. Trash deposition commenced as soon as the structure was abandoned. Layer 3, the lowest of our three rather large natural deposits, was basically alluvial but contained some trash near the center and in the western half. In Layers 2 and 3, refuse was thrown in from the west, from or near Room 9, while the eastern part of the pit was basically alluvial--events that appear to have taken only a few years. No trend toward early-to-late seriation could be discerned and several large sherds from single vessels were noted to have large vertical and horizontal distributions. Trash deposition ceased after about 1 m of fill had accumulated in the pit. After this, infilling was exclusively through alluvial deposition. Thus, the thick top of Layer 3 was laminated sand and silt with only a small amount of cultural inclusions. These materials probably were washed in from the surrounding ground surface.

Besides the large number of sherds (3,509) recovered from the pithouse, there were also high frequencies of hammerstones (41; 14 percent of the site total) and abraders (36; 20 percent of the site total). The totals from the latter two classes were exceeded only by material recovered from the plaza area. Other artifact classes did not appear to be over-represented in the pithouse fill. Much of the material may have been refuse or discards from plaza activities. Ceramic matches between the two areas

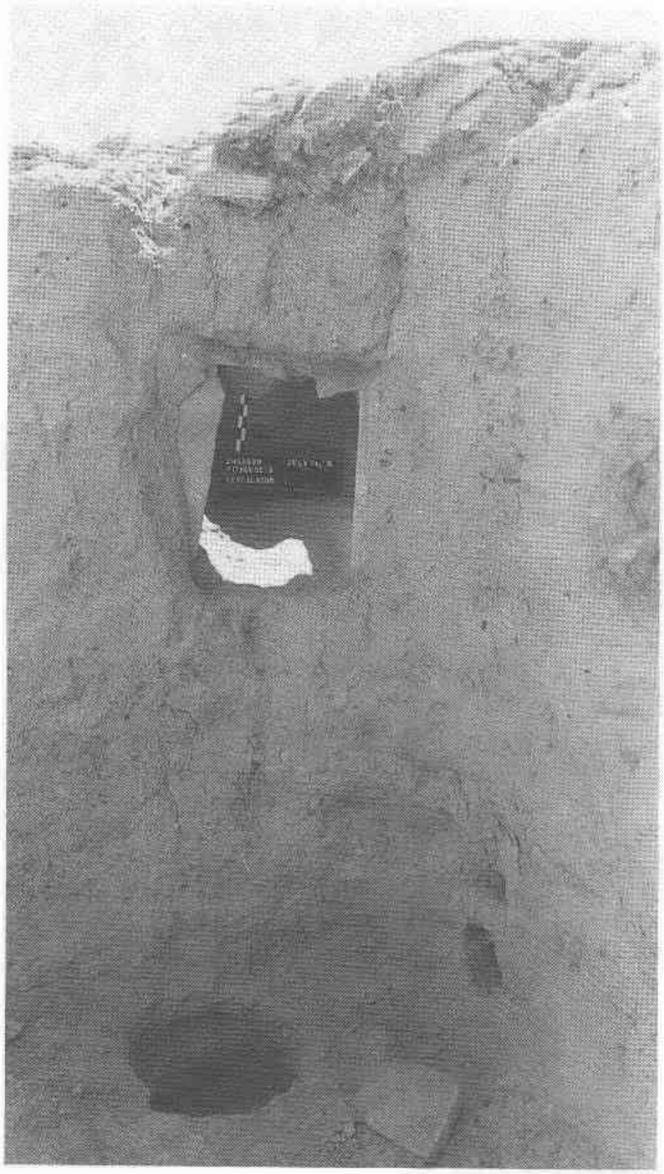

Plate 5.16. *Pithouse 3, Ventilator 3 tunnel mouth and, below it, Other Pit 3. 15-cm scale (NPS 12355).*

supported this hypothesis. There were a number of ceramic matches between sherds in Pithouse 3 and Plaza OP 6/12 and OP 14, indicating coeval deposition.

Ventilators. The plugging of Ventilator 2 suggested that Ventilator 3 served as its successor. Whether Ventilator 3 was built later as a replacement or earlier to supplement Ventilator 2, however, is unknown. Both were similar in construction and might have been contemporary. Certainly, there appeared nothing deficient with the functional capabilities of Ventilator 2, although Ventilator 3, alone, appeared inadequate for a proper draft. Note that the absence of the deflector should have allowed a disconcerting amount of firepit ash to be blown about the room when Ventilator 2 was operative. Such a small structure might have provided inadequate smoke or temperature ventilation, so that a second higher ventilator was needed. Both might, therefore, have functioned as a unit, with Ventilator 2 being sealed late in the occupation. Although Ventilator 3 could have been adequate alone, perhaps there was a change in chamber function when the firepit, and therefore, Ventilator 2, were no longer needed.

Function. The squarish shape and number of floor pits for Pithouse 3 was analogous to Anasazi pitstructures built in the eighth and ninth centuries. The small size, artifact assemblage, and lack of segregated work areas reflected other than domestic usage, although these traits were not uncommon for small pithouses. The house's diminutive size and location, off to the south of the site, away from the plaza and the initial core of rooms, suggests that it was constructed after initial occupation of the site (i.e., after the tub rooms and Pithouse 2 were built). The structure may have been built to take over some of the ceremonial needs of the community during a period when structures became more specialized and when the site population grew.

On Black Mesa, an auxiliary pitstructure off to one side of the site was commonly used as a pit mealing room (Gumerman et al. 1972:196-197; Powell 1983:23-24). The concentration of corn pollen and hammerstones recovered from the pithouse floor were expected at mealing loci, although no evidence for mealing bins, mealing basins, or metate rests were discovered in the pithouse. Other sites nearby (29SJ 626 East and 29SJ 627) have had ancillary pitstructures that seemed similar to Pithouse 3, but their specific function was ambiguous.

Temporal Assignment. Architecture and location of the pitstructure suggested it was not one of the initial site structures. Long occupation or use of the structure was not indicated from the amount of remodeling, which appears minimal. There was only a single floor and little oxidation of the firepit and heating pit. Another possible heating pit was unburned. Both the walls and floor exhibited no modifications and, overall, the impression was one of short occupation and/or limited use. Ceramic trash in the fill, including small percentages of Gallup Black-on-white and much Red Mesa Black-on-white (Table 5.4), marked deposition in the early A.D. 1000s. Apparently, then, Pithouse 3 was built after the initial founding of 29SJ 629 and abandoned before the end of the main (e.g., non-kiva) occupation. Thus, use of the building was probably limited to the late A.D. 900s and early A.D. 1000s. The single recalibrated radiocarbon date of A.D. 1050 (Chapter 8) from the Pithouse 3 heating pit contents marked last use of the structure and supported an interpretation of an early A.D. 1000s abandonment.

Pitstructure Summary and Conclusions

Three pitstructures were evident at 29SJ 629. Testing revealed no others in the immediate site vicinity. Each was distinct temporally, with Pithouse 2 representing the earliest structure at the site. Its earlier stratigraphic relationship to the Kiva (Pithouse 1) was clear, with the latter built into the abandoned depression of Pithouse 2. The temporal relationship between Pithouse 2 and Pithouse 3 was speculative but was resolved primarily by their relative locations within the site and their architectural morphology. Pithouse 2 was centered directly in front of the earliest core rooms at the site, Rooms 5-7, but Pithouse 3 was located off to one side, beyond the plaza and roomblock. Architecturally, Pithouse 2 began with a separation of floor work areas that was missing in Pithouse 3. In Pithouse 2, the mealing bin areas were separated from the main floor area by short wing walls, a characteristic of early pithouse occupations in the Basketmaker III and Pueblo I periods (Brew 1946; Bullard 1962; Bussey et al. 1973).

Pithouse 3, on the other hand, contained few floor features and was more "kivalike" than the initial use of Pithouse 2. The shift from primary use of pitstructures for domiciliary functions to one of specific use, such as ritual or mealing rooms, was evident here. Additionally, the relative sizes of the two pitstructures--Pithouse 3 was half the size of Pithouse 2--also suggested ancillary usage of Pithouse 3. The pattern of a secondary pitstructure, located to one side of the site from the primary, earliest, largest pitstructure, was common locally, at least, at other contemporary excavated sites: 29SJ 625, 29SJ 626 East, and 29SJ 627. In short, Pithouse 3 appeared to have been added to take over some specialized needs for the site occupants. These needs may have been prompted for two reasons: 1) the pan-regional increase of specialized ceremonial and food-preparation structures that occurred during the A.D. 900s (e.g., Gillespie 1976), and 2) intra-site population growth. In short, Pithouse 2 was built earlier than Pithouse 3, although both structures were used contemporaneously for a period of time.

The lack of remodeling, the multiple floors, and the poorly burned hearths indicated relatively short use of Pithouse 3. Furthermore, the use of Pithouse 3 for substantial trash deposition and the age of the homogenous ceramic assemblage within the trash also marked its abandonment during the primary occupation. The long use of Pithouse 2 was suggested by its multiple floors, numerous, sealed, floor features, and remodelling. After abandonment, some refuse was thrown into the structure, to be left with the cooking vessel, whiteware assemblage, and turquoise manufacturing debris. The remodelling in Pithouse 2 also reflected the shift from domiciliary to ritual, or specialized, use when the numerous pits used on the lower floor were eliminated with the new floor.

Finally, Pithouse 2 had been abandoned for long enough that it had mostly filled before the Kiva was constructed. The keyhole-shaped Kiva morphologically placed it in the late A.D. 1000s or early 1100s, which corresponded with the few late ceramics left on its floor. Samples for chronometric dates were taken from all three pitstructures, but a temporal ordering, based on these samples, was not possible. The pivotal date in the series came from the tree-ring-dated ventilator lintel, at A.D. 987vv, in Pithouse 2. This dates the remodeled ventilator when it was moved from an above-floor system to below the floor. The vessels left on the Pithouse 2 floor suggested abandonment by A.D. 1040. There was little to date the initial construction of Pithouse 2, except by morphology and linking it with the earliest ceramic assemblage at the site. These features suggested a late A.D. 800s or early A.D. 900s construction. Two tree-ring specimens, with minimal ring loss, near the floor in Pithouse 2 and in Room 9 may have marked some construction at the site in this period, but direct association with their respective structures is not possible.

The morphology and potential use of Pithouse 2 also suggested ties with nearby 29SJ 628, 85 m away, which is probably much larger than its known site limits. Truell (McKenna and Truell 1986; Truell 1992), who excavated both 29SJ 628 and nearby 29SJ 627 (155 m from 29SJ 629), believes that at least one or more pithouses at 29SJ 627 may have been part of a widespread Basketmaker III-Pueblo I village in the rincon, of which 29SJ 628 was only a part. At 29SJ 629, Pithouse 2 could have represented one of the later houses of this village that eventually added surface rooms. Pithouse C may have given rise to the initial core of aboveground architecture at 29SJ 627 in a similar fashion. This tenuous association may have also accounted for early tree-ring dates at 29SJ 629 that came from reused wood. The roofing impressions used as the base for the early floor in Pithouse 2, however, may have represented salvaged materials from a nearby pithouse or renovation of Pithouse 2.

A single mean radiocarbon date of A.D. 1050 from the heating pit in Pithouse 3 did little to improve the structure's suggested abandonment in the late A.D. 900s or early A.D. 1000s based on the ceramics in the fill. Its apparent short usage also suggested that it was constructed shortly before abandonment, probably in the late A.D. 900s, coeval with the remodeling of Pithouse 2 and the latter's shift from domiciliary to specialized use.

Cultural materials left at the abandonment of the pitstructures was informative of their last use. Pipes, which were historically used in kivas (e.g., Parsons 1936) were also commonly recovered from Chacoan pitstructures. One was recovered in a possible niche in the 29SJ 629 Kiva. Otherwise, little came from the Kiva and the ethnobotanical remains were relatively unrewarding--attributes common to kivas (i.e., pitstructures lacking evidence for domiciliary activities; see M. Toll 1987). Likewise, little was found in Pithouse 3, which also had been designated as a place of special use. The remains in Pithouse 3, however, were more illuminating. The presence of a dog mandible, an eagle's claw, a turkey foot, and an articulated turkey wing suggested ritual items left from some ceremonial function or abandonment ritual.

6

OUTDOOR AREAS AND MISCELLANEOUS TESTS

Aside from the rooms and pitstructures, a number of outdoor areas of the site were investigated, including the midden and plaza. A prodigious amount of material was recovered from the latter two areas. Prior to A.D. 1000, the majority of refuse produced during the primary site occupation was tossed into a small gully that had run along the north side of the site down to the east, where it had fanned out in the areas of 29SJ 628 and 29SJ 627. Although the midden deposits were physically separate from the architectural units and outdoor work areas of the site, it was an important aspect of the site occupation. The majority of some cultural items recovered from the site came from the gully midden deposits, which yielded clues to some activities conducted at the site and suggested the possibility of some intermittent occupation.

On the other hand, the plaza physically linked the site rooms with the pitstructures as outdoor work space. Overall, the outdoor areas between the rooms and pitstructures (i.e., the plaza) were generally devoid of features, except for the area directly in front of Rooms 6 and 7. Here, cultural remains and pits mark the loci for food preparation and turquoise jewelry manufacture. Large, bell-shaped, storage pits were found in the plaza, and the numerous postholes attest to a former ramada that once shaded much of the area. Finally, exploration of areas barren of cultural remains was conducted in and around the site, but generally, little was found in these miscellaneous tests.

Plaza

To define possible rooms and associated plaza and ramada features, work was undertaken east of Rooms 5-7, between Rooms 3 and 9. With the discovery of Room 9 (Figure 6.1), fronting Room 8, it was initially thought that tub Rooms 5-7 would also be fronted by a tier of larger, habitation rooms extending north from Room 9 and south from Room 3. Such was not the case; the area defined yielded exclusively outdoor plaza features and a series of ramada supports (Figure 6.1). Examination of this area was later extended to include the space between Rooms 1 and 2 and the nearby pitstructures. General control was maintained by a series of 3 m^2 grids which overlay the site. Those in the area of consideration were sometimes adjusted to best reflect the archeological situation (Figure 6.2). Parts of grid units that overlapped rooms and pitstructures were neither considered in the following discussions nor in the artifact lists.

Surface vegetation and 3-5 cm of loose, sandy fill and cultural material were removed from the plaza grids in 1975, but additional excavation did not commence until a year later. It was expected that any plaza features would be shallow and surfaces difficult to define. Therefore, a broadside stripping approach was utilized to aid in their discovery. Nevertheless, defining events in the plaza was, at times, confusing and frustrating because of the subtle changes in compacted use-surfaces. For this reason, the grids are discussed in groups as events were

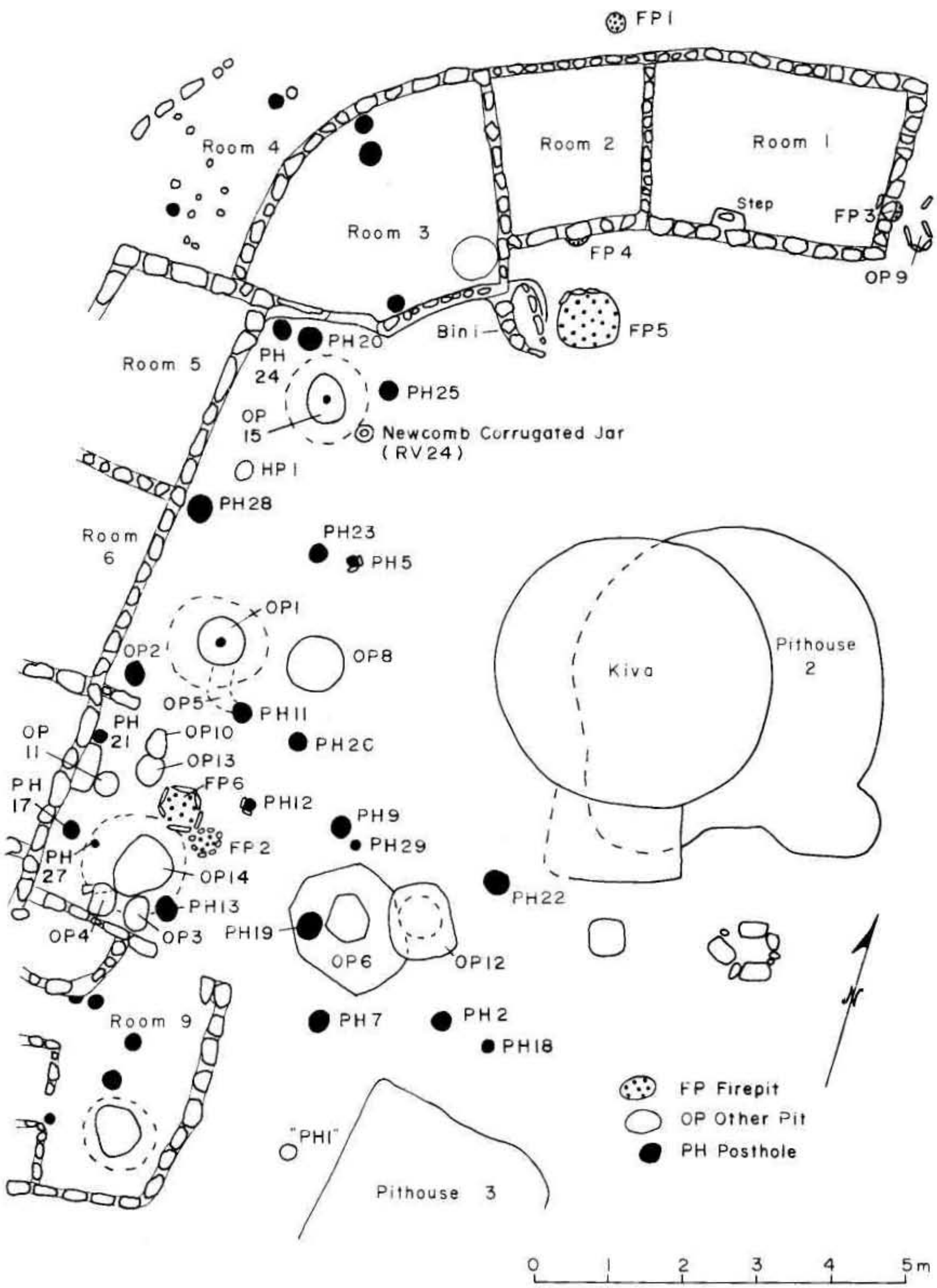

Figure 6.1. *Plaza, plan view of plaza features and former plaza features now in rooms (NPS 310/82247 B).*

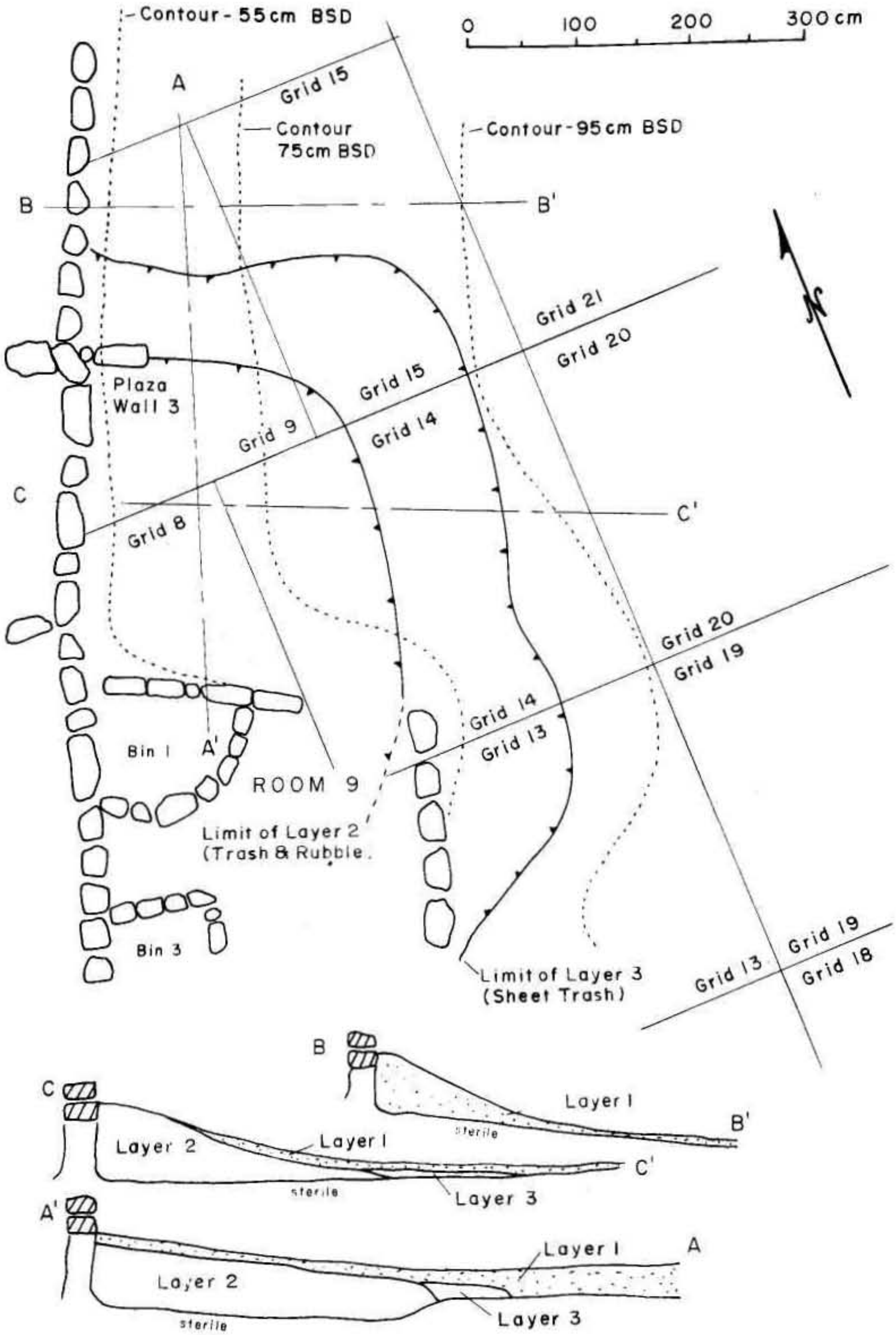

Figure 6.2. *Plaza, stratigraphic plan and profiles (NPS 310/82248 B).*

defined, which often differed from adjoining grids. All non-sterile fill was screened through 1/4 in. mesh for artifact recovery.

Grids 8-9 and 13-15

At the eastern edge of Grids 14 and 15, features were encountered almost immediately beneath the stripped surface, at 95 cm below the site datum (BSD). Consequently, this depth was maintained for control and the overburden in Grids 8, 14, and 15 removed in arbitrary levels above that depth (Figure 6.2). In Grid 8, features and artifact concentrations reflecting possible surfaces above and below 95 cm BSD were encountered, whereas in Grid 9, three surfaces (the lowest was sterile) were defined just below 75 cm BSD. The lowest surface in Grid 8, however, was at 99 cm depth (BSD) and overlaid sterile, undisturbed fill.

From the onset, the Grid 9/15 boundary was maintained 100 cm east of the site map location (Figure 4.1) to retain material from the 75 cm depth and subsequent contours within a single unit. Also, the stratigraphic events in Grid 9 appeared to differ north and south of Plaza Wall 3 (Figure 6.3), a short stub projecting into the plaza from the cross wall between Rooms 6 and 7. Material from these areas was kept separate. Only about 5 cm of alluvium was scraped from Grid 13 to define features that presumably were associated with those in Grids 14 and 15 at 95 cm BSD.

Fill

Deposition within the grids considered above was relatively simple, consisting of three cultural layers underlain by sterile native earth (Figure 6.2). Because of its removal in arbitrary levels from broadside stripping, the extent and sequence depicted is only approximate.

Layer 1. A shallow overburden of alluviated sand, containing small amounts of redeposited cultural material, covered the underlying layers of trash and rubble and, beyond them, the sterile undisturbed fill.

Layer 2. Under the sand was construction rubble, almost certainly wall fall from Room 9's north wall and from the east walls of Rooms 7 and 8, which was mixed with trash. The source of this trash and that found in the following stratum is uncertain, but it probably was deposited while Room 9 was falling to ruin. It is unlikely to have come from roofs of the back rooms (Rooms 5-8), however, because similar deposits were not found in these rooms which yielded definite wall and roof remains. There were, however, several sherd matches between Levels 1 and 2 of Grids 8 and 14 with those in Room 9. Deposits in both areas are similar, except for a lack of burned wood in the plaza. Layer 1 rested directly on sterile fill; however, it appears that artifacts mapped at the base of Level 2 and the top of Level 3, in Grid 8, was in-situ plaza material upon which the rubble and trash was deposited. This situation also applied to artifacts from the base of Level 1, Grid 14, and Level 4 of Grid 9 (south of Plaza Wall 3).

Layer 3. Surrounding the trash and rubble layer was a deposit of sheet trash, probably representing material mechanically redeposited from Layer 2.

Use Surfaces

Grids 8 and 14. Although no surfaces were defined, horizontal artifact concentrations, particularly of hammerstones, next to Plaza Firepit 2, indicate a possible surface between 97 and 99 cm BSD (Figure 6.3, Plate 6.1). The base of Plaza Wall 2 and the top of Posthole 21, at the base of Room 7's east wall, may define the west margin of another surface at about 89 cm BSD. Posthole 17, also next to Room 7, was truncated and probably originated somewhat higher than its recorded 92 cm BSD depth. Aligned to the east of the latter features were Postholes 11-13 in Grids 14 and 15, which were also placed slightly higher than recorded, 87-93 cm BSD.

The area in question reflects two possibilities for interpretation: 1) two surfaces of use at about 89 and 99 cm BSD or 2) a single activity area distributed over a basin-shaped surface. Characteristics of the fill support the latter interpretation. The homogeneity of Layer 2--the primary deposit involved--does not indicate a relatively flat surface at 89 cm BSD. Its lower configuration was parallel to a basin-shaped surface below that depth. Considering the slope involved, it would not be surprising to find some attempt at leveling the plaza area. This might account for the periphery of the area of use (bounded

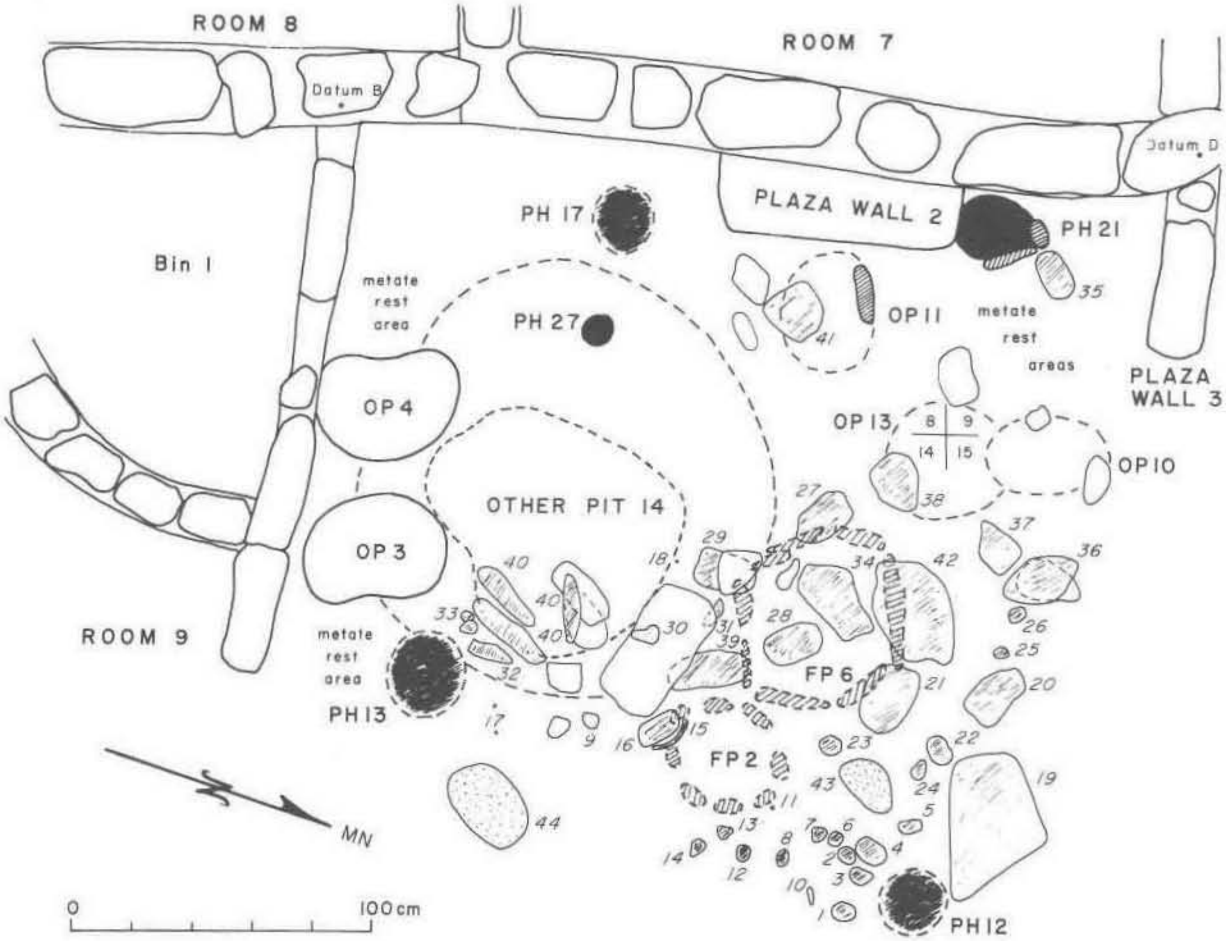

Figure 6.3. *Plaza work area and distribution of artifacts. All artifacts located between 92 cm and 107 cm below the site datum (Table 6.4) (NPS 310/82249 B).*

by ramada supports) to remain slightly higher than in the center--marked by Firepits 2 and 6. If the latter is correct, all features except OP 14 could be assigned to a single floor.

Grid 9. Three surfaces were defined between 77 and 83 cm BSD in the Grid 9 alluvial fill, descending east from the east wall of Room 6. These disappeared at a depth of between 79 and 87 cm along the extended east boundary of Grid 9 and could not be defined south of Plaza Wall 3. The lowest, "Floor 3," compared in depth to Level 1 of Grid 15. Levels 3 and 4 (actually natural units) separated the three surfaces, which were overlain by Levels 1 and 2. All units of fill were sterile, or nearly so, except for the recovery of some cultural material from Levels 2 and 3 south of Wall 3.

While the upper two surfaces lack cultural material and features, and thus probably represent spurious cleavage planes in the alluvium, the designation of "Floor 3" is more certain. In physical appearance, it was little different from the first two, but it articulated with Plaza Walls 3 and 4 and the base of Room 6's east wall. Furthermore, three pits (OP 1, OP 2, and possible OP 5) were defined at this level, as well as a fourth (OP 8) in adjoining Grid 15. This surface could not be confidently followed south beyond a line connecting PH 11 and Plaza Wall 3, where it interdigitated with the sheet trash of

Plate 6.1. *Plaza Grids 8 and 14 at 99 cm below the site datum. Note features and stone tools. Blackened Bin 1 (Room 9) at left side. 30-cm north arrow (NPS 11999).*

Layer 3. To the north, however, it corresponded in depth to "Floor 1" in Grid 16.

Grids 16 and 22

Excavation procedures followed those described above for the grids in front of Room 5. After surface-stripping Grids 16 and 22, the grids were expanded north to incorporate the small segments of adjoining grids next to Room 3. A number of ramada postholes, a large, bell-shaped pit (OP 15), and a storage jar were uncovered in the grid area, but little else.

Fill

Aside from the underlying native earth, three depositional layers were removed in arbitrary levels. Layer 1 consisted of unconsolidated sand with little cultural material, followed by a wedge-shaped (in cross section) deposit of rubble, designated as Layer 2. The rubble was 50 cm deep directly in front of Room 5 and tapered downslope towards the east. The latter (Layer 2), which corresponds to excavational units Level 1 and Level 2 in Grid 16, yielded 326 wall stones, mostly of spall size. The third deposit, Layer 3, was excavated only in Levels 2 and 3 in Grid 22 and represents mechanically redeposited material from Layer 1 and 2 (in Grid 16), alluviating into the Kiva depression. Although not obvious in ceramic tabulations, late sherds of Gallup and Chaco Black-on-white and Wingate Black-on-red were present in areas of Grid 22, which was closest to the Kiva, suggesting some late A.D. 1000s-early A.D. 1100s deposition. Also recovered from Grid 16, Level 1, was part of an early Gallup Black-on-white bowl (Plate 8.10A), the remaining half of the bowl recovered near the floor in Pithouse 2. The latter piece contained burned selenite that may have been used as a jewelry polishing compound. All three layers in the two grids correspond to their numerical counterparts in the southern part of the plaza (mentioned above).

Use Surface

A partial surface, "Floor 1", was articulated with the base of Room 5's east wall, at 97 cm BSD, which then descended east under Level 2 in Grid 16. It was reconstructed to be at about 115 cm BSD for the majority of Grid 22 and 120 cm BSD near Plaza Bin 1 in the northwestern part of the same grid. Most of the use surface in Grid 22 had eroded into the Kiva depression. All features exposed in Grids 16 and 22, however, were apparently associated with the compacted use surface.

Grids 29 and 35

These grids covered the area in front (south) of Rooms 1 and 2 and an area east of Room 1. Grid 35 was expanded east to include the western one-third of Grid 41. The remainder of Grid 41 had been removed by road-grader testing. Neither area was a complete grid due to overlap within the rooms to the north. Again, for reasons mentioned above, broadside stripping was employed and all non-sterile fill screened.

Fill

A single 10-cm-layer of alluviated sand, containing little cultural material, was removed from Grid 35. This rested upon a tenuous surface, underlain by 20 cm of fill identical to that above. Underneath was undisturbed native soil. Surprisingly, there was a lack of structural rubble from collapsed room walls, except for a pile of 25 stones, including three metate fragments and a mano, which were next to the east wall of Room 1. Sand 20-30 cm deep and identical to Grid 35 was removed from Grid 29 before sterile soil was reached, but a surface corresponding to the one in Grid 35 could not be identified.

Use Surfaces

Two discontinuous surfaces were tentatively defined in the grids. Between 139 and 145 cm BSD in Grid 35, the fill broke in such a way as to leave a relatively even, but unimpressive, surface ("Floor 1") covered by several sherds, hammerstones, and a mano. This surface appeared to articulate with the only grid feature, OP 9, a possible bin or firebox.

A second surface, about 20 cm below the first, may have been associated with Plaza Firepit 3, underlying the east wall of Room 1 (Figure 6.1). The adjoining fill is slightly oxidized and contains a high frequency of charcoal that probably came from the firepit.

In Grid 29, no surfaces were defined. Nevertheless, two firepits (FP 4 and FP 5) and Plaza Bin 1 (found partly in Grid 22) were sunk into undisturbed fill and must have once been associated with a surface that eroded into the Kiva. Only a small chunk of burned adobe remained of "Firepit 4," situated under the south wall of Room 2, directly north of slab-lined Firepit 5 (Figure 6.1). It is noteworthy that not a trace of post supports were observed for an outdoor shelter or ramada in this area.

Use Surface Summary

Use of the areas in front of the rooms apparently created a single, unprepared surface of compacted, native earth. A continuous surface, slightly basin-shaped, extended across the plaza in front or east of Rooms 5-7. A corresponding surface, although less clear, also existed in front (south of) Rooms 1 and 2. In the latter area, however, there may have been two very poorly defined surfaces. Despite the long use of the plaza area, there seems to have been little evidence of extensive, stratigaphic deposits accumulating over time, perhaps because of weathering and the lack of formal preparation of the plaza surfaces.

Plaza Features

Features were numerous in the area defined as a plaza (Figures 6.4-6.12, Tables 6.1-6.2). Except for

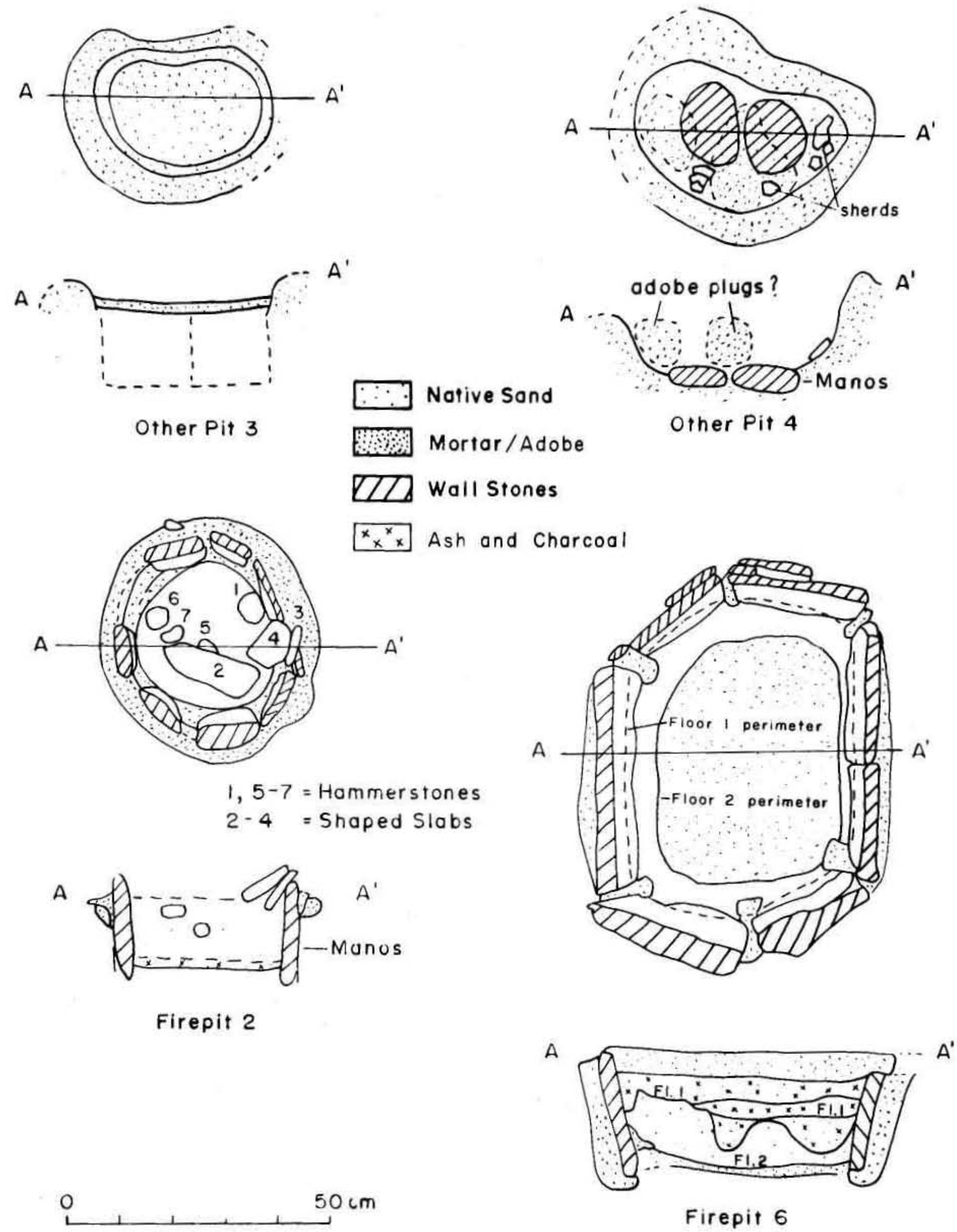

Figure 6.4. Plaza Other Pits 3 and 4 and Firepits 2 and 6, plans and profiles (NPS 310/82289 C).

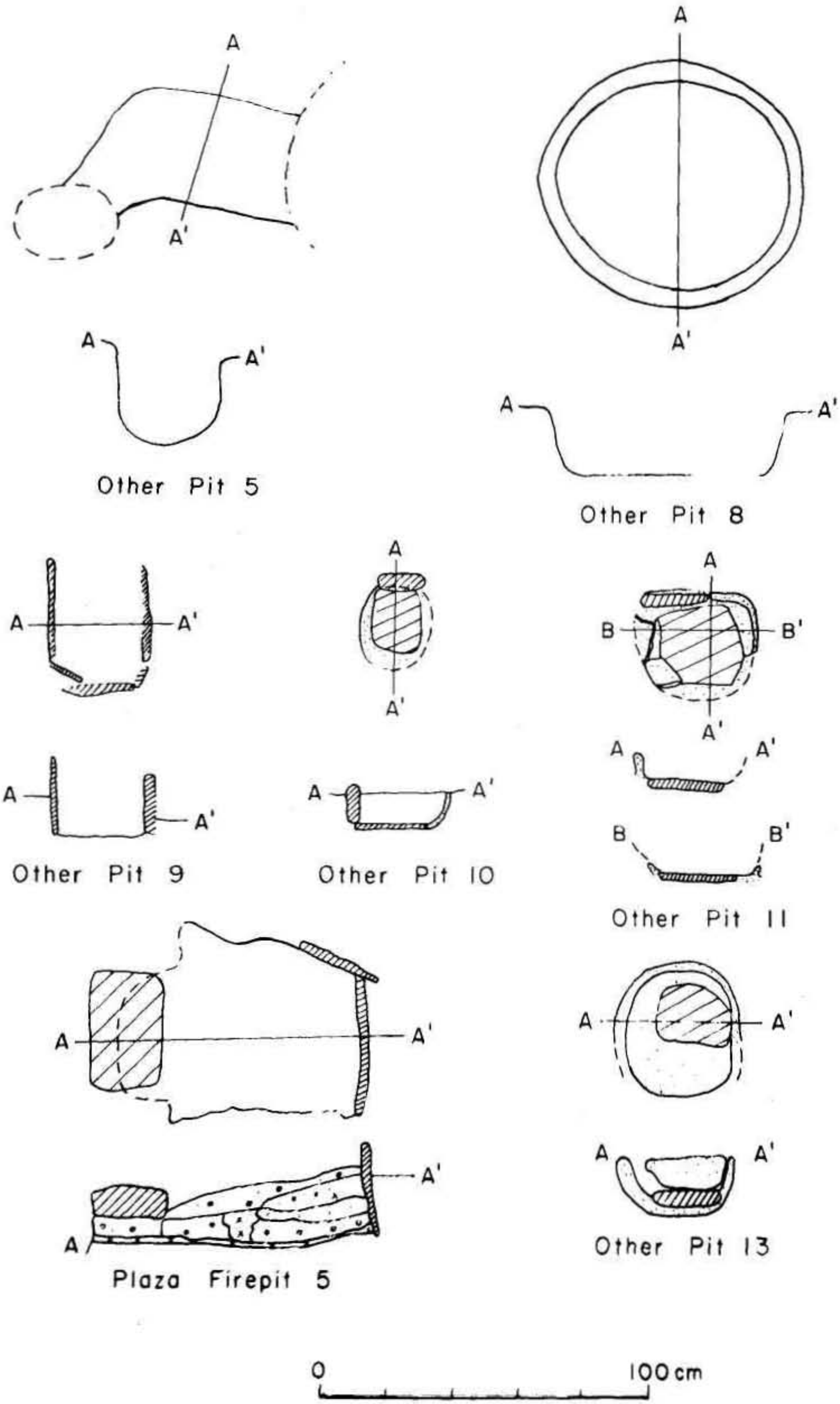

Figure 6.5A. *Miscellaneous plaza feature plans and profiles. Other Pits 5, 8-11, and 13, and Firepit 5 (NPS 310/82290 D).*

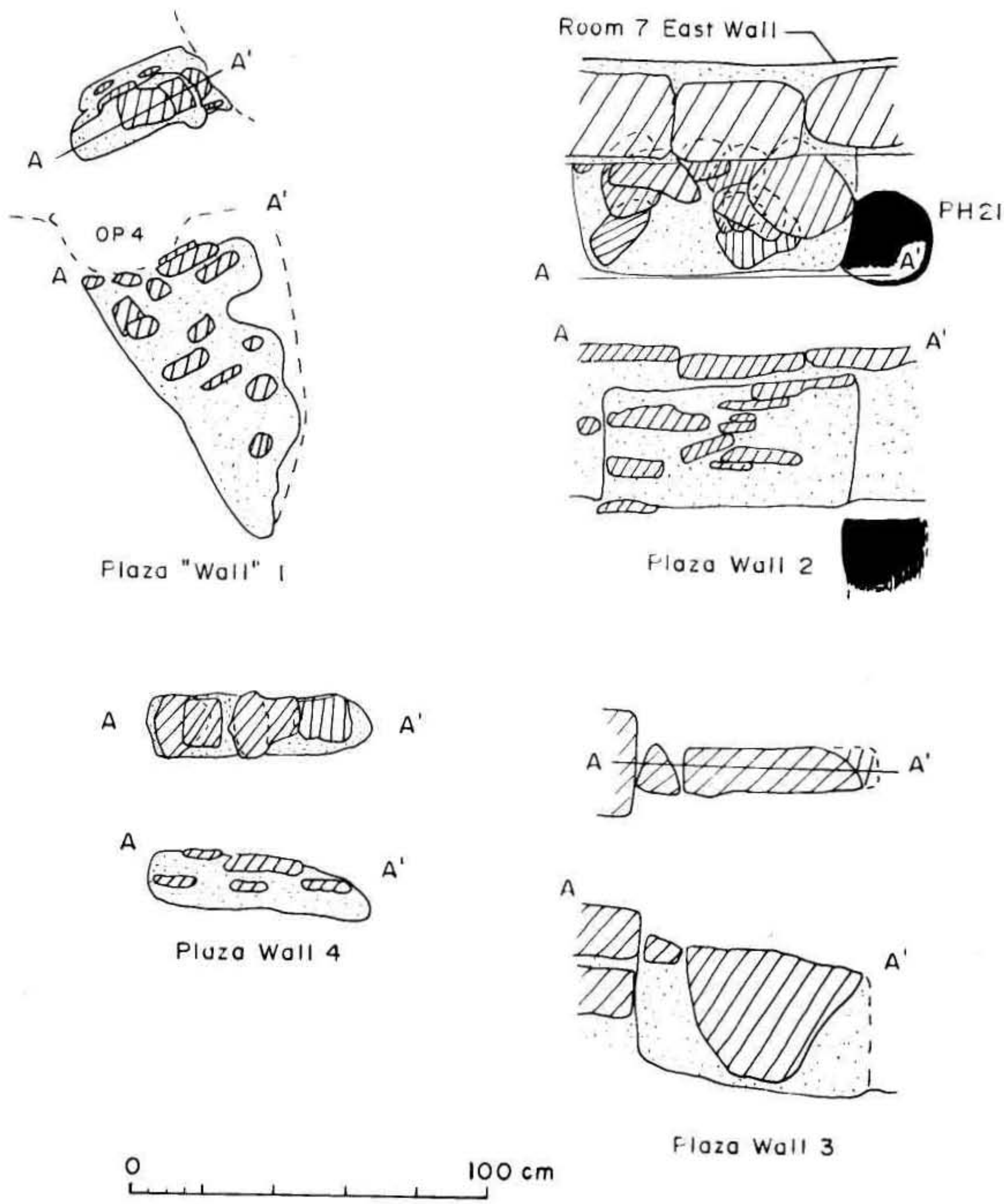

Figure 6.5B. *Miscellaneous plaza feature plans and profiles. Plaza Walls 1-4 (NPS 310/82290*

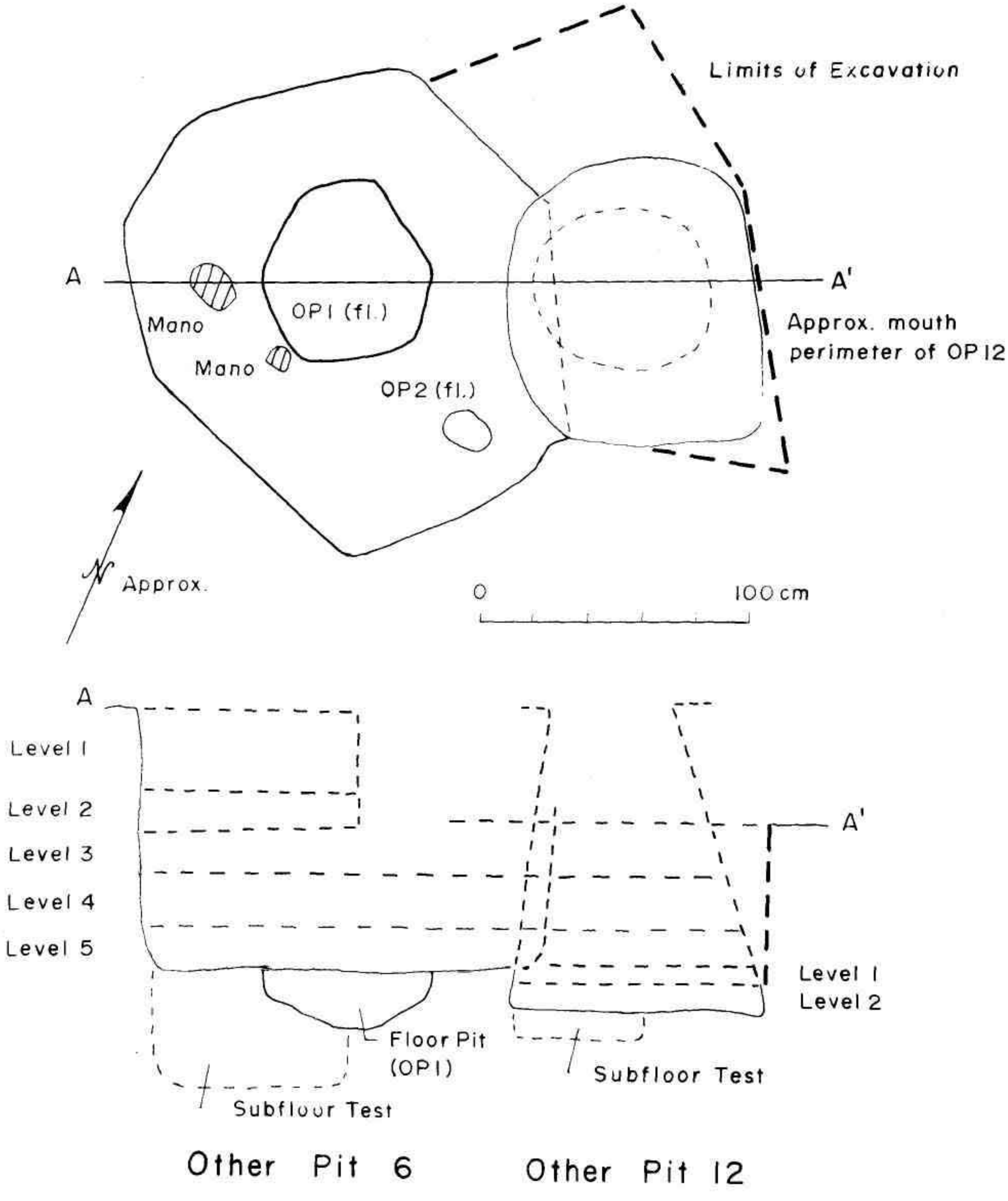

Figure 6.6. Plaza Other Pits 6 and 12, plans and profiles (NPS 310/82261 C).

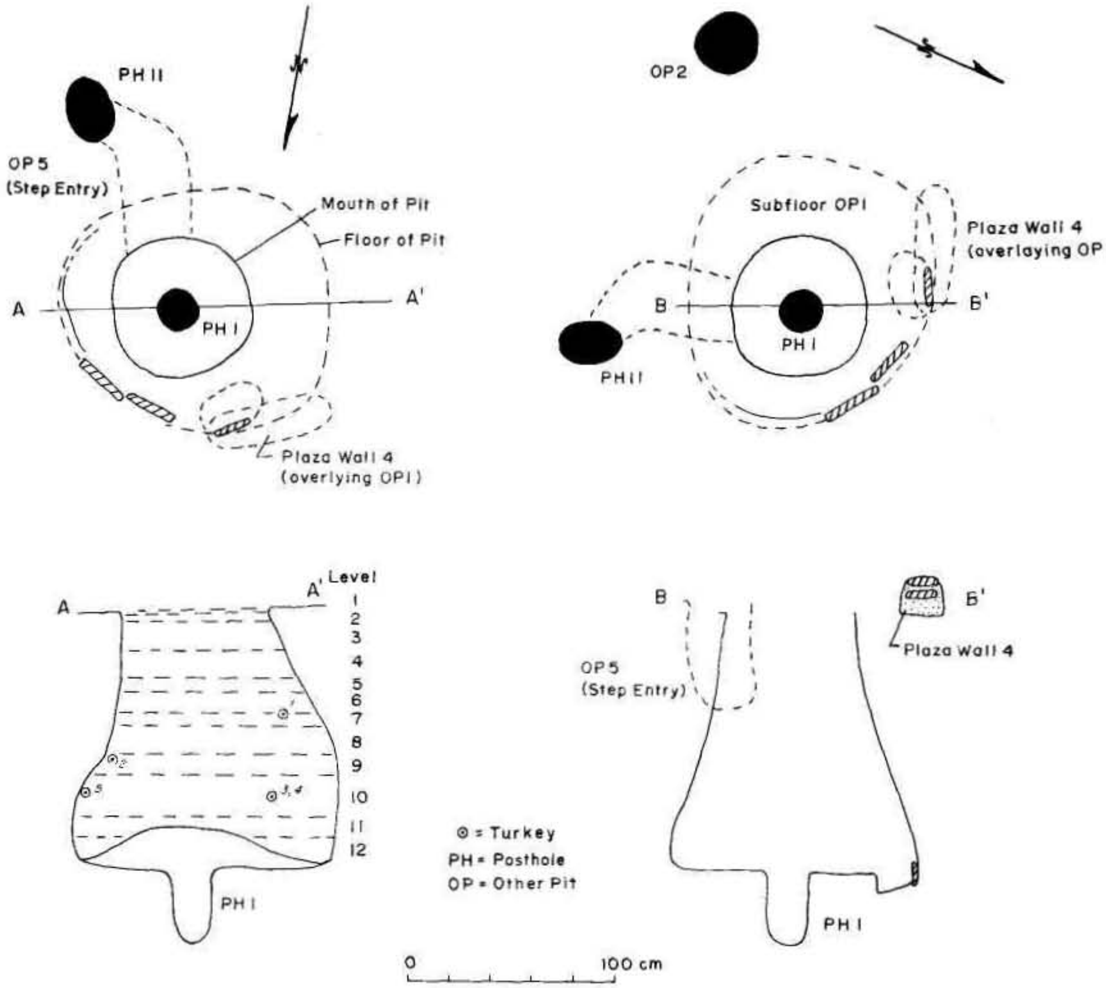

Figure 6.7. Plaza Other Pit 1, plans and profiles (NPS 310/82256 C).

postholes, the highest concentration of features was in the south plaza area, bounded on two sides by Rooms 7 and 9. Half of the Other Pits and the only intact firepits occurred in this area. The south plaza, however, comprised about 18 percent of the 31 m^2 fronting Rooms 1-7 or about 23 percent of the 24.9 m^2 of space sheltered by a ramada. Thus, it was the primary loci for a number of different outdoor activities at the site.

Firepits

Five features were classified as firepits; a sixth was later found to be part of burned material in OP 6. The only intact ones (FP 2 and FP 6) were in the plaza and these were fire-reddened and still filled with ash and charcoal (Figure 6.4, Plate 6.2). Firepit 6 was large and slab-lined, later to be sealed and replaced by FP 2 a few centimeters away. FP 2 was smaller than its neighbor and lined with whole manos. It had been remodeled at least once, revealing two burns separated by clean, unburned sand. Both burns yielded undatable archeomagnetic samples, although the plots suggested use at about A.D. 1030. Fourteen hammerstones were found in the fill around (10) and in (4) the firepit (Figure 6.3, Table 6.4). These were probably left at abandonment and associated with corn reduction at the catchment basins nearby (OP 3, OP 4, OP 10, OP 13). These basins are described below.

Flotation samples from Firepits 2, 5, and 6 all yielded moderate numbers of seeds and a diversity of plant taxa (M. Toll, this report). In all cases, the majority of taxa yielded burned seeds, primarily of weedy species, although charred corn and ricegrass were also recovered.

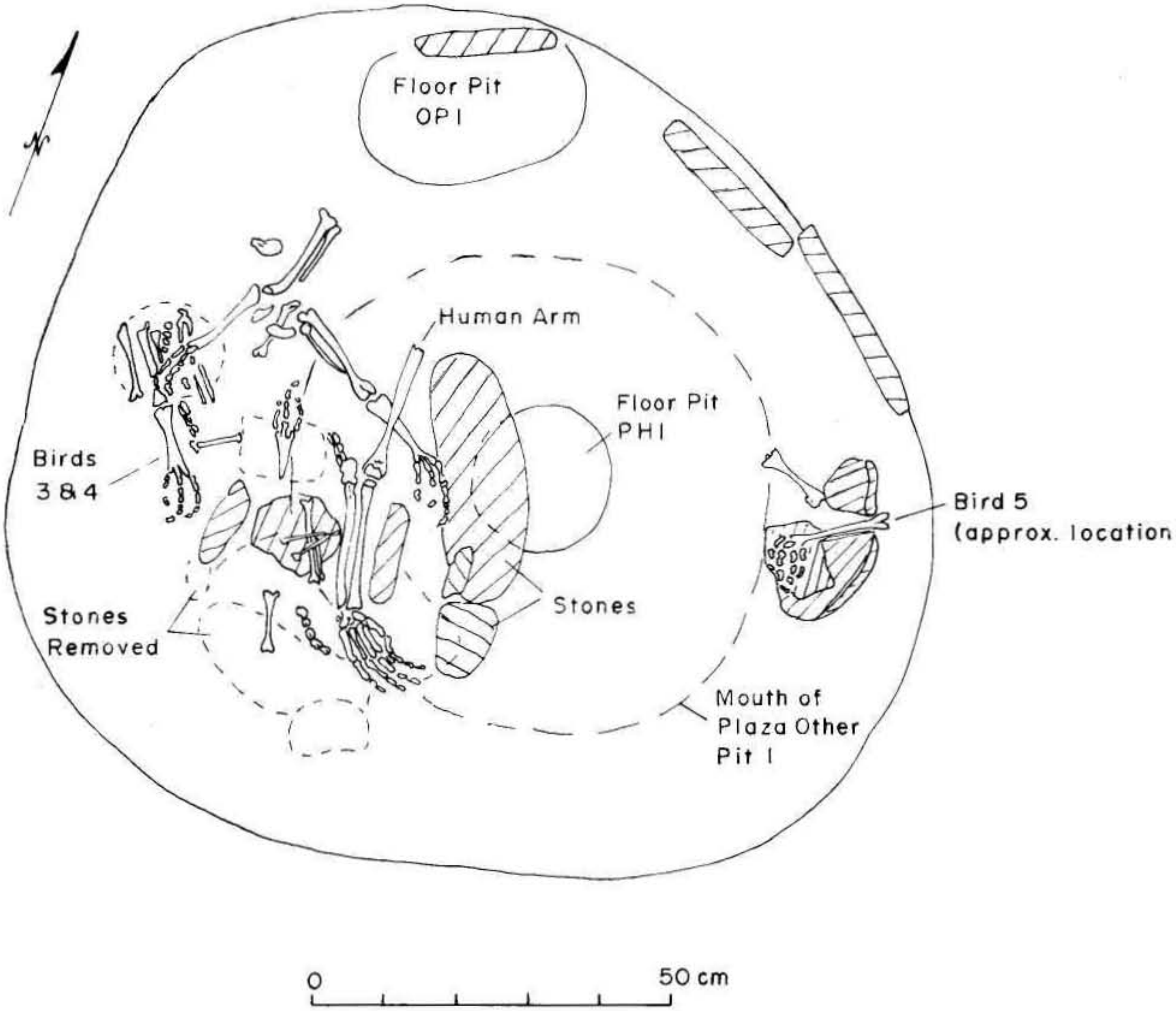

Figure 6.8. *Plaza Other Pit 1, plan of Level 10 showing the distribution of turkey and human remains (NPS 310/82257 B).*

Of the remaining firepits, only one was partly slab-lined (FP 5) and it lacked the south side. It had been built just in front of Room 2, next to Bin 1. Most of the contents probably washed into the Kiva depression, although it did contain some ash and charcoal. It could not be dated, but the presence of a slab metate just above the lowermost layer of ash indicates contemporaneity with the Kiva and not with the main site occupation, where all the metates were of the trough type. Slab metates are extremely rare in Chaco Canyon and occur in late (post A.D. 1100) contexts.

Heating Pits

A shallow, oval, highly oxidized pit in Grid 16, designated HP 1, was evidently caused by a small intense fire on the plaza surface but was without remains of flammable material. An archeomagnetic sample was secured from the burn, but it did not date. This pit, as well as "Firepits 3 and 4," might properly be termed a heating pit (Chapter 7) because of its small size and fragile liner of mortar, if any. The latter two revealed a partial adobe lining that had been oxidized, but both had been nearly destroyed by overlying walls of Rooms 1 and 2.

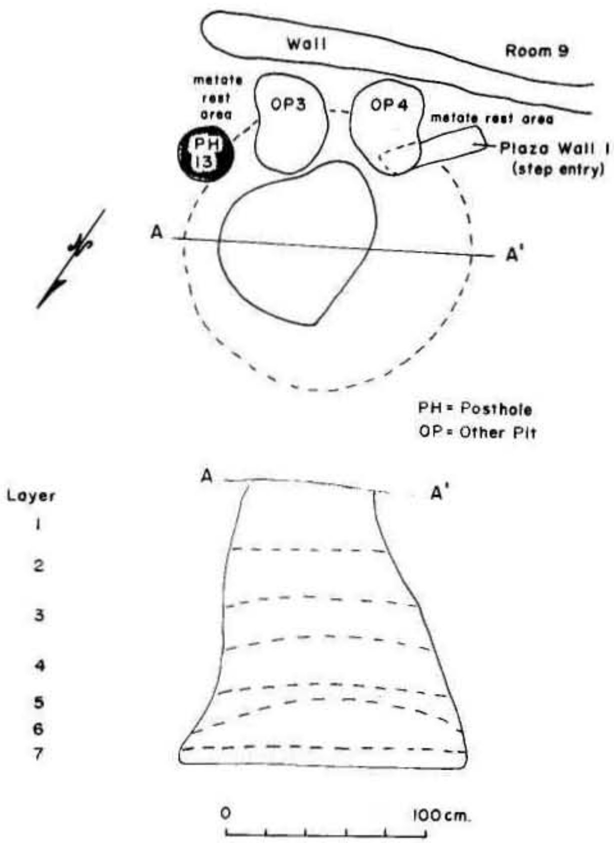

Figure 6.9. *Plaza Other Pit 14, plan and profile (NPS 310/82263 A).*

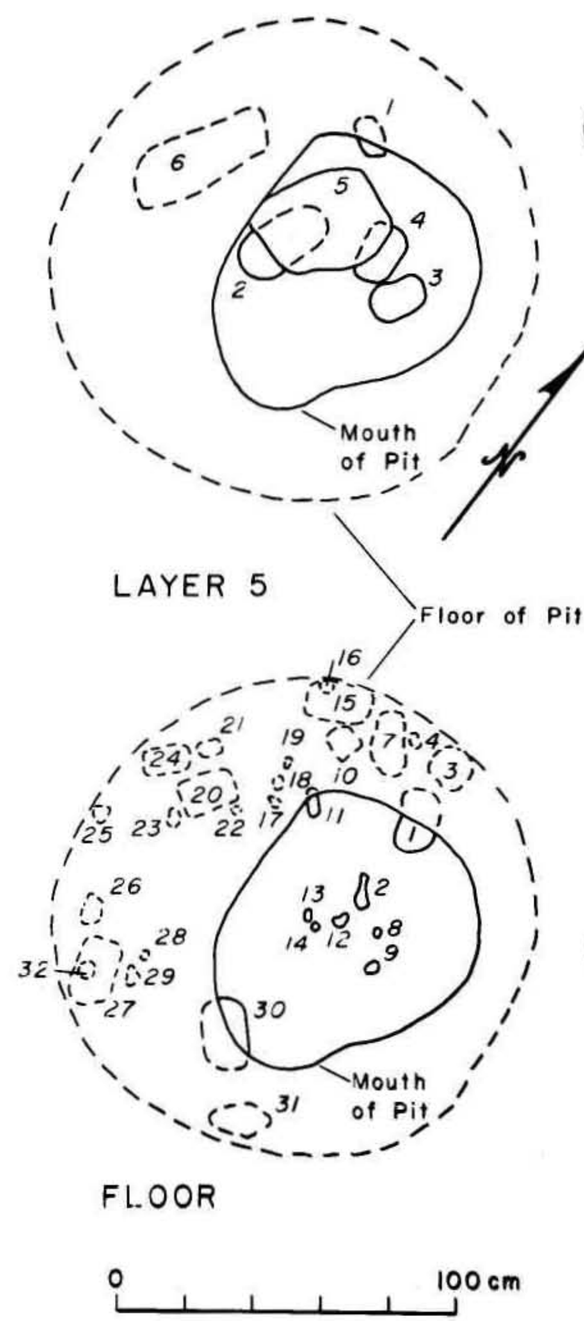

Figure 6.10. *Plaza Other Pit 14, distribution of artifacts in Layer 5 and on the floor (Table 6.3) (NPS 310/82264 B).*

Other Pits

Fifteen pits exhibiting a wide range of sizes and shapes, as well as a diversity of fill, were recorded in the plaza (Table 6.1). Six were small, oblong- or circular-shaped pits. All but one of the 15 were unlined or lined with adobe and usually sunk into undisturbed sterile soil. The exception was OP 9, a large, slab-lined feature that resembled a firepit but was unoxidized and contained little charcoal. Fill in most of these pits was sand, often mixed with charcoal flecks, and clay, apparently from postoccupational deposition (except for those sealed). The remaining four pits (discussed below) are deep and bell-shaped.

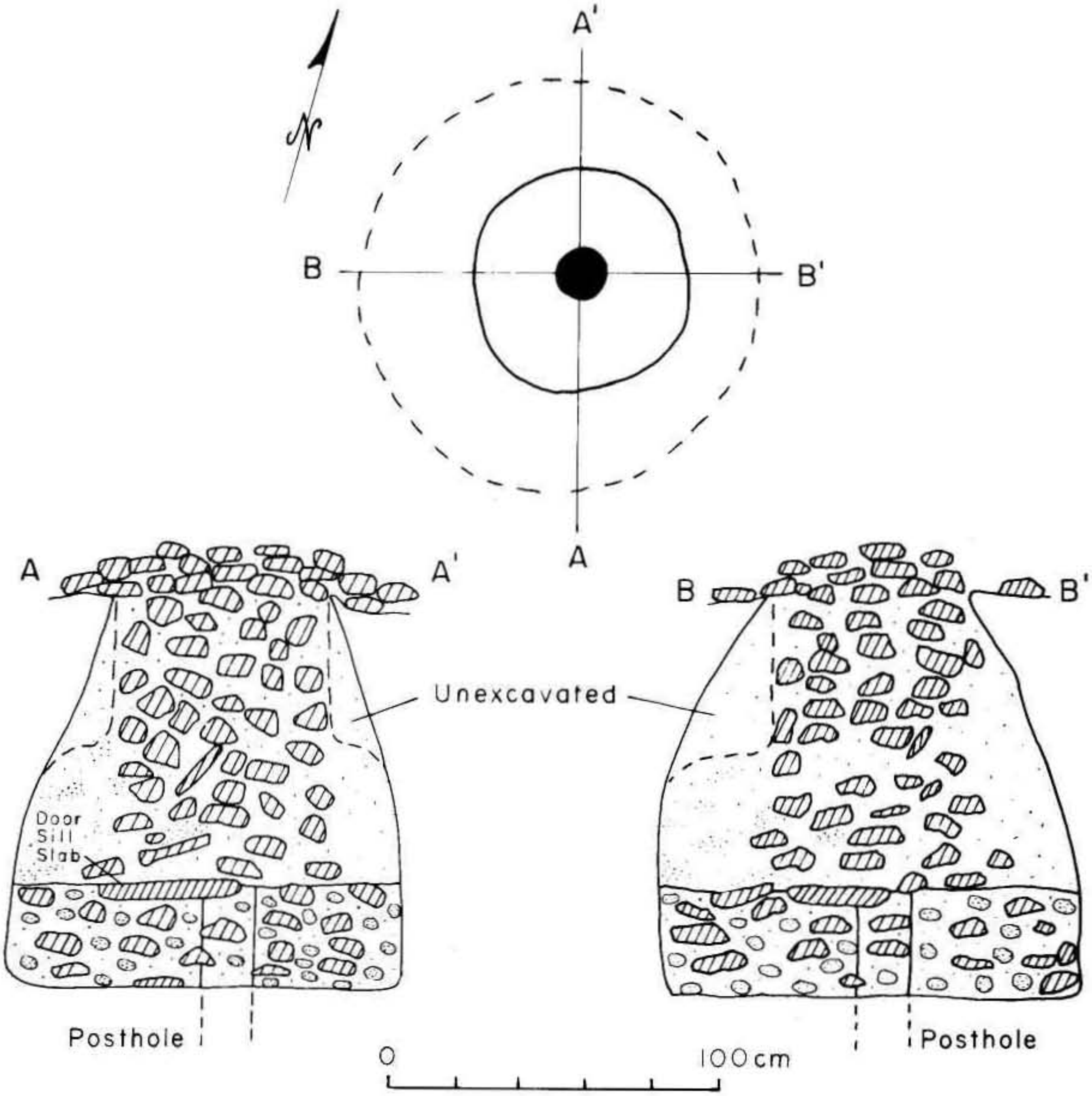

Figure 6.11. Plaza Other Pit 15, plan and profiles (NPS 310/82265 C).

Two sets of pits may represent related features. Both pairs consisted of a deep unit containing a base stone(s) set next to a shallower, slightly smaller pit. In both pairs (OP 3, OP 4 and OP 10, OP 13), the deeper pits were filled with adobe, creating floors nearly equal in depth to their counterparts. They were subsequently plugged with adobe after abandonment--a fate avoided by their companions. OP 3 and 4 were kidney-shaped pits, 10 cm apart, built against the north wall of Room 9 (Figure 6.4, Plate 6.3). OP 10 and OP 13 were circular and set about 15 cm apart in front of Room 7. Near the latter is circular OP 11, almost identical in all details to OP 10, except in size. These five pits were probably mealing catchment basins for portable metates (Chapter 7). Although a flotation sample from OP 4 was examined, it yielded nothing to confirm the pit use. Seeds were sparse, and no corn was found, but both burned and unburned taxa were recovered (M. Toll, this report). In contrast, much corn pollen and some squash pollen came from OP 3, OP 4, and OP 10 (Dean, this report). Nevertheless, the immediate area yielded numerous hammerstones, manos, a metate, and evidence of corn, much of it in a large plaza pit (OP 14), suggesting a corn reduction loci.

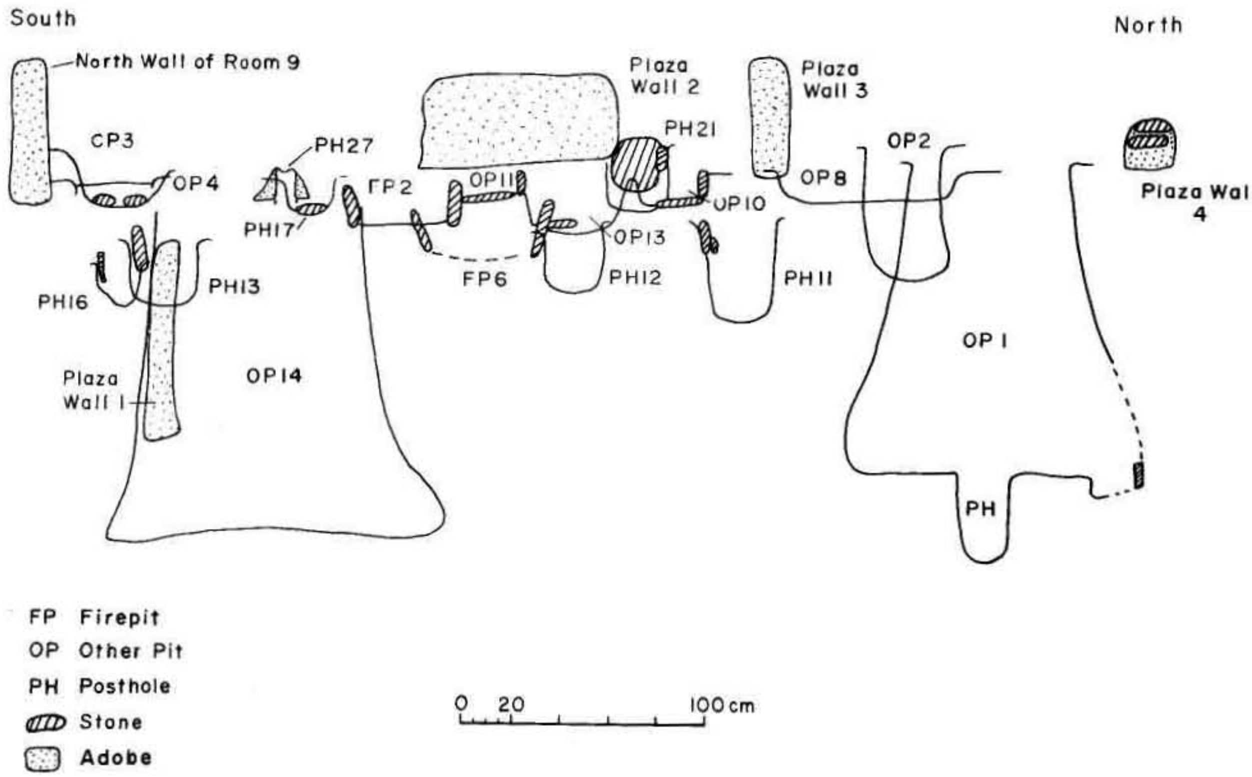

Figure 6.12. Plaza features, north-south profiles superimposed (NPS 310/82252 C).

The similarity and spatial distribution of these pits suggest that there were two clusters of associated Other Pits. Except for OP 14, these five possible mealing catch basins were the only Other Pits found in the south plaza. More tentatively, the mode of construction for each group indicates all were built, used, and partially abandoned contemporaneously. The lack of articulation with a common surface, however, fails to demonstrate this.

Five features were not man-made pits or were reclassified (one became a posthole). The remaining five Other Pits were of special interest and yielded quantities of material. Four of these were large, bell-shaped pits. Because of the unusual nature of these pits, they are described in detail below, separate from those of the remaining Other Pits covered above. Fill from all these was screened through 1/4 in. mesh.

Large Plaza Pits

Four large, bell-shaped pits (OP 1, OP 12, OP 14, OP 15) and a large, tub-shaped pit (OP 6) were found in the plaza to the east of Rooms 5-9 (Figure 6.1). Another bell-shaped pit in Room 9 may have been specifically built during room occupancy rather than initially as a plaza pit, although it is uncertain. The mouth of each pit was about 250 to 300 cm from its nearest neighbor, with four set in an almost linear arrangement (including the one in Room 9) across the plaza paralleling Rooms 5-8. The three fronting tub Rooms 5-7 (OP 1, OP 14, and OP 15) were remarkable for their similar morphology, as well as their postoccupational filling. These three were trash- and rubble-filled and then plugged with construction rubble (Plates 6.4-6.5). Each of the five bell-shaped pits was dug into sterile soil, had overhanging native-earth walls that constricted at the mouth, and a flat, native-earth floor. All were shaded by the plaza ramada.

The tub-shaped pit (OP 6) was 168 by 160 cm and located northwest of Pithouse 3 and east of the main pit concentration in the south plaza. After its abandonment, one of the large bell-shaped pits

Table 6.1. List of features in the plaza and miscellaneous grids, except for postholes.[a]

Feature (Grid No.)	Length (cm)	Width (cm)	Height/ Depth (cm)	Volume (liters)	Fill Type	Fill Period	Lining	Open/ Sealed	Comments
Firepit 1 (G 30)	40	38	12	15.6	20	Occ.	U	O	Mouth = 1271 cm^2. North of Room 2. A heating pit?.
Firepit 2 (G 14)	35	30	18	13.5	26	Occ/PO	L-PS	O	Lined with eight manos. Sand floor. Underlain by pit 36 x 45 cm. Mouth = 820 cm^2.
Firepit 3 (G 35)	65	29+	4-5	19.2±	27	Occ/PO	L-P	O	Under Room 1 E wall. Mouth = 4280 cm^2. A heating pit?.
Firepit 4 (G 29)	43?	33?	10	19.2±	12,20	Occ/PO	L-P	O	Under Room 2 S wall. Mouth = 1884± cm^2. A heating pit?
Firepit 5 (G 29)	82+	53	26	83.4±	27	Occ.	U/L-S	O	Mostly missing. Mouth = 3207± cm^2. Contains slab metate.
Firepit 6 (G 14)	75	55	25	47.4	27	Occ.	L-PS	S	Eight slabs; adobe floor. Mouth = 2786 cm^2.
Heating Pit 1 (G 2/3)	71	53	20	41.4	12,20	Occ/PO	U	O	West of Room 8. Mouth = 3077 cm^2.
Heating Pit 1 (G 16)	23	20	7-8	2.4	28	Occ.	U	S	Plugged with rubble. Mouth = 378 cm^2.
Other Pit 1 (G 15) top	67	65	125	683.4	33,50	Int.	U	S	Bell-shaped pit.
bottom	130	117	-	-	-	-	-	-	
Other Pit 1	26	19	8	3.0±	33	Int.	U/L-S	O	Pit in bottom of Other Pit 1.
Posthole 1	21	20	36	8.7	33	Int.	U	O	Posthole in bottom of Other Pit 1.
Other Pit 2 (G 9)	-	-	-	-	-	-	-	-	Placed with postholes.
Other Pit 3 (G 8)	33	23	4	2.3	10,12	Int?	L-P	O	Mealing catch basin.
Other Pit 4 (G 8)	40	23	18	9.7	10	Int?	L-P	S?	Mano base stones (2). Mealing catch basin.
Other Pit 5 (G 15)	60	32	28	-	12	PO	U	O	U-shaped trench (step connecting Other Pit 1/Posthole 11).
Other Pit 6 (G 14/20)	168	160	96	1962.5	32	Int.	U	O	Truncated. Cut by Other Pit 12.
Other Pit 1	70	60	16	40.4	32	Int.	U	O	Pit in bottom of Other Pit 6.
Other Pit 2	17	11	8	1.0	27	Int.	U	O	Pit in bottom of Other Pit 6.
Other Pit 7 (G 19)	25	20	?	-	32?	Int.	U	O	Basket dump? Former ??
Other Pit 8 (G 15) top	83	74	21	89.2	10	PO	U	O	Not a feature?
bottom	102	91							
Other Pit 9 (G 35)	49	36	20-23	18.2	11	PO	L-S	O	Five slabs. Incomplete.
Other Pit 10 (G 9)	29	23	12	4.8	10	PO	L-P/S	O	One slab and base stone. Mealing catch basin?
Other Pit 11 (G 9)	37	32	7	6.3	10	PO	L-P/S	O	One mano slab and base stone. Mealing catch basin?

Table 6.1. (continued)

Feature (Grid No.)	Length (cm)	Width (cm)	Height/ Depth (cm)	Volume (liters)	Fill Type	Fill Period	Lining	Open Sealed	Comments
Other Pit 12 (G 20) top	66?	66?	72+	679.7±	31?	PO	U	O	Bell-shaped. Cuts Other Pit 6.
Other Pit 13 (G 9)	42	38	12	10.3	12	PO?	L-P	S	Base stone. Mealing basin?
Other Pit 14 (G 14) top bottom	80 140	72 140	125	728.6	33,50	Int.	U	S	Bell-shaped pit.
Other Pit 15 (G 16) top bottom	66 122	60 120	115- 118	682.3	33,45 50	Int.	U	S	Bell-shaped pit. Post mold in fill confirms centrally placed post.
Bin 1 (G 22)	82	23-31	22	44.7±	11,13	PO	L-M/S	O	
Wall 1 (G 8)	47	12	83	-	50	Int.	-	-	Filled step for Other Pit 1?
Wall 2 (G 8/9)	80	30	34	-	55	Int.	-	-	
Wall 3 (G 9)	68	14	40	-	55	Int.	-	-	
Wall 4 (G 15)	62	18	13	-	55	Int.	-	-	

[a] See Tables 7.3-7.4 for an explanation of the feature and attribute codes.

Table 6.2. List of postholes in the plaza.[a]

Posthole No. (Grid No.)	Length (cm)	Width (cm)	Depth (cm)	Volume (liters	Lignite Weight (kg)	Fill Type	Shims	Base Stone	Comments
Posthole 1 (G 13)	-	-	-	-	-	-	-	-	Ash lens.
Posthole 2 (G 19)	34	30	17	9.4+	6	13,52	0	1	Truncated?
Posthole 3 (G 19)	-	-	-	-	-	-	-	-	Became Other Pit 7
Posthole 4 (G 13)	28	23	19	8.5+	7.0	13,52	1?	1	Truncated?
Posthole 5 (G 16/22)	24	19	29	13.2	4.5	13,52	7	1	Mano base stone.
Posthole 6 (G 27)	-	-	-	-	-	-	-	-	Put with Kiva postholes.
Posthole 7 (G 13)	35	33.5	29+	21.9+	38	13,52	4	1	Truncated.
Posthole 8 (G 14)	-	-	-	-	-	-	-	-	Ash lens in Other Pit 6.
Posthole 9 (G 14)	34	31	26	29.7	26.8	13,52	1?	1	
Posthole 10 (G 15)	10	10	3	-	0	13	0	0	Not a feature.
Posthole 11 (G 15)	31	21	35	14.9	16.3	52	2	1	Sealed.
Posthole 12 (G 14)	21	21	24	8.5	-	13	3	2	
Posthole 13 (G 14)	30	26	26	14.0	4	13,52	7	1	
Posthole 14 (G 21)	-	-	-	-	-	-	-	-	Put with Kiva postholes.
Posthole 15 (G 27, 28)	-	-	-	-	-	-	-	-	Put with Kiva postholes.
Posthole 16 (G 14)	17	13	14	1.9	0	11,12	1?	0	Not a feature?
Posthole 17 (G 8)	23	17	13+	3.5+	2	13,52	1	2	Mano base stone. Truncated.
Posthole 18 (G 19)	23	22	7+	3.0+ ??	?	13,52	0	1	Truncated--only lignite base remained.
Posthole 19 (G 14)	35	28	35-45	31.3	47	13,52	0	1	Mano base stone. Set in fill of Other Pit 6.
Posthole 20 (G 16)	33	33	10+	5.6+	4	13,52	0	1	Truncated.
Posthole 21 (G 9)	25	20	30	12.2	8.5	13,52	4	1	Metate fragment base stone. Digging stick marks in sides.
Posthole 22 (G 20)	46	30	10+	9.0+	5	13,52	0	1	Truncated.
Posthole 23 (G 16)	28	26	33	15.6	18	52	0	0	

Table 6.2. (continued)

Posthole No. (Grid No.)	Length (cm)	Width (cm)	Depth (cm)	Volume (liters	Lignite Weight (kg)	Fill Type	Shims	Base Stone	Comments
Posthole 24 (G 16)	31	27	42	20.8	11.5	13,52	0	0	
Posthole 25 (G 22)	30	26	32	17.1	12 or 18	13,52	0	1	Abrader base stone.
Posthole 26 (G 15)	25	22	13+	5.5+	4	13,52	0	1	Truncated.
Posthole 27 (G 8) mold	8	6	10	0.3	0	11	0	0	Has adobe collar, 19 x 16 cm. Auxiliary support.
Posthole 28 (G 16)	35	32	76	58.5	23	11,52	0	0	
Posthole 29 (G 14)	21	20	10+	2.3+	?	13,52	1?	0	Truncated.
Other Pit 2 (G 9)	31	28	50	32.3	31	50,52	0	0	Sealed.

[a] See Tables 7.3-7.4 for an explanation of the feature and attribute codes.

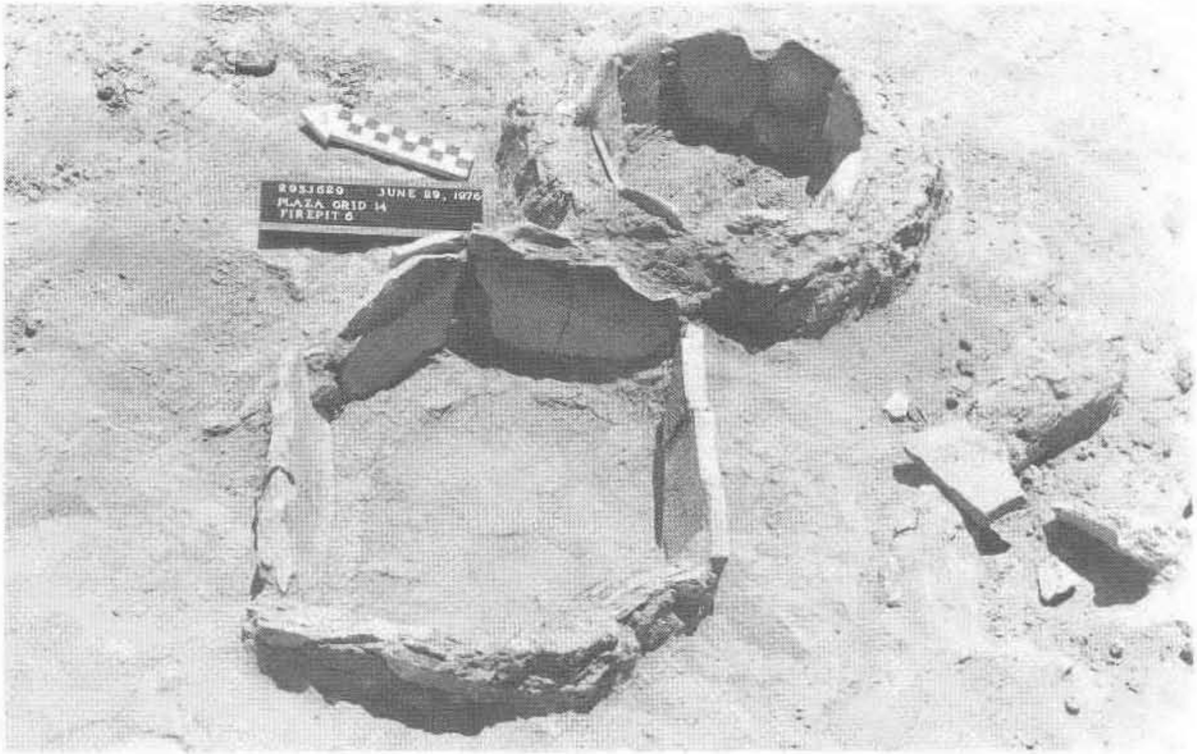

Plate 6.2. *Plaza Firepits 2 (top) and 6. Note manos used for construction in FP 2. 30-cm north arrow (NPS 12226).*

described above (OP 12) was sunk along one side. It was surrounded by postholes that indicate that it was shaded by a roof, although OP 6 apparently was not shaded during its use.

Other Pit 1. This bell-shaped pit was located directly in front of Room 6 at 75 cm BSD and yielded a wealth of unusual materials (Figures 6.7-6.8).

Fill. This pit was defined, with "Floor 3" of Grid 9, by a few protruding stones. The nature of the hard, well-compacted fill made it impossible to cross section and so the feature was excavated in 12 arbitrary levels. The depth of these was dictated by the amount and configuration of stone in the fill. Three layers of deposition were defined after excavation. The uppermost (Layer 1 consisting of Levels 1-8) was of intentionally placed chunks of adobe and wall masonry rubble (some stones were still mortared together) mixed with about 20 percent sand and a little cultural material. Fifty-one stones (ranging 9 by 6 by 1 cm to 50 by 4 by 2 cm), none burned, were recovered in the 68 cm depth of Layer 1, along with 46 spalls. Underneath was more of the same except for the addition of about 20 percent refuse (Layer 2: Levels 9-11). This layer, 40 cm deep, contained 127 stones and 27 spalls. Finally, a 20-cm-high mound of trash covered the floor and filled the floor features. This extended slightly into Level 11 but was concentrated in Level 12 (Layer 3). It contained no adobe chunks and 11 stones and 18 spalls.

Features. The pit floor was level and contained two features. OP 1 was a subfloor basin located next to the north wall and was partly lined by a single upright stone set in adobe. This stone set against the wall like two others, 28 cm high, against the northeast aide, perhaps as a partial lining of the pit bottom.

Other features suggest that there were two possibilities of entry for an otherwise difficult access. In the center of the pit bottom was a cylindrical pit, Posthole 1, which may have held a step or roof center pole. There was no evidence of roofing, however, unless the fill is construed as such. On the surface, OP 5 entered OP 1 from the south side and might have served as a step entry into the pit, like

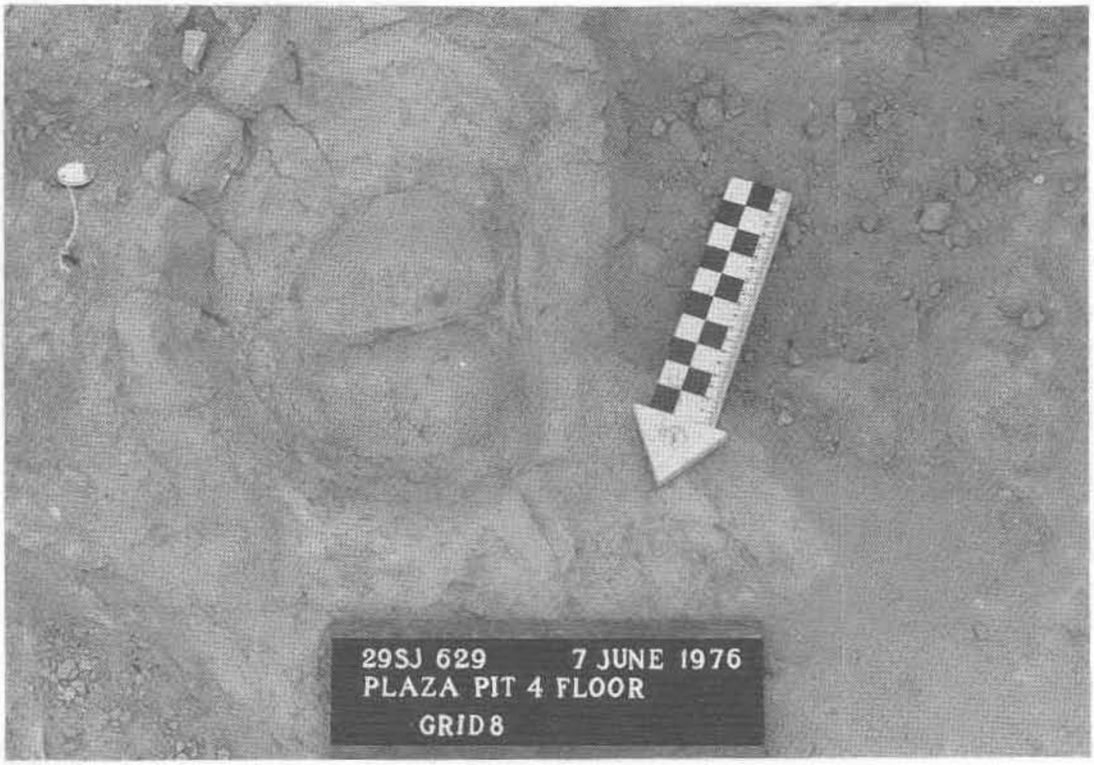

Plate 6.3. *Plaza Other Pit 4, a possible mealing catchment basin. Note the two manos set in the bottom plaster. 30-cm north arrow (NPS 11985).*

"Wall 1's" placement in OP 14. Even so, it is difficult to imagine entry into the pit without repeated damage to the fragile sandy mouth.

Artifacts. The biggest surprise at the site was the quantity of turquoise (Mathien, this report) found in the lower levels of OP 1. The densest concentration occurred in Layer 3, which was removed in its entirety and saved. Besides 50-100 beads, broken during manufacture, a few pieces of inlay, and a few pendants, the turquoise was mostly micron-size scraps. A sample (a 315 ml soup can) taken from the floor fill (Level 12) yielded 785 fragments, which took 3-4 hours to count microscopically. The remainder of Layer 3 was left unsorted. Overall, an estimated 500,000 turquoise micro-pieces litter the fill. No other kinds of materials used for ornaments was recovered.

In association with the turquoise was 41 percent of the site's lapidary abraders (34 of 83) and five other ground stones. The chipped stone was also distinctive. The majority of the 410 pieces of debitage was white, chalcedonic silicified wood of 1140 series (77 percent), much of it worked (39 percent). This was the highest relative concentration of the material at the site, followed by the Layer 6 in Pithouse 2 (53 percent) and the plaza deposits (52 percent). Both of the latter were also loci of turquoise manufacturing debris. In addition, three tiny drills and a core of the same material was recovered, but no hammerstones were found. Despite the frequency of 1140 material, cores from which the flakes might been struck were nearly absent. Instead, 10 of the 11 cores were another material (Volume II, Table 2.8).

Faunal remains (47 bones) were not common, but those present were dominated by an unusually high number of turkey bones (69 percent of the pit total), representing four turkey skeletons (Figure 6.8). Turkey remains at the site were rare and their placement here suggests ritual deposition (Hibben 1937a; Windes 1987d). Additionally, there was an arm of a young adult man and a small wooden cylinder (40 mm long and 28 mm in diameter) inset with flecks of turquoise or paint at one end, all of which came from Layers 1 and 2.

Sherd matches indicate that 56 of the 131 sherds (43 percent), and undoubtedly more, belonged to two vessels, a Kana'a Banded jar (RV 22; Plate 8.3E) and

Plate 6.4. *Plaza Other Pit 14 showing the mouth plugged with stone. 30-cm north arrow (NPS 12258).*

an early Red Mesa Black-on-white jar (RV 20). Pieces of RV 20 were also found on the site surface and in Levels 1 and 2 of nearby grids. Sherds from a canteen were recovered from Level 1 of the pit down to the fill of the floor posthole, denoting that OP 1 was intentionally filled in a single episode, probably in the early A.D. 1000s.

A dirt sample analyzed from the pit floor yielded a high percentage of corn pollen (19 percent of the sample) and small amounts of squash or gourd and prickly pear pollen (Cully 1985:169). Flotation samples from Level 9 and the pit floor also yielded corn, as well as prodigious numbers of Portulaca, spurge, mustard, and cheno-am seeds (M. Toll, this report). The ethnobotanical evidence, then, may reflect the last use of the pit for food storage before it was filled.

Other Pit 6 (Figure 6.6). Plaza clearing in 1975 in Grid 20 (Level 1) unknowingly removed 20 cm of fill from the east end of the pit before burned material halted work. This material was designated Plaza Firepit 1, which was discarded as a feature a year later when its true nature was discerned. The pit mouth was located approximately 98 cm BSD.

Fill was removed in five arbitrary levels. The first 30 cm (Levels 1 and 2) was of nearly sterile, alluviated, clayey sand like that removed the previous year. First discovered at the base of Level 2 was a later pit (OP 12) full of unburned, trashy fill that had cut into OP 6's east side. The rest of the fill (66 cm deep; Levels 3-5) contained dense trash mixed with soft, fire-reddened, clayey sand.

Features. At the pit bottom were two shallow floor pits designated Other Pits 1 and 2 of OP 6. No function could be assigned these pits.

Artifacts. Ceramics (605 sherds) from the two pits were dominated by plain gray and neckbanded culinary, and Red Mesa Black-on-white sherds. Not found were Gallup Black-on-white or

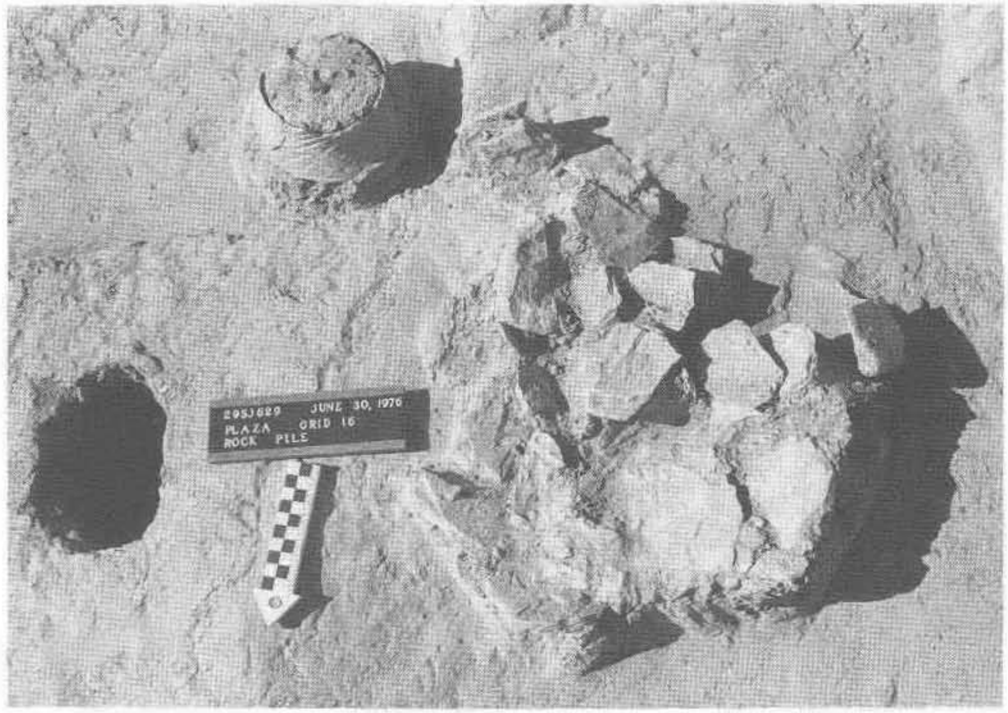

Plate 6.5. *Plaza Other Pit 15 showing the mouth plugged with stone. Note Newcomb Corrugated jar (RV 24) nearby. 30-cm north arrow (NPS 12239).*

other whitewares that came typologically later. Sherd matching indicates the deposits from both pits were probably redeposited, as there are numerous matches not only between the two pits (46 sherds from 5 vessels) but also among trash Levels 3-5 (59 sherds from 10 vessels). Matches from identical vessels found in the pits (Appendix E) fit with those from Pithouse 3, OP 14, and the Trash Midden that mark a common origin and possible coeval deposition in the late A.D. 900s or early A.D. 1000s.

Besides ceramics, other materials in OP 6 were profuse. Fragments of unworked selenite (151 pieces) were common, and probably not all were collected. Burned selenite may have been used as a polishing agent during jewelry production, although turquoise was rare in the pit. Chipped stone (211 pieces) was dominated by silicified wood of the dark, splintery (32 percent) and white chalcedonic (30 percent) varieties. There were two cores and a projectile point made from non-local materials. Nineteen percent of the debitage revealed use. Cottontail and prairie dog parts comprised the majority of the identified 91 bones recovered, but a few golden eagle and hawk bones were also present. Ground stones were rare, as were hammerstones. Finally, flotation analyses revealed numerous unburned weedy seeds but little of economic importance. Stickleaf and portulaca seeds were particularly common. Material in this pit appears to have been domestic refuse from a number of different activities, rather than debris from a specialized one.

Other Pit 12. Excavation of OP 6 inadvertently removed about 60 cm of fill off the top of OP 12 (Figure 6.6) before the latter was recognized. Therefore, the exact shape and depth is somewhat hypothetical, although probably similar to the other three bell-shaped pits. Since OP 12 was younger than OP 6, it must have originated at the same, if not higher elevation than OP 6. The estimated depth of the pit mouth was about 108 cm BSD, or about 10 cm higher than OP 6.

Fill. Five arbitrary levels cleared the homogeneous fill that consisted of unburned sand and trash from the pit. No structural rubble was found in the pit. The upper levels (3-5) were extensions of the levels from the excavation of OP 6, although the material was kept separate. While the bottom of OP 6 was reached with the removal of Level 5, OP 12 continued 15 cm deeper and this fill was removed as Levels 1 and 2.

Features. None.

Artifacts. The pit was filled with refuse, primarily ceramics. Twenty percent of the sherds (49 of 247), however, came from nine vessels distributed throughout Levels 3-5, suggesting deposition was relatively rapid or secondary. Ceramics were dominated by neckbanded, plain gray, and Red Mesa Black-on-white. It also yielded the highest percentage of indented corrugated sherds from any of the large plaza pits, but these probably came from neck indented corrugated vessels. Typologically later ceramics were absent, suggesting an assemblage dating to the early A.D. 1000s.

A scant 21 bones came from the pit, just 3 pieces of debitage, 1 hammerstone, and no ground stones or turquoise were found. Pollen and flotation samples from the pit were not analyzed. Thus, the fill of OP 12 stands in contrast to the other bell-shaped pits that yielded materials from a specialized, limited set of activities.

Other Pit 14. In front of Room 7 and adjacent to the Room 9 entry into the plaza was a bell-shaped pit filled with materials associated with mealing activities (Figure 6.9).

Fill. Fill was removed in natural units as best could be defined from vertical excavation. Like OP 1, a plug of masonry rubble and adobe jutted out of the plaza at 95 cm BSD to mark the pit mouth that was 14 cm deeper (Plate 6.4). It was difficult to precisely segregate the stone and adobe plug of Layer 1 from that in Layer 2, which also included pockets of trash. The plug (Layers 1 and 2) was 44 cm deep. Under the plug, and filling the rest of the pit, were four Layers (3-6) of soft, trash deposits, each visually distinct enough to warrant separation. Layer 6, the lowermost 32 cm, was subdivided to allow collection of the 6- to 8-cm-thick floor fill (Layer 7), although both were part of the same deposit. Except for their absence in Layer 5, stones and adobe chunks were frequently encountered in the trash layers, totalling 28 stones and 169 chunks in Layer 6, the densest layers.

Features. The only feature, Plaza Wall 1, intruded from the original surface northwest into the pit. It is not a wall but a small, possible entry step (47 cm long, 12 cm wide, and 83 cm deep) filled with adobe and stone rubble that at first resembled masonry. Before filling OP 14, this side-entry step into the pit had been carefully filled with wall rubble and then sealed with plaster.

Artifacts. A great diversity of material was recovered from OP 14, including 839 sherds, 24 abraders, 21 manos or fragments, 2 metate fragments, and 675 pieces of chipped stone (Figure 6.10, Table 6.3). In contrast to OP 1, the dominant lithic debitage was 1110 series material of splintery silicified wood and 4000 series quartzite--materials common to hammerstones. Hammerstones (124) were found in profusion from Layer 1 to the floor, representing 42 percent of the 297 recovered from the site. The majority of hammerstones were made of splintery silicified wood of the 1110 series material, with lesser numbers of quartzite tools. Hammerstones of these materials have been associated with mealing bins in other contemporary canyon sites (Volume II, Chapter 4; Windes 1987c). Most hammerstones (78) came from Layers 6 and 7, the trash deposit overlying the floor. The second highest concentration of hammerstones came from nearby Pithouse 3 (41; 14 percent of the site total), which may have shared part of the refuse that filled OP 14.

Sherds in the pit were dominated by neckbanded, plain gray, and Red Mesa Black-on-white without typologically later whitewares. These mark deposition in the very early A.D. 1000s. Ceramic matches were frequent throughout OP 14 (96 sherds from 25 vessels), with clustering especially evident for adjacent trash layers. One unusual find, an unfired, miniature bifurcated basket effigy fragment, suggests some pottery production at the site. Sherds from nine vessels were also matched to those in the Pithouse 3 trash fill.

A large proportion of the site's active (hand-held) abraders (21 percent or 12 of 57) also came from the

Table 6.3. Plaza Other Pit 14, distribution of materials from Layer 5 and the floor.[a]

Artifact Number	Artifact Class	Lithic Material or Ceramic Ware	FS No.
Top of Layer 5 (Layer 4)			
1	Mano (949 g)	2000 (sandstone)	2765
2	Mano (1315 g)	2000 (sandstone)	2765
3[b]	Mano fragment (1281 g)	2000 (sandstone)	2765
4[b]	Mano fragment (1325 g)	2000 (sandstone)	2765
5	Anvil/metate fragment	2000 (sandstone)	2792
6	Metate (lost)	2000 (sandstone)	2791
-	Mano blank (1741 g)	2000 (sandstone)	2793-3
-	Abrader (174.4 g)(burned)	2000 (sandstone)	2764-1
-	Abrader (658 g)	2000 (sandstone)	2764-2A
-	Abrader (grooved lapidary?, 621 g)	2000 (sandstone)	2764-2B
Floor			
1	Mano (1329 g)	2000 (sandstone)	3104
2	Clay handle (unfired)	- Cibola Whiteware	3101
3	Manuport	?	-
4	Hammerstone (93 g)	1112 (cherty silicified wood)	3105
5	Not used		
6	Not used		
7	Mano (704 g)(formerly #5)	2000 (sandstone)	3104
8	Sherd	-	3104
9	Plain gray jar sherd (sooted)	- Cibola Grayware	3103
10	Mano (1332 g)	2000 (sandstone)	3104
11	Plain gray jar sherd	- Cibola Grayware	3103

Table 6.3. (continued)

Artifact Number	Artifact Class	Lithic Material or Ceramic Ware	FS No.
12	Hammerstone (118 g)	1110 (splintery silicified wood)	3105
13	Sherd	-	3103
14	Sherd	-	3103
15	Sherd	-	3103
16	Hammerstone (114 g)	1011 (chert, fossiliferous)	3105
17	Unutilized flake (11.2 g)	1072 (yellow-brown spotted chert)	3102
18	Sherd	-	3103
19	Whiteware jar sherd	- Cibola Whiteware	3103
20	Mano (1316 g)	2000 (sandstone)	3104
21	Hammerstone (148 g)	1110 (splintery silicified wood)	3105
22	Plain gray jar sherd	- Cibola Grayware	3103
23	Hammerstone (96 g)	1112 (cherty silicified wood)	3105
24	Mano/abrader (333 g)	2000 (sandstone)	3104
25	Hammerstone (80 g)	1110 (splintery silicified wood)	3105
26	Passive abrader (92 g)	2000 (sandstone)	3106
27	Mano (1203 g)	2000 (sandstone)	3104
28	Plain gray jar sherd	- Cibola Grayware	3103
29	Whiteware jar sherd	- Cibola Whiteware	3103
30	Mano (1042 g)	2000 (sandstone)	3104
31	Lightly abraded stone (720 g)	2000 (sandstone)	3106
32	Lightly abraded stone	2000 (sandstone)	3106

[a] See distribution in Figure 6.10.
[b] Fit together as a whole mano.

pit and could be related to jewelry production. Some turquoise (ten pieces) and five Glycymeris shell bracelet fragments were also found. Unworked selenite (264 pieces) was common and may have been used for polishing turquoise. Bones (152) were mostly from prairie dogs, cottontails, and jackrabbits, although mule deer and coyote parts were also present (Gillespie, this report). For the most part, the faunal remains represent food items used at the site.

An unusually high percentage (70 percent) of corn pollen, just off the pit floor in Layer 7, dominated the single sample analyzed (Cully 1985:169). There were also small numbers of sagebrush and prickly pear pollen grains. Three flotation samples from Layers 3, 4, and 7 yielded corn, along with a diverse variety and a high density of seeds (M. Toll, this report). A large number of plant taxa yielded charred seeds, while charred corn cobs and fragments were recovered throughout the fill. The abundant evidence of economic plant remains, particularly corn, and those tools associated with food grinding activities are clear indicators that much of the pit material came from a food processing area(s), probably from the nearby surrounding plaza, where mealing catch basins were identified.

Other Pit 15. A familiar story was repeated here by the protruding mass of stone and adobe that marked the presence of another subterranean, bell-shaped, plaza pit (Figure 6.11, Plates 6.5-6.6) at about 115 cm BSD. It was located in front of Room 5 and the Room 3 entry into the plaza, away from the pits clustered at the south end of the plaza. Like OP 1, the stone rubble plug was in distinct contrast to the surrounding sandy fill. This pit, however, did not yield the quantities of cultural materials found in the other large pits. Off to one side of it, however, was a Newcomb Corrugated storage jar (RV 24; Plate 8.9B), resting in the fill on the plaza.

Fill. Instead of vertical excavation, a test trench was placed along the south side of the pit to expose the stratigraphy (Plate 6.6). Although the fill was removed as a single unit, three layers of fill were defined. Most of the pit consisted of a 100-cm-deep column of stone and sand (Layer 1) centered below the mouth. Around the sides, under the overhanging walls, the fill lacked stone and became alluvial (sand and clay lenses) in character (Layer 2). Finally, the lower 15-18 cm contained the familiar stone rubble mixed with sand and chunks of adobe (Layer 3).

Feature. A single postmold (not listed in Table 6.1) about 10 cm in diameter and 20 cm deep was found extending into Layer 3 directly below the center of the pit mouth (Plate 6.6). It is unknown if it continued down into the floor, but it probably duplicates the location and function of the postmold in OP 1--that is, it probably held a tall pole that assisted entry into the pit.

Artifacts. Unlike OP 1 and OP 14, cultural material was sparse in this pit. Only 8 abraders were recovered, along with 130 sherds, 3 pieces of chipped stone, 3 bones, 1 metate fragment, and no hammerstones. The sherds are similar to those in the other large pits: dominated by neckbanded, plain gray, and Red Mesa Black-on-white, indicating an early A.D. 1000s deposition. Only two sherds in the lot could be matched. Although no turquoise came from the pit, a large anvil from the floor fill was thought to have been employed for working turquoise because it was smoothed and grooved. More likely, however, it was a discarded door sill worn from foot traffic (Peter McKenna, personal communication 1989), with the center groove used for setting the door cover in place. Although a large number of seeds were recovered from the single flotation sample from the floor, it consisted largely of unburned weedy annuals similar to the OP 6 contents. No corn was recovered from the sample. Pollen analysis, however, revealed much corn pollen on the floor with some grains clumped together (Dean, this report) suggesting that corn was stored in the pit. Squash pollen was also recovered. The overall homogeneous nature of the fill suggested that the pit was rapidly filled and plugged.

Postholes

A rectangular pattern of postholes indicates that a ramada once existed along the eastern side of Rooms 5-7 (Figure 6.1, Table 6.2). The ramada might have continued unbroken into Rooms 3 and 9 prior to their construction. The lack of adobe impressions in the plaza reflects a roof covering of perishable material, probably brush. Posthole morphology was examined by Lekson and McKenna to elicit information concerning the spatial and

Plate 6.6. *Plaza Other Pit 15, view from the test pit along one side. Note the post mold and the possible stone door sill near the bottom. 30-cm north arrow (NPS 12283).*

temporal organization of these features (Chapter 7). Identification of PH 10 and 16 are uncertain and PH 27 was not a major support. These were left out of the following calculations.

Two general categories of pits were considered plaza postholes. Pits (21) containing crushed lignite and often containing stone shims and a stone footing were large and easily defined, at least at the lignite level. OP 2, a posthole in Grid 9's Floor 3, had almost 30 cm of soil and an adobe plug above the 20 cm of lignite packing--the second deepest posthole uncovered. Possibly others are base relics of truncated taller features, but the difficulty in correcting for the missing parts forces these to be treated as complete units in discussions of plaza stratigraphy. Soil-filled postholes are smaller, less regular in outline, and less certain in their functional designation. A single example of an adobe post cast (PH 27) was found just west of OP 14.

Posthole diameters for the group appear to exhibit a normal distribution, with a mean of 28.7 cm and a range of 21-46 cm. The majority (20 of 21) range from 21 to 35 cm. Basal stones occur in 73 percent (16 of 22) of the postholes. Shims, while common to 9 of 22 postholes, probably are underrepresented if many of the features are truncated. Those without shims or basal stones (four examples) cluster in front of Rooms 5 and 6. Three of these, set against the two rooms, are the deepest of any postholes, are larger, and contain more lignite than the average, suggesting contemporaneity.

Most postholes were packed with lignite, perhaps to reduce the capillary moisture from rotting the post butts. Those with lignite contained an average of 15.5 kg. Three of the four with the most lignite (PH 7, 9, and 19) were set in a linear arrangement along the west side of OP 12 as part of a single ramada to shelter OP 12. Different grades of packing (fine versus chunky) appeared randomly in the pits. The variation in lignite color in postholes may easily be explained as a function of lignite gathered from different areas rather than materials preparation. The more common, darker material (not weather bleached?) perhaps came from undisturbed beds in the Menefee formation.

Postholes were arranged in two parallel rows, about 150 cm apart, parallel to Rooms 5-7. Often there is a second posthole nearby which marks either an auxiliary support or one that was moved. A second cluster of postholes forms a rectangle around OP 6 and OP 12 between the main plaza and Pithouse 3. The superimposition of PH 19 into the fill of OP 6, and the central location of OP 12, in respect to the enclosing postholes, indicates ramada placement over the bell-shaped pit (OP 12) after abandonment of OP 6.

Remodeling or new construction of the ramada was not clearly evident from posthole elevations, which appear to conform to the natural ground slope and not to cultural deposits. OP 2 and PH 11, however, were opposite one another, as if a paired unit, and were sealed (plugged) with adobe. Thus, they were probably not used at the end of occupation and may reflect a rebuilt ramada. There appears to be a tendency for morphologically similar postholes to cluster in rectangular arrangements, as if multiple ramadas instead of a single continuous unit were in use. Nevertheless, except for the unit covering OP 12, the overall spatial ordering of the postholes is exceptionally linear, even with its extension into Room 3 and 9. This would seem to suggest that the ramada was a planned unit raised over a short period of time.

Plaza Walls

Four blocks of masonry that appeared to be short masonry walls were designated as Plaza Walls, although not all were walls. For instance, Plaza Wall 1, discussed above with OP 14, was a probable masonry-filled step entry. Plaza Wall 2 was a rectangular buttress, or shelf of stone and adobe, articulated with the base of Room 7's east wall. Its location suggests use as a possible step into Room 7. Plaza Wall 2 lies partly over PH 21, suggesting that it was built after the posthole. The post orientation was not disturbed by the "wall," and both features appear to have seen some coeval use.

A short extension of the cross wall between Rooms 6 and 7 into the plaza was designated Plaza Wall 3. It consisted of a single, large, friable stone set in abundant mortar, and it might have been intended to partly delineate two separate work areas. Finally, Plaza Wall 4 was an isolated adobe and stone stub built on Floor 3 of Grid 9 next to the opening of OP 1. It is possible that the wall related structurally to OP 1 due to its location over OP 1 and its improbable orientation for use as a wall extension from the roomblock.

Finally, another wall (not numbered) had been built along the western edge of Pithouse 3 after the pithouse had been abandoned and partly filled (Figure 5.12). It may have served as a safety barrier for passage between the pithouse depression and Room 9. Stratigraphic relationships suggest the wall was built late in the site use, perhaps after the Kiva was built.

Plaza Bin 1

A short, 100-cm-long wall extension was added to the south end of Room 3's east wall to form the west side of a masonry bin. This rested on the plaza use surface. An adobe collar, inset with upright slabs, forms the southern and eastern sides leaving the northern end at the top open. The bottom of the bin was adobe, set 22 cm below the surrounding plaza surface. Deposits within the bin were devoid of cultural material and probably postoccupational in origin. Dirt samples were not processed from the bin, however. Nearby (25 cm to the east), and perhaps associated, was Plaza Firepit 5, with a slab metate inside. The proximity of the two features and the metate suggest an area for food preparation.

Plaza Surface Materials

The 29SJ 629 plaza work surface(s) had few artifacts, except in the area surrounding bell-shaped Other Pit 14, in Grids 8 and 9, just north of Room 9 (Table 6.4). Material was particularly dense close to Rooms 6 and 7, where it had been protected by wall fall. Given the nature of the plaza surface and the excavation methodology, it is difficult to separate surface from fill materials. The continuity among fill and use-surface materials and the unusual nature of the some of the cultural materials strongly suggests that much of the material was left from plaza activities in the areas in which they were recovered.

Lithic debitage from the plaza use-surface include silicified woods of the 1110 (splintery woods), 1112-1113 (dark-light, chert woods), and 1140 (white, chalcedonic woods) series. The abundance of the latter is particularly striking because of its high relative frequencies in other site contexts (Plaza OP 1 and Pithouse 2, Layer 6) in association with turquoise jewelry manufacture. The splintery wood debitage, on the other hand, may have derived from sharpening manos and metates with hammerstones of the same material (Windes 1987c). The majority of the numerous plaza hammerstones were of 1110 material--several were recovered in and around FP 2 (Figure 6.3). Quartzite, however, was rare. Micro-drills were common, along with turquoise jewelry debris and broken turquoise beads. Cores were rare. Ground stones were not abundant, but several manos, mano fragments, and abraders were recovered. Faunal remains were essentially absent.

Ceramics were common in the plaza areas (Table 6.5). Types were dominated by Red Mesa Black-on-white and fragments of neck decorated utility jars from the early A.D. 1000s. As one moved north in the plaza or south past Room 9, however, small numbers of sherds from the last half of the A.D. 1000s and the early A.D. 1100s were encountered, including Gallup Black-on-white, Chaco Black-on-white, and carbon-painted sherds. These latter ceramics probably mark areas of later activities associated with use of the Kiva, although few plaza features can be attributed to the period.

Not unexpectedly, microbotanical results from the plaza surfaces yielded mixed results. A pollen sample from Grid 8, close to the walls between the OP 3 and OP 4 basins, yielded much corn (17 percent) and some cattail and cucurbit pollen (Cully 1985:168, 179). A sample from Grid 14, however, was essentially sterile. Flotation results from Grids 9 and 14 were poor (n=87 seeds for 3 samples), but Grid 8 yielded 281 seeds in two samples (M. Toll, this report). The sample from Grid 9 was nearly sterile, yielding just two seeds. Nevertheless, the seeds recovered came primarily from a diversity of weedy annuals, including tobacco. Of the 368 seeds examined, 2 unknown seeds were charred, but no corn was present.

Just east of OP 15 was a Newcomb (neck) Corrugated jar set flush with the use surface (Plate 8.9B). Although the jar might have held liquids, no deposits had accumulated inside that might have attested to long-term liquid storage. The lack of soot from firepit use suggested its original use was for storage, perhaps in conjunction with use of OP 15. The contents of the jar included only some carbonized corncob fragments and 10 seeds, including charred Chenopodium seeds.

Plaza Conclusions

The outdoor space located between the rooms and pitstructures contained evidence of activity areas that were concentrated in front of Rooms 6 and 7. Numerous postholes were aligned in two north-south rows in front of the earliest rooms at the site (Rooms 5-7) and beyond, which suggests a single, planned construction of a ramada to shade outdoor work areas of the site. The orientation of the ramada protected the inhabitants from the summer sun. Additionally, the alignment of the earliest rooms (north-south) also indicates that the site was planned and built for occupation during the warmer months of the year, ignoring the solar advantages of cold weather

Table 6.4. Plaza distribution of artifacts in Grids 8-9 and 14-15 between 92 and 107 cm below the site datum.[a]

Artifact Number	Artifact Class	Lithic Material or Ceramic Ware		BSD Depth (cm)	FS No.
1	Hammerstone (161 g)	1110	(splintery silicified wood)	99	1002
2	Hammerstone (134 g)	1110	(splintery silicified wood)	97	1002
3	Hammerstone (154 g)	1110	(splintery silicified wood)	96	1002
4	Hammerstone (237 g)	1110	(splintery silicified wood)	96	1002
5	Hammerstone (168 g)	4005	(quartzite)	95	1002
6	Hammerstone (143 g)	1110	(splintery silicified wood)	98	1002
7	Hammerstone (228 g)	1110	(splintery silicified wood)	98	1002
8	Hammerstone (84 g)	4370	(metarhyolite, quartz inclusions)	98	1002
9	Core (14 g)	1113	(cherty silicified wood)	98	1002
10	Concretion?	?		?	none
11	Sherd	-		100	1002
12	Wall stone? (discarded)	2000	(sandstone)	99	none
13	Hammerstone (123 g)	1110	(splintery silicified wood)	98	1002
14	Hammerstone (101 g)	2202	(quartzitic sandstone, Nacimiento)	99	1002
15	Tohatchi Banded jar sherd (sooted)	-	Cibola Grayware	95	1002
16	Mano (1049 g)	2000	(sandstone)	92	1002
17	Sherd	-		96	1002
18	Sherd	-		92	1002
19	Architectural slab 52x37x5 cm	2000	(sandstone)	98	2171
20	Wall stone (discarded)	2000	(sandstone)	97	none
21	Wall stone (discarded)	2000	(sandstone)	100	none
22	Active abrader #4 (55 g)	2000	(sandstone)	99	2179
23	Hammerstone (170 g)	1110	(splintery silicified wood)	99	2176
24	Active abrader #6 (148 g)	2000	(sandstone)	99	2179
25	Hammerstone (319 g)	1110	(splintery silicified wood)	99	2173
26	Hammerstone (155 g)	1110	(splintery silicified wood)	99	2173

Table 6.4. (continued)

Artifact Number	Artifact Class	Lithic Material or Ceramic Ware		BSD Depth (cm)	FS No.
27	Mano #13 (957 g)	2000	(sandstone)	101	2175
28	Mano #14 (939 g)	2000	(sandstone)	102	2175
29	Mano #15 (1083 g)	2000	(sandstone)	102	2175
30	Metate fragment (17.5 kg)	2000	(sandstone)	101	2174
31[b]	Sherds (sooted)	-	Cibola Grayware	101	2178
32[b]	Sherds (sooted)	-	Cibola Grayware	106	2178
33	Hammerstone (123 g) Hammerstone (69 g)	1110 4005	(splintery silicified wood) (quartzite)	106 106	2176 2176
34	Architectural slab, abraded and bifacially chipped (discarded)	2000	(sandstone)	107	2172
35	Mano (737 g)	2000	(sandstone)	95	2326
36	Wall stone (discarded)	2000	(sandstone)	98	none
37	Wall stone (discarded)	2000	(sandstone)	98	none
38	Wall stone (discarded)	2000	(sandstone)	102	none
39	Wall stone (discarded)	2000	(sandstone)	102	none
40	Wall stone (discarded)	2000	(sandstone)	102	none
41	Wall stone (discarded)	2000	(sandstone)	95	none
42	Architectural slab fragment (discarded)	2000	(sandstone)	101	none
43	Clay lump	-		99	none
44	Clay lump (turtleback?)	-		99	none

[a] See distribution in Figure 6.3.
[b] These two concentrations yielded 17 plain gray, 4 indented corrugated, and 1 neck indented corrugated sherds.

Table 6.5. Ceramic frequencies from the plaza grids, the large plaza pits, and other small miscellaneous plaza features.[a,b]

Ceramic Type	Grids No.	Grids %	OP 1 No.	OP 1 %	OP 6 No.	OP 6 %	OP 12 No.	OP 12 %	OP 14 No.	OP 14 %	OP 15 No.	OP 15 %	Misc. No.	Misc. %
CIBOLA/CHUSKA CULINARY														
Lino Gray	2	T	-	-	2	1	1	T	-	-	-	-	-	-
Plain gray	997	33	39	30	163	46	70	28	276	33	86	66	17	31
Wide neckbanded	64	2	-	-	20	6	8	3	16	2	2	2	-	-
Narrow neckbanded	414	14	27	21	35	10	39	16	85	10	10	8	7	13
Neck indented corrugated	36	1	-	-	2	1	2	1	-	-	-	-	-	-
Unclassified indented corrugated	516	17	7	5	32	9	44	18	39	5	12	9	6	11
PII indented corrugated rim	5	T	-	-	1	T	4	2	3	T	-	-	-	-
PIII indented corrugated rim	1	T	-	-	-	-	-	-	-	-	-	-	-	-
CIBOLA WHITEWARE														
Unclassified BMIII-PI B/W	5	T	-	-	1	T	-	-	2	T	1	1	-	-
Red Mesa B/w	317	11	46	35	56	16	40	16	252	30	10	7	5	9
Escavada B/w	5	T	-	-	-	-	-	-	-	-	-	-	-	-
Puerco B/w	1	T	-	-	-	-	-	-	-	-	-	-	-	-
Gallup B/w	26	1	-	-	-	-	-	-	-	-	-	-	-	-
Chaco B/w	4	T	-	-	-	-	-	-	-	-	-	-	-	-
Unclassified PII-PIII B/w	192	6	4	3	12	3	13	5	48	6	4	3	6	11
UNCLASSIFIED WHITEWARE	377	13	8	6	29	8	25	10	104	12	4	3	9	16
UNCLASSIFIED CARBON B/w	10	T	-	-	-	-	-	-	-	-	-	-	-	-
CHUSKA WHITEWARE														
Tunicha B/w	13	T	-	-	-	-	-	-	3	T	1	1	-	-
Newcomb B/w	-	-	-	-	-	-	1	T	-	-	-	-	-	-
TUSAYAN WHITEWARE														
Lino B/g	2	T	-	-	2	1	-	-	-	-	-	-	-	-
MESA VERDE WHITEWARE														
Mesa Verde B/w	1	T	-	-	-	-	-	-	-	-	-	-	-	-
SMUDGED WARE	9	T	-	-	3	1	-	-	2	T	-	-	-	-
SAN JUAN REDWARE														
Unclassified redware	6	T	-	-	-	-	-	-	9	1	-	-	5	9
WHITE MOUNTAIN REDWARE														
Unclassified redware	2	T	-	-	-	-	-	-	-	-	-	-	-	-
Totals	3,005	98	131	100	358	102	247	99	839	99	130	100	55	100
Time Period (A.D.)	975-1050+		975-1025		975-1025		975-1025		975-1025		975-1025		975-1025	
Volume excavated (m³)			0.70		2.00		0.68		0.73		0.68			
Density (sherds/m³)			188		179		363		1152		191			

[a] T = trace (less than 0.5%).

[b] Includes Plaza Grids 8-9, 13-16, 20, 22, 29, and 35.

occupation. These aspects of construction suggest that the site was first used as a seasonal residence. It is clear that the initial ramada extended north and south of Rooms 5-7 into areas that later were used as living rooms (Rooms 3 and 9), with the ramada incorporated into the room superstructure. The shift in orientation of these two new rooms to take advantage of the winter sun, however, suggests a change to year-round occupancy (Chapter 9).

It is difficult to assess the exact initial temporal relationship between Rooms 5-7 and the ramada. In the A.D. 800s and early A.D. 900s, when the site may have been first occupied, some Chacoan sites with a pithouse exhibited little surface architecture other than a ramada (e.g., Doleman 1979). The presence of the ramada before the rooms were built might be argued from the superimposition of the Room 7 step partly over a ramada posthole. The alignment of the postholes along the rooms, and placement of the main weight bearing-supports set along the outer row away from the rooms, however, suggests that the rooms were built to support part of the ramada framework. Thus, the rooms were built first and then reroofed to support the ramada, or both were built at the same time. A few sealed postholes, however, indicate that some rebuilding of the ramada occurred.

The majority of plaza features were sheltered by the ramada. These clustered adjacent to Rooms 7 and 9 and consisted of two firepits and a number of possible mealing catchment basins (OP 3, OP 4, OP 10, OP 13). In association with this cluster of pits was a large, bell-shaped storage pit (OP 14) filled with corn pollen and materials used for corn processing. Similiar materials were also found on the plaza use-surfaces and in the fill nearby. For the most part, then, the area next to Rooms 7 and 9 appears to have served primarily for food preparation and the storage of foodstuffs.

Overall, four, large, bell-shaped pits existed in the 29SJ 629 plaza, each one covered by a ramada. Several characteristics argue for a similar function and history: the spatial arrangement of three of the pits (OP 1, 14, and 15), the ramada supports and the three tub rooms; their similar morphology and volume; and their process of postoccupational filling. Only the Room 9 bell-shaped pit yielded a floor artifact suggesting a functional association with the pit. It contained a whole trough metate, only one of eight whole metates recovered from the site, overlying some corn pollen. Ethnobotanical remains from the floors of OP 1, OP 14, and OP 15, however, suggest that the pits were used primarily for corn storage before abandonment. It seems reasonable, then, to ascribe a storage function for all five bell-shaped pits (including the one in Room 9). The lack of lining, however, dictates that storage was only for short-term food items or non-perishable goods. The paucity of features and cultural material around each of the pits (except OP 14) suggests plaza activities were limited, aside from those related to the pits. The position of a large, bell-shaped storage pit in front of each tub-shaped storage room suggests that the pits and rooms were functionally paired. Perhaps long-term storage occurred in the rooms, while the pits were used for short-term storage during food processing activities. The presence of a living room adjacent to two of the pits (OP 14 and OP 15) may also tie the two site residental groups with specific storage rooms and pits.

Large, bell-shaped pits have occurred sporadically throughout the Anasazi region (Brew 1946:123-124; Bullard 1962:35-36; Gumerman et al. 1972:125-126; Roberts 1930:29-30, 1939:178; Wendorf et al. 1956:72). Such pits are rarely reported for later sites, although a number of Pueblo II and Pueblo III occupations along the LaPlata Highway in northwestern New Mexico recently revealed bell-shaped pits, which were placed in a semi-circle around the exterior ground surface of kivas (Sarah Schlanger, personal communication 1991). These were not sheltered by ramadas. Anasazi bell-shaped pits generally occur in surface rooms, with or without features, beneath ramadas or jacal structures, or in isolation near surface rooms or pitstructures. These were probably used for storage, despite almost always being filled with postoccupational deposits after abandonment. A few have contained the corn stored in them or yielded corn cob impressions on the floor (Bullard 1962:35; Gumerman et al. 1972:134; Smith 1964:204). In the Piedra area of Colorado, a deep pit filled with carbonized corn (Roberts 1930:30) was associated with a ramada similar to those at 29SJ 629. A mealing complex found nearby suggests a direct relationship between these pits and food preparation. Others found scattered outside around the houses at Kiatuthlanna were individually roofed and half filled with carbonized corn (Roberts 1931:41).

The numerous features around OP 14 contrasts sharply with the barren areas around the other bell-shaped plaza pits. In addition, the superimposition of OP 4 over the possible step (Plaza "Wall 1") into OP 14 indicates possible abandonment of OP 14 before OP 4 and its twin, OP 3, were constructed (Figure 6.12). By extension, it might be argued that most or all the pits around OP 14 post-date the bell-shaped pit(s).

The only other superimposition of features involves the firepits (Figure 6.12). An unburned seal covering Firepit 6, a possible burned surface nearby, and a pit under Firepit 2 correspond in depth. FP 6 and the pit under FP 2 were therefore contemporaneous. When FP 2 was constructed, FP 6 and the lower pit were abandoned. The minimal superimposition of features is in accordance with the single-surface theory for the plaza. Nevertheless, the difficulty in defining unprepared outdoor use-surfaces raises the possibility that multiple surfaces existed but were altered by weather and soil conditions, and by human trampling (e.g., Nielsen 1991).

Abandonment of the three large pits in front of Rooms 5-7 occurred rapidly and simultaneously. Although the contents of each was unique, sherd matches, the relative homogeneity of the fill, and the similar method of plugging the pits indicates that materials were gathered from specific activity areas to quickly fill the pits after abandonment.

Two pits (OP 1 and OP 14) were filled with materials that lend considerable insights into major activities at the site. The dominant materials recovered from OP 1 indicate the importance of turquoise bead and pendant production at the site. Many of the jeweler's tools were present, along with selenite and debitage of white chalcedonic silicified wood that are apparently related to the jewelry process. How the latter was used in the process is not understood, but its association seems certain by its presence in similar contexts on the plaza and in Pithouse 2. The origin of the pit material probably was from the adjacent plaza where similar materials were recovered. Although turquoise production debris from Pithouse 2 must have been encountered and then removed by the builders of the Kiva, the turquoise differs in color between the pithouse and OP 1. The human arm and turkey remains in OP 1 also suggest that the pit received ritual consideration when it was filled.

OP 14 yielded a mass of materials associated with food processing activities, which probably came from the adjacent plaza where a number of possible mealing catchment basins were located. Many of the site's hammerstones and manos, along with much corn pollen and other economic plant remains were recovered from the pit.

OP 6 was the only large pit not of bell-shape construction. It was located outside the main ramada area behind Pithouse 3, suggesting the pit and pithouse might have been associated. Sherd matches suggest it was filled with refuse at the same time as Pithouse 3. After pit abandonment, a bell-shaped pit (OP 12) was built next to it and shaded with a new-built ramada. Later, OP 12 too, was filled with refuse. Finally, OP 15, the northernmost bell-shaped pit, was filled primarily with sand and roofing adobe.

Little can be determined from those areas adjacent to Rooms 1 and 2, which had few features and where pollen and flotation samples were not analyzed. A few temporal indicators (i.e., ceramics and a slab metate) suggest use of this area near the end of the site occupation or perhaps later. Two heating pits were found under the room walls that predate room construction and might mark some outdoor activity. Two more burned pits were found behind the roomblock (behind Rooms 2 and 8), but their temporal association with other features and architecture is unclear.

FP 5 and Bin 1 form a spatially distinct work area in front of Room 2. These features suggest a loci for food preparation and storage. Because Room 1 is immediately adjacent to FP 5 and Bin 1, and all are temporally late and just behind the Kiva, these may mark the space and architectural units used during the final occupation.

Plaza Temporal Assignment

It is difficult to date first use of the plaza other than by its association with major architectural units (e.g., rooms) at the site. The absence of Gallup Black-on-white and carbon-decorated sherds from the deep plaza pits appears significant, given the large pit sample size (1,705 sherds). Indented, corrugated sherds were also in the distinct minority when compared to plain gray and neckbanded sherds (Table

6.5), but many, if not all, of these probably came from neck indented corrugated jars. Ceramics, therefore, suggest filling of the bell-shaped plaza pits in the early A.D. 1000s. Ceramics appear little different from the levels overlying the big pits although a little Gallup Black-on-white was present. Indented corrugated sherds remain at about the same or somewhat higher frequencies when compared to neck-coiled types. Plaza surface abandonment can be dated from these latter ceramics as occurring between about A.D. 1030 and 1050.

Chronometric dates from FP 2 and FP 6 yielded mixed results. The mean radiocarbon date from FP 6 of A.D. 617 was unrealistic and not supported by other evidence. The archeomagnetic samples from FP 2 suggested firepit use between A.D. 926 and 1077. A sample from Plaza Heating Pit 1 in Grid 16 was plotted on the archeomagnetic curve at A.D. 916-1035. Despite the imprecision of the archeomagnetic dates, they were in general accord with the ceramic time.

Trash Midden

Trash deposits at 29SJ 629 were investigated for several reasons: 1) to determine chronological limits of the site occupation, 2) to delineate the extent and volume of trash deposited during occupation, 3) to define its stratigraphic history and to correlate it with events elsewhere on the site, 4) to locate features that might expand the diversity and distribution of other activities, 5) to locate burials for a study of the site population and funerary practices, and finally, 6) to recover cultural material reflecting aspects of site use and inhabitant behavior (Figures 6.13-6.15).

A large area of sheet trash was evident downslope 15-40 m east of Room 1, where the Trash Midden (Figures 6.13-6.15) was eventually discovered. The grid system was extended to cover this area and two preliminary test pits placed in areas of high surface trash density. These test pits, the north third of Grid 49, and the southwestern quarter of Grid 59, yielded refuse that quickly terminated at sterile about 25 cm below the surface (Figure 4.1). To hasten testing for trash and features (particularly pitstructures) beyond the roomblock, a road grader was employed to strip the surface vegetation and 20-40 cm of fill from an L-shaped swath. The area was 2.5 grids wide (7.5 m) from Grids 41, 47, and 53, south 30 m and then west 15 m, reaching Grids 18-20 (Figure 4.1). This striping revealed sterile in all grids except for the Pithouse 2 ventilator shaft top, Plaza OP 7, and a circular ash-stained area in Grid 52 about 8 m east of Room 1.

Further testing in the latter area (Test Trench 1) revealed a shallow trash-filled channel in the bedrock. Eventually, it was discovered that the channel became deeply entrenched in the northwestern corner of Grid 64 (Plate 6.7) and then meandered east downslope 16 m before opening out into the spacious alluvial fan characterizing the mouth of Marcia's Rincon (Plates 6.8-6.9). Testing a slight depression in Grids 98, 103, and 104 for further evidence of the channel revealed that run-off had created a maze of shallow gullies in the fan. From Grid 64 east to Grid 88, the channel had cut about a meter below the surrounding bedrock, which in turn was 20-40 cm below the present ground surface. This channel, which carried water at the time of the first occupation, served as the specific point for refuse deposition during much of the 29SJ 629 occupation.

Methods

Control for removal of the trash was maintained by 100-cm-wide test trenches within the 3 by 3 m grids, with the fill generally removed in arbitrary 20 cm levels. In parts of Grids 52, 53, 82, and 88, an attempt was made to remove material in natural strata after profiling the main trenches. To define the channel and obtain about a 50 percent sample of the refuse material, excavation proceeded along the projected channel's path. Overall, 45.5 m^3 of trash and sand was removed from the channel--about 70 percent of the midden area. Another 19.0 m^3 of trash probably remains in and adjacent to the channel that was not excavated, including about 5.7 m^3 still in the channel.

Excavation began by removing the vegetation and a 5-cm-thick layer of unconsolidated fill and bagging the artifacts as surface material. Trenches were then carried down to bedrock. All fill was put through 1/4 in. screen except from units just above sterile that contained little cultural material. Additionally, a 6-liter sample was taken from each excavation unit and sifted dry through progressively smaller screens (1/2, 1/4, 1/8, and 1/16 in.) to quantify the density and size of material (Appendix C). It soon became

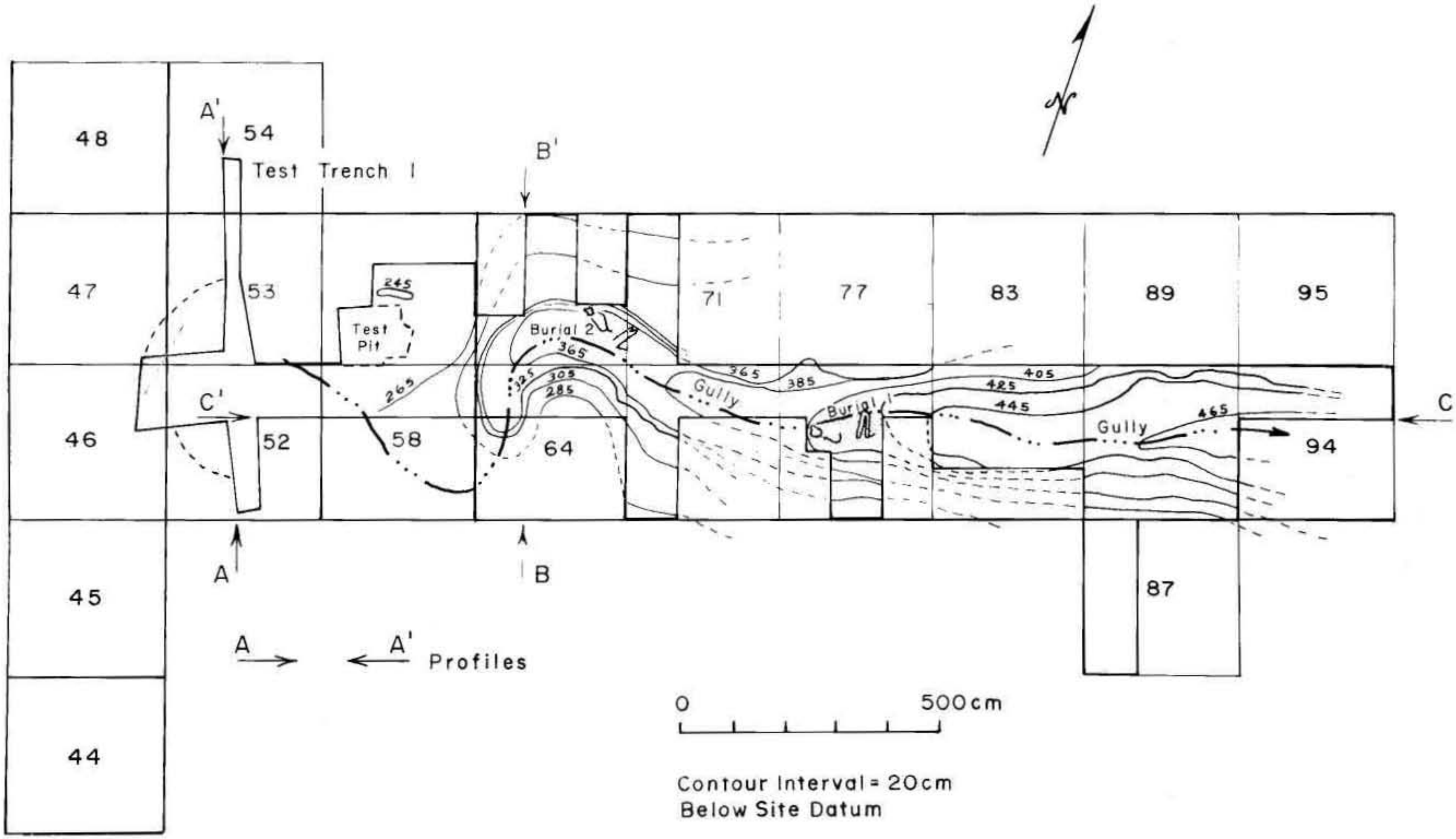

Figure 6.13. Trash Midden, plan of excavations and main gully channel (NPS 310/82267 C).

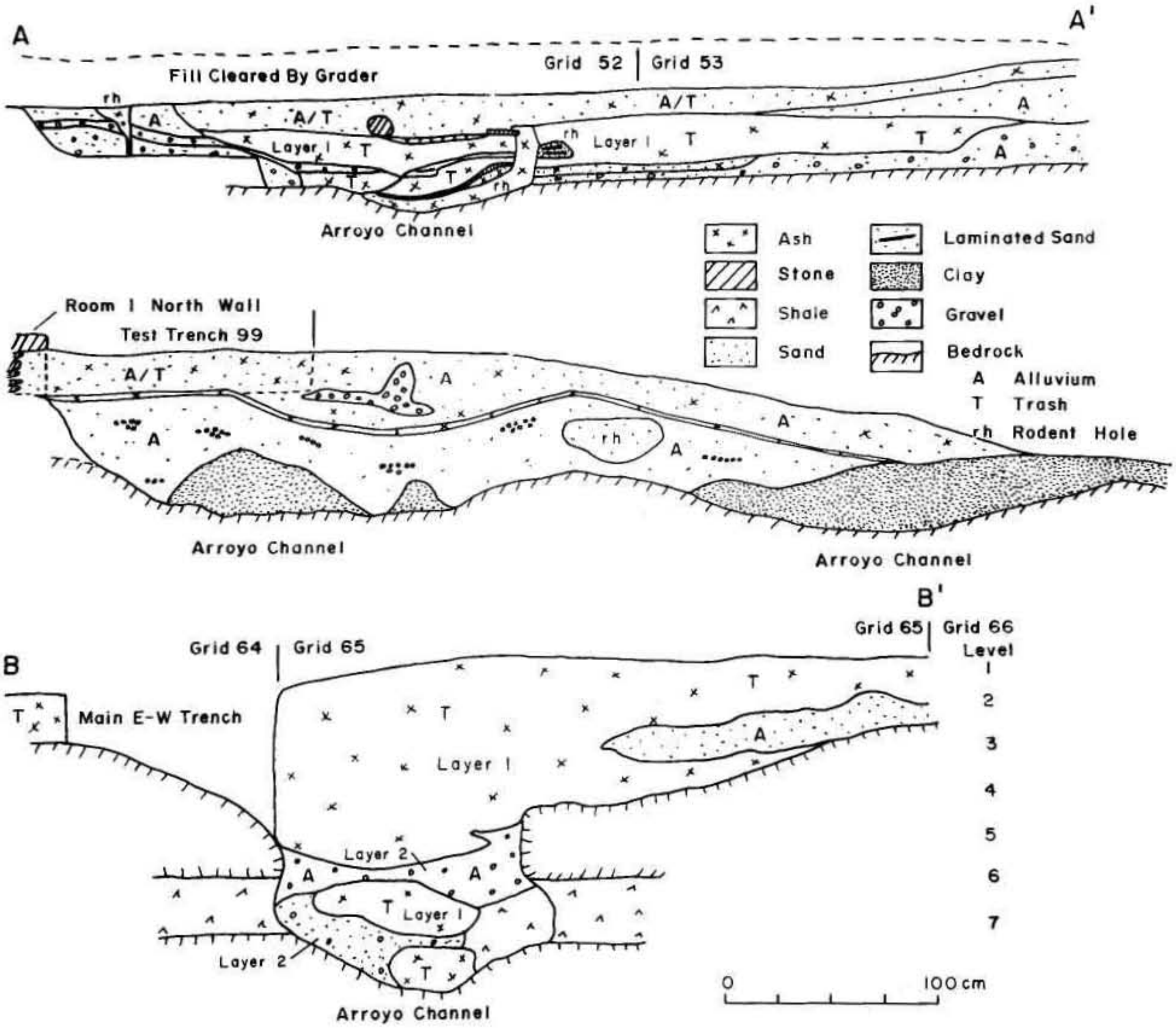

Figure 6.14. *Trash Midden, north-south profiles of stratigraphy of Test Trench 1 in Grids 52/53 and Grids 64/65, and of Test Trench 99 north of Room 1 (NPS 310/82273 C).*

apparent, however, that 1/16 in. screening was a prohibitive time investment, and it ceased. The variability within excavation units precluded an accurate appraisal of material from only a 6-liter sample, although the practice was useful in measuring the frequency of small stones and charcoal fragments, as well as for the recovery of small faunal remains. Larger volume samples (0.027 m^3) were later selected from trash deposits in the site in anticipation of obtaining a more accurate assessment of intrasite variability, although the subsequent time involved for water screening and tabulations was costly.

Fill

Two layers or zones were tentatively identified in the Trash Midden after examination of the main east-west trench (Figure 6.15). The upper 10-50 cm of fill in all grids (Layer 1) was a fine, well-sorted, uncompacted sand and silt, which was stained gray or black, and included occasional small stones (often burned) and a high frequency of cultural material. Large stones were nearly absent and flecks of charcoal ran from 4-10 up to 50 per 100 cm^2. Layer 2, underneath, was characterized by coarse to fine yellow sand and gravel with a slightly higher stone

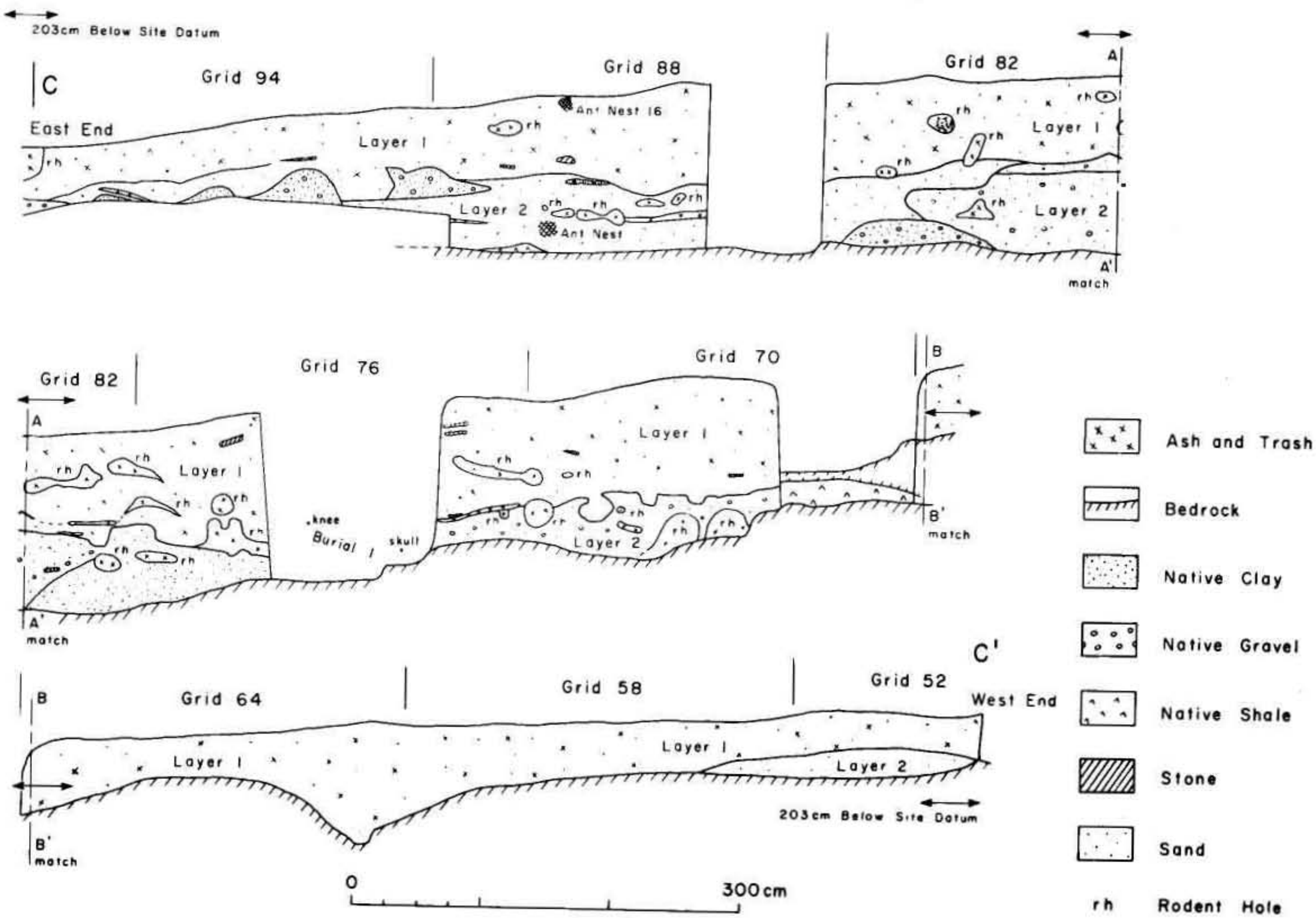

Figure 6.15. Trash Midden, east-west profiles (NPS 310/82269 C).

Plate 6.7. *Trash Midden, looking east from the rooms and Test Trench 1 in Grid 52 (NPS 12085B).*

content but with greatly reduced frequencies of charcoal and cultural material. Most of the latter tended to occur in pockets and rodent tunnels. There was considerable variability within each layer, however, and the basic distinction between the layers was primarily color. Beginning in Grid 82 and east to Grid 94, both layers became progressively more alluvial, more sterile, lighter in color, and higher in clay content. These changes probably signify an increasing amount of material that was redeposited from alluvial action upslope after site abandonment.

Depositional History

The relationship between the main site Trash Midden and the underlying channel is important to understanding the trash deposition and changes in the rincon drainage system. Testing behind Rooms 1-3 in Test Trench 99 revealed that the former channel had once run next to those rooms' north walls, which may explain the alluvial deposition under and in those rooms (Figures 4.1, 6.14). Presently, run-off from the head of the rincon proceeds east along two

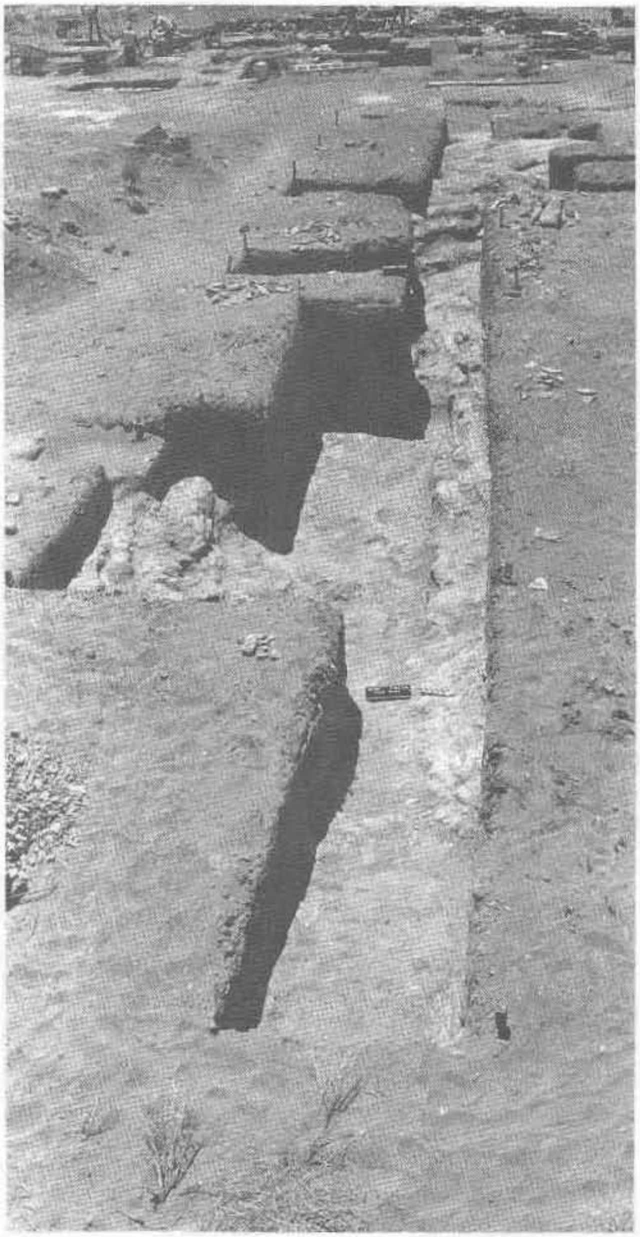

Plate 6.8. *Trash Midden, looking west towards the rooms from the trench in Grid 94. 30-cm north arrow in trench bottom with signboard (NPS 12092).*

gullies, one 10 m south of the roomblock and another about 5 m north of it and parallels the prehistoric channel. During storms, both divert quantities of water around 29SJ 629, particularly via the more deeply entrenched northern trench and out onto the alluvial plain below toward sites 29SJ 628, and 29SJ 627. Such run-off is exceedingly troublesome to 29SJ 627, a larger contemporary site located about 150 m downslope from 29SJ 629.

The size and nature of the channel entrenchment under the Trash Midden suggests that it once carried substantial run-off, possibly equal to the modern channel 5 m to the north. Trash lying directly on the bottom indicates that the channel was functional when the site was first occupied. Compact deposits of trash on the bedrock bottom (Figure 6.14) reveal that with the start of trash deposition, the channel ceased to carry a sufficient volume of water to clear out the trash. Either run-off was greatly reduced due to

Plate 6.9. *Trash Midden, looking south across the head of the arroyo in Grids 65 and 64 where Burial 2 was located. 30-cm north arrow (NPS 12086).*

climatic change or, more likely, it drained elsewhere. Considering that both channels join somewhere near Room 4, it is suggested that run-off shifted towards the present northern channel away from the house and dump.

Stream capture might account for the shift but it seems unlikely that it would have coincided with the beginnings of trash deposition. The alternative inference is that the run-off was intentionally diverted by the site inhabitants. The unexplained west wall of "Room" 4 and the odd wall built against the outside west wall of Room 5 might indicate that run-off in that area was once a problem. This problem was not investigated during excavation but seems the most plausible, given the circumstances.

Ceramic assemblages were earliest in the bottom of the western Trash Midden grids (Tables 6.6-6.7). The earliest concentrations of ceramics nestled near the head of the entrenched channel, the area subject to the greatest forces of run-off. Nevertheless, they appeared to retain their associational and temporal integrity. Sherds were large and fragments from the same vessel were in close proximity. Furthermore, edges on the sherds and bones were not eroded and soot was still prominent on many jars. The surrounding fill was unsorted and contained a higher frequency of charcoal and stones than would be expected from alluviation. Concentrations of sorted sand and gravel above and around the trash does suggest, instead, that run-off continued over and through the existing dumps during periods of episodic deposition. Trash is not widespread beyond the channel; therefore, even if there was redeposition, it was relatively contained and did not come from the roomblock area.

Unfortunately, fine stratigraphic events in the Trash Midden were not evident and were further confused by extensive rodent activity. Numerous burrows were obvious during excavation and in the profiles. Ceramic matches confirm the disturbed nature of the deposits. Fragments from a vessel were typically found in most of the Trash Midden grids and in every level, contrary to expected horizontal displacement if the disturbance had been caused

Table 6.6. Ceramic frequencies from the Trash Midden and Test Trench 99.[a,b]

	Test Trench		Surface		Grid 49 Surf.-Lev. 1		Grids 52-53 Layers 1-2		Grid 58 Levels 1-4		Grid 59 Lev. 1-2	
Ceramic Type	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
CIBOLA/CHUSKA CULINARY												
Lino Gray	11	4	2	T	-	-	6	3	1	1	10	2
Plain gray	163	66	929	34	69	36	144	70	127	57	246	53
Wide neckbanded	15	6	40	1	-	-	4	2	4	2	9	2
Narrow neckbanded	6	2	237	9	24	12	2	1	9	4	24	5
Neck indented corrugated	-	-	6	T	-	-	-	-	1	T	-	-
Unclassified indented corrugated	9	4	292	11	20	10	7	3	3	1	39	8
PII indented corrugated rim	-	-	1	T	-	-	-	-	-	-	-	-
CIBOLA WHITEWARE												
Unclassified BMIII-PI B/w	31	13	15	1	2	1	9	4	4	2	10	2
Red Mesa B/w	6	2	372	14	18	9	14	7	8	4	41	9
Escavada/Puerco B/w	-	-	2	T	-	-	-	-	-	-	-	-
Gallup B/w	-	-	6	T	1	1	-	-	-	-	-	-
Chaco B/w	-	-	1	T	-	-	-	-	-	-	-	-
Chaco-McElmo B/w	-	-	1	T	-	-	-	-	-	-	-	-
Unclassified PII-PIII B/w	-	-	333	12	23	12	4	2	16	7	22	5
UNCLASSIFIED WHITEWARE	2	1	482	18	33	17	16	8	50	22	52	11
UNCLASSIFIED CARBON B/W			3	T	-	-	-	-	-	-	1	T
CHUSKA WHITEWARE												
Pena B/w	-	-	-	-	-	-	-	-	-	-	1	T
Tunicha B/w	-	-	1	T	-	-	-	-	-	-	1	T
Newcomb B/w	-	-	2	T	-	-	-	-	-	-	-	-
Unclassified carbon B/w	-	-	2	T	-	-	-	-	-	-	1	T
TUSAYAN WHITEWARE												
Lino B/g	1	T	-	-	-	-	-	-	-	-	-	-
Kana'a B/w	1	T	1	T	-	-	1	T	-	-	-	-
LITTLE COLORADO WHITEWARE												
Holbrook B/w	-	-	1	T	-	-	-	-	-	-	-	-
SMUDGED WARE	2	2	3	T	2	-	-	-	-	-	-	-
SAN JUAN REDWARE												
Unclassified redware	-	-	14	1	1	-	-	-	1	T	3	1
CHUSKA REDWARE												
Sanostee B/r	1	T	3	T	-	-	-	-	-	-	1	T
TSEGI ORANGEWARE												
Unclassified orangeware	-	-	2	T	-	-	-	-	-	-	1	T
Totals	248	99	2,751	101	193	100	207	100	224	100	462	98
Time Period (A.D.)	875-925		950-1000		950-1000		875-925		875-925		875-925	
Volume excavated (m³)	1.66		3.15		0.68		3.14		1.50		1.54	
Density (sherds/m³)	149		873		284		66		149		300	

Table 6.6. *(continued)*

	Grid 64		Grid 65				Grid 70				Grid 71			
	Lev. 1-3		Lev. 1-3		Lev. 4-7		Lev. 1-3		Lev. 4-6		Lev. 1-2		Lev. 3-5	
Ceramic Type	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
CIBOLA/CHUSKA CULINARY														
Lino Gray	4	1	8	1	43	5	2	T	5	1	3	1	8	8
Plain gray	163	55	451	44	484	59	247	25	162	45	159	45	63	63
Wide neckbanded	14	5	18	2	48	6	38	4	28	8	2	1	4	4
Narrow neckbanded	10	3	43	4	23	3	67	7	7	2	19	5	2	2
Neck indented corrugated	1	T	2	T	1	T	2	T	-	-	-	-	-	-
Unclass. indented corrugated	6	2	73	7	42	5	33	3	13	4	8	2	2	2
PII indented corrugated rim	1	T	1	T	-	-	3	T	-	-	-	-	-	-
CIBOLA WHITEWARE														
Unclassified BMIII-PI B/w	10	3	20	2	26	3	23	2	14	4	14	4	6	6
Red Mesa B/w	21	7	154	15	50	6	156	16	44	12	33	9	-	-
Escavada/Puerco B/w	-	-	-	-	-	-	3	T	-	-	-	-	2	2
Unclassified PII-PIII B/w	20	7	72	7	34	4	163	16	26	7	41	12	5	5
UNCLASSIFIED WHITEWARE	42	14	157	15	62	8	235	24	51	14	62	18	7	7
UNCLASSIFIED CARBON B/W	-	-	3	T	-	-	-	-	-	-	-	-	-	-
CHUSKA WHITEWARE														
Theodore B/w	-	-	-	-	-	-	1	T	-	-	-	-	-	-
Pena B/w	2	1	-	-	-	-	5	1	-	-	-	-	-	-
Tunicha B/w	-	-	1	T	-	-	4	T	-	-	-	-	-	-
Newcomb B/w	-	-	-	-	-	-	1	T	-	-	-	-	-	-
Unclassified carbon B/w	1	T	3	T	1	T	-	-	-	-	-	-	-	-
TUSAYAN WHITEWARE														
Lino B/g	-	-	-	-	1	T	2	T	-	-	1	T	-	-
Kana'a B/w	-	-	1	T	1	T	2	T	-	-	-	-	-	-
Black Mesa/Sosi B/w	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MESA VERDE WHITEWARE														
McElmo B/w	-	-	-	-	-	-	1	T	-	-	-	-	-	-
SMUDGED WARE	-	-	-	-	-	-	2	T	2	1	-	-	-	-
SAN JUAN REDWARE														
Unclassified redware	1	T	11	1	7	1	4	T	5	1	6	2	-	-
Bluff B/r	-	-	-	-	-	-	2	T	2	1	-	-	-	-
CHUSKA REDWARE														
Sanostee B/r	1	T	6	1	2	T	2	T	1	T	6	2	1	1
TSEGI ORANGEWARE														
Unclassified orangeware	-	-	2	T	-	-	1	T	-	-	-	-	-	-
Totals	297	98	1,026	99	825	100	999	98	360	100	354	100	100	100
Time period (A.D.)	875-950		925-975		875-975		925-975		875-950		875-950		875-925	
Volume excavated (m^3)	1.87		2.55		2.40		3.00		1.60		1.20		1.07	
Density (sherds/m^3)	210		405		344		333		225		295		93	

Table 6.6. (continued)

Ceramic Type	Grid 76 Lev. 1-2 No.	%	Grid 76 Lev. 3-5 No.	%	Grid 82 Layer 1 No.	%	Grid 82 Layer 2 No.	%	Grid 87 No.	%
CIBOLA/CHUSKAO CULINARY										
Lino Gray	3	T	5	1	3	T	2	T	-	-
Plain gray	535	39	250	52	483	36	118	46	21	23
Wide neckbanded	68	5	15	3	47	3	12	5	1	1
Narrow neckbanded	74	5	27	6	159	12	10	4	11	12
Neck indented corrugated	3	T	4	1	10	1	-	-	-	-
Unclassified indented corrugated	128	9	19	4	94	7	2	1	19	21
PII indented corrugated rim	3	T	-	-	3	T	-	-	-	-
CIBOLA WHITEWARE										
Unclassified BMIII-PI B/w	14	1	16	3	11	1	9	4	-	-
Red Mesa B/w	227	16	56	12	212	16	46	18	12	13
Escavada/Puerco B/w	-	-	1	T	-	-	-	-	-	-
Gallup B/w	-	-	-	-	4	T	-	-	-	-
Chaco B/w	-	-	-	-	-	-	-	-	-	-
Unclassified PII-PIII B/w	101	7	19	4	107	8	10	4	9	10
UNCLASSIFIED WHITEWARE	205	15	66	14	191	14	30	12	17	19
UNCLASSIFIED CARBON B/W	-	-	-	-	1	T	-	-	-	-
CHUSKA WHITEWARE										
Pena B/w	1	T	-	-	2	T	-	-	-	-
Tunicha B/w	1	T	2	T	4	T	1	T	-	-
Newcomb B/w	-	-	-	-	-	-	2	1	-	-
Unclassified carbon B/w	4	T	-	-	4	T	1	T	-	-
TUSAYAN WHITEWARE										
Lino B/g	-	-	1	T	1	T	1	T	-	-
Kana'a B/w	-	-	-	-	-	-	2	1	-	-
MESA VERDE WHITEWARE										
McElmo B/w	-	-	-	-	1	T	-	-	-	-
SMUDGED WARE	-	-	2	T	-	-	-	-	-	-
SAN JUAN REDWARE										
Unclassified redware	7	1	-	-	8	1	2	1	-	-
Bluff B/r	1	T	1	T	2	T	1	T	-	-
CHUSKA REDWARE										
Sanostee B/r	1	T	-	-	-	-	2	1	-	-
TSEGI ORANGEWARE										
Unclassified orangeware	-	-	-	-	-	-	1	T	-	-
Totals	1,376	98	484	100	1,347	99	252	98	90	99

	Grid 76 Lev. 1-2	Grid 76 Lev. 3-5	Grid 82 Layer 1	Grid 82 Layer 2	Grid 87
Time period (A.D.)	975-1025	925-975	925-1025	925-975	975-1025
Volume excavated (m^3)	2.47	2.31	3.45	3.00	0.20
Density (sherds/m^3)	557	210	390	84	450

Table 6.6. (continued)

Ceramic Type	Grid 88 Level 1 No.	Grid 88 Level 1 %	Grid 88 Level 2 No.	Grid 88 Level 2 %	Grid 94 No.	Grid 94 %
CIBOLA/CHUSKA CULINARY						
Lino Gray	3	T	3	1	-	-
Plain gray	519	29	97	36	12	13
Wide neckbanded	65	4	17	6	-	-
Narrow neckbanded	212	12	15	6	8	9
Neck indented corrugated	5	T	-	-	-	-
Unclassified indented corrugated	170	9	15	6	9	10
PII indented corrugated rim	5	T	-	-	-	-
CIBOLA WHITEWARE						
Unclassified BMIII-PI B/w	7	T	6	2	3	3
Red Mesa B/w	287	16	46	17	19	21
Escavada/Puerco B/w	-	-	-	-	-	-
Gallup B/w	8	T	-	-	1	1
Chaco B/w	2	T	-	-	2	2
Unclassified PII-PIII B/w	160	9	18	7	19	21
UNCLASSIFIED WHITEWARE	340	19	37	14	14	16
UNCLASSIFIED CARBON B/W	1	T	-	-	2	2
CHUSKA WHITEWARE						
Pena B/w	-	-	1	T	-	-
Tunicha B/w	1	T	2	1	-	-
Newcomb B/w	3	T	2	1	-	-
Unclassified carbon B/w	4	T	1	T	-	-
TUSAYAN WHITEWARE						
Lino B/g	-	-	1	T	-	-
Kana'a B/w	1	T	2	T	-	-
MESA VERDE WHITEWARE						
McElmo B/w	-	-	-	-	-	-
SMUDGED WARE	3	T	-	-	-	-
SAN JUAN REDWARE						
Unclassified redware	12	1	1	T	-	-
Bluff B/r	4	T	1	T	-	-
CHUSKA REDWARE						
Sanostee B/r	-	-	2	1	-	-
TSEGI ORANGEWARE						
Unclassified orangeware	-	-	1	T	-	-
Totals	1,812	99	268	99	89	98
Time period (A.D.)	975-1025		925-975		975-1050	
Volume excavated (m³)	5.40		3.87		1.32	
Density (sherds/m³)	336		69		67	

[a] T = trace (less than 0.5%).
[b] Surface includes the loose top soil from the entire midden grids.

Table 6.7. Ceramic frequencies from grids east of the Trash Midden.[a]

Ceramic Type	Grid 97		Grid 98		Grid 103		Grid 104	
	No.	%	No.	%	No.	%	No.	%
CIBOLA/CHUSKA CULINARY								
Lino Gray	-	-	-	-	-	-	1	T
Plain gray	6	33	46	19	15	20	111	27
Wide neckbanded	-	-	4	2	3	4	7	2
Narrow neckbanded	2	11	26	11	6	8	41	10
Neck indented corrugated	-	-	-	-	-	-	1	T
Unclassified indented corrugated	2	11	42	17	7	9	58	14
PII indented corrugated rim	-	-	2	1	-	-	-	-
CIBOLA WHITEWARE								
Unclassified BMIII-PI B/w	-	-	-	-	1	1	2	T
Red Mesa B/w	3	17	44	18	23	30	59	14
Gallup B/w	-	-	-	-	-	-	2	T
Chaco B/w	-	-	1	T	-	-	5	1
Chaco-McElmo B/w	-	-	-	-	-	-	-	-
Unclassified PII-PIII B/w	3	17	23	9	7	9	46	11
UNCLASSIFIED WHITEWARE	2	11	50	20	14	18	79	19
CHUSKA WHITEWARE								
Theodore B/g	-	-	1	T	-	-	-	-
Pena B/w	-	-	1	T	-	-	-	-
Newcomb B/w	-	-	-	-	-	-	1	T
Chuska B/w	-	-	-	-	-	-	1	T
Unclassified carbon B/w	-	-	2	1	-	-	-	-
TUSAYAN WHITEWARE								
Lino B/g	-	-	-	-	-	-	1	T
MESA VERDE WHITEWARE								
McElmo B/w	-	-	1	T	-	-	1	T
SMUDGED WARE	-	-	-	-	-	-	1	T
SAN JUAN REDWARE								
Unclassified redware	-	-	1	T	-	-	1	T
CHUSKA REDWARE								
Sanostee B/r	-	-	1	T	-	-	-	-
WHITE MOUNTAIN REDWARE								
Puerco B/r	-	-	1	T	-	-	-	-
Totals	18	100	246	98	76	99	418	98
Time period (A.D.)	?		975-1025		975-1025		975-1050	
Volume excavated (m³)	?		0.48		?		1.89	
Density (sherds/m³)	?		513		?		221	

[a] T = trace (less than 0.5%).

primarily by alluviation. Deposits east of Grid 76, however, probably were redeposited mainly by alluviation after site abandonment.

Material Culture

Material collected from surface grids prior to excavation revealed high frequencies of artifacts, particularly ceramics. Sherds on the surface are exceedingly small, reflecting numerically higher frequencies for disproportionate lower volumes or weights than encountered for material below the surface. The density of artifactual stone should remain relatively constant from the surface to the fill below if foot traffic resulted in the higher frequencies of surface sherds (Nielsen 1991).

Over half of the site faunal remains were recovered from the Trash Midden, which yielded about 1,540 bones (Gillespie, this report). On the other hand, bone was practically absent from the surface, undoubtedly due to its more fragile nature and the effects of weathering. Additionally, ground water probably accounts for the poor bone preservation in the lower deposits. Of identified species, cottontail and jackrabbit bones were most common (481 elements), followed by prairie dog (78 elements), domestic dog (56 elements) and pocket gopher (39 elements). None of the latter bones were burned; therefore, gopher activity was probably primarily postoccupational. Domestic dog elements were also unburned, although 11 of the 24 coyote bones were charred. Otherwise, midden bones were primarily unburned. Few artiodactyl and bird remains were found in the midden, and the majority of the latter 43 bones were turkey (13) and hawk (10). Scattered human remains were also common in the trash, along with the recovery of two burials (Plate 6.10) (Volume II, Chapter 8).

Approximately 3,000 pieces of chipped stone came from the midden (Cameron, this report). Silicified wood of the 1112 variety was dominant throughout, comprising between 25 and 40 percent of all material. This material probably derived primarily from the production of small drills used in perforating beads and from hammerstone debris during the sharpening process of manos and metates. Both drills and hammerstones were commonly made of this material, although none of the many site projectile points were made of the 1112 variety (Cameron, this report; Lekson, this report). The white chalcedonic, silicified wood (1140 series) was also common (20-30 percent), except in the early trash deposits where it was rare. The 1140 series was associated with turquoise jewelry production at the site and most of the small drills for perforating beads were made of it. Only a few projectile points and hammerstones were made of the 1140 variety. Finally, the distinct, clear, chalcedonic stone with black inclusions (material 1053) comprised the third highest totals in the midden--about 5-10 percent. There was a paucity of obsidians and quartzites, but a number of projectile points and point fragments (10; 29 percent of the site total) were mostly obsidian. Hammerstones were present in the midden, but not to the extent found elsewhere on the site (9 percent of 297 site specimens)--these were made mostly of quartzite and 1112 silicified wood.

Unworked fragments of selenite were widespread, along with occasional ground pieces of hematite and limonite that were probably used for red and yellow paint, respectively. These minerals can be found associated with the nearby Menefee formation, and the majority may have been natural intrusives. Nevertheless, a small quantity of burned selenite recovered from Pithouse 2 may have been used for polishing turquoise. Thus, selenite could have been gathered for jewelry production at the site. A number of turquoise bits were recovered, but their frequency cannot be determined because of the lack of fine-screening. The only two whole turquoise beads from the site came from north of the midden on the edge of the modern gully and in the midden.

Ground stones were rarely found in the Trash Midden, probably because of their value for reuse as construction materials. Only 4 percent of the 177 site manos and mano fragments and none of the 114 site metate fragments came from the midden. Midden abraders comprised 6 percent of the 247 recovered from the site.

Flotation and pollen samples were collected from the two layers defined in the south face of the main east-west trench of Grids 70, 76, 82, 88, and 94. Several pinches along the face were obtained for each sample. To help determine the degree of contamination of the deposits, samples were also taken from rodent tunnels and ant nests. Because pollen results from the midden at 29SJ 627 were unproductive, none were analyzed at 29SJ 629. Six

Plate 6.10. *Burial 1, an adult male recovered from Trash Midden Grid 76. 30-cm north arrow (NPS 11972).*

flotation samples yielded low to moderate numbers of seeds, mostly unburned annual weedy species. Many of the unburned seeds of stickweed, spurge, and pigweed, however, were probably introduced by rodents (M. Toll, this report). Burned corncob fragments were common throughout the midden.

Midden Conclusions

The primary location for discarding refuse during most of the site occupation was in a former arroyo channel east of the roomblock. Although trash is broadcast over a much wider area than just in the channel, this scatter appears to represent shallow deposits of sheet and primary trash resting on bedrock. Immediately outside the channel, fill is a scant 15-20 cm deep, except in deeper pockets of the bedrock. Sherds are common in this thin mantle of trash but there is a paucity of other cultural material. Athough other areas within the site served as receptacles for trash, notably Pithouse 3, the ceramic assemblage in the arroyo is the earliest for the site with one major exception.

Test Trench 99 (discussed below), along the north side of Rooms 1-3 and next to a section of the same channel used for most of the site trash, yielded particularly early ceramics common in the late ninth century/early tenth century (Table 6.6). It is probably not fortuitous that pieces from seven different vessels were found in both TT 99 and the main Trash Midden tying these two areas temporally together. Nevertheless, the later ceramic assemblages common within the houseblock and pitstructures were noticeably absent from the channel refuse. This absence indicates that by the early A.D. 1000s, there was a shift in deposition away from the earlier midden outside the working areas of the site.

There is some question as to whether there was a hiatus of dumping between the deposits in the channel bottom and those above (see the profile of Grids 64 and 65 in Figure 6.14). The implications of this to events elsewhere on the site, especially in Pithouse 2 and in the plaza, are obvious regarding episodic use of the site but, unfortunately, mixing of the trash deposits makes any conclusions tenuous, at best. There were no clear episodes of single dump deposits, unlike the less disturbed Trash Mound at Pueblo Alto (Windes 1987a). For the most part, however, there is no indication of a stratigraphic separation between the two defined layers in the 29SJ 629 midden, although there is a subtle change in ceramic time between the upper and lower deposits (Chapter 8 and Tables 8.7-8.9).

Temporal Assignment of Midden Deposits

Estimating the time of deposition of the midden trash must rely totally on ceramics (Table 6.6) that have been cross-dated elsewhere. Briefly, the earliest ceramics (late Pueblo I) cluster in the western grids of the midden. Of these, decorated sherds make up a consistent 2-6 percent of the grid total west of Grid 76 (Tables 8.7-8.8). In Test Trench 99 they comprise 13 percent of the total, highest at the site, suggesting its very early origins. Plain gray sherds from Lino Gray and neck-coiled vessels were at their highest frequencies in the western midden grids, comprising around 50 percent of the total sherds, but 70 percent in TT 99. The dominant ceramic type in the midden was Red Mesa Black-on-white with traces of Gallup, Escavada, and Puerco Black-on-whites, represented in a few grids at or near the site surface. The earliest ceramic assemblage, from TT 99, is best dated between A.D. 875 and 925 for the initial deposition, with continued use of the channel throughout the A.D. 900s and perhaps into the very early A.D. 1000s (Tables 8.7-8.9).

Miscellaneous Tests

Several tests were conducted about the site which are not well-covered elsewhere in the text (Figure 4.1). The large swath cleared by the road grader to the east and south of the site and the grid tests east of the Trash Midden (Grids 97-98, 103, and 104) are discussed under the notes on the midden. Temporally, the cultural material appears similar to that in the nearby midden (Table 6.7). Several other trenches were dug to check for additional pitstructures and other cultural evidence, but they revealed only sterile deposits.

Forty centimeters of fill were removed from the entire area of Grid 25 after the grader had passed, and a 150 cm deep backhoe trench placed north-south across Grid 31 revealed only sterile sand. Another backhoe trench 100 cm deep was placed along the western boundaries of Grids 4 and 5 and a third extended east 9.5 m from the wall of Pithouse 2 along the north boundary of Grids 33, 39, 45, and 51. Only sand was found in the second trench while the third reached natural beds of shale and sandstone (Menefee Formation), just over a meter deep. A fourth trench 2.5 m deep ran east-west 3.6 m, from Room 6 to within 2 m of the Kiva. This grazed the northern side of Plaza OP 1 but was completely sterile below the level defined as the plaza surface in Grid 15. Bedrock was reached at the bottom about 3 m below the surface. Other backhoe trenches a meter or more in depth hit sterile deposits at the outside juncture of Rooms 8 and 9.

Clearing about 20 cm of sandy fill from behind Room 8 in Grid 2 and around "Room 4" revealed small amounts of cultural material. The sherds recovered were early and similar to those in the lower deposits of the Trash Midden and in TT 99. To check for ramada supports, further stripping was done in Grids 2-4 behind the rooms, but there were none. The few artifacts found behind or west of Rooms 5-8 probably came from wall or roof deterioration and not from specific activities behind the rooms. A hand-dug trench was placed against the outside west wall of Room 5 in the northern one-third of Grid 10. It was carried down to slightly over a meter to reveal mostly sterile fill, with a few charcoal flecks and a little rubble in the uppermost 20 cm of fill.

Test Trench 99

Finally, two backhoe trenches were extended north from Rooms 1 and 3, nearly to the present arroyo gully (Figure 4.1). These were dug to locate and examine an earlier gully that connected to the one found under the Trash Midden. Material from the eastern test, plus the superimposition of the Rooms 1 and 2 walls over cultural debris, forced further examination of the area for early deposits and ramada remains. As a result, Test Trench 99, 125 cm wide and 15-20 cm deep, was placed directly north of Rooms 1 and 2 and yielded a bonanza of early cultural material, primarily ceramics.

Several vessel fragments from TT 99 matched companions in the Trash Midden, although there were no matches with ceramics from the adjacent rooms. A thin (1-4 cm) layer of ash and burned vegetal material was uncovered about 15 cm below the surface at a depth similar to the burned deposits in Room 2 and those sealed under the walls of Room 1. This layer spread beyond the northern confines of the test trench and was also present to a lesser degree south of Room 2 in Grid 29 around Plaza Bin 1 and Firepit 5. The layer around Room 1 apparently was alluviated from concentrations upslope. Alluvium north and south of Room 2, associated with the ash, was extensively fire-reddened. Perhaps the burning created the heating pits (FP 3 and 4) under the walls of Rooms 1 and 2.

At the west end of TT 99, where it extended slightly behind Room 3, the fill was notably sterile except for a few sherds, perhaps from wall chinking. These sherds were lumped with the other TT 99 material (Table 6.5), but McKenna observed that the late Red Mesa Black-on-white and unidentified Pueblo II-III sherds came solely from behind Room 3. Without these sherds, the assemblage appears to date to about A.D. 900. Both backhoe trenches failed to yield artifacts north of TT 99, although ash continued north to the second buried gully north of Room 1. Eventually, three buried gullies were found between Room 1 and the present gully, but all were filled with sterile alluvium overlain by ash. It appeared that the three gullies joined as one just beyond Room 1 and became the channel found under the Trash Midden. Wall and roof material was absent in all the trenches north of Rooms 1-3.

Despite the disparity between ceramic types from the burned material in Room 2 and in TT 99, the ash and charcoal seemingly derive from a single source. It was nearly continuous from north of Room 2 to the south of the room. Obviously, a fire in close proximity oxidized the fill on both sides of the room. No supports for a ramada were found. McKenna thought that a thin layer of alluvium was sandwiched between the Room 2 wall foundations and the burned layer, suggesting that the room construction came after the burning. Likewise, the even distribution of burned material downslope suggested the absence of Room 1 during this period of alluviation. Architecture and ceramics, as well as the burned material plastered behind the walls, obviously indicate that Room 1 was constructed later. Evidence within Room 2, however, demonstrates the presence of Room 2 when a fire burned much of the cultural material within it. Thus, no satisfactory conclusion can be reached regarding the burned material inside and around Room 2.

Chapter Summary

Two areas of the site revealed intensive use of outdoor space: the Plaza and the Trash Midden. In-depth summaries and conclusions are covered above at the end of the sections on the Plaza and Trash Midden. To briefly reiterate, most of the outdoor space between the rooms and pitstructures revealed that the north-south strip in front of Rooms 5-7, the earliest at the site, was the primary loci of outdoor activities. These activities were shaded by a ramada that indicates construction for warm-weather use and seasonal occupancy. Aside from the ramada postholes, most of the plaza features (firepits and Other Pits) clustered in front of Room 7. A string of large, bell-shaped storage pits were shaded by the ramada. The contents of these, the plaza features, and plaza cultural material indicate that food processing and storage (particularly of corn), and turquoise bead and pendant production were important outdoor activities in the late A.D. 900s/early A.D. 1000s.

Materials recovered from the Trash Midden, located to the east of the site, partly support the plaza findings of the importance of turquoise jewelry production and corn use at the site. In addition, household refuse consisting of animal food remains and broken small-game hunting weapons (projectile points) broaden the knowledge of the site's activities. Although it is not clear, episodic deposition of refuse may have occurred. Midden deposits, however, reflect only the early part of the site occupation. Later refuse was deposited within Pithouse 3 or thinly scattered across the plaza areas.

The earliest ceramics, recovered from the midden and TT 99, suggest long use of 29SJ 629, although, perhaps, intermittently from the late A.D. 800s or early A.D. 900s. There is little indication of prolonged use of the plaza or its associated rooms, although some remodeling is apparent. The discrepancy in the data reflecting occupancy duration is not easily rectified. Room or outdoor pits containing early ceramics would be expected for a site that saw last use in the early A.D. 1100s. Either the ceramics did not derive during the occupancy of the architectural remains at the site or the ceramics are temporally misclassified. Judging from the occupational history of Marcia's Rincon, however, a third alternative is possible, that is, Pithouse 2 represents part of the latest occupation of nearby 29SJ 628 (a late Basketmaker III-early Pueblo I village) before surface architecture was constructed. A site contemporary with the Spadefoot Toad site, 29SJ 627 (Truell 1992), on the opposite side of 29SJ 628, yielded early pithouses that formed the nucleus of the A.D. 900s and 1000s construction. A similar development is plausible at 29SJ 629, the Spadefoot Toad Site.

7

FORM, DISTRIBUTION, AND FUNCTION OF FEATURES

The nonportable manifestations of human behavior, the site features or furniture (Binford 1977), are examined here as relevant to understanding human behavior and cultural processes at the site. Floor features surpass other cultural materials in the possibility of reconstructing potential spatial and functional strategies, the size of the occupation group, etc., because they usually avoid problems of displacement and removal without trace. Even roof features can often partially survive architectural collapse (e.g., Ciolek-Torrello 1978:155), although those in room walls invariably disappear.

Portable remains can assist in the identity of room function, although few materials were actually found on the site floors, and even with these, primarily from living areas, it is difficult to distinguish them with great certainty from floor-related use versus collapsed roofs or trash deposits. Because they are non-portable, features are far more reliable indicators of the room use when present.

Approximately 161 features were recorded at the Spadefoot Toad Site (29SJ 629). These were man-made pits, cavities, or boxes in the floors and walls of structures and outdoor areas (Figure 7.1), not the large architectural structures such as rooms or pitstructures. Burns on floors and walls, which were formally recognized as the remains of intentional human behavior at Pueblo Alto (Windes 1987a:292-293) and in the Bis sa'ani Community (Dykeman 1982:851), were not systematically recorded in the small site excavations, although they were often common.

It is difficult to assess the prolific number of features recorded at 29SJ 629 with most other sites excavated in Chaco Canyon. For most excavations, little effort was expended on recognizing and reporting features unless they were of substantial size or construction (e.g., of stone or adobe). This was particularly true in greathouse excavations where the disparity between rooms excavated during the Chaco Project and earlier was enormous (Windes 1987a:Table 9.1). This disparity also seems to include small-house excavations in Chaco Canyon, although the differences are more variable and difficult to ascertain (Tables 7.1-7.2). Typically, thermal features (firepits, adobe-lined heating pits, ovens, etc.), large storage pits, mealing bins, and occasionally postholes were the grist for pre-1970 small-house excavation notes.

The causes for the variable reporting of features in Chacoan small-house excavations are many. Some differences may be attributed to varying site functions, changes in activities over time, and the length of occupation, but the excavation strategies also have clearly affected results. The masses of features often found in outdoor areas were seldom reported, except for slab-lined features, because excavations were often restricted to space enclosed by architecture. Often excavations also failed to penetrate below the uppermost floors, thus avoiding the earlier, often prolific, occupations.

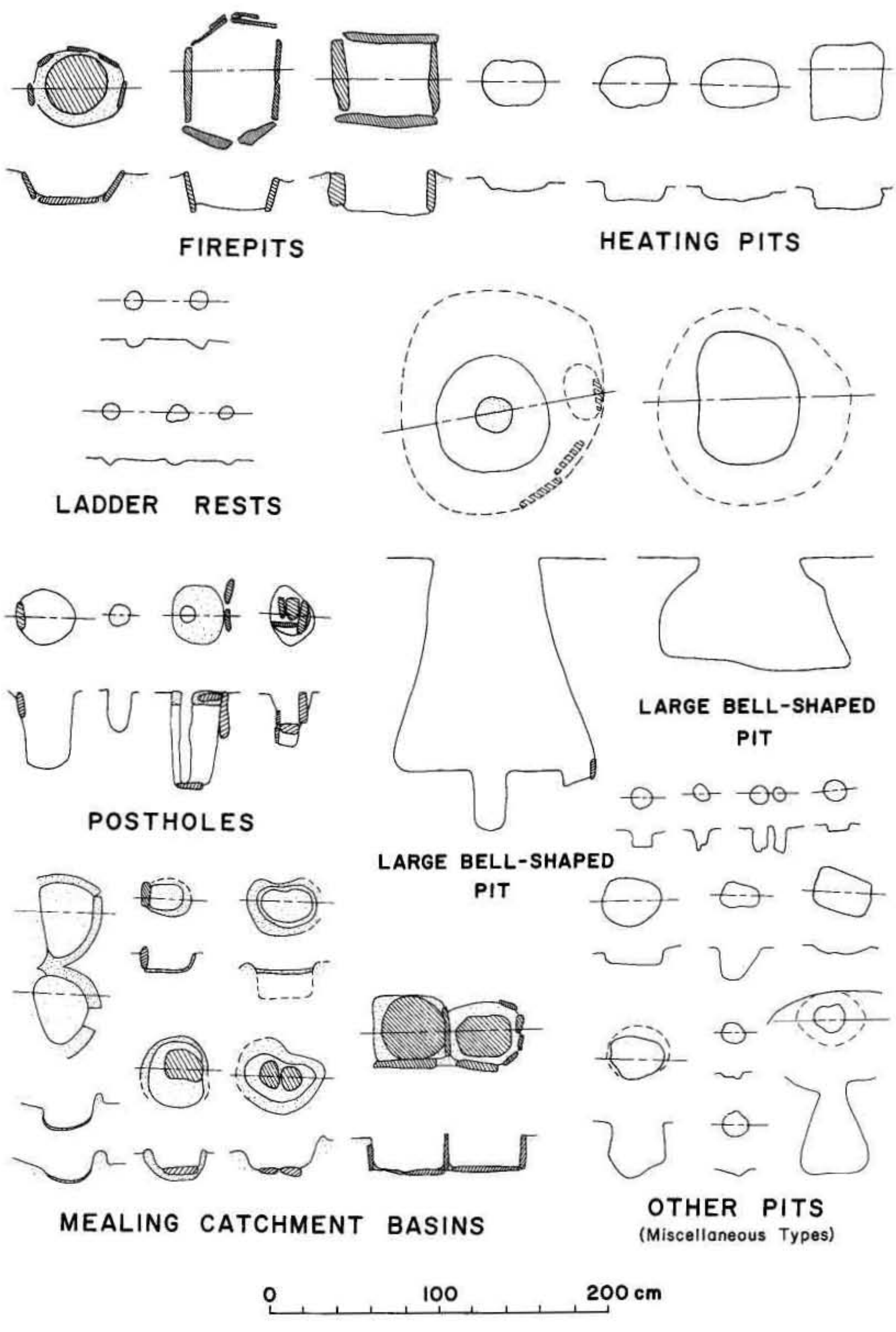

Figure 7.1. *Examples of common features at 29SJ 629. Many of these were field classified as Other Pits (NPS 310/82802 A).*

Table 7.1. Floor features and wall niches recorded for selected small-house sites and greathouses in Chaco Canyon.[a]

Site	Excavation Period	No of Rms. Exc.	Floor Features: Fire-pits	Heat. Pits	Fl. Burns	Deflec-tors	Other Pits	Post-holes	Stor. Bins	Meal. Bins	Fl. Vents	Wall Niches	Floor Totals	Floor Feat. Per Rm.	Floor Feat. Per Fl.
Greathouses:															
Pueblo Alto	1976-1979	15	7	126	55	0	195	141	2	12	0	60	483	32.2	8.8
Una Vida[b]	1960	15	1	1	0	1	2	6	2	0	2	4	15	1.0	1.0
Una Vida[c]	1978-1979	8	6	11	23	1	17	21	3	0	9	9	91	11.4	6.5

Site	Excavation Period	No. of Str. Exc.	Site Features: Fire-pits	Heat. Pits	Fl. Burns	Deflec-tors	Other Pits	Post-holes	Large Stor. Bins	M.Bins or Basins	Misc. Feat.[d]	Wall Niches	Site Totals	Floor Feat. Per Str.	Floor Feat. Per Fl.
Small Houses:															
29SJ 625 (3-C)	1930, 1949	10	4	6	?	2	9	2	6	0	0	3	32	3.2	3.2
29SJ 626 East	1982-1983	9	9	2	+	1	12	2	0	0	0	4	30	3.3	3.0
29SJ 627	1974-1975	25	22	37	?	1	65	62	16	17	3	0	223	8.9	4.1
29SJ 629	1975-1976	12	13	12	?	3	63	41	10	6	3	4	155	12.9	9.7
29SJ 1360	1973	16	8	12	+	1	15	60	10	5	6	1	118	7.4	5.4
Bc 26 (Leyit Kin)	1934, 1936	17	10	2?	7+	1	6	7	3	4	0	1	41	2.4	0.8
Bc 54	1940-1941	28	7	0?	2	0	0	0	0	0	2	1	12	0.4	0.3
Bc 192 (Lizard House)	1960	20	3	5	+	0	0	0	0	3+	0	6	17+	0.9	0.9
Bc 236	1958	12	21	6	+	0	2	13	4	6[e]	0	4	50	4.2	2.5
Bc 362	1962	20	18	1	6	0	16[f]	29	1	17	0	0	88	2.4	1.9

[a] May include some features associated with plaza surfaces under rooms.
[b] Adjusted from Windes (1987a:Table 9.1). Does not include two steps.
[c] Rooms recleared by the Chaco Center in 1978-1979. Frequencies include those recorded in 1960 that were not destroyed by weathering.
[d] Miscellaneous features include steps.
[e] Includes three metates set in the floor and one in a bin.
[f] Includes two slab-lined cists and four corrugated jars set in floors for storage.

Table 7.2. *Floor features and wall niches recorded by room type for excavated Pueblo II small-house sites in Fajada Gap, Chaco Canyon.*[a]

			Floor Features												
Site	Period of Occupation	No. of Str. Exc.	Fire-pits	Heat. Pits	Fl. Burns	Deflec-tors	Other Pits	Post-holes	Large Stor. Pits/ Bins	Meal. Basins	Misc. Feat.	Wall Niches	Floor Total	Floor Feat. Per Str.	Floor Feat. Per Fl.
29SJ 625 (3-C)	925-1050	10	4	6	?	2	9	2	6	0	0	3	29	3.2	3.2
Storage rooms		4	0	2		0	2	0	0	0	0	0	4	1.0	1.0
Living rooms		2?	0	4		0	5	0	1	0	0	0	10	5.0	5.0
Pitstructures		2	2	0		2	2+	2	5	0	0	3	13	6.5	6.5
Extramural areas		-	2	0		0	0	0	0	0	0	0	2	-	2.0
29SJ 626 East	975-1050	9	9	2	+	1	12	2	0	0	0	4	26	3.3	3.0
Storage rooms		4	0	0	+	0	0	0	0	0	0	0	0	0.0	0.0
Living rooms		2	1	0	+	0	3	0	0	0	0	0	4	2.0	2.0
Pitstructures		3	3	2		1	9	2	0	0	0	4	17	5.7	4.3
Extramural areas		-	5	0		0	0	0	0	0	0	0	5	-	5.0
29SJ 627[c]	775-1140	25	22	37	?	1	65	62	16	17	3	0	223	8.9	4.1
Storage rooms		8	0	2		0	3	14	2	0	1	0	22	2.8	1.0
Living/Ramada rm		8	13	20		0	21	37	8	6	2	0	107	13.4	5.6
Special rooms		4	0	1		0	5	0	2	9	0	0	17	4.3	2.1
Pitstructures		5	6	10		1	36	8	1	1	0	0	63	12.6	12.6
Extramural areas		-	3	4		0	0	3	3	1	0	0	14	-	14.0
29SJ 629	875-1140	12	13	12	?	3	63	41	10	6	3	4	155	12.9	9.7
Storage rooms		7	1	0		0	0	2	0	0	1	0	4	0.6	0.6
Living rooms		2	3	4		0	0	8	4	2	1	0	22	11.0	5.5
Pitstructures		3	3	6		3	49	7	0	2	1	4	75	25.0	15.0
Extramural areas		-	5	2		0	14	24	6	2	0	0	43	-	43.0
29SJ 1360	900-1030	16	8	12	+	1	15	60	10	5	6	1	118	7.4	5.4
Storage rooms		10	0	0		0	1	2	3	0	1	0	7	0.7	0.6
Living rooms		2	2	0		0	2	5	1	0	0	0	10	5.0	3.3
Special rooms		2	2	5		0	1	8	1	0	0	0	17	8.5	4.3
Pitstructures		2	3	1		1	11	10	2	0	0	1	29	14.5	14.5
Extramural areas		-	1	6		0	0	45	3	5	5	0	65	-	65.0

[a] May include some features associated with plaza surfaces under rooms.
[b] Miscellaneous features includes steps.
[c] Only approximate numbers could be divided between living, storage, and special rooms.

Inexperienced laborers and archeologists are also accountable for the paucity of recorded features in many sites, a problem that may have plagued early Chaco Project work, despite some very skilled personnel. By 1976, accrued experience by a well seasoned staff and a greatly reduced laborer-to archeologist ratio undoubtedly benefited feature recognition and recording in general. If this is true, the profession may wonder about the results of research that relies on a high laborer-low archeologist ratio. Nevertheless, experience and careful note-taking does not guarantee numerous features at small-house sites, as our work at 29SJ 626 East in 1983 and other excavations have demonstrated (Table 7.2). Some sites simply do not exhibit extensive architectural use, although it is difficult to separate these out from those hampered by poor field recording.

Feature Recording

After the entire floor or excavation surface was cleared, the field staff excavated the floor features, collected the appropriate samples (pollen and flotation), and mapped and bagged the floor artifacts. Policy later dictated that pre-excavation photos be taken of every feature, but this procedure was not in effect nor systematic during the 29SJ 629 excavations. Standard procedure for feature excavation was to remove half the fill, profile it, determine the stratigraphy, and then collect pollen and flotation samples from the remaining natural units of fill. The feature fill was removed by natural units when possible. Small or very deep, narrow features could not be handled in this fashion, and the excavator was forced to record natural units and collect samples as fill was removed. Only a "conservation" sample or a combined pollen/flotation sample of fill (from which pollen and flotation could later be pulled) was collected from small-volume features.

All features were mapped. Standardized feature forms were introduced for the first time at the site during the Chaco Project in 1976. Plan views and profiles for most features were drawn to scale and a field form was completed. As a rule, at least one or two profiles perpendicular to one another were drawn for each pit. Volumes were computed by measuring the plan view and profile areas with a digital planimeter and then computing a mean depth. Mathematically, V (volume) = A_1 (area of plan view) times D (mean depth). D is calculated by dividing the profile area (A_2) by the mouth width (W), or $D = A_2/W$. The mean depth was calculated for each profile and then averaged. This assumes, of course, that features are symmetrical and that the profiles are representative of that symmetry. For the most part that assumption was true, and the calculated volumes should be relatively correct, particularly for comparative purposes.

Definitions and Abbreviations

The definitions and abbreviations for features and use surfaces recorded at the site are listed in Table 7.3. Some "features" listed were designated solely for coding purposes and were not analyzed as features because of low frequency or because they were natural (i.e., rodent holes). Others were simply unsuitable for detailed description and analyses (e.g., steps, wall stubs, floors, surfaces, test pits, wall clearing trenches, etc.). In general, feature categories defined at Pueblo Alto (Windes 1987a:271-335) were also used at 29SJ 629. The number and variety of features at Pueblo Alto was not duplicated at 29SJ 629 because there were fewer features at 29SJ 629 (161 versus 750). The computer coding for these features was standardized and conforms to the Pueblo Alto analyses to enhance comparability. Some detail has been omitted from the 29SJ 629 features simply because it was not readily available for this report.

Goals

Both metric and categorical data were recorded for each feature, which permitted completion of some of the goals for the feature analyses. These goals were:

1) to provide basic metric data and descriptions for each feature and each feature class;

2) to examine the use of features and feature classes through time and space;

3) to verify the field classifications of the feature categories;

Table 7.3. Definitions for features and use surfaces at 29SJ 629.[a]

Feature Abbrev.	Feature Category	Definition
--	Beam Socket*	A small, lined, wall cavity in Pithouse 2 just above the floor that contained a short pole. Not a roof support.
B	Burn*	An oxidation spot on the floor or wall caused by an intentional localized fire, probably at or after abandonment. None were caused by architectural (i.e., roof) fires. These have no fill contents, and the materials causing the burn were often dispersed nearby.
--	Deflector*	A wall constructed of mud, stone, or wood to shield the firepit from the ventilator draft and to circulate air around the chamber, typically in a pitstructure. Often only a narrow slot in the floor remains of the feature.
Fl	Floor*	A prepared surface of adobe or plaster. This definition was not rigidly adhered to and generally applied to prepared and unprepared surfaces within architectural enclosures (i.e., rooms and pitstructures). In contrast, such areas were designated "Surfaces" when found in a plaza or in unbounded spaces. Numbered from the uppermost surface down.
FP	Firepit	An oxidized pit lined with upright slabs and mortar. Volumes usually exceed 15-20 liters. Typically exhibit extensive oxidation and a fill of ash and charcoal. These often act as trash traps or as pits for floor sweepings.
G/Gr	Grid*	A control square for recording the location of floor artifacts and floor fill particularly for collecting flotation and pollen samples.
HP	Heating Pit	Sometimes labeled a "baking pit." Defined as an oxidized, oval-shaped, floor feature with little or no preparation other than a scooped-out pit. The mouth dimensions are greater than the depth. Normally, they were unlined or lined with a thin layer of adobe and filled with sand and carbonized brush or, rarely, ash. Most appear to have been used for a very short period, perhaps just once. Most have small volumes (<20 liters) and were incapable of producing long-term heat or light.
--	Ladder Rest	A small, shallow pit (that occurred in pairs) located south of a pitstructure firepit. The position matches that for ladder seats in historic kivas.

Table 7.3. (continued)

Feature Abbrev.	Feature Category	Definition
MB	Mealing Bin	Slab- and adobe-lined rectangular boxes to enclose the metates and receptacles for catching ground material. A basin to catch ground food products is located at one end. In many sites only the catch basin is a permanent fixture and used with a mobile trough metate.
OP	Other Pit	An ubiquitous floor feature not assignable to another category. May vary greatly in size, shape, and location. Many may have been postholes and storage pits.
PH	Posthole	A cylindrical floor pit with a depth greater than the mouth diameter. Typically unlined with inset stone shims and a basal stone and filled with crushed lignite.
PS	Post Support	Not a posthole, but a small, lined box that held the end of a post. See posthole.
--	Recess	A large, fan-shaped shelf located above the ventilating system in kivas. Commonly termed the southern recess and probably served as a storage area.
rh	Rodent Hole*	Tunnels and irregularly shaped pits resulting from rodent activity. Often contrasted with surrounding fill because of infilling with material different from surrounding matrix.
--	Sipapu	A small pit often filled with clean sand and located between the pitstructure firepit and the wall opposite the ventilating system. In historic kivas, the entry to the underworld.
--	Step*	An elevated stone set in the room floor to provide egress and ingress through a door in the wall. Also a trench dug next to a storage pit to provide access.
--	Storage Bin	A masonry or adobe container of large volume presumably used for storage.
--	Storage Pit	Deep pit, often bell-shaped, with a narrow mouth and a large volume. At 29SJ 629, all were field designated as OPs.
S	Surface*	(a) Generally an unprepared utilized surface, exterior to areas bounded by masonry. Numbered from the uppermost surface down. (b) A partial replastering of a floor. Sometimes the replastered surface covered the original floor area. (c) The present top of the ground. In the latter case, the word is only spelled out in lower case (i.e., on figures). See also Floor (above).

Table 7.3. (continued)

Feature Abbrev.	Feature Category	Definition
TP	Test Pit*	A small trench, usually rectangular, to examine a horizontal area of fill or architecture. Sometimes the term is used interchangeably with Test Trench.
TT	Test Trench*	A longitudinal trench to examine the fill or architecture. Also used to designate arbitrary subdivisions of deep fill above Floor 1 during initial excavations of the rooms. Sometimes the term is used interchangeably with Test Pit.
V	Ventilator*	(a) A rectangular horizontal opening that goes through the wall. Normally these were found near the ceiling and built during initial wall construction. Their position and small size indicate that they served for room air circulation. None were found at 29SJ 629 because of wall collapse. (b) An opening that allows air to be drawn by the draft of a fire into an enclosed structure near the floor. This feature is usually comprised of two parts: a horizontal tunnel extending through the wall and connected to a vertical shaft that reached to the surface. At 29SJ 629 these were all associated with pitstructures.
WF	Wall Foundation	A mass of adobe or clay interspersed with unshaped stones that serves as the footing for masonry walls.
N	Wall Niche	A wall cavity that might have served as a repository. Like the Other Pits category, this term serves for a variety of lined and unlined pockets in shape, size, and location.

* Those with an asterisk were not analyzed.

4) to discover subclasses of features obscured by the field classifications to further refine interpretation of feature function; and

5) to compare 29SJ 629 with Pueblo Alto to evaluate the role of small-house versus greathouse use.

Problems with the Field Classification of Features

Before feature analyses and broad functional interpretations could be made, it was imperative to evaluate feature classification consistency. Many of the feature categories are not exclusive, although most can be classified into broad functional categories with considerable assurances of exclusiveness (e.g., thermal versus nonthermal, wall versus floor, etc.). Because of widely different perspectives and field experience among the staff, however, classificatory consistency can be a problem, even with field guidelines.

Features may have been misclassified for various reasons, but errors occurred primarily because the types were not mutually exclusive and because pre-excavation photo records of some features forced their premature classification. The problem of misclassification is not a large one, and some features were later reclassified. Fill contents (excluding pollen and flotation analyses) did not prove useful in segregating features regarding potential pit function except in the case of thermal features. Nearly all pits were filled with postoccupational material or sands used to cover the floors.

Features that suffered the least recognition by inexperienced personnel and during crisis excavations were postholes and the ambiguous, small volume, unlined pits that this project designated as just "pits" or, more formally, "Other Pits." Luckily, the canyon-bottom Anasazi's proclivity for seating posts in beds of crushed lignite, perhaps to ward off rotting and insect infestation of the post bottoms, made recognition easier for such features. Otherwise, pits sunk into the fine windblown sands and postoccupationally filled with a like material were difficult to identify. The number and location of small, amorphous "Other Pits" missed may be a problem, but the small-mouth, huge bell-shaped pits that can contain a vast quantity of unique and important materials also skew an understanding of site function when missed.

A second area of overlapping feature categories occurs among the thermal features. Although the distinction between them is based primarily on morphological characteristics, we are aware that there was sometimes a gradation among the large-volume, lined firepits and the small-volume, unlined heating pits. Unlined, basin-shaped, thermal features occasionally are large-volumed, making classification a difficult choice between a firepit and a heating pit. The exceptionally large example from Grids 2 and 3 at the site is unlined, but could have been a special-use firepit. From flotation analyses (M. Toll, this report) we know that the function of heating pits at the small sites was different from firepits.

After culling the uncertain features and those unsuitable for analysis, 131 features remained. Four pit categories produced the majority of features. The catch-all Other Pit category yielded the most features (69; 43 percent of the total), followed by postholes (48; 30 percent), heating pits (13; 8 percent), and firepits (13; 8 percent). The relative frequencies of the different feature categories differ from the Pueblo Alto findings. At 29SJ 629, there were relatively more firepits, mealing catchment basins, and postholes, while at Pueblo Alto, heating pits, floor burns, and wall niches were prominent (Windes 1987a:Table 9.4). In frequency and presence, the subclasses of Other Pits also differed between the two sites, although Other Pits dominated both assemblages.

Feature Attributes and Classification

The basic data categorizing the various types of features are summarized for each provenience and floor in Chapters 4-6. The features are listed primarily as they were identified in the field, although under the "Comments" column in each table, misclassifications are noted. Explanations of the non-metric attributes are covered in Table 7.4. Due to the smaller data base and because computer assistance was not readily available, discriminatory analyses were not used to identify or confirm various feature types. Primarily, context and attributes helped to classify features for this study. Other Pits, in particular, included a variety and large number of

Table 7.4. Feature attribute codes.[a]

Code	Description
FILL	
Primarily sand	
10 -	Clean sand. Sterile or nearly sterile sand.
11 -	Slightly dirty sand. Contains sparse charcoal flecks, ash, or small pieces of carbonized brush.
12 -	Clayey sand. Sand mixed with clay or small clay nodules.
13 -	Sand and lignite. Sand mixed with sparse to moderate pieces of lignite.
14 -	Sand and gravel. Sand mixed with small nodules of sandstone or residual gravels common to local subsurface soils.
16 -	Rotted post or beam.
17 -	Non-rotted pole.
Primarily burned sand and carbonized wood	
20 -	Unburned sand with pockets or layers of moderate to dense amounts of carbonized brush.
21 -	Burned sand with pockets or layers of moderate to dense amounts of carbonized brush.
25 -	Dense amount of charcoal and ash.
27 -	Burned and/or unburned sand with moderate amounts of charcoal and ash.
28 -	Burned sand.
Primarily trash	
30 -	Light trash. Artifacts, bone, adobe, stones, and charcoal present in sparse amounts in a sand matrix.
31 -	Moderate trash. Same as 30 except in moderate amounts.
32 -	Dense trash. Large sherds, abundant bone, some lithics, and perhaps wall and roofing debris. Ash and charcoal darkens the sand matrix.
33 -	Specific trash. Abundant cultural debris from a single or very few activities (e.g., chipped stone, bone, or coprolites).
Primarily architectural debris	
41 -	Wall debris. Stones, spalls, and mortar with pockets of sand.
42 -	Wall?/roof debris. Stones, roofing adobe, adobe impressions, and redeposited mortar.
45 -	Adobe chunks or clay lumps only.
46 -	Spalls in a sandy matrix.
Miscellaneous	
50 -	Plug. Most of the pit filled with a plug of adobe and/or stones.
51 -	Construction packing. A liner of mortar and stones.
52 -	Lignite packing (in a posthole).
54 -	Construction packing. A liner of mortar or clayey sand.
55 -	Masonry. Feature is of stacked stone and mortar.
LINING	
U -	Unlined
L-M -	Lined with masonry and mortar
L-P -	Lined with adobe plaster
L-PR -	Lined with adobe and stones (not masonry)
L-SP -	Lined with upright slabs and adobe
L-S -	Lined with upright slabs
SEALED	
U -	Unsealed (pit left open at abandonment or when new floor applied)
S -	Sealed with plaster and/or stone during use of the associated floor (not by the addition of a new or resurfaced floor)
S-FP -	Covered by floor plaster (pit is in fill below floor plaster)

[a] After Windes (1987a), with slight modifications and deletions.
See tables in Chapters 4-6.

pits that needed reclassification. Attribute means for the new feature categories are listed under Table 7.5.

Coefficients of variation (CV) in percent help to compare the relative dispersion of means for multiple feature attributes. Low CVs for pit dimensions help to define feature types (e.g., Thomas 1976:84). The high values exhibited by some features suggest the weakness of some pit categories or of individual attributes. Nevertheless, we can expect that the nature of unlined pits sunk into sands will produce considerable dimensional variability over time from use, erosion, and finally from excavation by the archeologist. Thus, a CV less than about 40 percent may be acceptable for some archeological data when produced for samples of about 10 or more (William Doleman in Windes 1987a:313). For instance, this standard seems particularly appropriate when we can examine the means for size for a known group of features used for a single purpose: the plaza ramada postholes (Table 7.5). Finally, differential depositional processes affect pit-fill artifact frequencies (Table 7.5), but on the other hand, high CV values may still be useful in interpreting pit function.

Floor Features

Thermal features

Burned pits comprise one of the larger feature categories (26; 16 percent of the total features). These types fall into several subclasses (Windes 1984:76-77; 1987a:292-293): burns, firepits, and heating pits. Large, deep firepits, classified as ovens at the greathouses (Windes 1987a:293), were absent from all of the excavated small-houses sites, except for one late house (Bc 236) on the edge of Chaco Wash, northeast of Fajada Butte. The primary criterion for identifying thermal features, of course, is the noticeable oxidation of the pit walls and floor. In conjunction with this, thermal features often contain ash and charcoal. Only in few instances was the identity of thermal features problematic.

Burns

Burns are included under thermal features because it was clear that most resulted from the action of building fires for heating or light. These generally appeared on upper floors and in the fill that suggested expedient use of the site near or at the end of the site occupation. Burns were two-dimensional features that lacked identifiable contents and volume, although sometimes the oxidized fuel rested directly above the feature or was scattered nearby. These did not receive the same attention as three-dimensional features until well into the Chaco Project. At 29SJ 629, a few burned spots marked the floors in Rooms 5 and 8, and one was sampled for archeomagnetic dating without success. McKenna (1984:71) mentions another burn on the floor of Room 1 at 29SJ 1360, and there were numerous burned spots in late sites at Bc 236 (Bradley 1971), Bc 362 (Voll 1964), and two small-house sites in the Bis sa'ani Community (Dykeman 1982:851; Donaldson 1982:Figure 150); but otherwise there is a paucity of information about floor burns.

Firepits

Slab-lined, thermal features have been classified as firepits at 29SJ 629. The distinction between firepits and heating pits is more than semantic, however. Despite some overlap in size, clear differences exist between contents of the two feature types that delineate different functions. In contrast to firepits, heating pits rarely contain economic plant remains (M. Toll 1987; this report). The amount of cultural material yielded by firepits, compared to the heating pits, may be due to the differences in size or, more likely, that firepits were preferred as trash receptacles. At 29SJ 629, nevertheless, neither feature type yielded much cultural material, with the exception of the numerous burned bones in the Kiva firepit.

High temperatures and/or use of long duration were indicated by the ash contents, the oxidation penetration, and color of the firepit liners. Heating pits at the site, on the other hand, typically revealed little oxidation. Because intense burning deteriorates the firepit liners, there was a surprising paucity of remodeled or replaced firepits, particularly outdoors, that might be expected for a long continuous site occupation.

Firepit frequency and distribution appears normal for small-house sites. A single example occurred in each pitstructure and multifunctional living room but with multiple outdoor examples in the work areas

Table 7.5. General statistics for 29SJ 629 features.

Feature Type	Number	Mean	sd	C.V. %	Range
Firepits:					
Length	11	59.5 cm	14.9	25.0	35-82
Width	11	48.1 cm	9.7	20.2	30-58
Mouth	11	2,402.8 cm^2	1,086.6	45.2	820-4,619
Depth	11	21.3 cm	6.4	30.1	10-32
Volume	10	469.2 dl	231.7	49.4	140-830
Burned bones	10	9.1	28.4	312.4	0-90
All bones	10	10.6	31.8	299.7	0-101
Chipped stones	10	0.9	1.3	143.0	0-4
Sherds	10	7.3	8.3	114.3	0-24
Heating Pits:					
Length	14	42.2 cm	12.4	29.4	23-71
Width	14	31.6 cm	12.7	40.1	18-57
Mouth	14	1,284.5 cm^2	835.9	65.1	378-3,077
Depth	14	9.9 cm	3.8	38.4	5-20
Volume	14	146.0 dl	135.0	92.2	30-560
Burned bones	14	0.0	-	-	0
All bones	14	0.0	0.0	0.0	0
Chipped stones	14	0.1	0.3	360.6	0-1
Sherds	14	0.2	0.4	244.1	0-1
Other Pits (<10 liters):[a]					
Length	33	15.7 cm	9.2	58.6	5.5-46
Width	33	13.0 cm	5.4	41.8	5-27
Depth	33	9.5 cm	4.9	51.2	2.5-22.5
Volume	33	16.8 dl	22.4	132.8	0.1-9.8
Bones	33	0.5	2.7	530.4	0-15
Chipped stones	33	0.0	-	-	0
Sherds	33	0.1	0.4	416.2	0-2

Table 7.5. (continued)

Feature Type	Number	Mean	sd	C.V. %	Range
Other Pits (>10<100 liters):					
Length	5	43.6 cm	24.1	55.3	16-76
Width	5	39.6 cm	23.8	60.2	13-75
Depth	5	29.0 cm	15.4	53.0	18-53
Volume	5	249.4 dl	92.0	36.9	12.6-32.6
Bones	5	0.0	-	-	0
Chipped stones	5	0.8	1.3	163.0	0-3
Sherds	5	5.8	8.1	140.3	0-17
Plaza Bell-shaped Pits:					
Length (mouth)	4	69.8 cm	6.9	9.8	66-80
Width (mouth)	4	65.8 cm	4.9	7.5	60-72
Length (bottom)	4	123.5 cm	16.1	13.0	102-140
Width (bottom)	4	117.0 cm	20.1	17.2	91-140
Depth	3	122.7 cm	4.0	3.3	118-125
Volume	4	6,935.0 dl	234.5	3.4	6,797-7,286
Bones	4	56.8	69.1	121.8	3-157
Chipped stones	4	266.0	324.2	121.9	3-687
Sherds	4	336.8	339.3	100.8	130-839
Ground stone	4	24.0	23.0	95.8	0-47
All Large Storage Pits (>100 liters):					
Length (mouth)	5	71.4 cm	7.0	9.8	66-80
Width (mouth)	5	66.6 cm	4.7	7.0	60-72
Length (bottom)	6	128.3 cm	23.9	18.6	102-168
Width (bottom)	6	122.7 cm	24.3	19.8	91-160
Depth	5	104.8 cm	27.7	26.5	60-125
Volume	6	8,520.8 dl	5,589.1	65.6	3,376-19,625
Bones	6	56.0	58.3	104.1	1-157
Chipped stones	6	203.5	273.7	134.5	0-687
Sherds	6	285.5	296.0	103.7	8-839
Ground stones	6	16.5	21.3	128.9	0-47

Table 7.5. (continued)

Feature Type	Number	Mean	sd	C.V. %	Range
Storage Bins:					
Length	4	86.2 cm	28.1	32.6	49-127
Width	4	65.0 cm	30.1	46.4	31-100
Depth	4	42.8 cm	24.6	57.4	22-81
Volume	4	3,091.8 dl	3,659.0	118.3	18.2-921
Bones	4	0.8	0.8	104.6	0-2
Chipped stones	4	2.4	1.8	75.7	0-4
Sherds	4	18.2	23.0	126.3	2-58
Wall Niches:					
Length	4	32.5 cm	12.8	39.4	20-50
Width	4	20.8 cm	5.6	26.8	14-27
Depth	4	25.5 cm	3.1	12.2	23-30
Volume	3	1,580.0 dl	1,001.4	63.4	9-27.3
Bones	4	0.5	0.6	115.5	0-1
Chipped stones	4	1.0	1.2	115.5	0-2
Sherds	4	0.8	1.5	200.0	0-3
Ladder Rests:					
Length	7	9.8 cm	2.5	25.7	5-12
Width	7	8.6 cm	2.8	32.5	4-12
Depth	7	3.4 cm	0.9	25.4	2-4.5
Volume	7	1.9 dl	0.9	48.5	1.0-3.0
Bones	7	0.0	-	-	0
Chipped stones	7	0.0	-	-	0
Sherds	7	0.0	-	-	0
Pot Rests:					
Length	3	22.3 cm	1.2	5.2	21-23
Width	3	22.3 cm	2.3	10.3	21-25
Depth	3	5.0 cm	4.4	87.2	2-10
Volume	3	19.7 dl	14.6	74.1	8-36
Bones	3	0.0	-	-	0
Chipped stones	3	0.0	-	-	0
Sherds	3	0.3	0.6	173.2	0-1

Table 7.5. (continued)

Feature Type	Number	Mean	sd	C.V. %	Range
Mealing Catchment Basins:					
Length	11	37.0 cm	5.0	13.5	29-42
Width	11	29.9 cm	5.2	17.5	23-38
Mouth	11	904.6 cm^2	295.0	32.6	484-1,513
Depth	11	13.6 cm	5.4	39.9	4-23
Volume	11	114.5 dl	91.3	79.7	23-294
Bones	11	0.5	0.8	180.4	0-2
Chipped stones	11	0.6	1.0	161.4	0-3
Sherds	11	2.4	17.3	175.7	0-12
Outdoor Postholes:					
Length	29	28.8 cm	6.1	21.1	20-46
Width	29	24.9 cm	5.2	21.0	16.5-34
Depth	20	34.6 cm	13.5	39.2	17-76
Volume	18	212.7 dl	131.1	61.6	85-585
Lignite fill	23	15.0 kg	13.6	90.8	2-47
Bones	29	0.1	0.3	373.9	0-1
Chipped stones	29	0.1	0.3	373.9	0-1
Sherds	29	1.1	5.6	489.1	0-30
Ground stones	29	0.2	0.4	180.4	0-1
Indoor Postholes:					
Length	8	18.0 cm	7.5	41.5	8-30
Width	8	14.5 cm	5.7	39.5	10-26
Depth	8	22.5 cm	16.0	71.2	2-44
Volume	8	47.5 dl	49.4	104.1	1-145
Bones	8	0.1	0.4	282.8	0-1
Chipped stones	8	0.1	0.4	282.8	0-1
Sherds	8	0.1	0.4	282.8	0-1
Ground stones	8	0.1	0.4	282.8	0-1

[a] Excludes ladder rests, pot rests, mealing basins, and postholes.

between the rooms and pitstructures. This pattern is repeated in the other excavated houses in Marcia's Rincon (29SJ 625, 29SJ 626 East, 29SJ 627) and at 29SJ 1360. At Pueblo Alto and other greathouses, however, large, lined thermal features were relatively absent in rooms and outdoor areas (Windes 1987a:293, 335).

Firepits at 29SJ 629 (Table 7.5) and similar small-house sites are smaller than those at Pueblo Alto and contained relatively fewer artifacts (Windes 1987a:293, Table 9.3). At 29SJ 629, 1-2 outdoor firepits may have been in coeval use, while only one at a time was used in rooms and pitstructures--just like Pueblo Alto. Firepit 2 resembles heating pits in size and may have been lined only to withstand inclement weather, although both FP 2 and FP 6 contained a variety of economic seeds, suggesting a similar use (M. Toll, this report). Firepit 5 contained a slab metate that suggests early A.D. 1100s or later use. Earlier use of the firepit cannot be discounted, although its very early carbon-14 date is much too early to be reliable.

Firepits undoubtedly are centers of food processing, warmth, and light, as well as handy receptacles for sweeping trash. Heating pits, on the other hand, must have served a limited, specialized role such as warming pits. The common association of the two feature types at 29SJ 629 suggests an interrelated function.

Heating Pits

In equal numbers with firepits at 29SJ 629 were the scooped-out, unlined heating pits (Plates 5.10A-B). These pits were similar to unlined burned pits described in early Basketmaker houses (Bullard 1962:163-166; Morris and Burgh 1954:51) that appeared in Chacoan houses at least into the early A.D. 1000s. Sometimes those at 29SJ 629 revealed a thin coating of plaster, but seldom were they extensively oxidized. Although morphologically similar to those at Pueblo Alto, the small-site pits exhibited a content use dissimilar to firepits, that is, they seldom contained refuse, economic plant remains, or pollen (M. Toll 1987; this report), suggesting that food-processing activities did not take place around them. Contents typically were alternating layers of clean, yellow sand, sand oxidized red and purple, and lenses of carbonized brush. In contrast to firepit use, the poorly oxidized pit liner and carbonized brush indicate fires of short, intense duration.

The only questionable heating pits at the site are important because they might indicate that two were used contemporaneously in each pithouse. Other Pit 1 in Pithouse 3 and Other Pit 10 in Pithouse 2 (Floor 2) were unburned, but in form and position, they resembled heating pits. If these were heating pits, it might reflect separate use of features within the pithouses by the two resident groups postulated to have lived at the site. Two other thermal features built over by room walls could not be confidently assigned to either hearth category, although their poor construction marked them as possible outdoor heating pits.

A huge unlined outdoor pit (HP 1) behind Room 8 in Grids 2 and 3 was designated a heating pit on morphological grounds, although its size suggests a firepit function. It was hidden or kept isolated from normal site activities, marking it for special use. Because this pit was located away from areas used extensively on a daily basis, it may have been used for roasting, which takes a relatively large work space (Binford 1983:170).

In small sites, heating pits seemed to be auxiliary to the primary firepit and seldom were lined or contained cultural material other than fuel. They were usually much larger than the Pueblo Alto examples (15 liters versus 7 liters), but all were smaller than the 20-liter-or-greater capacity observed for slab-lined firepits. Because of the abundance of economic food remains in the Pueblo Alto heating pits, they may have replaced firepits as loci for food preparation.

Other Pits

Other Pits are the most conspicuously absent feature from excavations predating 1970. Their absence, however, is undoubtedly due to a lack of recognition and different excavation philosophies. The vast majority of the Other Pits were unlined, which suggests that they were unsuitable for long-term storage of perishables. Many of these pits (29 of 64; 45 percent), however, are too small (< 1 liter) to have been much use for anything except small post supports. Whatever their function, these small pits are negligible in terms of storage capacity.

On the basis of construction (lined/unlined), size (volume), and spatial context, several subcategories of Other Pits could be defined (Figure 7.2). Although there was a range and density of cultural materials present in these pits, fill contents were not useful in defining pit function and use.

Other Pits (Small Volume). The majority of ubiquitous pits of uncertain function were prolific in the pitstructures but nearly absent outdoors and in rooms. Arbitrarily segregating these by volume (less than 10 liters) from other categories below yielded a class of 33 pits (including sipapus and pot rests) dominated by unlined pits averaging only 1.7 liters in volume. Only two (6 percent) in the category were larger than 5 liters. Most (58 percent) were 0.7 liters or less in volume--unsuitable for any storage. The three in the sipapu position between the firepit and pitstructure wall, in line with the ventilator, may have symbolized entry to the underworld, a common theme in historic Puebloan cosmology. These were unlined and filled with clean, yellowish sand, but so were many other pits. Nine pits were plastered, which suggests more than casual use or importance. Three shallow, basin-shaped pits may have been pot rests. All were located in Pithouse 2. Overall, these small pits were similar to the 118 recorded at Pueblo Alto, defined in Cluster 1 by cluster analyses (Windes 1987a:Table 9.15), which averaged 1.9 liters in volume. Those at Pueblo Alto were ubiquitous across time and space, as they were at 29SJ 629. Many of the former (27 percent of the total) were reclassified as postholes after cluster analyses were performed. The function of the majority of these small pits is unknown.

Ladder Rests. Seven small pits that would have been included in the above category were segregated on the basis of pairing and spatial context. Except for a pair in the Kiva, these very shallow pits were located between pitstructure firepits and ventilators. Again, historic analogy may explain the pit use as ladder rests for roof entry. The odd pair in the Kiva (OP 2 and OP 4) may have been part of some structural framework, along with OP 1, OP 10, and "PH 1", while the three in front of the ventilator (OP 5, OP 6, OP 9) could mark a 3-pole ladder or one that had shifted location. OP 1 and OP 10, however, are in perfect position for postulated sipapus.

Other Pits (Moderate Volume). A histogram suggests that pits between about 10 and 100 liters could form a functionally meaningful class separate from the smaller and larger pits (Figure 7.2). Unlike their kin in the small-volume category, these rare pits cluster in size and could have served as some kind of storage. We were without clues, however, as to the type of storage contents and the storage-duration use for these pits (discounting the possible mealing catchment basins). Five were located in the two pithouses: the three in Pithouse 2 were lined with plaster while those in Pithouse 3 were not. Three others were located in the plaza. Because their location below the ground surface makes the pits susceptible to dampness, storage of perishable foods would seem unlikely. There were a number of moderate-sized pits at Pueblo Alto (Windes 1987a:Table 9.15) and nearby 29SJ 627 (Truell 1992), but their scarcity at the other excavated sites in the Fajada Gap community suggests differences in storage strategies that might reflect differences in occupation and use of the sites. A number of other pits have similar volumes to these but have been excluded because of characteristics that suggest non-storage use, although some overlap in the categories is to be expected due to the difficulty in confirming pit uses.

Other Pits (Large Volume). Clearly in a class by themselves, these huge unlined pits clustered in the site plaza (Figures 6.6, 6.7, 6.9, and 6.11; Plate 6.6). With one exception, all were bell-shaped and were similar in morphology, location, and abandonment history. The four bell-shaped pits in the plaza reveal the smallest variation in metric dimensions of any category; therefore, they must have been constructed to exacting coevality standards by the same persons. Pit contents and mouth plugs (Plates 6.4-6.5) suggest that the three in a row (OP 1, OP 14, OP 15) were sealed simultaneously in the early A.D. 1000s with debris from plaza activities related to food processing and jewelry manufacture. Presumably, this act signals a major shift and reduction in site activities, and possibly, a period of abandonment. The only non-bell-shaped pit, OP 6, dates to an earlier use because one of the bell-shaped pits (OP 12) was later placed in its fill.

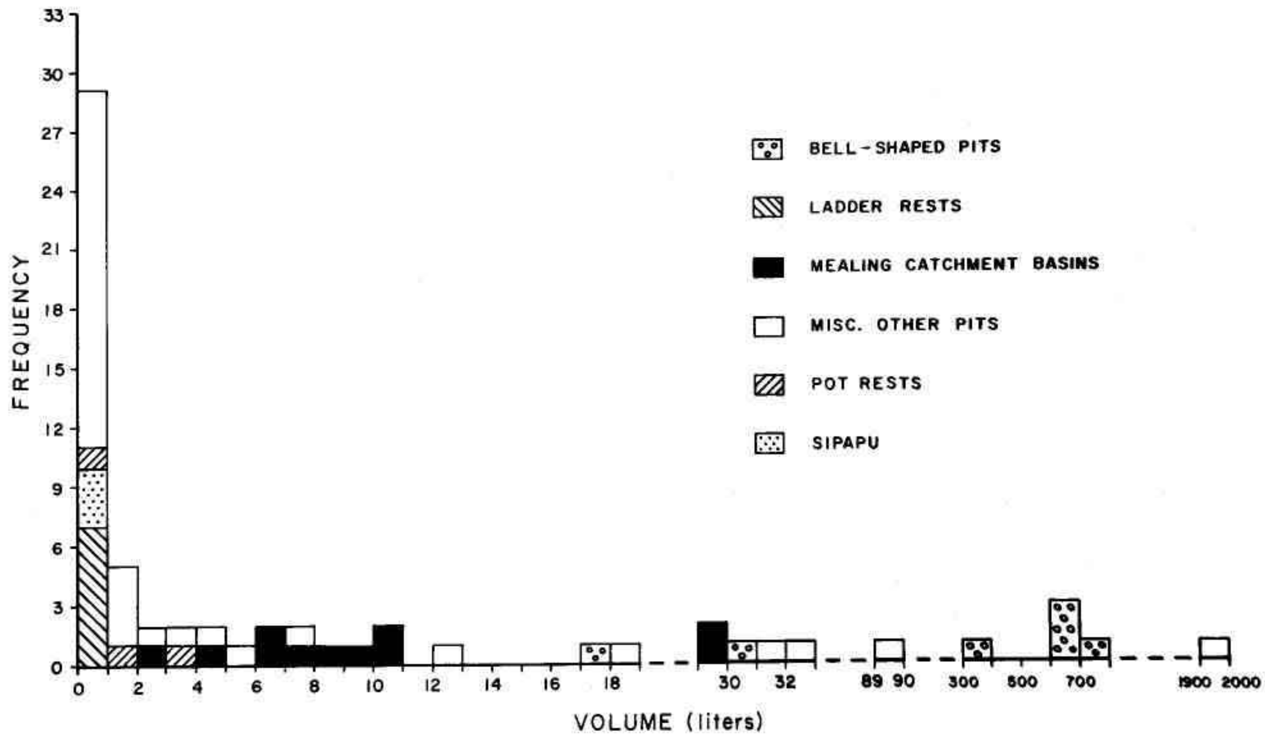

Figure 7.2. Histogram of Other Pit volumes at 29SJ 629 (NPS 310/82803 A).

The sole pit not found in the plaza was located in living Room 9. Although it was morphologically similar to the others, it was shallower (Figure 4.13), not in exact alignment with the others, and had filled naturally. Room 9 was built over part of the initial plaza. Of course, this pit might once have been a plaza pit, but the lack of conformity to the others suggest that it was built later for use in Room 9.

All the pits were shaded by a pole and brush ramada that mark major use of the plaza during the hot summer months (Figure 6.1). Because the pits were outdoors and not protected against the harsher elements, potential content theft, and ground moisture, they may have served for short-term storage for weeks or months. On the other hand, the dry climate and cool ground temperature could have allowed for long-term storage. Pits such as these were commonly used for storage by mobile groups (Gilman 1983:125, 147), and they have been found in the area in an archaic site associated with corn cobs and seasonal plant processing (Simmons 1982:543-554). The associated concentration of mealing basins and firepits at 29SJ 629 suggests that food processing was related to pit use, perhaps in preparation for winter food storage.

At contemporary sites in Black Mesa, Arizona, similar, gigantic storage pits were also found in the plaza. Some revealed corn cobs (e.g., Gumerman et al. 1972:125, 134, Figure 54) that attest to bulk storage. These may be more common than excavation has shown for small-house sites in Chaco Canyon because outdoor areas have traditionally lacked intensive scrutiny. McKenna (1984:91), for example, believes that an unexcavated mass of stone under the ramada at 29SJ 1360 might be another plugged, bell-shaped, storage pit.

Mealing Catchment Basins. Only two formal mealing bins were evident at the site, although nine Other Pits mark probable mealing loci. The former were paired in the southeastern corner of Pithouse 2, but the metates had been stripped from both (Figure 5.14; Plate 5.8). Both catchment basins had been highly oxidized an orange color from a fire started after the abandonment of the pithouse. Two other pits in the southwestern corner (OP 3 and

OP 6) may represent another set of catchment basins, although we cannot be certain because the Kiva ventilator removed vestiges of the walls and any possible bins. The latter basins were the largest unburned floor pits in Floor 1, were close together in a setting similar to those in the southeastern corner, were still plastered with remnants of a low encircling adobe collar, and yielded some corn pollen. For these reasons, and because they are similar to other basin sets in the site (Table 7.6), it is possible that they represent a second set of mealing bins in the pithouse.

Formalized, structural bins to hold metates were only present in Pithouse 2, but presumably food processing was done elsewhere at the site. Besides morphological attributes that readily identify mealing bins, other traits may help to identify potential grinding loci when bins are lacking. We know from Bartlett's (1933) work at Hopi, among others, that the position and space requirements for the grinders has been traditionally maintained for over a millennium. Almost always the mealing activities are placed so that grinders may brace their feet and back against the walls. The spacing between the backs of the metates or bins and the walls measures approximately 50± cm in historic contexts as well as in obvious prehistoric settings (e.g., Pithouse 2 at 29SJ 629 and Pueblo Alto).

Additionally, catchment basins and bins, if present, traditionally occur in multiples. In Chacoan contexts, mealing bins typically occurred as a set of three (Windes 1987c) or two or three (Dykeman 1982:852), but different combinations have been found. At nearby 29SJ 627, for instance, two rooms that appeared set aside for grinding activities contained five and six catchment basins (Truell 1992). A third room at 29SJ 627, however, contained just three. At 29SJ 1360, McKenna (1984:87, Figure 2.29) reported three similar basins in an outdoor area surrounded by 39 manos, 2 hammerstones, and 2 metates. The size, shape, volume, and construction of these three mirror several Other Pits at 29SJ 629 (Table 7.6). In fact, one duplicated the paired manos set in the bottom of OP 4 in the 29SJ 629 plaza. All those at 29SJ 1360 were set approximately 90 cm from an L-shaped wall, just enough space for the grinders and their metates.

Potential paired catchment basins to trap processed food were found associated with the two surface living rooms. Room 3 exhibited two, contiguous stone-lined basins that contained, along with some trash, abundant corn and economic grass pollen that was also prevalent on the nearby floor (Cully 1985:Tables 4.3-4.4; Dean, this report). On the floor, a short distance behind the two basins, were two odd ridges of adobe turtleback construction. Their distance from the basins (45-48 cm) created just the space needed for resting two metates (the mean 29SJ 629 metate length was 47.5 cm; Volume II, Table 4.9). These ridges, therefore, appear to have been for the grinders to set their knees on or against with their feet propped against the room wall approximately 44-48 cm away. The space for grinders to kneel has been documented at Pueblo Alto (Windes 1987b:209, 247) and at Hopi (Bartlett 1933:15) as between 40 and 55 cm, so that the fit in this case is a good one. The space is similar to that between the Pithouse 2 wall and the two mealing bins (44 and 48 cm) in the southeastern corner.

Several basins constructed of adobe were uncovered in the plaza between Pithouse 2 and Rooms 5-8. A pair of kidney-shaped basins (OP 3 and OP 4) had been placed against the outer north wall of Room 9, next to the Room 9 entry (Plate 6.3). Both yielded much corn pollen, while OP 4 also yielded squash pollen (Dean, this report). Abundant corn pollen and artifacts nearby also suggest their use as catchment basins for food ground on movable metates. Their placement suggests that grinders faced one another during the mealing process. There is just enough space (80 cm) for a metate and its user to fit between OP 4 and the Room 8 wall. There is no evidence for a foot- or metate-rest for OP 3. Nearby, there were three other adobe basins with stone bottoms that also may have been catchment basins for ground food. A pair (OP 11 and OP 13) set in a corner 85 cm east of Room 7 also were placed with just enough room for metates and their users facing east. The sole solitary basin (OP 10) was nearby, but only 30 cm from Room 7 and directly in front of a possible step (Plaza Wall 2) into Room 7--an unlikely spot for a catchment basin if the step was not later in time. Nevertheless, a satisfying 93 cm separated the basin from a short wall to the north, Plaza Wall 3, which provided just enough room for a metate and a kneeling person.

Table 7.6. Mealing basins and possible mealing basins at small-house sites.

Site	Provenience	Feature	Length (cm)	Width (cm)	Depth (cm)	Volume (liters)	Mouth (cm²)
29SJ 627	Rooms 17/18	Mealing Bin 1	34	33	9	-	-
		Mealing Bin 2	25	24	15	-	-
		Mealing Bin 3	35	25	8	-	-
		Mealing Bin 4	30	25	2	-	-
		Mealing Bin 5	34	20	9	-	-
	Room 19	M. Catchment 1	53	30	24	-	-
		M. Catchment 2	37	27	19	-	-
		M. Catchment 3	39	32	19	-	-
		M. Catchment 4	40	28	22	-	-
		M. Catchment 5	34	26	12	-	-
		M. Catchment 6	46	26	8	-	-
	Room 20	Bin Catch. 1	44	33	16	-	-
		Bin Catch. 2	50	36	8	-	-
		Bin Catch. 3	40	36	12	-	-
	Mean (n = 14)		38.6	28.6	13.1		
	sd		7.7	4.8	6.3		
	CV%		19.8	16.7	48.2		
29SJ 629	Pithouse 2	Mealing Bin 1	43	31.5	14.5	10.8	938
		Mealing Bin 2	36	28	12	7.9	785
		Other Pit 3	33	30	14	8.9	768
		Other Pit 6	30.5	30.5	13	6.5	706
	Room 3	Other Pit 1	42	34	23	29.0	1,298
		Other Pit 2	41	36	20	29.4	1,513
	Plaza Grid 8	Other Pit 3	33	23	4	2.3	672
		Other Pit 4	40	23	18	9.7	782
	Plaza Grid 9	Other Pit 10	29	23	12	4.8	484
		Other Pit 11	37	32	7	6.3	944
		Other Pit 13	42	38	12	10.3	1,061
	Mean (n = 11)		37.0	29.9	13.6	11.4	904.6
	sd		5.0	5.2	5.4	9.1	295.0
	CV%		13.5	17.5	39.9	79.7	32.6
29SJ 1360	Plaza Area 3	Other Pit 1	43	41	12	13.8	1,380
		Other Pit 2	46	41	12	14.5	1,380
		Other Pit 3	38	35	11	10.1	1,072
	Mean (n = 3)		42.3	39.0	11.7	12.8	1,277.3
	sd		4.0	3.5	0.6	5.6	177.8
	CV%		9.5	8.9	4.9	18.5	13.9

This basin also yielded corn and squash pollen (Dean, this report).

The latter three basins (OP 10, 11, and 13) were found at depths below the kidney-shaped pair (OP 3 and OP 4) and may be earlier. OP 3 and OP 4 overlie the entry step into OP 14 and must have been built after OP 14 was abandoned. Although pollen and flotation samples were not analyzed from these basins, with one exception, all are next to a large, bell-shaped, storage pit (OP 14) filled with economic plant seeds (M. Toll, this report), corn pollen (Cully 1985:Table 4.4), 22 manos, and 124 hammerstones, which comprised much of the site tool totals. The area between this huge pit and Room 9 was also high in corn pollen. It is suggested that the artifacts and pollen came from the area around the pit and were swept into the pit when it was abandoned. The position of the large pit next to OP 10, 11, and 13 would have centralized the outdoor storage, retrieval, and corn processing activities at the site.

Catchment basins at 29SJ 629 were similar in form to heating pits but could be segregated on the basis of construction, contents, and the lack of oxidation. Overall, the basins from 29SJ 629, 29SJ 627, and 29SJ 1360 reveal remarkable dimensional homogeneity (Table 7.6). Paired t-tests of the 29SJ 627 and 29SJ 629 pit dimensions did not reveal significant differences between the two sites ($t_{2\text{-tail}}=0.63$, $p=0.53$ for length and width; $t_{2\text{-tail}}=0.22$, $p=0.83$ for depth; $df=23$), strengthening the inference that the 29SJ 629 pits were functionally similar to the 29SJ 627 basins, despite the lack of artifactual associations.

In summary, adobe and stone basins, particularly if they appear in multiples together and are located in areas where there is space to brace one's feet (and back?) and to set a metate, have a high probability of representing food preparation areas. When corn pollen is abundant and the area is littered with tools associated with grinding food, then the locus seemingly is without question. The lack of evidence for metate bins and metate rests has obscured the identity of these catchment basins in the past, as it did in the field at 29SJ 629. Furthermore, different patterns for metate placement often exist in the small sites--at Bc 362, for instance, some metates were sunk into the floor (Voll 1964), and baskets or ceramic bowls could easily have been used as catchment basins that would have left no archeological evidence.

The numerous pairs of these pits suggests use by multiple groups. The pairs in Room 3, attached to Room 9, and in Pithouse 2, suggest use by the respective living-room social units, probably individual families. Of course, the isolated OP 11, and the fact that Room 9's basins are located outside, make the scenario imperfect. Depending on how those basins attached to Room 9 are interpreted, there could be two sets in the plaza or they served both as the "outdoor" and "indoor" set for the Room 9 inhabitants. The contemporaneity of all basins is questionable, however. In all cases, the basins indicate the use of movable metates that could be shunted, perhaps seasonally, among the various mealing areas: in the aboveground living rooms, in the well-sheltered pithouse, or outdoors adjacent to large storage pits.

Other examples of adobe basins in Fajada Gap houses in the A.D. 900s and early A.D. 1000s suggest group sharing of catchment basins. If two families occupied Pithouse B at 29SJ 1360, as McKenna (1984:362) asserts, then the sole trio of outdoor basins there may also have been shared. The number of whole manos around them is double those expected for use of a single metate, suggesting multiple family use (Windes 1987c:Chapter 4).

A pattern of shared and non-shared mealing basin units is not clear from the excavated examples. Basins set aside for special events and loci used on a seasonal basis complicate identity of a prevailing social pattern of basin use. Nevertheless, it is clear that movable sets of metates must have been utilized for the different mealing basins, although separate sets may have been used to avoid lifting the heavy blocks through pithouse roof entries. The Chaco Canyon pattern may contrast with the contemporary special grinding loci set aside in ancillary pitstructures on Black Mesa (e.g., see Gumerman et al. 1972). Pithouse 3, however, yielded much corn pollen, which suggests that it might have served for processing corn, like the mealing-bin pitrooms on Black Mesa, except there were no catchment basins evident. Overall, the frequency and spatial extent of the 29SJ 629 catchment basins attests to the importance of food processing at the site, particularly of corn.

It may be that the grinders in these cases were women. Historically, Puebloan women have always done the processing--a chore that occupied almost all their waking hours (e.g., Sekaquaptewa 1969:111). When the lower leg measurements from a sample of Chaco small-site skeletons were compared by sex, the women were significantly shorter than men [females tibias were 31.3 cm long (sd=1.8; n=11) compared to 39.0 cm for males (sd=3.1; n=4): t=6.13; df=13; $p_{2\text{-tail}}$=.00004]. Adding another 14-16 cm length for the knees, ankles, and feet (e.g. 31 cm + 14-16 cm = 45-47 cm) from measurements of ten short female subjects left just enough space to enable most females, but few males, to work at the site metates where there was typically space of less than 50 cm to kneel. A larger sample of Anasazi male and female tibias from non-Chacoan sites (Bennett 1975) supported the probability that the kneeling space was built primarily for women.

The intensive and prolonged labor involved in grinding corn and other seed plants would have affected the knee, wrist, and shoulder joints of older Anasazi women. Thus, it is interesting that Akins (1986:53, 55) remarks on the arthritic condition of an older female's knees from a burial recovered at a small site not far from 29SJ 629. A more pertinent observation was made by Akins (1986:24-25) concerning the Chacoans when she noted that there was evidence of more pronounced shoulder muscle mass in women, not men, through time, which may have been caused by corn grinding.

Postholes

Postholes were common at 29SJ 629. Alignment and positioning of the plaza postholes, the presence of shims, basal stones, and lignite in the posthole fill assures their recognition. None had post remains in them, probably because the posts had been robbed rather than left to deteriorate. The majority of the site's postholes occurred in outdoor areas, primarily as part of the brush shelters covering the plaza between the rooms and pitstructures (31 of 39, 79 percent). Unlike Pueblo Alto, only a few supports occurred within structures, and these were noticeably smaller pits than their relatives in the plaza.

Plaza posthole morphology, contents, and spatial arrangements were examined to delineate structures and their modifications, as well as possible construction groups. Overall, postholes in the plaza reflect great similarity. Figure 6.1 reveals that the majority of postholes used to support the ramadas must have been found. There was no apparent clustering of shims and basal stones in postholes, although both were common attributes. The southern part of the plaza contains the majority of these support stones, as it does the majority of postholes. Likewise, size grades of lignite used for posthole packing appeared random. Most lignite was a chunky, dark, yellow-brown-olive gray with only a few noted as finely crushed, light gray. McKenna and Lekson believe that the differences in lignite may be attributed to several people collecting from different areas (erosional slopes versus undisturbed beds) of the same source, with most coming from undisturbed deposits, probably near the site. The usefulness of lignite packing in reducing capillary action to prevent lower post rotting would seem the practical explanation for its widespread use under postholes. It was also used extensively under the deep, plaza kiva floors at Pueblo Bonito (Judd 1964), which would have been subject to wet conditions from the underlying water table.

The majority of the pits along the eastern margins of the plaza were truncated because of erosion. Nevertheless, pairings are obvious in the sample, with each deep, bell-shaped plaza storage pit surrounded by four distinct ramada posts. The plaza ramadas extended the length of the north-south roomblock into areas at each end that included the two living rooms 3 and 9. Room 9, however, was built later over the post supports. Posthole sizes seem related solely to the structural requirements of weight bearing: the largest ones are centrally located away from the possible secondary support of the room walls. The random nature of the posthole morphological attributes but their uniformity in relation to structural requirements suggest that the main ramada was built as a single unit. This is in contrast to the duality in construction noted for the ramada supports at 29SJ 724, a Pueblo I house near Werito's Rincon (Windes 1976b) that was built coevally by two groups with distinctive patterns of posthole construction.

The postholes reveal that the ramada paralleled the storage Rooms 5-8 with an extension east between Pithouses 2 and 3. A lack of postmolds prevents estimation of the size of the posts used, although elsewhere in Chaco Canyon postmolds indicate that posts were considerably smaller than the posthole. Posts between 10 and 15 cm in diameter are suggested for the primary ramada supports. A set of three poorly defined pits around the top edges of the Kiva (PH 6, PS 14, PS 15) suggest that the Kiva also had been shaded. The number and placement of shade structures built at the site indicates that outdoor activities were important during the warmest months.

Storage Bins

Three masonry storage bins had been built inside living Room 9. Bins are sometimes used to store shelled and cob corn (Gilman 1983:124, 141), but there was no evidence of corn in these. Flotation samples revealed a number of unburned weedy plant seeds, including groundcherry and tobacco, that may have been stored in them, but modern contaminants may also be present (M. Toll, this report). Bin 3, however, contained crushed turkey eggshells and had a side entry that suggests its use for a turkey pen.

Two other features were classified as bins at the site (Table 7.5). These were much smaller and located in the plaza at the eastern end of the roomblock. OP 9 in Grid 35 was only a partly intact slab-lined box and morphologically could have been a firepit, although there was no evidence of burning. The other, in Grid 22, was attached to the dividing wall of Rooms 2 and 3 next to a plaza firepit containing a slab metate. Similar adobe bins were appended to walls at 29SJ 1360 (McKenna 1984), one within a mealing area. The bin at 29SJ 629, therefore, may have been associated with food preparation activities, possibly to hold corn.

Pot Rests

Only a few shallow circular floor basins might have served as possible rests for round-bottomed vessels. Their true function, however, is problematic, although all were located adjacent to firepits. The overall shape of these pits, which have flat bottoms, is unsuitable for holding the majority of vessel forms recovered from the site, except for bowls.

Wall Features

A small number of features penetrated pitstructure walls at 29SJ 629. Undoubtedly, wall cavities were also present in the aboveground buildings but were destroyed with wall collapse. Thus, these features must be seriously underrepresented in site totals, unlike those at Pueblo Alto where walls were standing to nearly their original height. At Pueblo Alto, wall niches were commonly associated with rooms containing firepits (Windes 1987a:303). Because of thin walls, only small-volume cavities could have been placed in the 29SJ 629 rooms.

In many aspects, wall niches can be equated with Other Pits in the floors. In both groups, many probably served for storage of small or bulk items. Wall cavity space may have been supplemented by floor cavities for storage. Particularly in Pithouse 3, the large niches more than made up for the inadequacy of floor storage space. The initial impression of Pithouse 3 was one of limited storage capacity, but when the niches are considered, its total volume for storage exceeds the other pitstructures. The latter contained few identifiable wall cavities.

Doors

No doors remained at 29SJ 629, although their presence seems certain where large slabs were set in the floor as steps next to a room wall. Slab steps were placed in Rooms 1 and 3, with the former indicating direct passage to the plaza and the latter, giving access to Room 2. In both cases, the slab elevated egress and ingress by 36 cm above the floor through a suspected door. We can only surmise that elevated doorways also existed into the storage rooms at the site, although no trace was evident. A stone (Plaza Wall 2) set flat on the plaza against the exterior wall of Room 7 probably provided a landing for door access to Room 7 from the plaza. Interestingly, in the three cases where doors can be postulated on the basis of associated features, none were located in the center of the wall, the most common location in other sites (see door locations at 29SJ 627 for a comparison; Truell 1992). Both living rooms had openings at ground level connecting them to the ramada-covered plaza. Finally, a door must have existed between the storage bins in living

Room 9 to allow direct access into the storage Room 8 behind it.

Ventilators

Air circulation was provided through two types of architectural conduits. Pitstructure ventilator tunnels and shafts are familiar Anasazi traits and need no elaboration here. At 29SJ 629, all three pitstructures exhibited this common ventilating system, although Pithouse 3 had two ventilators, one high above the floor in the southwestern corner (Figures 5.7, 5.19, 5.24-5.25; Plates 5.6, 5.12, 5.15-5.16). Small, square openings high in greathouse room walls may have been common to small houses as well, but structural deterioration always eliminates the possibility of finding them. Perhaps the rooms at 29SJ 629 were small enough that holes in the roof or separate roof entries sufficed.

Analyses of Features

Feature Diversity Indices

The distribution and frequency of different kinds of features are traditionally used by archeologists as indices of the functions of enclosed architectural space (e.g., storage, ceremonial, and living; see Hill 1970:37-40; Ciolek-Torrello 1985). Aside from the kinds of features present, their frequency and distribution can also be taken as clues to the use of space. Storage rooms, for instance, are often characterized by few features, if any, whereas living rooms yield a variety of features that mark the diversity of activities that took place within them. We might suspect that ceremonial rooms would fall somewhere between storage and living rooms in terms of the number and diversity of features. On this basis, categories are insensitive to finer divisions of room use (i.e., Ciolek-Torrello 1985) but may be useful for broad standardization. Additionally, the indices are influenced by how categories are selected and the frequency of features within each. For this study, uncertain features were dropped, and the broad Other Pit category divided into storage pits, mealing basins, ladder rests, and others, based on volume as indicative of probable functional differences. Of course, Other Pits that were postholes or vice versa, were placed in their respective functional classes.

The Shannon-Weiner diversity index ($\bar{H}$), borrowed from the field of ecology (Pielou 1969,1974), can be used as a measure of diversity between the types and frequencies of floor features in the rooms, pitstructures, and outdoor areas excavated at 29SJ 629. Low $\bar{H}$ values indicate the presence of few features and/or little variation in the types present; whereas high values indicate many features, a number of different feature types, or both. An evenness measure (J), derived from $\bar{H}$, measures how evenly the feature types are distributed in the sample. A maximum J value (1.0) reveals that all feature types occur in even numbers. The lower the J value, the more uneven the distribution of different feature classes in the room. For living rooms and pithouses we would expect a low J value and a high $\bar{H}$ value. Conversely, storage rooms should exhibit a low $\bar{H}$ value and a high J value, if any.

All floor and wall features were used in generating the indices. Although the majority or room walls had collapsed, it is unlikely they would have included the large volume niches that characterized pitstructures. Postholes were included because of their potential regarding room function (i.e., for room furniture), although most clearly held roof-support posts. Whether roofs or entries vary according to the type of rooms is uncertain. Discriminating for types of features, however, allows indices that may be more sensitive for diverse cultural activity. Thus, two lists of indices were generated--one for all features and one for those associated with food processing and storage activities (Table 7.7). The numerous Other Pits, less than 2 liters in capacity, were not included in the latter list.

The indices reveal some trends, which differ depending on the list consulted. When all features are considered, the greatest diversities are evident for the pitstructures, although not in the order expected for habitation versus ceremonial-dominated floors. To some, this might imply that considerable habitation activities took place in all the pitstructures, but this is misleading. Instead, inclusion of some rare features (multiple vents, ladder rests, a wall peg, deflector postholes, etc.) affected results, as well as other postholes and the numerous small-volume Other Pits. Additionally, the expected primary occupation floor for the site (Floor 2, Pithouse 2) revealed less

Table 7.7. *Shannon-Weiner diversity ($\overline{H}$) and evenness (J) values for assemblages of floor features in rooms, pitstructures, and outdoor work areas.*

	All Features				Food Processing and Storage Features[a]			
Provenience	$\overline{H}$	J	No. of Features	No. of Types	$\overline{H}$	J	No. of Features	No. of Types
Room 1, Floor 1			0	0			0	0
Room 2, Floor 1			1	0			0	0
Room 3, Floor 1	1.505	0.935	10	5	1.011	0.921	5	3
Room 3, Floor 2			1	1			1	1
Room 4, Floor 2	0.637	0.918	6	2			4	1
Room 5, Floor 1			2	1			0	0
Room 6, Floor 1			0	0			0	0
Room 7, Floor 1			0	0			0	0
Room 8, Floor 1			0	0			0	0
Room 9, Floor 1	1.242	0.896	6	4	1.242	0.896	6	4
Room 9, Floor 2	0.950	0.865	5	3	0.693	1.000	2	2
Kiva, Floor 1	1.680	0.863	16	7	0.693	1.000	2	2
Pithouse 2, Floor 1	1.707	0.877	17	7	1.213	0.875	8	4
Pithouse 2, Floor 2	1.653	0.795	29	8	1.617	0.902	15	6
Pithouse 2, Floor 2[b]	1.739	0.836	29	8	1.581	0.882	16	6
Pithouse 2, Floor 3	0.562	0.811	4	2	0.562	0.811	4	2
Pithouse 3, Floor 1	1.802	0.926	15	7	0.693	1.000	2	2
Pithouse 3, Floor 1[c]	1.876	0.964	15	7	1.581	0.982	9	5
Plaza, East side[d]	1.209	0.675	43	6	1.220	0.880	13	4
Plaza, North side[e]	1.242	0.896	6	4	1.242	0.896	6	4

[a] Firepits, heating pits, medium and large capacity Other Pits, wall niches, and mealing basins.
[b] If five Other Pits were reclassified as four postholes and one heating pit.
[c] If one Other Pit was reclassified as a heating pit.
[d] Includes Grids 8, 9, 12, 14, 15, 19, and 22, east of storage Rooms 5-8.
[e] Includes Grids 23-24, 29-30, 35-36, and 42-43, under and around Rooms 1-2.

diversity than other floors because several features used during occupation of Floor 1 could not be positively linked to the Floor 2 use, although some may have been used for both floors (e.g., the four mealing basins, a wall niche, and a firepit). When features associated with storage and food processing are considered alone, with the questionable features mentioned above, Floor 2 reveals the greatest diversity. Pithouse 3 shows the next greatest diversity, containing fewer, but all the same features as Floor 2 in Pithouse 2, except for mealing basins. Both the kiva and the uppermost floor in Pithouse 2 lacked the diversity and presence of features associated with food processing and storage on other floors.

Surface living rooms revealed less diversity than the pitstructures, but a more even distribution of them. Outdoor work areas revealed the least diversity of features (excluding the many featureless or nearly featureless storage rooms), but with evenness indices midway between the pitstructures and living rooms.

These values are similar to some of those generated for early (A.D. 600-800) pitstructure floors in the Dolores area, which may also be characterized as multifunctional habitation rooms (Breternitz 1982a:Table 9), and at Pueblo Alto (Windes 1987a:311). Low values, if any, however, characterize rooms interpreted as storage rooms. The low samples of diverse work areas at 29SJ 629 do not allow these indices to be particularly useful as independent measures of activity diversity at the site.

Conclusions

Despite ceramic and chronometric dates suggesting a lengthy site occupation, the 161 features do not seem excessive. A nearby site (29SJ 626 East), architecturally similar to 29SJ 629 and also yielding evidence of turquoise production, had very few features (Tables 7.1-7.2) for an occupation chronometrically dated at less than 75 years or, more likely, less than 50 years. Thus, for sites of similar size and age, feature frequency may be correlated to length of occupancy. In terms of feature frequency, the diversity of feature types, and feature redundancy, however, there does not seem compelling evidence to suggest that occupation was always intensive and continual throughout use of 29SJ 629. Few feature categories revealed multiple reconstructions or great redundancy over time. Except in Pithouse 2, less intensive occupation is also supported by the lack of extensive architectural remodeling and floor resurfacing that would be otherwise expected for a long term, intensive occupation. Pithouses generally seem to be occupied for only short periods, perhaps as little as 10 to 20 years, before abandonment (Ahlstrom 1988:638; Cameron 1990:161; Cordell 1984:314, 325; Schlanger 1987:579-589), but the evidence at 29SJ 629, 29SJ 627, and 29SJ 1360 and other sites in Chaco Canyon indicates exceptionally long use of many of these structures in the A.D. 900s and 1000s. Perhaps the two strategies are mixed in the Chaco Canyon archeological record: Occupations might have been relatively short and intense, but the limited resources and dry environment allowed and dictated that houses were reused over long periods of time before they were considered uninhabitable.

Features at 29SJ 629 reveal spatial and temporal patterning that provide clues to different functions within the site. Additionally, groupings of feature types by size, shape, and capacity provided some meaningful clues to pit function. There is a clear dominance of features of all types in a few spatially distinct areas, attesting to their presumed multifunctional use. Most rooms reveal few features and less pit diversity, in keeping with an interpreted storage function. Rooms that contain features suggestive of living rooms (e.g., firepits, mealing catchment basins, storage pits, heating pits, etc.) are dissimilar.

Mealing catchment basins, heating pits, and firepits occurred in groups in different settings of the site. These may be interpreted as serving similar functions for the same groups but in different spatial contexts--in living rooms, in pitstructures, and in the plaza--perhaps marking seasonal shifts in work areas at the site.

Heating pits were associated with firepits at 29SJ 629 and other small sites. In other cultures, they have been suggested as complementary to firepits (e.g., Binford 1983:158; Jennings et al. 1980:39), and that is the case at 29SJ 629.

Mealing bins, an important piece of domestic room furniture, were rare at the site, but catchment basins were grouped about the site, suggesting use by the two families or social groups occupying the site. Seasonal shifts in locale for food grain reduction at the site is suggested by the spatial distribution of the basins. This is in contrast to the rise and disappearance of mealing bins shortly afterwards in the A.D. 1000s and early A.D. 1100s at Pueblo Alto. This suggests changing environmental conditions and shifts in greathouse occupation (Windes 1987a:302; 1987c).

The norm in the pitstructures was multitudes of small pits and cavities that are inadequate for any storage needs. Many of these were probably created by various kinds of room furniture for which there is no other trace (e.g., ladder rests, auxiliary posts and poles) or for some sort of special use (e.g., sipapus).

The large, bell-shaped, plaza pits are particularly interesting because of their potential for marking strategies of occupational duration and food procurement at 29SJ 629. Spatially, they are linked to loci of food processing but whether the food stored in them was for different harvests over the years or for processed food for more immediate consumption is difficult to ascertain. If the site was periodically abandoned during the colder months, these pits may have held surplus foods as similar pits did for mobile groups. Long-term food storage was probably initially kept in the tub rooms (Rooms 5-7), but these may have been used later for turquoise production and storage, with the plaza pits replacing them for food storage. Finally, the spatial arrangement of the large plaza pits also suggests their division between the two residential groups at the site.

8

TEMPORAL CONTROL AT 29SJ 629

Establishment of the chronology at the Spadefoot Toad Site (29SJ 629) was based on ceramic seriation and a number of different chronometric techniques. Absolute dates were obtained from dendrochronology, carbon-14, archeomagnetism, and obsidian hydration, producing a bewildering range of results (Table 8.1). Although a multichronometric approach was desired, it produced multiple problems that were not easily resolved (for a similar situation, see Windes 1987a:Chapter 8). In general, chronometric dates were less fruitful than control exercised for architectural, stratigraphic, and ceramic variability. This was partly resolved in 1992, however, when the archeomagnetic dates were reevaluated and new radiocarbon dates were obtained.

Dendrochronology

One hundred and seventy-one pieces of wood from small poles and a single large diameter viga were submitted for tree-ring analysis, but the return was a meager four dates. The majority of wood fragments, 4-5 cm in diameter, carbonized, and representing a variety of tree species (Table 8.2), was recovered from Room 9 (150 samples). It was surprising to find so many species of wood from what seemed to be a single burned wooden architectural framework. The mix of species suggested multiple structural frameworks that were burned, a single renovated framework, or one that had been built of scavenged materials.

The presence of ponderosa pine and Douglas fir in the room mirrors the coeval use of these large conifers in the greathouses, suggesting that wood procurement by the late A.D. 900s or earlier was similar to greathouse strategies. Because roofs at 29SJ 629 did not need to be spanned by long timbers, unlike the greathouse rooms, there was no compelling reason to expect that large conifers were needed unless local species (cottonwood, pinyon pine, and juniper) had been depleted, the small-house residents were directly involved culturally and economically in large-conifer procurement, or the wood was procured from greathouse stocks through exchange. By the late A.D. 900s or early A.D. 1000s, local species were no longer in heavy demand for greathouse construction, probably because of depletion, conservation practices, or a combination of both (Windes and Ford 1992). Thus, wood obtained for small houses and greathouses may have derived from a common procurement strategy.

Only one of the 150 samples submitted for dating from Room 9 was dated (at A.D. 792vv), but even considering extensive ring loss, a tree-ring death date in the A.D. 800s does not coincide with the ceramic evidence that suggests a much later initial occupation. Thus, this date does little to assist in interpreting the occupation chronology.

Except for the rotten poles covering the Pithouse 2 subfloor ventilator, no wood was found in situ at 29SJ 629. A single date from one of these poles (A.D. 987vv) is meaningful due to its surprising lateness and context. It is probable that this lintel reflects remodeling of the ventilator system from a floor-level type ventilator, typical of Pueblo I pithouses, to a subfloor variety more commonly

Table 8.1. Absolute dates and related data from 29SJ 629.

Laboratory No.	Provenience	Species/Tool Type	Date
Dendrochronology[a]			
CNM #241	Room 9, Level 1-2	Ponderosa pine	A.D. 0720 - 0792 vv
CNM #347	Pithouse 2, Layer 7, SE corner	Pinyon pine	A.D. 0737p - 0813 vv
CNM #348	Pithouse 2, Layer 7, SE corner	Pinyon pine	A.D. 0875fp - 0943 vv
CNM #350	Pithouse 2, Vent. tunnel lintel	Pinyon pine	A.D. 0942p - 0987 vv
Radiocarbon[b]			
Dic #793	Pithouse 3, Heating Pit 1 (fill)	Sarcobatus/Atriplex and Artemisia	A.D. 960 ± 80
SI-3713	Pithouse 2, Floor 2, Heating Pit 3 (fill)	Sarcobatus/Atriplex	A.D. 1340 ± 55
SI-3714	Plaza Grid 29, Firepit 5 (Layer 5)	Sarcobatus/Atriplex	A.D. 875 ± 55
SI-3715	Plaza Grid 14, Firepit 6 (Layer 3)	Sarcobatus/Atriplex and Juniperus	A.D. 555 ± 50
CAMS-8185	Plaza Grid 16, Level 2	Corn kernel	A.D. 912 ± 136
SI-3716	Room 3, Floor 1, Heating Pit 1 (fill)	Sarcobatus/Atriplex and Artemisia	A.D. 1020 ± 65
Beta-51961	Grid 2/3, Heating Pit 1, Layer 2	Sarcobatus/Atriplex	A.D. 760 ± 60
Beta-51962	Pithouse 2, Floor 2, HP 3 (fill)	Sarcobatus/Atriplex	A.D. 830 ± 60
Beta-51963	Pithouse 2, Floor 2, HP 3 (fill)	Sarcobatus/Atriplex	A.D. 900 ± 50
Beta-51964	Pithouse 2, Floor 2, HP 4 (fill)	Sarcobatus/Atriplex & Artemisia	A.D. 1010 ± 60
Beta-51965	Pithouse 2, Subfloor 2, Layer 3	Sarcobatus? & Artemisia?	A.D. 900 ± 90

Table 8.1. (continued)

Laboratory No.	Provenience	Species/Tool Type	Date
Archeomagnetic[e]			
ESO #1297	Room 3, Floor 1, Firepit 1 sides		A.D. 1022 ± 92
ESO #1462	Room 3, Floor 1, Firepit 1 bottom		A.D. 988 ± 69
ESO #1407	Room 3, Floor 1, Heating Pit 1		A.D. 987 ± 68
ESO #1406	Room 3, Floor 1, Heating Pit 2		none
ESO #1408	Room 3, Floor 1, Heating Pit 3		none
ESO #1409	Room 3, Floor 2, Firepit 2		A.D. 813 ± 129
ESO #1404	Room 5, tub floor (burned spots)		none
ESO #1514	Room 5, west wall mortar (unburned)		none
ESO #1403	Room 9, Floor 1, Firepit 1 (last burn)		A.D. 998 ± 69
ESO #1415	Room 9, Floor 1, Firepit 1 (first burn)		A.D. 953 ± 54
ESO #1410	Kiva, Floor 1, Firepit 1 (first burn)		none
ESO #1458	Pithouse 2, Floor 1, Mealing Bin 1		A.D. 1047 ± 46
ESO #1414	Pithouse 2, Floor 1, Mealing Bin 2		none
ESO #1417	Pithouse 2, Floor 2, Heating Pit 2		none
ESO #1416	Pithouse 2, Floor 2, Heating Pit 3		none
ESO #1419	Pithouse 2, Floor 2, Heating Pit 4		none

Table 8.1. (continued)

Laboratory No.	Provenience	Species/Tool Type	Date
ESO #1431	Plaza Grid 14, Firepit 2 (last burn)		A.D. 978 ± 83
ESO #1412	Plaza Grid 14, Firepit 2 (earlier burn)		none
ESO #1411	Plaza Grid 16, Heating Pit 1		A.D. 976 ± 60
Obsidian Hydration[d, e]			
OHL 7690	Room 2, E. 1/2, Level 1 (FS 242)	Flake	none
OHL 7692	Plaza Grid 16, Level 1 (FS 1965)	Flake	none
AHC89-153	Trash Midden Grid 65, Level 4 (FS 1512)	Flake	A.D. 309 ± 90
AHC 89-152	Trash Midden Grid 65, Level 4 (FS 1512)	Point fragment break Point fragment manufacture	A.D. 1074 ± 59 A.D. 972 ± 62
AHC 89-147	Trash Midden Grid 70, Level 1 (FS 616)	Flake	A.D. 871 ± 97
AHC 89-149	Trash Midden Grid 70, Level 1 (FS 619)	Flake	B.C. 747 ± 119 A.D. 630 ± 84
AHC 89-151	Trash Midden Grid 71, Level 1 (FS 514)	Point fragment Point fragment manufacture	A.D. 882 ± 76 A.D. 860 ± 77
AHC 89-150	Pithouse 3, Level 8 (FS 2341)	Flake	A.D. 596 ± 86 A.D. 1048 ± 70
AHC 89-145	Kiva, Level 11 (FS 2012)	Flake	none

Table 8.1. (continued)

Laboratory No.	Provenience	Species/Tool Type	Date
AHC 89-148	Pithouse 3, Layer 2 (FS 2513)	Flake	A.D. 1052 $\pm$ 94
ACH 89-146	Pithouse 3, Layer 3 (FS 2605)	Flake	A.D. 1418 $\pm$ 69

[a] Laboratory of Tree-Ring Research, University of Arizona, Tucson, AZ.
[b] Beta Analytic, Inc., Miami, FL; Dicarb Radioisotope Company, Gainesville, FL; and the Radiation Biology Laboratory, Smithsonian Institution, Washington, D.C. Dates listed are uncorrected.
[c] Earth Sciences Observatory, University of Oklahoma, Norman, OK. Dates calculated from plots on the 1990 Wolfman Southwestern curve.
[d] Archaeological and Historical Consultants, Centre Hall, PA; and Obsidian Hydration Laboratory, U.C.L.A.
[e] Dates as of June 1992 based on 1989-1992 soil temperature data.

Table 8.2. *Species of samples collected for dendrochronology at 29SJ 629.*

Provenience	Species	No.	Form/Function
Room 2, Layer 2	Ponderosa pine	5	Charcoal
	Pinyon	2	Charcoal
	Non-conifer	2	Charcoal
	Total	9	
Room 9, fill-floor	Ponderosa pine	47	Carbonized roofing
	Pinyon	12	Carbonized roofing
	Non-conifer	17	Carbonized roofing
	Populus sp.	34	Carbonized roofing
	Juniper	37	Carbonized roofing
	Douglas fir	3	Carbonized roofing
	Total	150	
Room 9, Firepit 1, fill	Ponderosa pine	2	Carbonized fuel
Kiva, Level 9	Populus sp.	1	Unburned viga
Pithouse 2, Layer 2	Pinyon	1	Carbonized roofing?
Layer 5	Ponderosa pine	1	Carbonized roofing?
Layer 7	Pinyon	2	Carbonized roofing?
Floor 1	Pinyon	3	Carbonized roofing?
Vent. tunnel	Pinyon	1	Vent. lintel #4
Vent. tunnel	Juniper	1	Vent. lintel #5
	Total	9	
Trash Midden, Test Trench 1, Layer 2	Pinyon	1	Charcoal
Trash Midden, Grids 52-53, Level 1	Juniper	1	Charcoal

associated with late Pueblo II kivas.

The dated lintel came from a small diameter (3.3 cm) pinyon that was over 45 years old. Judging from the tree age and size of lintel, few exterior rings could have been missing, so that a date for the ventilator construction at about A.D. 1000 is probable. To check this reasoning against other data, all eight pinyon poles with vv (unknown number of outside rings were missing) dates (five of them lintels) from well-dated contexts at Pueblo Bonito (from the 1987-1989 Chaco Wood Project) revealed only a 6.8 year difference between the presumed tree death and the vv date. All 17 dated pinyon specimens from Pueblo Bonito (11 of them lintels), with an average diameter of 7.1 cm, yielded 10.44 rings per every 10 mm of diameter. Either way the 29SJ 629 lintel date is calculated using the Pueblo Bonito estimates, it is close to A.D. 1000, confirming that it can be considered a near cutting date.

A few small, carbonized, pole fragments, possibly roofing, were recovered on or just above the pithouse upper floor, but only two pieces of pinyon dated. The piece found on the Pithouse 2 floor near the ventilator that dated at A.D. 943vv was approximately 3-4 cm in diameter and suggests possible construction, repair, or remodeling in the pithouse sometime after A.D. 943. The other piece, dated at A.D. 813vv suggests either extensive ring-loss, which seems unlikely given its diameter of 4.4 cm, or a piece of old or reused wood. The date of the ventilator lintel, at least, suggests an event that may coincide with the reflooring of the pithouse, when many of the Floor 2 pits, used for domestic activities, were discontinued. Otherwise, dendrochronology did little to help refine the period of site occupancy or resolve intersite temporal variability.

Carbon-14

Ten radiocarbon (C-14) dates were obtained from hearths at 29SJ 629. To avoid old wood problems, in all cases, carbonized brush was selected for sampling. Initially, five of these were not grouped by provenience so that a statistical evaluation could not be made for individual sample results. Thus, intuitive judgment and archeological contexts were used to assess the dates (Table 8.3). As a group, these five revealed mixed results. Two of them were centuries in disagreement so that contamination of the samples was suspected (i.e., Baker 1991:Appendix A; Windes 1987a:214-220). Two others, from Room 3 and Pithouse 2, yielded results that were similar to archeological expectations.

As a group, however, these five were suspect, despite recalibration with tree-ring dating (e.g., Stuiver and Reimer 1987). Adjustments for stable carbon ratios (C^{13}/C^{12}) were not made for any samples in the initial group of five. This adjustment could make considerable difference in the radiocarbon age, as revealed by the 1992 analyses of five more samples sent to Beta Analytical. For the latter, the initial mean ages differed by 110 to 230 years, after the dates were adjusted.

In the second group (Table 8.3), four samples were submitted to date the presumed earliest structure on the site, Pithouse 2. Samples from Floor 2 heating pits and a concentration of charcoal under Floor 2 provided four samples from which to assess the Floor 2 occupation. These were from the same archeological period of time. Because of the large amount of charcoal, Heating Pit 3 yielded two samples, which were averaged to yield a date of use at A.D. 952 $\pm$ 62 (2 σ). These two samples are instructive for evaluating the poor results of the earlier samples: initially a sample from Heating Pit 3 was dated at A.D. 1347 $\pm$ 66 (2 σ), much too late for the archeological evidence.

All four Floor 2/subfloor Floor 2 samples came from the same period of time statistically. When averaged, they yielded a date of A.D. 988 $\pm$ 41 (2 σ) with 95 percent confidence that Floor 2 use was between A.D. 947 and 1029. It was noteworthy that the latest tree-ring date, at A.D. 987vv, was nearly identical to the mean radiocarbon date, thus providing additional confidence in the accuracy of the latter date. Although the firepit and heating pits from Floor 2 in Pithouse 2 were also sampled for archeomagnetic results, none dated. A later burn from Floor 1, which probably marked abandonment of the pithouse, gave an archeomagnetic date of A.D. 1035 $\pm$ 35, which was in agreement with the ceramic evidence.

Finally, Heating Pit 1, in Grids 2 and 3 behind Room 8, was radiocarbon dated. The position of this firepit behind the roomblock suggested that it was used late in the primary occupation with Room 8, which may have had a back exit. A lack of cultural material, however, prevented an assessment of its age, although some of the earliest site ceramics came from behind the surface rooms. The recalibrated radiocarbon date, A.D. 825.5 $\pm$ 138.5 (2 σ), suggested that the firepit was used during the initial part of the site occupation. The date fits with the early ceramics recovered from the site, however, not enough charcoal was left to process a second sample for confirmation of the date. Another date was received too late for here (Table 8.3, note).

Archeomagnetism

Eighteen burns were sampled for archeomagnetic analysis at 29SJ 629, while a nineteenth was taken from unburned wall mortar under Room 5. Despite the many well-oxidized adobe samples, none were strongly magnetized. In contrast, samples taken from the nearby sites of 29SJ 625 (Figure 8.1, Table 8.4) and 29SJ 626 (East) yielded good results, both suggesting occupation in the late A.D. 900s and early A.D. 1000s, indicating coeval occupations with 29SJ 629.

Two events at the site may have affected the poor 29SJ 629 (and 29SJ 627) results and could have caused magnetic problems, aside from possible beds of iron-filled concretions common to the local geology. First, the site locations in the rincon were subject to flooding. The small, deep gully just north of 29SJ 629 probably was responsible for much of the post-site deposition. Samples taken from features that have clearly been affected by extremely wet conditions have generally yielded poor results for archeomagnetic (and radiocarbon) samples taken during the Chaco Project. A thorough wetting may dilute the adobe and place the iron particles in suspension, thus reorienting them and causing poor archeomagnetic results.

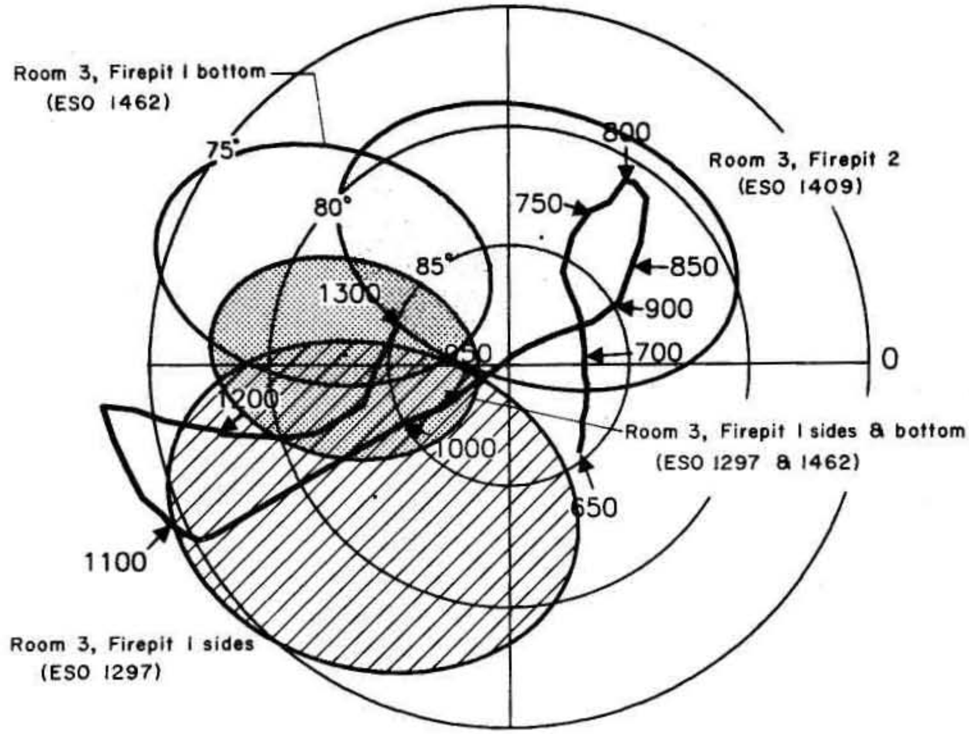

Figure 8.1a. *Oval of confidence plots of archeomagnetic samples along the Wolfman (1990) Southwestern VGP curve. 29SJ 629, Room 3 (NPS 310/82804 A).*

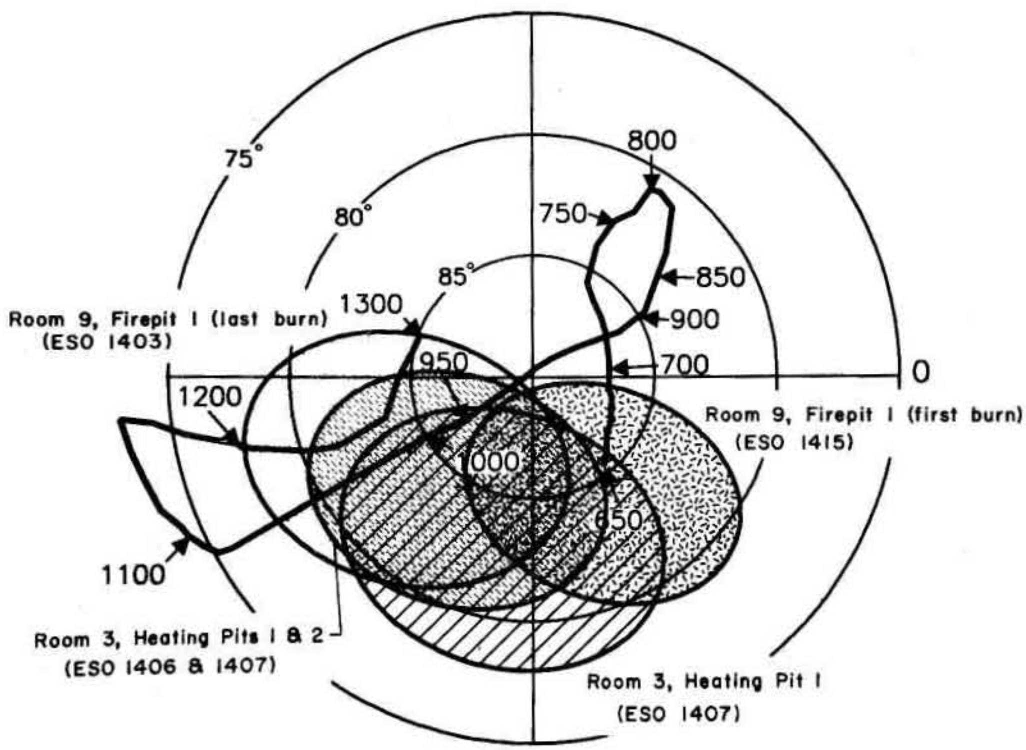

Figure 8.1b. *Oval of confidence plots of archeomagnetic samples along the Wolfman (1990) Southwestern VGP curve. 29SJ 629, Rooms 3 and 9 (NPS 310/82806 A).*

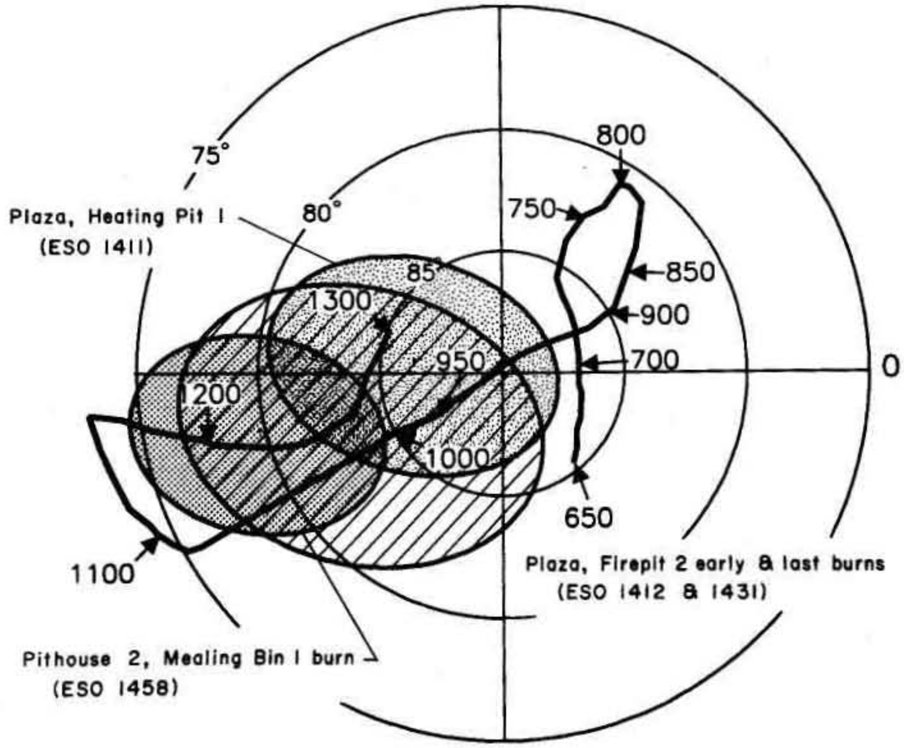

Figure 8.1c. *Oval of confidence plots of archeomagnetic samples along the Wolfman (1990) Southwestern VGP curve. 29SJ 629, Plaza and Pithouse 2 (NPS 310/82805 A).*

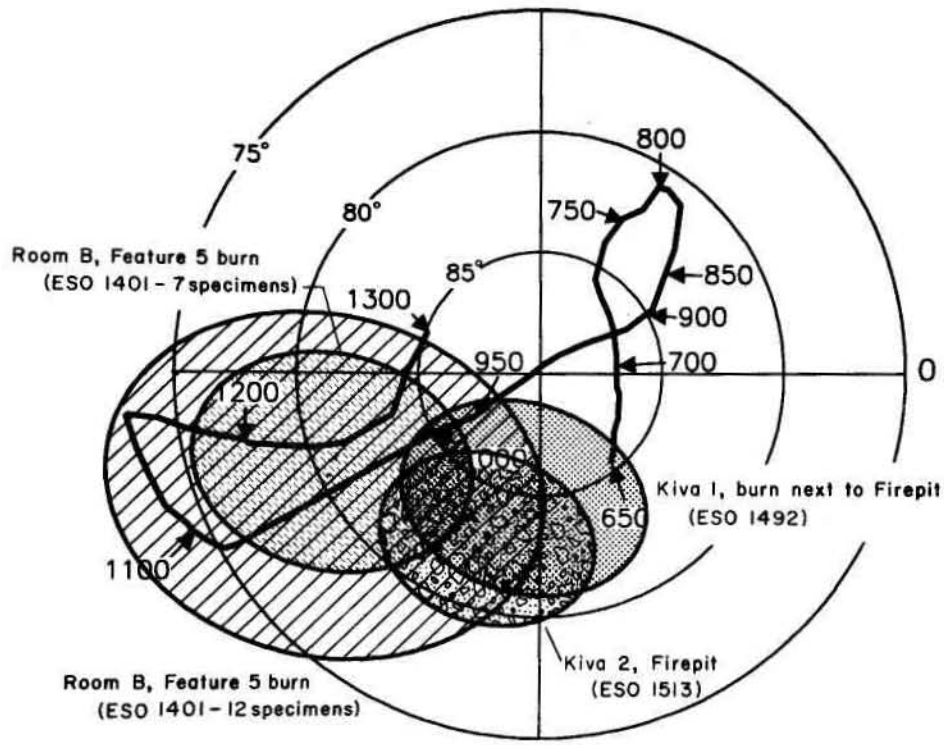

Figure 8.1d. *Oval of confidence plots of archeomagnetic samples along the Wolfman (1990) Southwestern VGP curve. 29SJ 625 (3-C Site), kivas and Room B (NPS 310/82807).*

Table 8.3. Radiocarbon dates from 29SJ 629.[a]

Provenience	Lab No.	Est. Date	BP Date	AD Date[b]	Calibrated AD Date	Mean Date	Sigma	Probability Distribution	DATE: Accept/ Reject[c]
Room 3, Fl. 1, Heating Pit 1	SI-3716	early 1000s	930±65	1020±65	1023-1160	1091.5	1	1.00	A
					986-1227	1106.5	2	1.00	A
Pithouse 2, Fl. 2, Heating Pit 3	SI-3713	early 1000s	610±55	1340±55	1296 1331	1313.5	1	.42	R
					1344-1375	1359.5	1	.37	R
					1281-1413	1347.0	2	1.00	R
Heating Pit 3	Beta-51962	early 1000s	900±60	830±60	862- 989	925.5	1	1.00	A
					780-1016	898.0	2	1.00	A
Heating Pit 3	Beta-51963	early 1000s	830±50	900±50	949-1022	985.5	1	.91	A
					881-1046	963.5	2	.98	A
Heating Pit 3	Beta-51962-51963	early 1000s	1087.7±38.4	862.3±38.4	898- 920	909.0	1	.25	R
					943- 999	971.0	1	.75	R
					890-1014	952.0	2	1.00	A
Heating Pit 4	Beta-51964	early 1000s	830±60	1010±60	1026-1068	1047.0	1	.34	A
					1071-1128	1099.5	1	.46	R
					1133-1158	1145.5	1	.20	R
					993-1220	1106.5	2	1.00	A
Subfloor 2, Layer 3	Beta-51965	900s	910±90	900±90	881-1046	963.5	1	.91	A
					776-1185	980.5	2	1.00	A
Pithouse 2, Fl.2 (4 dates averaged)	Beta-51962-51965	900s	1039.7±30.4	910.3±30.4	979-1016	997.5	1	1.00	A
					947-1029	988.0	2	.96	A
Pithouse 3, Fl. 1, Heating Pit 1	Dic-793	late 900s	990±80	960±80	981-1133	1057.0	1	.88	A
					878-1221	1049.5	2	1.00	A
Plaza Grid 2/3, Heating Pit 1	Beta-51961	unknown	960±60	760±60	765- 897	831.0	1	.91	A
					687- 964	825.5	2	1.00	A
Plaza Grid 35, Firepit 5	SI-3714	early 1100s	1075±55	875±55	935-1001	968	1	.64	A
					851-1033	942	2	.92	A
Plaza Grid 14, Firepit 6	SI-3715	early 1000s	1395±50	555±50	598- 672	635	1	.99	R
					541- 693	617	2	.96	R

[a] Calculated by the Radiocarbon Calibration Program (1987), Revision 2.1 (University of Washington, Quarternary Isotope Laborarory). See Stuiver and Reimer (1987). Lab error multiplers included for all dates listed.

[b] Beta Analytic dates adjusted for C13/C12 ratios.

[c] Rejected or accepted on archeological grounds (context and ceramics) for the given time span.

Note: Corn kernel from Plaza Grid 16, Level 2 (FS 2435) AMS dated (Jan. 1994) by Lawrence Livermore Lab, CA. CAMS-8185: calibrated at 2 sigma: A.D. 776-1048 (.98 prob. distrib).

Table 8.4. *Archeomagnetic results from 29SJ 629 and 29SJ 625 (3-C Site).*[a]

ESO Lab No.	No. Spec.[b]	Demag Level	Declin.	Inclin.	Major Axis Pole	Minor Axis Pole	k	VGP Paleo-Lat.	VGP Paleo-Long	Alpha 95	Dubois Date (A.D.)	Wolfman Date (A.D.)	Archeo-logical Est. Date	Date: Accept/Reject
29SJ 629:														
1297	10/10	NRM	355.1	61.6	6.7	8.7	75	82.2	-135.7	5.6	990	930-1114	1000-1050	A
	10/10	50G	357.6	56.2	6.6	9.2	59	88.0	-175.3	6.4				
1403	9/9	NRM	358.3	60.1	5.5	7.3	116	84.8	-122.2	4.8				
	9/9	100G	354.9	59.6	5.1	6.8	130	84.1	-148.5	4.5	1030	929-1067	1000-1050	A
1404	9/9	NRM	355.4	62.5	13.7	17.5	22	81.4	-130.7	11.2	1060[c]	none	1000-1050	A
1406	10/9	NRM	349.6	54.3	8.1	11.6	40	81.4	157.5	8.2				
	10/8	50G	354.4	54.7	5.8	8.2	92	85.4	154.0	5.8	none	none	1000-1050	–
1407	10/9	NRM	9.3	62.0	4.4	5.7	195	79.8	- 65.9	3.7	1000	-	1000-1050	A
	10/10	50G	1.2	61.3	5.3	6.8	119	83.5	-100.1	4.4	-	919-1054		
	20/18													
1407+1406		NRM	358.0	60.2	4.8	6.3	70	84.6	-124.5	4.1	1020	934-1054	1000-1050	
														A
1408	12/12	NRM	346.1	50.0	10.8	16.2	14	77.3	141.8	12.1				
	12/12	50G	351.3	48.5	10.6	16.1	14	80.2	123.0	12.2	1000[c]	none	1000-1050	A
1408+1407	22/20	NRM	357.3	59.5	6.0	8.0	39	85.2	-132.8	5.3				
	22/21	50G	357.6	56.2	6.2	8.6	29	87.9	-174.4	6.0	990	none	1000-1050	A
1409	12/12	NRM	355.3	50.6	14.0	20.8	9	83.9	113.2	15.4				
	12/9	50G	359.6	49.7	5.7	8.5	66	84.5	75.7	6.4	980[c]	684-942	950-1000	A
1410	10/8	NRM	342.0	63.1	6.1	7.7	129	73.9	-160.2	4.9	1110	none	1100-1150	A
	10/10	100G	343.0	63.6	15.0	18.9	17	74.2	-157.1	11.9				
1411	11/11	NRM	355.6	56.0	4.3	6.0	120	86.4	171.5	4.2	none	916-1035	1000-1050?	–
	11/11	50G	357.5	53.0	5.2	7.4	73	86.8	113.6	5.4				
1412	8/7	NRM	347.7	60.2	10.2	13.5	47	79.1	-166.4	8.9				
	8/7	50G	345.7	58.8	8.0	10.8	71	78.1	-176.3	7.2	1140	none	1000-1050?	R?
1414	10/10	NRM	346.7	64.6	6.9	8.5	84	75.5	-147.3	5.3	1090[c]	none	1000-1050	?
1415	7/7	NRM	8.6	60.5	4.4	5.8	255	81.4	- 59.7	3.8	950[c]	899-1007	950-1025?	A
	7/7	50G	5.5	58.6	4.3	5.8	237	84.6	- 56.8	3.9				
1416	11/11	NRM	6.1	66.5	13.3	16.2	22	76.3	- 90.7	9.9	1000[c]	none	900-1000	A

Table 8.4. *(continued)*

ESO Lab No.	No. Spec.[b]	Demag Level	Declin.	Inclin.	Major Axis Pole	Minor Axis Pole	k	VGP Paleo-Lat.	VGP Paleo-Long	Alpha 95	Dubois Date (A.D.)	Wolfman Date (A.D.)	Archeo-logical Est. Date	Date: Accept/ Reject
1417	8/8	NRM	3.3	62.3	7.9	10.1	73	82.0	- 90.4	6.5				
	8/8	50G	0.7	59.5	5.3	7.0	142	85.7	-100.5	4.7	1000[c]	none	900-1000	A
1419	9/8	NRM	342.8	61.7	9.7	12.6	47	75.1	-165.4	8.2	1130	none	900-1000	R
	9/8	50G	338.9	55.6	10.5	14.7	30	73.0	168.7	10.3				
1431	8/8	NRM	358.4	57.1	6.9	9.4	74	87.9	-145.3	6.5	1010	895-1061	1000-1050?	A
	8/8	50G	0.3	57.9	9.8	13.3	39	87.4	-103.4	9.0				
1431+1412	16/15	NRM	353.7	58.6	5.6	7.6	57	84.0	-162.5	5.1	1030	926-1077	1000-1050?	A
	16/15	50G	353.7	58.5	6.1	8.4	47	83.9	-163.8	5.7				
1458	8/7	NRM	345.6	57.5	4.0	5.5	261	78.4	176.6	3.7				
	8/8	150G	348.4	59.9	3.9	5.2	259	79.8	-167.0	3.5	1125	1001- 1093	900-1000	A/R
1462	13/13	NRM	349.6	53.1	4.9	7.0	68	81.1	149.5	5.1	1070,1100	919-1057	1000-1050	A/R
	13/12	50G	348.8	60.6	7.1	9.3	51	79.6	-161.4	6.1	1160[d]			
1462+1297	23/23	NRM	351.7	56.8	4.2	5.7	60	83.2	176.3	3.9	1190	933-1058	1000-1050	A/R
1514[e]	16/16	NRM	354.4	52.6	20.4	29.5	4	84.6	132.7	21.4	none	none	875-925	--
<u>29SJ 625</u>:[f]														
1401	13/12	NRM	347.2	63.0	7.3	9.3	55	77.1	-153.1	5.9				
	13/12	50G	350.6	61.2	7.0	9.1	55	80.4	-154.2	5.9		938-1302		
	13/7	50G	350.7	60.6	4.4	5.8	251	80.9	-157.4	3.8	1060[c]	967-1078	1000-1050	A
1492	12/12	NRM	10.7	61.9	6.0	7.7	77	79.1	- 61.9	5.0				
	12/9	100G	1.3	60.0	3.9	5.1	230	85.0	- 96.8	3.4	1000c	917-1023	950-1050	A
1513	10/10	NRM	4.2	63.3	7.4	9.4	67	80.6	- 89.5	5.9				
	10/10	200G	0.1	61.8	3.5	4.5	279	83.0	-107.7	2.9	1020	936-1040	900-1100[g]	A

[a] Based on a Longitude of 108.0° and Latitude of 36.0° for both sites. Demagnetization level is in gauss (NRM = natural remanent magnetization). Alpha 95 is in degrees of the oval of confidence about the VGP (virtual geomagnetic pole).
[b] Number of specimens collected/number of specimens used in final results.
[c] DeBois pole position is far from plotted curve. Date is interpreted as if position were on or close to curve. All dates are estimates because of high alpha-95 values except those from 29SJ 625 and #1458.
[d] Sample was from unburned mortar. Plot results were highly dispersed.
[e] Sample was from unburned mortar. Plot results were highly dispersed.
[f] 29SJ 625 (3-C site) contexts: 1401 = Room B, Feature 5, burn; 1492 = Kiva 1, burn on floor next to Firepit; 1513 = Kiva 2, uppermost floor, Firepit.
[g] Truell (1986:Table 2.3) dates this pitstructure in the A.D. 900s-early 1000s. Windes believes that it was later.

A second possibility for the poor results may have been caused by settling of the site (Robert DuBois, personal communication 1988). Earthquakes are known from the San Juan Basin (one occurred in Chaco Canyon in March 1977: Cecil Werito, personal communication 1989), which may have disturbed the sediments, but poor archeomagnetic results are not a widespread problem in Chaco Canyon. More likely, extensive flooding of the site, which is built on alluvial sands, may be the primary cause of problems by diluting the magnetic properties of the features as well as causing localized settling.

All archeomagnetic samples were initially analyzed and dated by Robert DuBois, based on his revised southwestern curve of 1989 (DuBois 1989). Recently, these were replotted by Daniel Wolfman on the basis of two newer southwestern curves spanning A.D. 650 to 1300. There is some disagreement about the exact paths of southwestern magnetic secular variation (Eighmy and Sternberg 1990), and these represent just two possible interpretations. The early curve (SWCV 590) between A.D. 650 and 950 was derived primarily from work in the Dolores, Colorado, area (Eighmy and Klein 1990), while that between A.D. 1000 and 1300 came from the revised Wolfman curve of 1990, which was based on an earlier segment devised by DuBois and Wolfman. The path between the two curves was extrapolated to cover the A.D. 950 to 1000 era. Unfortunately, this span falls directly within the main site occupation, so that some loss of temporal control must be expected. Nevertheless, some meaning of the temporal occupation at the site is possible, although intrasite events based on time are difficult to make with confidence.

Only 9 of the 18 samples were plotted, plus some sets were combined. Those with large alphas were exempt from the reanalysis because their plots covered so much of the curve that temporal interpretations were meaningless. The remainder often overlapped two or more segments of the curve so that multiple dates were possible. When samples plotted off the curve, the center points of the plots were shifted perpendicular to rest on the curve. Then the date was extrapolated (by the author) from the limits of the oval of confidence (Figure 8.1) with the date span increased by five years at either end (see Eighmy and Sternberg 1990).

Because of the lack of archeological evidence, dates later than the mid-A.D. 1100s and earlier than the mid-A.D. 800s were rejected when an option included the A.D. 900s-1000s span. While the results were insensitive for intrasite interpretations, as a group, the majority of samples yielded redundant results that supported a site occupation in the A.D. 900s and 1000s.

The earliest date at the site derived from a firepit under the floor of Room 3, which probably was used during the early site occupation prior to room construction. The archeomagnetic date supported the archeological interpretation--its distinctly early plot intercepted the looping curve between about A.D. 684 and A.D. 942. An early to mid A.D. 900s date is suggested.

The samples from Firepit 2 and Heating Pit 1 in the plaza, and the uppermost floor in Room 3 generally support a late A.D. 900s/early A.D. 1000s use. These dates agree with the ceramic evidence (see below). The presumed latest sample from the site, in the Kiva, could not be dated.

The latest archeomagnetic date came from the highly oxidized mealing bins in Pithouse 2. These bins were apparently burned in an attempt to destroy the pithouse at or after its abandonment. We know that this occurred after A.D. 987 from a tree-ring dated ventilator lintel. Ceramic vessels left at abandonment suggest deposition at about A.D. 1040. Thus, the archeomagnetic date of A.D. 1001-1093 agrees with the other evidence.

In two instances, multiple firepit burns were sampled. Firepit 2 in the plaza yielded very different plots for the two burns, but as a set they spanned the A.D. 926-1077 span. Although an early date was plausible for the outdoor firepit, probably it was an early A.D. 1000s feature.

The firepit in Room 9 yielded two distinct constructions, with the earliest plot falling on the curve before A.D. 700, although it plotted just off the A.D. 950 span. When the plot was moved to the later segment, it was still one of the earliest dates from the site (A.D. 899-1007), but probably marked an A.D. 900s use. The latest firepit construction and use dated between A.D. 989 and 1067. Although the late Gallup Black-on-white jar lying in the firepit (Plate 8.11b) seems anomalous and probably dates to the late A.D. 1000s/early A.D. 1100s, it may have been related to the last firepit use.

Archeomagnetic results did not provide the kind of precise dating that is possible for 18 samples, but results agreed with other dating methods for a primary occupation in the A.D. 900s and 1000s. Additional demagnetization of the samples could reduce the error range of many samples (Daniel Wolfman, personal communication 1992) that could provide refined intrasite temporal comparisons.

Obsidian Hydration

An independent method of verifying the initial and early occupations at the site was attempted in 1989 with obsidian hydration. Obsidian processed by MOHLAB for Pueblo Alto material appeared chronologically promising (Windes 1987a:235-240), however, MOHLAB is no longer in business. Instead, samples were processed by Archaeological and Historical Consultants (AHC). Theoretical and analytical differences, however, existed between the two laboratories (Christopher Stevenson, personal communication 1989). Importantly, AHC has not calculated the hydration rates for many obsidian sources and is reluctant to use those devised by MOHLAB.

Obsidian from Chacoan Pueblo II sites, including 29SJ 629, is rare, with much of it in the form of projectile points that one hesitates to mar by hydration cuts. A mere 39 pieces of obsidian were recovered from 29SJ 629 from a total inventory of 7,022 chipped stones (Cameron, this report), 0.6 percent of the total. Many of these were too small for hydration analysis and several could not be relocated for testing. Two small clusters of obsidian provided the best samples for the desired testing. Several pieces and two points were selected from the Trash Midden (Grids 65, 71, and 70) and the trash-filled Pithouse 3. The Trash Midden ceramics were some of the earliest at the site, while the trash thrown into Pithouse 3 was some of the latest (disregarding the early A.D. 1100s occupation).

In the late 1970s, 34 of the 39 pieces were sourced by Lee Sappington (University of Idaho) with X-ray fluorescence spectrometry using 10 elements. This revealed that the vast majority of the 29SJ 629 obsidian had been obtained from sources in the Jemez Mountains (54 percent) and Red Hill (40 percent), New Mexico, but none from the Grants, New Mexico, area (Cameron and Sappington 1984:Table 1). Four of these pieces were then analyzed at the obsidian laboratory of the University of California, Los Angeles (Meighan and Scalise 1988:360), without obtaining dates, and two of these were resampled for the present analysis.

Considerably more work has been done with southwestern obsidian and its sources since then, particularly with Jemez material (e.g., Bertram 1989; Michels 1983; Phagan 1985; Shackley 1988; Stevenson and McCurry 1990), so that it is not unexpected that sources are better known since this earlier analysis. Material identified as Jemez obsidian by Sappington has been confirmed by the MOHLAB and AHC analyses, although Jemez obsidian is now identified as comprising several distinct source flows that exhibit greater chemical variability than the nearby Jemez Polvadera source. The present sample, however, revealed no Red Hill obsidian, despite it being one of the most distinctive obsidians in the Southwest (Shackley 1988:762), while East Grants Ridge material, from near Mt. Taylor, Grants, New Mexico, was prominent. Grants Ridge obsidian was also the source that Sappington had identified as Polvadera obsidian at Pueblo Alto (Windes 1987a:238). In 1992, 25 pieces were again examined by X-ray fluorescence at the University of Wyoming. Of these, 12 were identified from sources at Mt. Taylor (4), Jemez Polvadera (1), Jemez Cerro del Medio (5), and Jemez Obsidian Ridge (2), while the rest remained unidentified (Ray Kunselman, Department of Physics and Astronomy, personal communication 1992). Thus, we can assume that Grants Ridge obsidian was more common in Chaco Canyon than originally reported by Cameron and Sappington (1984) and that the source at Red Hill was rarely used, if at all.

A variety of sources were identified for the nine pieces through X-ray fluorescence analysis (Table 8.5), however, AHC hydration rate constants were not known for all of the Jemez sources (Stevenson and McCurry 1990). Initial results were poor, with most dates far from the interpreted span of occupation. This was surprising, considering the satisfactory dates obtained from Pueblo Alto. Results

Table 8.5. Obsidian hydration and source analysis results.[a]

Provenience	FS No.	Lab Numbers AHC	Lab Numbers OHL	AHC Sources[b]	Hydration (microns) AHC	Hydration (microns) OHL	Dates (1 sd)	Temporal Context	Comments
Room 2, E 1/2, Lev. 1	242	-	7690	-		5.0 ± 0.2	no date	A.D. 1000-1050	Debitage
Plaza Grid 16, Level 1	1965	-	7692	-		3.1 ± 0.2	no date	A.D. 1000-1050	Debitage
TM Grid 65, Lev. 4	1512	89-153	7691	OR	3.68 ± 0.05	4.8 ± 0.2	A.D. 309 ± 90	A.D. 900-950	Debitage
TM Grid 65, Lev. 4	1512.3	89-152		PP	3.18 ± 0.05		A.D. 972 ± 62	A.D. 900-950	Initial edge[c]
		89-152			3.01 ± 0.07		A.D. 1074 ± 59	A.D. 900-950	Broken stem[c]
TM Grid 70, Lev. 1	616.01	89-147		EGR	2.30 ± 0.05		A.D. 871 ± 97	A.D. 900-950	Debitage
TM Grid 70, Lev. 1	619[a]	89-149		CdM	4.56 ± 0.08		AD. 747 ± 119	A.D. 900-950	Debitage
					3.19 ± 0.08		A.D. 630 ± 84		
TM Grid 71, Lev. 1	514	89-151		CdM	2.90 ± 0.05		A.D. 860 ± 77	A.D. 900-950	Initial edge[c]
		89-151			2.87 ± 0.05		A.D. 882 ± 76	A.D. 900-950	Broken edge[c]
Pithouse 3, Lev. 8	2341	89-150	7693	CdM	3.21 ± 0.05	4.0 ± 0.2	A.D. 596 ± 86	A.D.. 975-1020	Debitage
					2.62 ± 0.07		A.D. 1048 ± 70		
Pithouse 3, Lay. 2	2513-1	89-148		EGR	1.97 ± 0.07		A.D. 1052 ± 94	A.D. 975-1020	Debitage
Pithouse 3, Lay. 3	2605	89-146		EGR	1.60 ± 0.05		A.D. 1418 ± 69	A.D. 975-1020	Debitage
Kiva, Level II	2012-1	89-145		?	not analyzed		no date	A.D. 975-1020	Debitage

[a] Laboratories: Archaeological and Historical Consultants (AHC) and Obsidian Hydration Laboratory (OHL) at U.C.L.A.

[b] Sources: CdM (Cerro del Medio, Jemez Mts.), EGR (East Grants Ridge near Mt. Taylor), OR (Obsidian Ridge, Jemez Mts.), and PP (Polvadera Peak, Jemez Mts.). All OHL samples identified as Jemez obsidian by L. Sappington. Sources identified by X-ray fluorescence analysis, Biosystems Analysis Inc., Santa Cruz, CA.

[c] Obsidian projectile point or hafted blade (see Plate 8.1).

Table 8.5. (continued)

Provenience	Lab No.	Lead		Thorium		Rubidium		Strontium		Yttrium		Zirconium		Niobium		Source[b]
		ppm	sd	ppm	sd	ppm	sd	ppm	sd	ppm	sd	ppm	sd	ppm	sd	
Kiva, Level II	89-145	36.4	2.1	15.2	3.2	107.8	2.4	78.7	2.1	20.2	2.1	74.4	2.6	45.8	2.8	?
Pithouse 3, Lay. 3	89-146	62.7	2.5	30.4	3.9	538.6	4.8	11.5	1.5	75.5	2.9	110.2	2.8	169.3	3.5	EGR
TM Grid 70, Lev. 1	89-147	54.0	2.8	34.7	4.6	489.1	5.2	12.9	1.8	80.2	3.4	124.5	3.3	192.5	4.2	EGR
Pithouse 3, Lay. 2	89-148	54.6	1.9	33.5	3.3	513.5	4.1	11.1	1.3	90.6	2.6	132.8	2.6	205.9	3.3	EGR
TM Grid 70, Lev. 1	89-149	32.3	2.1	25.6	3.5	164.0	2.9	12.9	1.6	45.5	2.4	162.7	3.1	48.1	2.9	CdM
Pithouse 3, Lev. 8	89-150	31.8	3.3	23.4	5.3	143.1	4.0	10.1	2.3	40.9	3.4	150.4	4.2	41.6	4.0	CdM
TM Grid 71, Lev. 1	89-151	30.0	2.1	22.4	3.9	178.4	3.3	10.0	1.7	47.7	2.7	165.1	3.4	49.3	3.2	CdM
TM Grid 65, Lev. 4	89-152	31.1	1.6	25.0	2.8	158.5	2.5	11.5	1.3	23.5	1.9	65.8	2.2	44.5	2.5	PP
TM Grid 65, Lev. 4	89-153	42.2	2.0	34.1	3.5	222.5	3.1	8.7	1.4	69.3	2.5	183.5	3.1	96.6	3.1	OR

from two sets of thermal and humidity cells, buried in the park for a year in June 1989 and June 1992, at Shabik'eshchee Village and near Fajada Butte, respectively, greatly improved the calculated hydration rates and subsequent dating (Stevenson, Appendix G).

Overall, seven of the twelve dates occurred during the expected site occupation. Because the site is 85 m from a Basketmaker III-Pueblo I site (29SJ 628), dating at about A.D. 800, some of the obsidian may have been scavenged from the earlier deposits. Obsidian is relatively rare during the periods in question, so that scavenging could have been a viable local strategy for its procurement. The more likely alternative for the early dates, however, is that the hydration rates are imprecise (Ridings 1991).

The small samples do enable some assessment as to the consistency of the hydration rates for various sources within their temporal context. As expected, the three from East Grants Ridge yielded smaller hydration rinds from the later Pithouse 3 trash deposits and larger rinds from the earlier Trash Midden deposits. When the rinds were compared to those from Grants Ridge at Pueblo Alto, which were later in time (Windes 1987a:Table 8.11), a large discrepancy is obvious. The Pueblo Alto material reveals measurements nearly 50 percent greater than those at 29SJ 629, despite being younger material. As discovered during the Pueblo Alto analyses, different laboratories measure the obsidian rinds in very different ways, but other sources of error may account for the discrepancies (Bertram 1989). Of great importance to the determination of the artifact age is proper source analysis techniques, which Shackley (1988) cautions is a potential pitfall. Additionally, the rates of hydration, which vary by depth, may still be poorly known for Chaco Canyon.

The three Cerro del Medio (Jemez) samples gave mixed results, lacking a clear distinction among rind thicknesses between the early and late deposits. The finely-manufactured, side-notched projectile point (34± x 14 x 2 mm; FS 514; Plate 8.1a) recovered from the Trash Midden, which is typical of Pueblo II and Pueblo III points, yielded dates early in the site occupation. Rinds were cut from both the broken stem (A.D. 882 ± 76) and its flaked edge formed during manufacture (A.D. 860 ± 77), but there was a negligible difference between the rinds. Therefore, the point is assumed to have broken shortly after its manufacture. The other point or hafted blade (39 x 23± x 6 mm; FS 1512.3; Plate 8.1b) also suggested that the span between manufacture (A.D. 972 ± 62) and breakage (A.D. 1074 ± 90) could also have been only a few years or much longer.

Summary

At this time, obsidian hydration does not aid refinement of the site chronology, although the results were promising. Generally, obsidian recovered from the Trash Midden dated earlier than the Pithouse 3 deposits, as it should have, based on the archeological evidence. Results, however, were not well clustered. The sample also suggests that obsidian was procured primarily from the Jemez Mountains and the Mt. Taylor region, the closest sources to Chaco Canyon. It also appears that the source at Red Hill, far to the south of the San Juan Basin and Chaco Canyon, was not a major procurement area, if at all, for the 29SJ 629 inhabitants.

Ceramic Time

Because of the large role that ceramics play in interpreting chronology at 29SJ 629, they receive more than cursory discussion allotted to some other methods of dating. The study focused on the ceramic time-depth for the greathouse period, which spans roughly A.D. 900 to 1140 and covers the period that 29SJ 629 was occupied. Luckily, ceramic seriation for this period was conducted for the Pueblo Alto report (Windes 1987a), which included some proveniences from 29SJ 629.

Ceramic types were employed for the seriation while leaving more detailed ceramic analyses to Toll and McKenna (this report). The limitations of the materials that have been "rough-sorted," without further detailed analyses at this stage, are obvious. In particular, it must be recognized that the formation of assemblages from ceramic types that were not precisely defined during the initial sorting may weaken results.

Major shifts in ceramic usage occurred during the Bonito phase and are highly useful as chronological markers (Table 8.6). Basically, ceramic assemblages remained fairly stable for a period of time and then were quickly replaced or

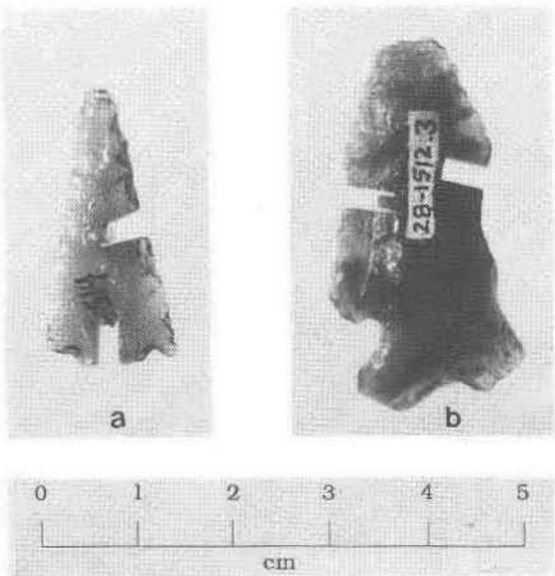

Plate 8.1. *Projectile points cut for obsidian hydration analysis (NPS 25677A). a) From Trash Midden Grid 71, Level 1. b) From Trash Midden Grid 65, Level 4.*

supplemented by a number of new types that gave form to new assemblages. Because assemblages, defined here as groups of ceramic types that were used together for a specified length of time, are named and used throughout this and other reports as temporal markers, a detailed discussion of them is appropriate. Individual ceramic type descriptions are not discussed here, but may be found in McKenna and Toll (1984), Toll and McKenna (this report; 1987), Windes (1977, 1985), and Windes and McKenna (1989).

Kiatuthlanna Ceramic Assemblage (A.D. 875-925)

The earliest ceramics at 29SJ 629 belong to this late Pueblo I and very early Pueblo II period (Table 8.7). Ceramic types are dominated by commonly known Basketmaker III and Pueblo I types: Lino Gray, some with fugitive red paint smeared over the exterior, La Plata, Whitemound, Lino, and early Kana'a Black-on-whites (Plate 8.2a-b). Neckbanded vessels are often absent or represented by few Kana'a (neck) Banded jars (Plate 8.3). A poorly defined type with a creamy, well-polished slip that is clearly transitional between Whitemound and Red Mesa Black-on-whites in design and chronological context was designated here as Kiatuthlanna Black-on-white (Plate 8.2c-d). Red Mesa Black-on-white often appears in small quantities, but roughly at parity with other painted types.

Ceramics from this assemblage were found in the western end of the Trash Midden and under and behind the 29SJ 629 roomblock. The assemblage was clearer at other sites of the Fajada Gap Community that did not have later occupations (Table 9.1).

Red Mesa Ceramic Assemblage (A.D. 900-1040/1050)

This assemblage corresponds to the Early Bonito phase (Toll et al. 1980), although the initial span of A.D. 920 to 1020 has been altered to A.D. 900-1050. Of the three assemblages characterizing the Bonito phase, this period lasted the longest but yields the poorest chronometric control, with a particularly long, undated gap existing for the last half of the A.D. 900s. Ceramic types used during this period underwent relatively little change until the early A.D. 1000s. The entire span, dominated by Red Mesa Black-on-white (Plates 8.4-8.6) and neck-decorated culinary vessels, can be divided into two subperiods. Aside from the primary types, the early period (A.D. 900-975) often exhibits the minor presence of types typical of the preceding century: Lino Black-on-gray, Whitemound, Kiatuthlanna, Theodore, and La Plata Black-on-whites, along with Lino Gray and early San Juan Redwares. Other trade wares commonly found include early Chuskan (Tunicha and Newcomb Black-on-whites and Sanostee Black-on-red) and Kayentan types (Kana'a Black-on-white). Culinary vessels are almost exclusively neckbanded

Table 8.6. *Ceramic change in the San Juan Basin during the Bonito phase using chronometrically dated assemblages of painted ceramics with the KYST-2A multidimensional scaling program.*[a,b]

No. of assemblages:	10		6		4		14		8	
Chronometric dates:[c]	918v-1031±20		987vv-1047r		1042+vv-1080±55		1039++vv-1132r		1109r-1142r	
Best Range (A.D.):	945-1024		1006-1047		1045±		1075-1115		1120-1142	
Ceramic Ware/Type	Total	%	Total	%	Total	%	Total	%	Total	%
CIBOLA WHITEWARE		(91)		(91)		(97)		(83)		(41)
La Plata & Whitemound B/w	3	T	5	1	14	T	10	T	1	T
Red Mesa B/w	1,109	89	317	49	2,585	32	290	11	9	1
Escavada/Puerco B/w	7	1	81	12	1,918	24	732	28	87	10
Gallup B/w	13	1	190	29	3,175	40	977	38	73	8
Chaco B/w	-	-	-	-	56	1	75	3	5	1
Chaco-McElmo B/w	-	-	-	-	1	T	43	2	148	17
Socorro B/w	-	-	-	-	4	T	2	T	26	3
CHUSKA WHITEWARE		(3)				(T)		(4)		(31)
Newcomb & Burnham B/w	21	2	-	-	6	T	4	T	1	T
Chuska & Toadlena B/w	-	-	-	-	13	T	58	2	231	27
Nava B/w	-	-	-	-	1	T	4	T	7	1
Unclassified carbon B/w	13	1	-	-	1	T	28	1	27	3
TUSAYAN WHITEWARE		(2)		(6)		(T)		(6)		(5)
Lino B/g	-	-	-	-	-	-	3	T	-	-
Kana'a B/w	19	2	25	4	-	-	5	T	-	-
Black Mesa/Sosi B/w	2	T	12	2	17	T	132	5	39	5
Unclassified B/w	1	T	-	-	3	T	8	T	3	T
MESA VERDE WHITEWARE		(T)				(T)		(2)		(13)
Mancos B/w	-	-	-	-	10	T	15	1	83	10
McElmo B/w	-	-	-	-	-	-	14	1	24	3
Mesa Verde B/w	-	-	-	-	-	-	-	-	2	T
Unclassified B/w	1	T	-	-	-	-	25	1	4	T
SMUDGED WARE	35	3	12	2	126	2	84	3	19	2
SAN JUAN REDWARE	16	1	-	-	24	T	11	T	2	T
CHUSKA REDWARE		(T)		(T)		(T)				
Sanostee B/r	2	T	1	T	2	T	-	-	-	-
TSEGI ORANGEWARE		(T)		(T)		(1)		(1)		(3)
B/o monochromes	1	T	-	-	41	1	24	1	22	3
Tusayan Polychrome	-	-	1	T	-	-	-	-	5	T

Table 8.6. (continued)

No. of assemblages:	10		6		4		14		8	
Chronometric dates:[c]	918v-1031±20		987vv-1047r		1042+vv-1080±55		1039++vv-1132r		1109r-1142r	
Best Range (A.D.):	945-1024		1006-1047		1045+		1075-1115		1120-1142	
Ceramic Ware/Type	Total	%	Total	%	Total	%	Total	%	Total	%
WHITE MOUNTAIN REDWARE				(1)		(T)		(1)		(5)
B/r monochromes	-	-	2	T	36	T	25	1	43	5
St. Johns Polychrome	-	-	3	T	-	-	-	-	-	-
Totals (13,355 sherds):	1,243		649		8,033		2,569		861	
Type %		100		99		100		98		100
Ware %		100		99		101		100		100

[a] T = trace (less than 0.5%).
[b] Totals derived from 42 assemblages recovered from excavations in the San Juan Basin (after Windes 1987a:Table 8.19).
[c] Derived from the span of youngest and oldest tree-ring and carbon-14 dates in each sample.

Table 8.7. Ceramic time at 29SJ 629. The A.D. 875-925/950 period.[a]

	Room 4, fill		TT 99		Grids 52-53		Grid 58		Grid 59	
Ceramic Type	No.	%	No.	%	No.	%	No.	%	No.	%
CIBOLA/CHUSKA CULINARY										
Lino Gray	2	1	11	4	6	3	1	1	10	2
Plain gray	89	64	163	66	144	70	127	57	246	53
Wide neckbanded	3	2	15	6	4	2	4	2	9	2
Narrow neckbanded	5	4	6	2	2	1	9	4	24	5
Neck indented corrugated	-	-	-	-	-	-	1	T	-	-
Unclassified indented corrugated	-	-	9	4	7	3	3	1	39	8
PII indented corrugated rim	-	-	-	-	-	-	-	-	-	-
CIBOLA WHITEWARE										
Unclassified BMIII-PI B/w	6	4	31	13	9	4	4	2	10	2
Red Mesa B/w	10	7	6	2	14	7	8	4	41	9
Escavada/Puerco B/w	-	-	-	-	-	-	-	-	-	-
Unclassified PII-PIII B/w	12	9	-	-	4	2	16	7	22	5
UNCLASSIFIED WHITEWARE	9	6	2	1	16	8	50	22	52	11
UNCLASSIFIED CARBON B/W	1	1	-	-	-	-	-	-	1	T
CHUSKA WHITEWARE										
Pena B/w	-	-	-	-	-	-	-	-	1	T
Tunicha B/w	-	-	-	-	-	-	-	-	1	T
Newcomb B/w	-	-	-	-	-	-	-	-	-	-
Unclassified carbon B/w	-	-	-	-	-	-	-	-	1	T
TUSAYAN WHITEWARE										
Lino B/g	-	-	1	T	-	-	-	-	-	-
Kana'a B/w	-	-	1	T	1	T	-	-	-	-
SMUDGED WARE	1	1	2	2	-	-	-	-	-	-
SAN JUAN REDWARE										
Unclassified redware	1	1	-	-	-	-	1	T	3	1
Bluff B/r	-	-	-	-	-	-	-	-	-	-
CHUSKA REDWARE										
Sanostee B/r	-	-	1	T	-	-	-	-	1	T
TSEGI ORANGEWARE										
Unclassified orangeware	-	-	-	-	-	-	-	-	1	T
Totals	139	100	248	99	207	100	224	100	462	98

[a] T = trace (less than 0.5%). Percentage brackets [ ] denote those tallied for both individual and ceramic ware totals.

Table 8.7. (continued)[a]

Ceramic Type	Grid 64 No.	Grid 64 %	Grid 65 Levels 4-7 No.	Grid 65 Levels 4-7 %	Grid 70 Levels 4-6 No.	Grid 70 Levels 4-6 %	Grid 71 Levels 3-5 No.	Grid 71 Levels 3-5 %	Totals	%
CIBOLA/CHUSKA CULINARY										(72)
Lino Gray	4	1	43	5	5	1	8	8	90	3
Plain gray	163	55	484	59	162	45	63	63	1,641	57
Wide neckbanded	14	5	48	6	28	8	4	4	129	5
Narrow neckbanded	10	3	23	3	7	2	2	2	88	3
Neck indented corrugated	1	T	1	T	-	-	-	-	3	T
Unclassified indented corrugated	6	2	42	5	13	4	2	2	121	4
PII indented corrugated rim	1	T	-	-	-	-	-	-	1	T
CIBOLA WHITEWARE										(16)
Unclassified BMIII-PI B/w	10	3	26	3	14	4	6	6	116	4
Red Mesa B/w	21	7	50	6	44	12	-	-	194	7
Escavada/Puerco B/w	-	-	-	-	-	-	2	2	2	T
Unclassified PII-PIII B/w	20	7	34	4	26	7	5	5	139	5
UNCLASSIFIED WHITEWARE	42	14	62	8	51	14	7	7	291	[10]
UNCLASSIFIED CARBON B/W	-	-	-	-	-	-	-	-	2	[T]
CHUSKA WHITEWARE										(T)
Pena B/w	2	1	-	-	-	-	-	-	3	T
Tunicha B/w	-	-	-	-	-	-	-	-	1	T
Newcomb B/w	-	-	-	-	-	-	-	-	-	-
Unclassified carbon B/w	1	T	1	T	-	-	-	-	3	[T]
TUSAYAN WHITEWARE										(T)
Lino B/g	-	-	1	T	-	-	-	-	2	T
Kana'a B/w	-	-	1	T	-	-	-	-	3	T
SMUDGED WARE	-	-	-	-	2	1	-	-	5	[T]
SAN JUAN REDWARE										(1)
Unclassified redware	1	T	7	1	5	1	-	-	18	1
Bluff B/r	-	-	-	-	2	1	-	-	2	T
CHUSKA REDWARE										(T)
Sanostee B/r	1	T	2	T	1	T	1	1	7	T
TSEGI ORANGEWARE										(T)
Unclassified orangeware	-	-	-	-	-	-	-	-	1	T
Totals	297	98	825	100	360	100	100	100	2,864	99 (99)

[a] T = Trace (less than 0.5%). Percentage brackets [ ] denote those tallied for both individual and ceramic ware totals.

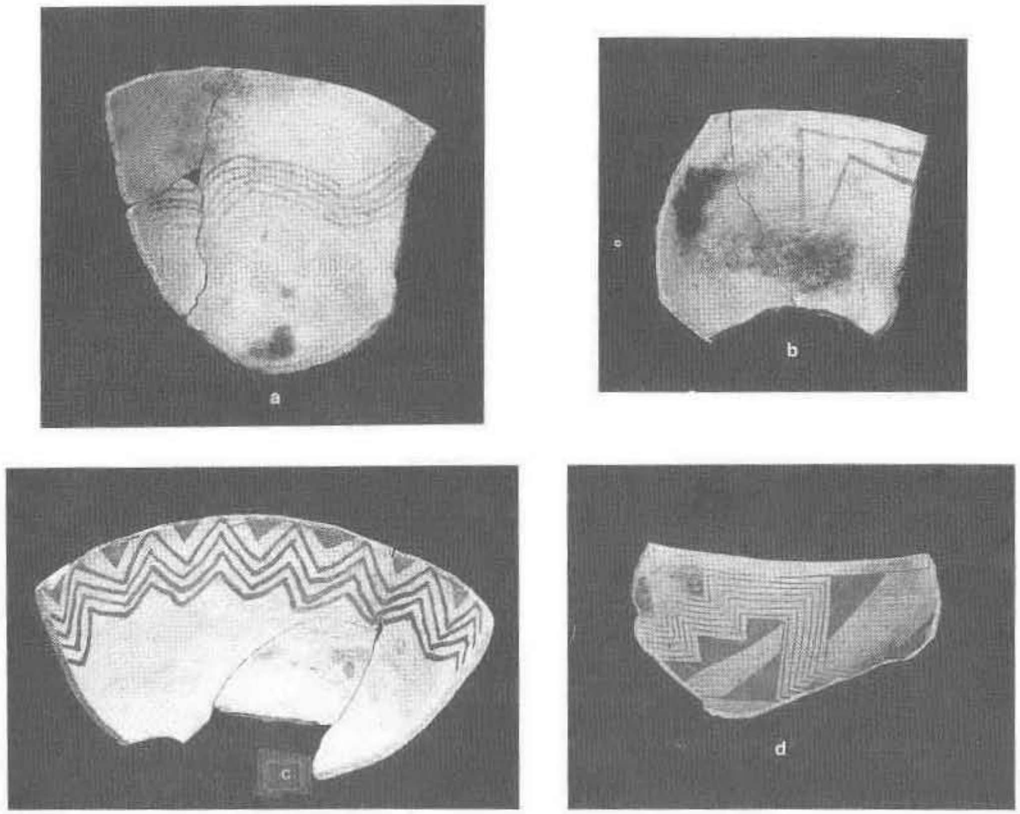

Plate 8.2. *Early decorated bowl fragments from the Trash Midden, circa A.D. 900. a) La Plata B/w from Grid 70, Level 6 (NPS 15970). b) Kana'a B/w from Grid 65, Level 5 (NPS 15971). c) Kiatuthlanna B/w from Kiva fill (NPS 16009A). d) Kiatuthlanna B/w or early Red Mesa B/w from Pithouse 3, Layer 2 (NPS 20878).*

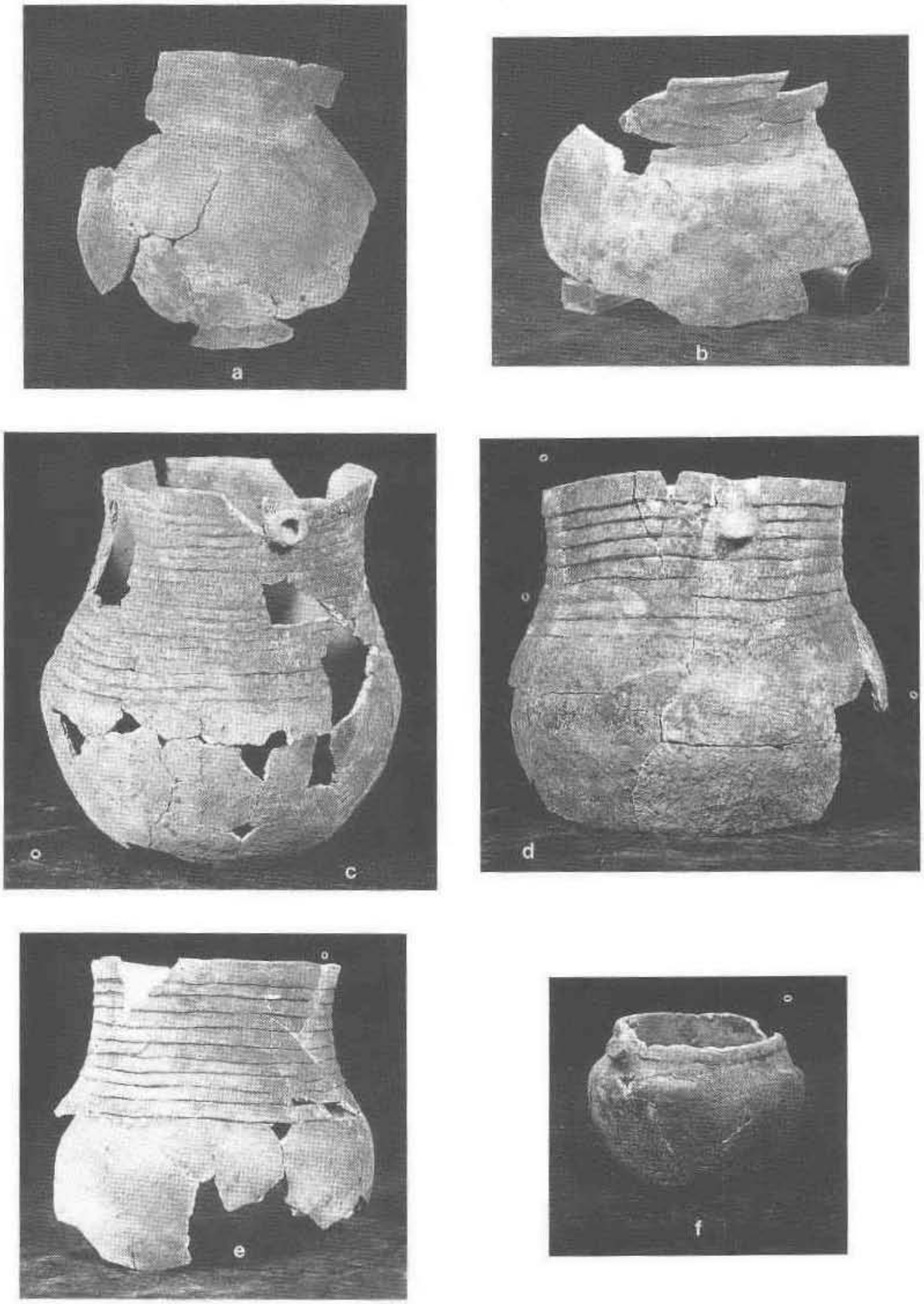

Plate 8.3. *Restorable jars of Kana'a (neck banded from 29SJ 629, circa A.D. 900-1000. a) RV 49 from Trash Midden Grid 65, Level 6 (NPS 15984A). b) RV 46b from Trash Midden Grid 65, Level 4 (NPS 15978). c) RV 31 from Pithouse 2, Layer 5 (NPS 15964C). d) RV 19 from Pithouse 2, Layer 4 (NPS 15965C). e) RV 22 from Plaza Other Pit 1 floor (NPS 15992C). f) RV 18 from Room 5 fill (NPS 15979C).*

forms of Kana'a Banded and Tohatchi Banded that incorporated sand temper (Plates 8.3 and 8.7).

The best-dated assemblages from this period, radiocarbon dated to the first half of the A.D. 900s, came from Una Vida and Kin Nahasbas, across from Marcia's Rincon. Other dated samples came from sites in northeastern Arizona. Although several greathouses (e.g., Kin Bineola, Pueblo Bonito, Peñasco Blanco, and Una Vida) yielded numerous tree-ring dates in the A.D. 900s, the dates cannot be directly associated with the contemporary ceramic assemblages at the sites, although it is assumed.

The late period (A.D. 975-1040/1050), when Chuskan trade wares became prominent, appears to have a less diverse number of painted types. Neck indented corrugated (here designated as Coolidge Corrugated; Plate 8.8; Windes and McKenna 1989) and Chuskan neckbanded and clapboard types of Captain Tom and Newcomb Corrugated (Plate 8.9a-b) challenge the popularity of sand-tempered, narrow neckbanded vessels. The Chuskan and neck corrugated vessels constitute significant minorities by the early A.D. 1000s. Overall indented corrugated Chuskan jars of Blue Shale Corrugated (Plate 8.9c) make their first appearance at about A.D. 1030, just prior to the shift to the Gallup Black-on-white-dominated ceramic assemblages. Painted trade wares are dominated by Tunicha and Newcomb Black-on-whites, and San Juan Redwares.

Division of the overall period at A.D. 975 is arbitrary and merely represents the midpoint between the better-dated ends of the period. Sites with absolute dates for the subperiod all cluster in the first half of the A.D. 1000s and, with the exception of Pueblo Alto, all are small-house sites. At 29SJ 629, subtle changes in type frequencies can be observed when the assemblage is split into 25- or 50-year periods by stratigraphic units (Tables 8.8-8.10). These are primarily trash units recovered from the 29SJ 629 Trash Midden, Pithouses 2 and 3, and the large plaza pits.

Gallup Ceramic Assemblage (A.D. 1040/1050-1100)

Formerly dated between A.D. 1020 and 1120 (e.g., Toll et al. 1980), this period corresponds to the Classic Bonito phase. At about A.D. 1030 to 1050, there is a major shift in ceramic usage highlighted by the rapid demise of Red Mesa Black-on-white and the rise of Gallup Black-on-white (cf., Truell 1986:143-144). Many painted vessels reflect the temporal transition from earlier times with motifs, design layouts, and hachure reflective of Red Mesa Black-on-white but are dominated by hachure designs characteristic of Gallup Black-on-white or the solid elements of Puerco Black-on-white (Plate 8.10). Likewise, there is a shift from the neck-decorated, culinary wares to overall indented corrugated jars of Chaco Corrugated (Plate 8.11a). Except for the early transitional period, this assemblage is absent at 29SJ 629 and the other small-house sites excavated by the Chaco Center, as well as at the 3-C Site, when classic Gallup Black-on-white (e.g., Plate 8.11b) became dominant.

The clear shift in type preference is paralleled by a corresponding realignment in the trade network, with high frequencies of the new types originating in the Chuska Mountains, at times dominated by Chuskan culinary jars (H. Toll 1981, 1984, 1985; Toll and McKenna 1987, and this report). Siliceous stone (Cameron 1984, this report) and perhaps some high-altitude timbers also came from the same mountains. Aside from the overwhelming numbers of Chuskan culinary vessels, Chuska and Toadlena Black-on-whites show up as common but minor types. A few Tsegi Orangewares and San Juan Redwares also occur in association, while White Mountain Redware is absent. Toward the end of the period, and perhaps even dominating it for a very short period of time (e.g., 10 years?), are relatively high frequencies of Tusayan Whitewares (Sosi and Black Mesa Black-on-whites). Dated assemblages are again restricted to Pueblo Alto and small-house sites outside of Chaco Canyon. It is when this period begins that many of the small-houses were abandoned in Fajada Gap, including 29SJ 625, 29SJ 626 East, 29SJ 629, and 29SJ 1360.

Late Mix Ceramic Assemblage (A.D. 1100-1140)

The latest Bonitian assemblage corresponds to the Late Bonito phase, which has been considerably shortened from the A.D. 1120 to 1220 span, originally defined by Toll et al. (1980). At A.D. 1100, there was another change in the ceramic assemblages compositions. An influx of types

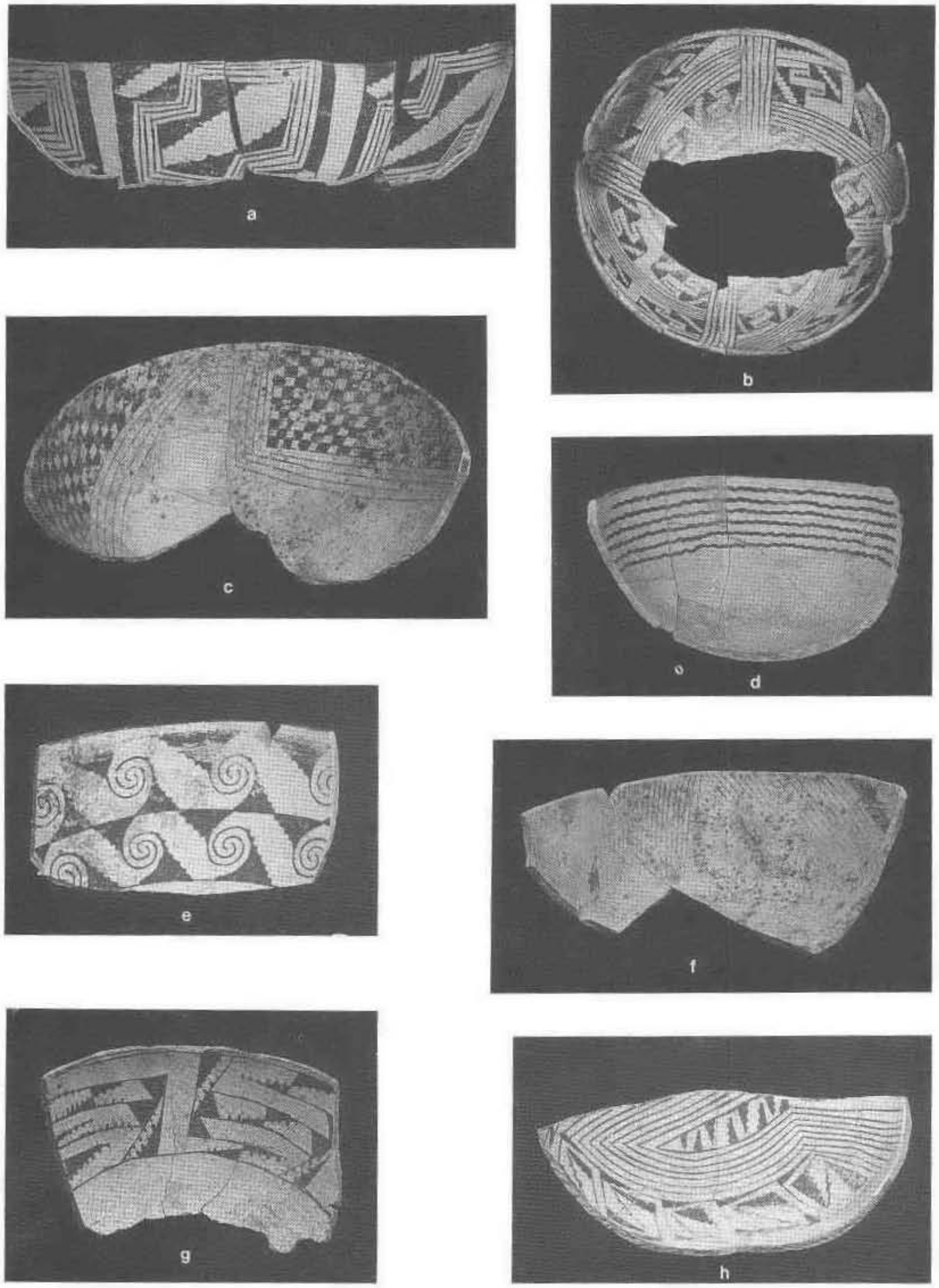

Plate 8.4. *Restorable vessels and large bowl sherds of Red Mesa B/w, circa A.D. 925-1025. a) RV 5 from Room 2 fill (NPS 15981A). b) RV 4 from Room 9 fill (NPS 15961B). c) RV 7 from Plaza Other Pit 14 floor (NPS 15962). d) RV 38 from Plaza Grid 14, Level 1 (NPS 15982). e) Pithouse 2, Layer 6 (NPS 21275). f) Pithouse 3, Level 7 (NPS 16013). g) Pithouse 3, Levels 6 and 7 (NPS 16014). h) Pithouse 3, Level 7 (NPS 21274A).*

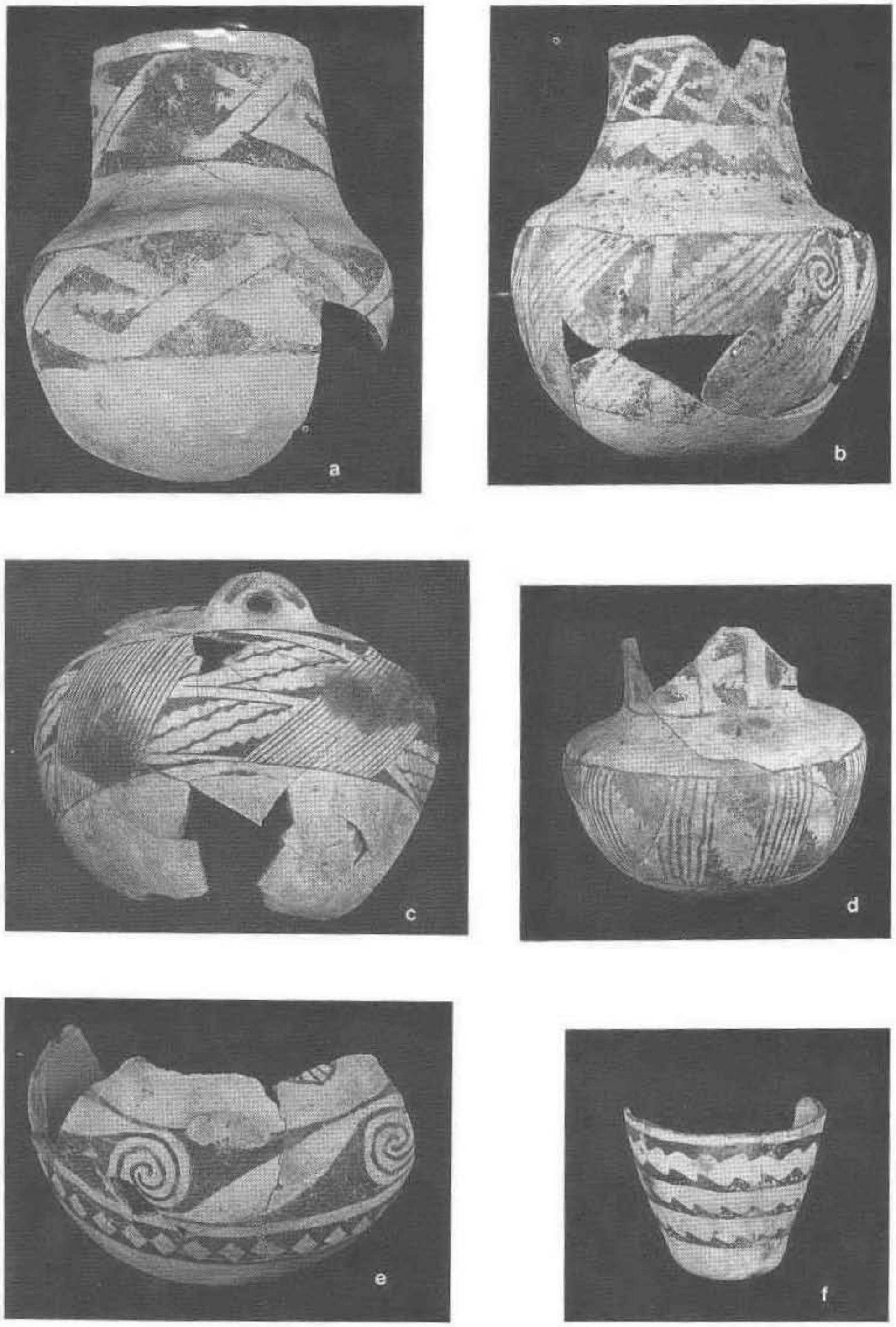

Plate 8.5. *Restorable vessels and large jar sherds of Red Mesa B/w, circa A.D. 925-1025. a) RV 2 from Room 9, Floor 1 (NPS 15974A). b) RV 10 from Pithouse 3 fill (NPS 16003B). c) RV 13 from Pithouse 3 fill (NPS 15976). d) RV 14 from Pithouse 3 fill (NPS 15960). e) RV 33 from Pithouse 3 fill (NPS 15975A). f) RV 6, an unusual vase or cup from Pithouse 3 floor (NPS 15977B).*

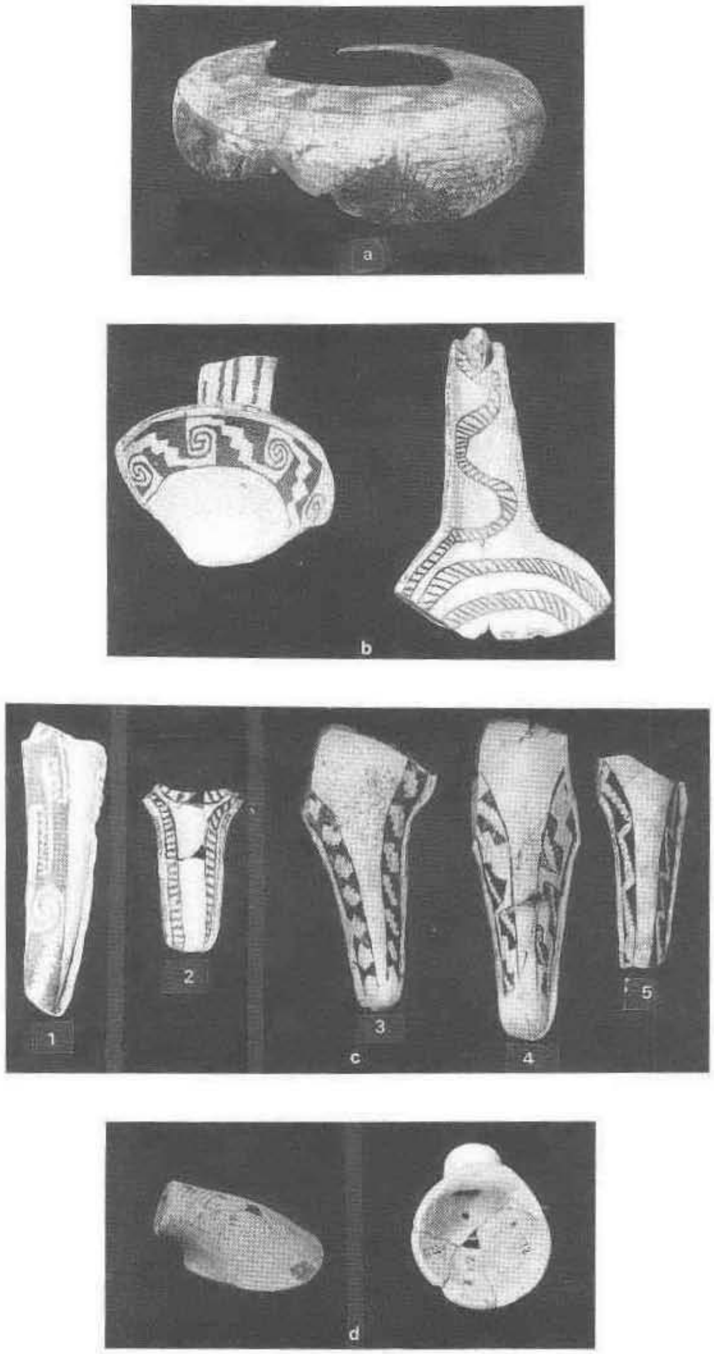

Plate 8.6. *Miscellaneous forms and ladles of Red Mesa B/w, circa A.D. 925-1025. a) RV 8 from Pithouse 2, floor and ventilator fill (NPS 15987B). b) RV 51 (left) and RV 52 from Room 7 fill. The latter is an early Gallup B/w (NPS 15994), circa A.D. 1025-1050. c) Gourd ladle handles (NPS 15998): 1. RV 53 from Plaza Other Pit 6, Level 3; 2. RV 55 from Room 9 floor fill; 3. RV 54 from Pithouse 3, Levels 3-6; 4. RV 50 from Plaza Other Pit 14 fill; 5. RV 56a from Pithouse 3, Layer 3. d) Two views of RV 35 (a ground jar handle fragment?) from Pithouse 3, Level 7 (NPS 16010B, 16010D).*

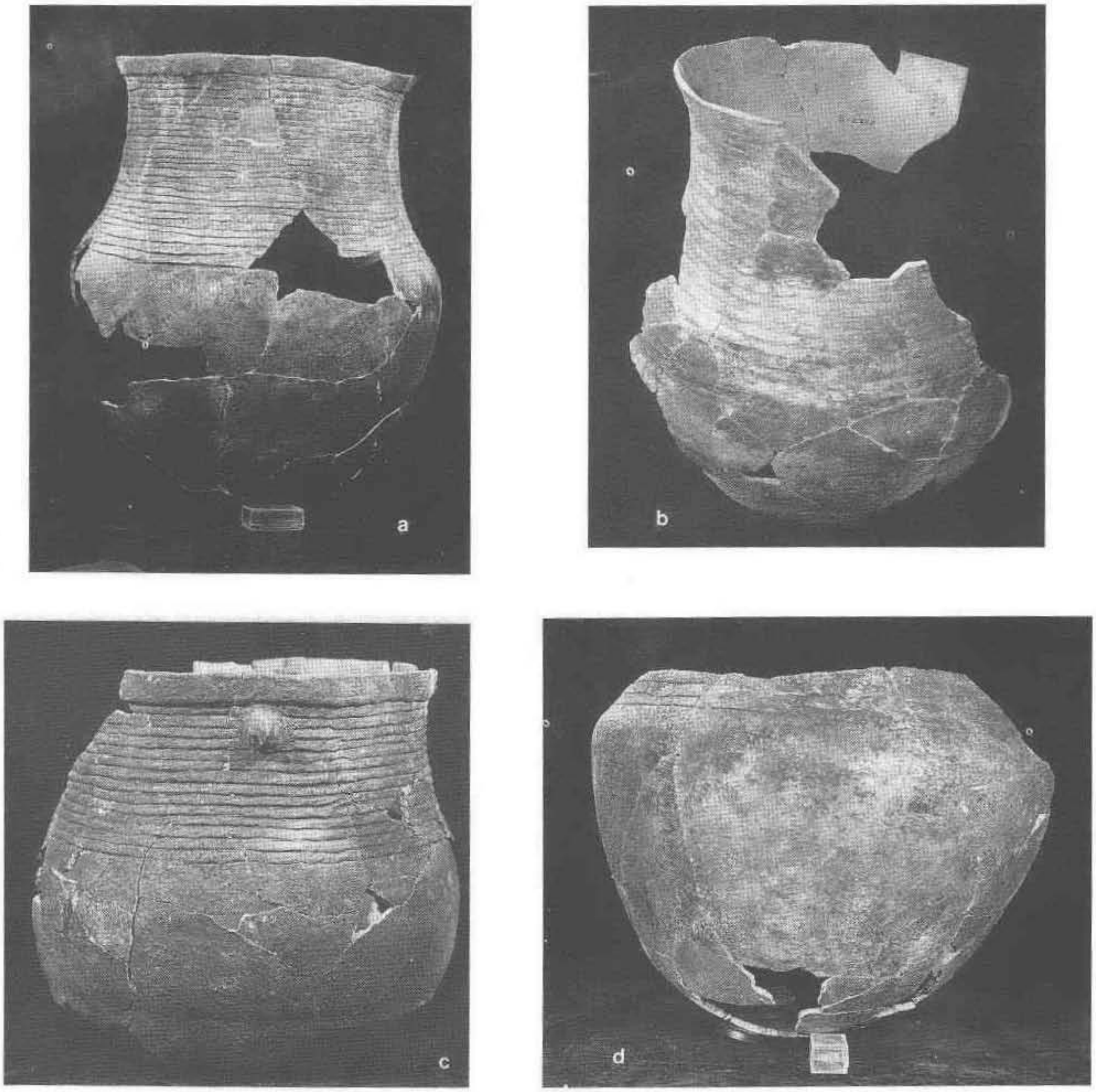

Plate 8.7. *Tohatchi (neck) Banded jars, circa A.D. 925-1025. a) RV 1 from Room 2 fill (NPS 15967B). b) RV 23 from Pithouse 3, Levels 3-6 (NPS 21278A). c) RV 30 from Pithouse 2, Floor 1 (NPS 15972). d) RV 17 from Pithouse 2, Layer 5 and Floor 1 (NPS 15980D).*

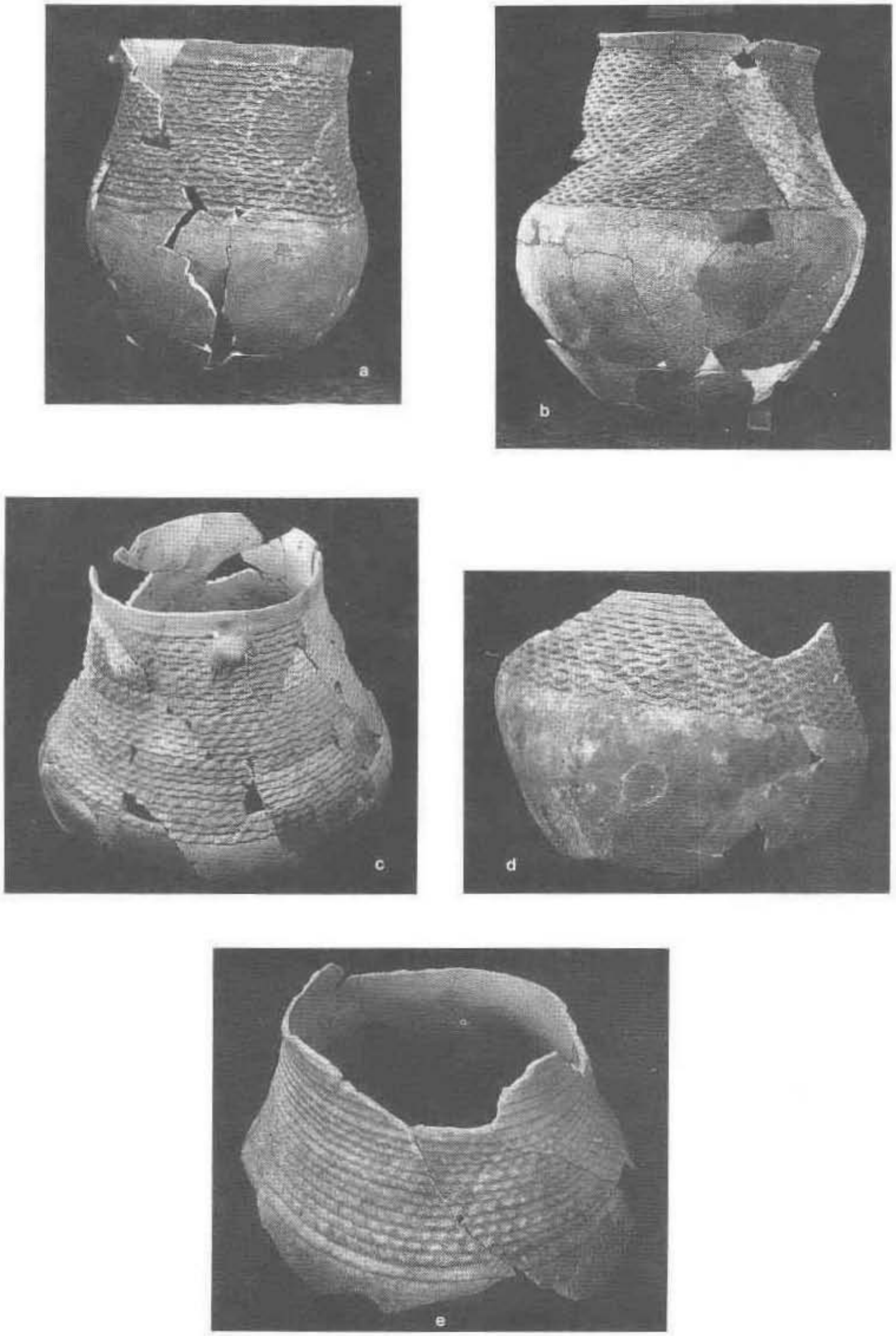

Plate 8.8. *Coolidge (neck) Corrugated jars, circa A.D. 975-1050. a) RV 15 from Pithouse 2, Floor 1 (NPS 15963C). b) RV 21 from Room 2 fill (NPS 15966A). c) RV 40 from the plaza, Room 2 fill, and Room 3 fill and floor (NPS 15990C). d) RV 41 from the plaza, Room 5 fill, and Pithouse 2 fill and floor (NPS 20879). e) RV 47 from the plaza and Room 2 fill (NPS 15993).*

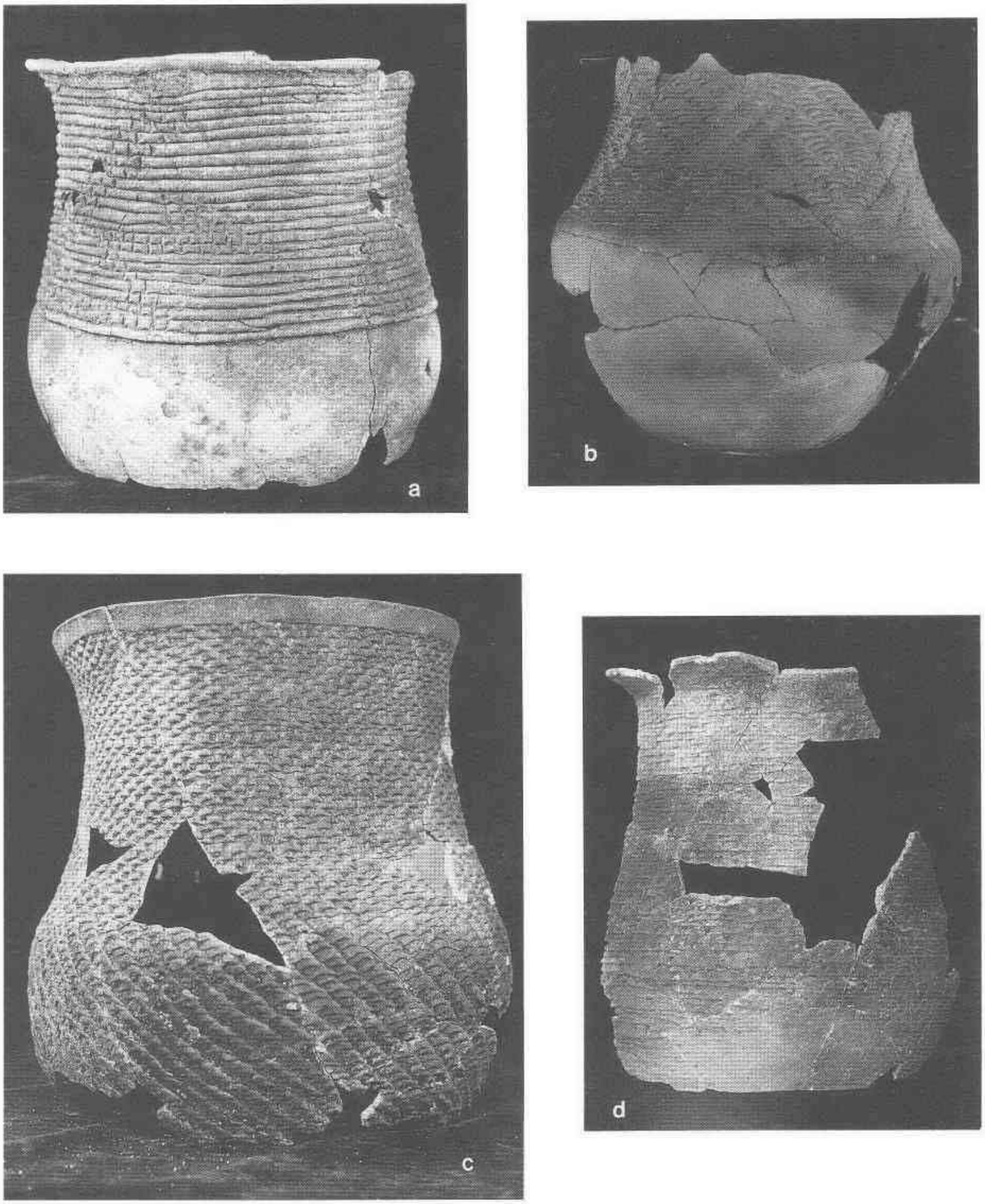

Plate 8.9. *Chuskan culinary vessels, circa A.D. 975-1140. a) Captain Tom Corrugated jar (RV 25) from Pithouse 3, Level 7 (NPS 16001M). b) Newcomb Corrugated jar (RV 24) from Plaza Grid 22, Level 3 (NPS 12244). c) Blue Shale Corrugated jar (RV 27) from Pithouse 2, ventilator fill (NPS 16012B). d) Hunter Corrugated jar (RV 29) from the Kiva floor (NPS 15983B).*

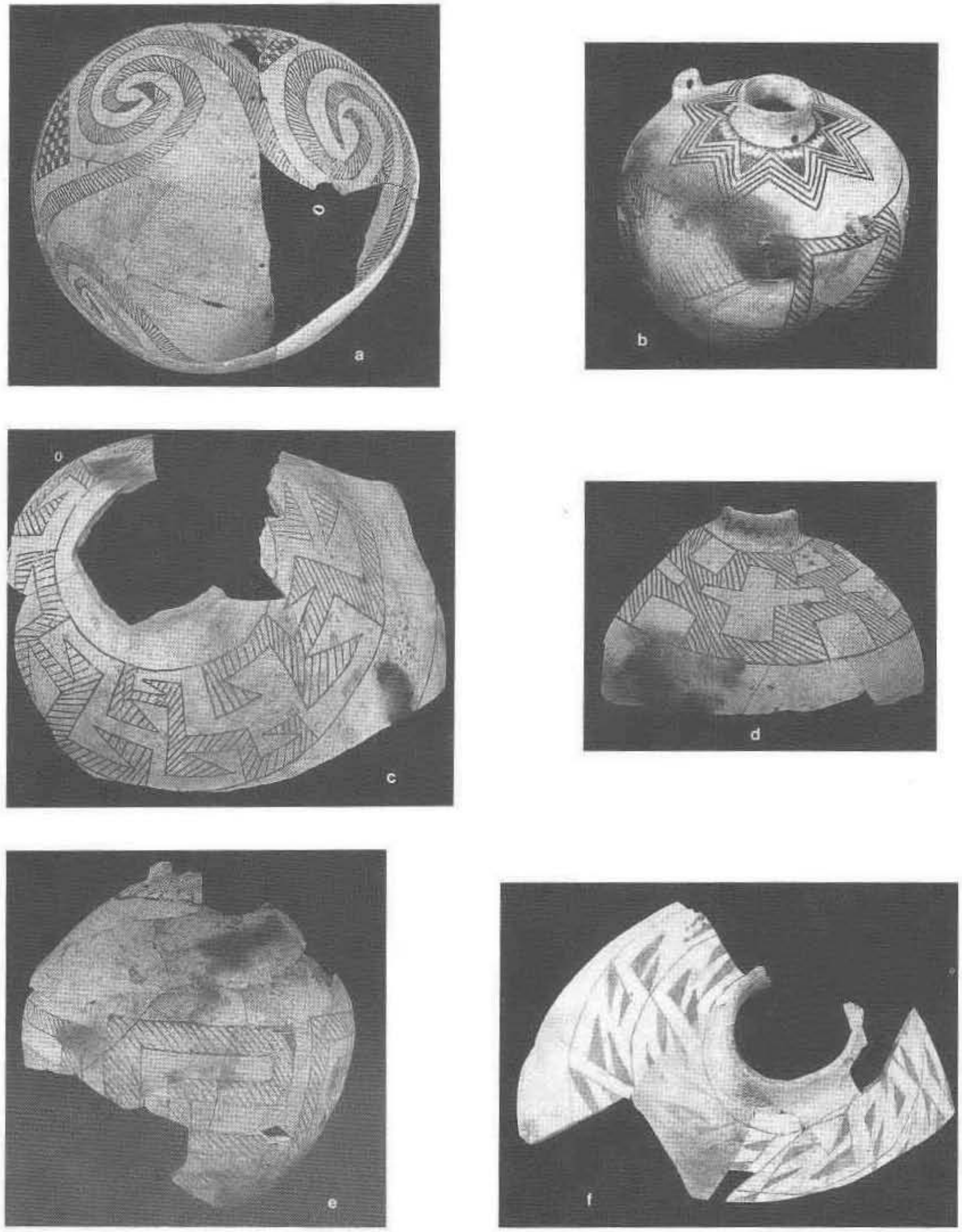

Plate 8.10. *Transitional types revealing Red Mesa B/w designs, layouts, or hachure, circa A.D. 1025-1050, classified as early Gallup B/w (A-E) or early Puerco B/w (F). a) RV 16 from the plaza and Pithouse 2 floor fill (NPS 15968B). b) RV 48 from Room 2 fill and Room 9 fill (NPS 15986A). c) RV 34 from Pithouse 3 fill (NPS 16016). d) RV 56b from Pithouse 3, Layer 3 (NPS 16015). e) RV 11 from Pithouse 2, Floor 1 (NPS 15973A). f) RV 36 from the plaza, and the fill in Rooms 2 and 3 and the Pithouse 2 ventilator (NPS 16002).*

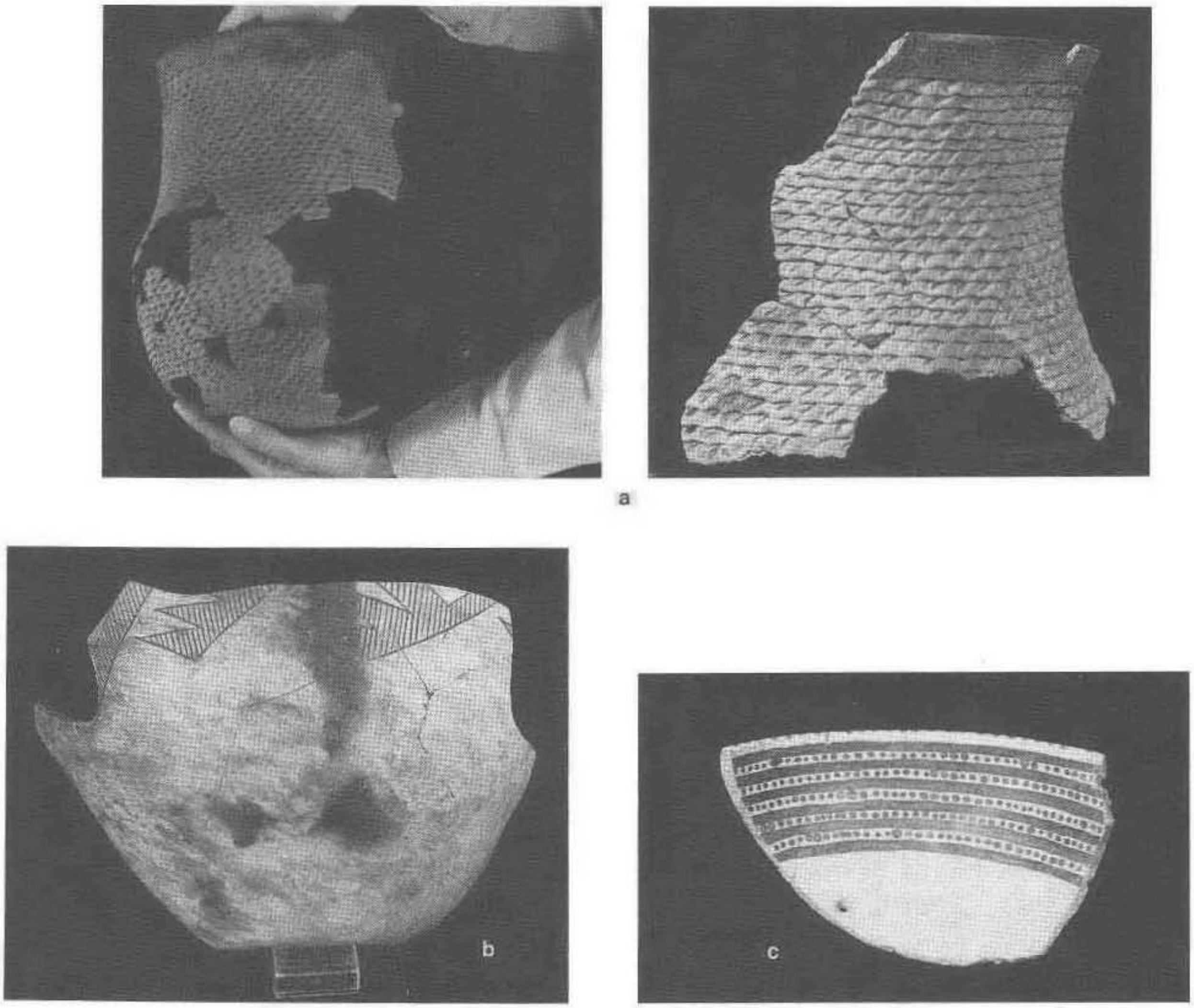

Plate 8.11. *Miscellaneous vessels, circa A.D. 1025-1140. a) Chaco Corrugated jar (RV 12) from the plaza, Room 8, and the Pithouse 2 fill, floor, and ventilator (two views) NPS lost; NPS 15989C). b) Classic Gallup B/w olla (RV 3) from Room 9, Firepit 1 (NPS 15969). c) Chaco-McElmo B/w bowl fragment from the Kiva floor (NPS 15995).*

Table 8.8. Ceramic time at 29SJ 629: The A.D. 925/950-975 period.[a]

Ceramic Type	Grid 65 Levels 1-3 No.	%	Grid 70 Levels 1-3 No.	%	Grid 71 Levels 1-2 No.	%	Grid 76 Levels 3-5 No.	%	Grid 82 Layer 2 No.	%	Grid 88 Layer 2 No.	%	Totals	%
CIBOLA/CHUSKA CULINARY														(53)
Lino Gray	8	1	2	T	3	1	5	1	2	T	3	1	23	1
Plain gray	451	44	247	25	159	45	250	52	118	46	97	36	1,322	39
Wide neckbanded	18	2	38	4	2	1	15	3	12	5	17	6	102	3
Narrow neckbanded	43	4	67	7	19	5	27	6	10	4	15	6	181	5
Neck indented corrugated	2	T	2	T	-	-	4	1	-	-	-	-	8	T
Unclassified indented corrugated	73	7	33	3	8	2	19	4	2	1	15	6	150	4
PII indented corrugated rim	1	T	3	T	-	-	-	-	-	-	-	-	4	T
CIBOLA WHITEWARE														(27)
Unclassified BMIII-PI B/w	20	2	23	2	14	4	16	3	9	4	6	2	88	3
Red Mesa B/w	154	15	156	16	33	9	56	12	46	18	46	17	491	15
Escavada/Puerco B/w	-	-	3	T	-	-	1	T	-	-	-	-	4	T
Unclassified PII-PIII B/w	72	7	163	16	41	12	19	4	10	4	18	-	323	10
UNCLASSIFIED WHITEWARE	157	15	235	24	62	18	66	14	30	12	37	14	587	[17]
UNCLASSIFIED CARBON B/W	3	T	-	-	-	-	-	-	-	-	-	-	3	[T]
CHUSKA WHITEWARE														(1)
Theodore B/w	-	-	1	T	-	-	-	-	-	-	-	-	1	T
Pena B/w	-	-	5	1	-	-	-	-	-	-	1	T	6	T
Tunicha B/w	1	T	4	T	-	-	2	T	1	T	2	T	10	T
Newcomb B/w	-	-	1	T	-	-	-	-	2	1	2	T	5	T
Unclassified carbon B/w	3	T	-	-	-	-	-	-	1	T	1	T	5	T
TUSAYAN WHITEWARE														(T)
Lino B/g	-	-	2	T	1	T	1	T	1	T	1	T	6	T
Kana'a B/w	1	T	2	T	-	-	-	-	2	1	2	T	7	T
MESA VERDE WHITEWARE														(T)
McElmo B/w	-	-	1	T	-	-	-	-	-	-	-	-	1	T
SMUDGED WARE	-	-	2	T	-	-	2	T	-	-	-	-	4	[T]
SAN JUAN REDWARE														(1)
Unclassified redware	11	1	4	T	6	2	-	-	2	1	1	T	24	1
Bluff B/r	-	-	2	T	-	-	1	T	1	T	1	T	5	T
CHUSKA REDWARE														(1)
Sanostee B/r	6	1	2	T	6	2	-	-	2	1	2	T	18	1
TSEGI ORANGEWARE														(T)
Unclassified Orangeware	2	T	1	T	-	-	-	-	1	T	1	T	5	T
Totals	1,026	99	999	98	354	100	484	100	252	98	268	99	3,383	99 (100)

[a] T = trace (less than 0.5%). Percentage brackets [ ] denote tallies for both individual and ceramic ware totals.

Table 8.9. Ceramic time at 29SJ 629: The A.D. 975-1025 period.[a]

	Grid 76 Levels 1-2		Grid 82 Layer 1		Grid 87		Grid 88 Level 1		Grid 94		Pithouse 3	
Ceramic Type	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
CIBOLA/CHUSKA CULINARY												
Lino Gray	3	T	3	T	-	-	3	T	-	-	1	T
Plain gray	535	39	483	36	21	23	519	29	12	13	1,288	31
Wide neckbanded	68	5	47	3	1	1	65	4	-	-	39	1
Narrow neckbanded	74	5	159	12	11	12	212	12	8	9	566	14
Neck indented corrugated	3	T	10	1	-	-	5	T	-	-	25	1
Unclassified indented corrugated	128	9	94	7	19	21	170	9	9	10	566	14
PII indented corrugated rim	3	T	3	T	-	-	5	T	-	-	34	1
PII-III indented corrugated rim	-	-	-	-	-	-	-	-	-	-	1	T
CIBOLA WHITEWARE												
Unclassified BMIII-PI B/w	14	1	11	1	-	-	7	T	3	3	2	T
Red Mesa B/w	227	16	212	16	12	13	287	16	19	21	855	21
Escavada/Puerco B/w	-	-	-	-	-	-	-	-	-	-	10	T
Gallup B/w	-	-	4	T	-	-	8	T	1	1	51	T
Chaco B/w	-	-	-	-	-	-	2	T	2	2	-	-
Unclassified PII-PIII B/w	101	7	107	8	9	10	160	9	19	21	246	6
UNCLASSIFIED WHITEWARE	205	15	191	14	17	19	340	19	14	16	414	10
UNCLASSIFIED CARBON B/W	-	-	1	T	-	-	1	T	2	2	5	T
CHUSKA WHITEWARE												
Pena B/w	1	T	2	T	-	-	-	-	-	-	-	-
Tunicha B/w	1	T	4	T	-	-	1	T	-	-	-	-
Newcomb B/w	-	-	-	-	-	-	3	T	-	-	7	T
Unclassified carbon B/w	4	T	4	T	-	-	4	T	-	-	-	-
TUSAYAN WHITEWARE												
Lino B/g	-	-	1	T	-	-	-	-	-	-	-	-
Kana'a B/w	-	-	-	-	-	-	1	T	-	-	1	T
Black Mesa/Sosi B/w	-	-	-	-	-	-	-	-	-	-	1	T
MESA VERDE WHITEWARE												
McElmo B/w	-	-	1	T	-	-	-	-	-	-	1	T
Mesa Verde B/w	-	-	-	-	-	-	-	-	-	-	-	-
SMUDGED WARE	-	-	-	-	-	-	3	T	-	-	10	T

Table 8.9. (continued)

Ceramic Type	Grid 76 Levels 1-2		Grid 82 Layer 1		Grid 87		Grid 88 Level 1		Grid 94		Pithouse 3	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
SAN JUAN REDWARE												
Unclassified redware	7	1	8	1	-	-	12	1	-	-	5	T
Bluff B/r	1	T	2	T	-	-	4	T	-	-	-	-
CHUSKA REDWARE												
Sanostee B/r	1	T	-	-	-	-	-	-	-	-	2	T
WHITE MOUNTAIN REDWARE	-	-	-	-	-	-	-	-	-	-	-	-
Totals	1,376	98	1,347	99	90	99	1,812	99	89	98	4,130	99

[a] T = trace (0.5%). Percentage brackets [ ] denote tallies for both individual and ceramic ware totals.

Table 8.9. (continued)

Ceramic Type	Plaza Grids No.	Plaza Grids %	Plaza Features: OP 1 No.	OP6 No.	OP12 No.	OP 14 No.	OP 15 No.	Misc. No.	Feat. Totals[b] No.	Feat. Totals[b] %	Totals No.	Totals %
CIBOLA/CHUSKA CULINARY												(61)
Lino Gray	2	T	-	2	1	-	-	-	3	T	15	T
Plain gray	997	33	39	163	70	276	86	17	651	37	4,506	33
Wide neckbanded	64	2	-	20	8	16	2	-	46	3	330	2
Narrow neckbanded	414	14	27	35	39	85	10	7	203	12	1,647	12
Neck indented corrugated	36	1	-	2	2	-	-	-	4	T	83	1
Unclassified indented corrugated	516	17	7	32	44	39	12	6	140	8	1,642	12
PII indented corrugated rim	5	T	-	1	4	3	-	-	8	T	58	T
PII-III indented corrugated rim	1	T	-	-	-	-	-	-	-	-	2	T
CIBOLA WHITEWARE												(25)
Unclassified BMIII-PI B/w	5	T	-	1	-	2	1	-	4	T	46	T
Red Mesa B/w	317	11	46	56	40	252	10	5	409	23	2,338	17
Escavada/Puerco B/w	6	T	-	-	-	-	-	-	-	-	16	T
Gallup B/w	26	1	-	-	-	-	-	-	-	-	90	1
Chaco B/w	4	T	-	-	-	-	-	-	-	-	8	T
Unclassified PII-PIII B/w	192	6	4	12	13	48	4	6	87	5	921	7
UNCLASSIFIED WHITEWARE	377	13	8	29	25	104	4	9	179	10	1,737	[13]
UNCLASSIFIED CARBON B/W	10	T	-	-	-	-	-	-	-	-	19	[T]
CHUSKA WHITEWARE												(T)
Pena B/w	-	-	-	-	-	-	-	-	-	-	3	T
Tunicha B/w	13	T	-	-	-	3	1	-	4	T	23	T
Newcomb B/w	-	-	-	-	1	-	-	-	1	T	11	T
Unclassified carbon B/w	-	-	-	-	-	-	-	-	-	-	12	T
TUSAYAN WHITEWARE												(T)
Lino B/g	2	T	-	2	-	-	-	-	-	-	5	T
Kana'a B/w	-	-	-	-	-	-	-	-	-	-	2	T
Black Mesa/Sosi B/w	-	-	-	-	-	-	-	-	-	-	1	T
MESA VERDE WHITEWARE												(T)
McElmo B/w	-	-	-	-	-	-	-	-	-	-	2	T
Mesa Verde B/w	1	T	-	-	-	-	-	-	-	-	1	T
SMUDGED WARE	9	T	-	3	-	2	-	-	-	-	27	[T]

Table 8.9. (continued)

Ceramic Type	Plaza Grids No.	Plaza Grids %	Plaza Features OP 1 No.	OP6 No.	OP12 No.	OP 14 No.	OP 15 No.	Misc. No.	Feat. Totals[b] No.	Feat. Totals[b] %	Totals No.	Totals %
SAN JUAN REDWARE												
Unclassified redware												(T)
Bluff B/r	6	T	-	-	-	9	-	5	-	-	52	T
	-	-	-	-	-	-	-	-	-	-	7	T
CHUSKA REDWARE												(T)
Sanostee B/r	-	-	-	-	-	-	-	-	-	-	3	T
WHITE MOUNTAIN REDWARE	2	T	-	-	-	-	-	-	-	-	2	[T]
Totals	3,005	98	131	358	247	839	130	55	1,760	99	13,609	100 (99)

[a] T = trace (0.5%). Percentage brackets [ ] denote tallies for both individual and ceramic ware totals.
[b] Plaza Features were not included in the Plaza Grid totals.

Table 8.10. Ceramic time at 29SJ 629: The A.D. 1025-1050 period.[a]

Ceramic Type	Kiva Fill		Pithouse 2		Room 1		Room 2		Room 3		Room 5		Room 6	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No	%
CIBOLA/CHUSKA CULINARY														
Lino Gray	2	T	3	T	-	-	-	-	-	-	-	-	-	-
Plain gray	520	26	877	34	30	40	232	40	128	32	39	31	13	28
Wide neckbanded	10	T	11	T	2	3	3	1	1	T	1	1	1	2
Narrow neckbanded	225	11	301	12	3	4	83	14	14	3	12	10	-	-
Neck indented corrugated	16	1	40	2	2	3	3	1	23	6	1	1	-	-
Unclassified indented corrugated	509	25	564	22	7	9	159	28	118	29	6	5	3	6
PII indented corrugated rim	14	1	12	T	-	-	-	-	14	3	-	-	-	-
PII-PIII indented corrugated rim	2	T	-	-	-	-	-	-	-	-	-	-	-	-
CIBOLA WHITEWARE														
Unclassified BMIII-PI B/w	7	T	5	T	-	-	-	-	1	T	-	-	-	-
Red Mesa B/w	183	9	279	11	6	8	47	8	40	10	4	3	11	23
Escavada B/w	-	-	1	T	-	-	-	-	-	-	-	-	-	-
Puerco B/w	6	T	9	T	3	4	2	T	-	-	-	-	-	-
Gallup B/w	20	1	75	3	3	4	4	1	7	2	7	6	-	-
Chaco B/w	3	T	-	-	-	-	-	-	-	-	-	-	-	-
Chaco-McElmo B/w	6	T	2	T	-	-	-	-	-	-	-	-	-	-
Unclassified PII-PIII B/w	140	7	122	5	6	8	20	3	22	5	3	2	6	13
UNCLASSIFIED WHITEWARE	288	14	229	9	11	15	23	4	36	9	51	40	13	28
UNCLASSIFIED CARBON B/W	6	1	6	T	-	-	-	-	-	-	-	-	-	-
CHUSKA WHITEWARE														
Tunicha B/w	3	T	3	T	-	-	-	-	-	-	-	-	-	-
Newcomb B/w	-	-	1	T	-	-	-	-	-	-	-	-	-	-
Chuska B/w	4	T	3	T	1	1	-	-	-	-	-	-	-	-
Unclassified carbon B/w	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 8.10. (continued)

Ceramic Type	Kiva Fill		Pithouse 2		Room 1		Room 2		Room 3		Room 5		Room 6	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No	%
TUSAYAN WHITEWARE														
Lino B/g	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Kana'a B/w	-	-	2	T	-	-	-	-	-	-	-	-	-	-
Black Mesa/Sosi B/w	1	T	1	T	-	-	-	-	-	-	-	-	-	-
Unclassified whiteware	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LITTLE COLORADO WHITEWARE Holbrook B/w	1	T	-	-	-	-	-	-	-	-	-	-	-	-
MESA VERDE WHITEWARE														
McElmo B/w	2	T	1	T	-	-	-	-	-	-	-	-	-	-
Mesa Verde B/w	1	T	-	-	-	-	-	-	-	-	-	-	-	-
SMUDGED WARE	35	2	1	T	1	1	2	T	2	T	-	-	-	-
SAN JUAN REDWARE														
Unclassified redware	8	T	5	T	-	-	-	-	-	-	-	-	-	-
CHUSKA REDWARE														
Sanostee B/r	-	-	1	T	-	-	-	-	-	-	2	2	-	-
WHITE MOUNTAIN REDWARE														
Wingate B/r	1	T	-	-	-	-	-	-	-	-	-	-	-	-
Totals	2,013	98	2,554	98	75	100	578	100	406	99	126	101	47	100

* T = trace (less than 0.5%).

Table 8.10. (continued)

Ceramic Type	Room 7		Room 8		Room 9		All Rooms		Totals	
	No.	%	No.	%	No.	%	No.	%	No.	%
CIBOLA/CHUSKA CULINARY										(68)
Lino Gray	-	-	-	-	-	-	-	-	5	T
Plain gray	12	20	19	21	48	16	521	31	1,918	30
Wide neckbanded	-	-	2	2	5	2	15	1	36	1
Narrow neckbanded	4	7	6	7	31	10	153	9	679	11
Neck indented corrugated	7	11	5	5	4	1	45	3	101	2
Unclassified indented corrugated	4	7	17	19	76	25	390	23	1,463	23
PII indented corrugated rim	-	-	-	-	1	T	15	1	41	1
PII-PIII indented corrugated rim	-	-	-	-	-	-	-	-	2	T
CIBOLA WHITEWARE										(19)
Unclassified BMIII-PI B/w	2	3	1	1	1	T	5	T	17	T
Red Mesa B/w	11	18	17	19	49	16	186	11	648	10
Escavada B/w	-	-	-	-	-	-	-	-	1	T
Puerco B/w	-	-	1	1	-	-	6	T	21	T
Gallup B/w	7	11	1	1	7	2	36	2	131	2
Chaco B/w	-	-	-	-	-	-	-	-	3	T
Chaco-McElmo B/w	-	-	-	-	-	-	-	-	8	T
Unclassified PII-PIII B/w	4	7	13	14	16	5	90	5	352	5
UNCLASSIFIED WHITEWARE	9	15	7	8	57	19	207	12	724	[11]
UNCLASSIFIED CARBON B/W	-	-	-	-	1	T	1	T	13	[T]
CHUSKA WHITEWARE										(T)
Tunicha B/w	-	-	-	-	-	-	-	-	6	T
Newcomb B/w	-	-	-	-	-	-	-	-	1	T
Chuska B/w	-	-	-	-	-	-	1	T	8	T
Unclassified carbon B/w	1	2	1	1	-	-	2	T	4	T
TUSAYAN WHITEWARE										(T)
Lino B/g	-	-	-	-	1	T	1	T	3	T
Kana'a B/w	-	-	-	-	-	-	-	-	2	T
Black Mesa/Sosi B/w	-	-	-	-	-	-	-	-	-	-
Unclassified whiteware	-	-	-	-	-	-	-	-	-	-

Table 8.10. (continued)

	Room 7		Room 8		Room 9		All Rooms		Totals	
Ceramic Type	No.	%	No.	%	No.	%	No.	%	No.	%
LITTLE COLORADO WHITEWARE										(T)
Holbrook B/w	-	-	-	-	-	-	-	-	1	T
MESA VERDE WHITEWARE										(T)
McElmo B/w	-	-	-	-	-	-	-	-	3	T
Mesa Verde B/w	-	-	-	-	-	-	-	-	1	T
SMUDGED WARE	-	-	-	-	6	2	11	1	47	[1]
SAN JUAN REDWARE										(T)
Unclassified redware	-	-	1	1	-	-	1	T	13	T
CHUSKA REDWARE										(T)
Sanostee B/r	-	-	-	-	-	-	2	T	3	T
WHITE MOUNTAIN REDWARE										(T)
Wingate B/r	-	-	-	-	-	-	-	-	1	T
Totals	61	101	91	100	304	98	1,688	99	6,254	97 (100)

[a] T = trace (less than 0.5%). Percentage brackets [ ] denote tallies for both individual and ceramic ware totals.

marking northern and southern origins co-occurs with the ceramic types of the previous period. There is no overwhelming preference for a particular painted type, and several types are common: Gallup, Puerco, Chaco-McElmo, and varieties of McElmo Black-on-whites occur along with Puerco and Wingate Black-on-reds. The new hallmark type was Chaco-McElmo Black-on-white (Plate 8.11c), a type that blends Chacoan, Mesa Verdean, and Tusayan ceramic traditions (Franklin and Ford 1982; Windes 1985). This type, along with McElmo varieties and White Mountain Redware types, appears for the first time in Chaco Canyon. Sherd-tempered, overall indented corrugated vessels also appear for the first time in low frequencies (<12 percent overall). Chuskan culinary jars of Blue Shale Corrugated and a new type, Hunter Corrugated (Plate 8.9d), are still common, along with sand-tempered Chaco Corrugated jars.

This late assemblage is poorly represented at 29SJ 629, where it is mixed and dominated by earlier ceramics of the Red Mesa period. It is primarily found on the floor and in the floor fill of the Kiva, with scattered sherds also occurring near the surface in the adjacent plazas to the west and south.

Numerous dated sites accurately reflect the Late Mix assemblage (Windes 1987a:Table 8.16), although many proveniences suffer from mixing of earlier assemblages. Dates in the last half of the century are notoriously absent and may reflect major population withdrawal from the San Juan Basin, which was spurred on by unprecedented drought (Burns 1983). Later assemblages, marked by Mesa Verde Black-on-white, do not occur until the A.D. 1200s in Chaco. Classic San Juan McElmo black-on-white, a type that might be expected in quantity if much occupation extended into the late A.D. 1100s, is rare in the canyon sites. Where it does occur in Chaco Canyon, it probably derived from a late A.D. 1100s or A.D. 1200s occupation.

The Ceramic Seriation

In lieu of tree-ring dating, cross-dated ceramic types have often provided the most useful method of temporal control in the Southwest. Unfortunately, there has been no attempt to update the pioneering effort of Breternitz (1966) on which most efforts rely. From the Chacoan perspective, it is clear that tighter control of chronometric results and ceramics is required before temporal accuracy of ceramic cross-dating can be refined (Windes 1984). A multidimensional-scaling program (i.e., KYST-2A), developed by Kruskal and Wish (1978), provides an alternative approach to the use of cross-dated ceramic types. The utility of the program for Southwestern ceramic seriation has been successfully tested by Durand and Hurst (1991), Matson and Lipe (1977), and Windes (1987a).

A short discussion may be useful here to acquaint the reader with the KYST program. The program provides a scattergram, with the proximity of points (ceramic assemblages here) reflecting increasing similarity as the points converge and dissimilarity when far apart. It is based on the percentage of type sherds within each sample compared to all other samples. The underlying structure is deduced from examination of the plot, and in this case, thanks to added chronological control from chronometric dates, at least one dimension of the program can be attributed to temporal ordering. Most plots have been subjectively divided into periods of time on the basis of the dated samples to enhance the temporal ordering for the reader. Desirable plots are often in horseshoe form or a related configuration. Some attributes may affect the plot configuration and yet not be strong enough to become visible as separate configurations. Increased program dimensionality may produce more desirable results (and lessen the "stress" factor), although not all dimensions may be interpretable (Kruskal and Wish 1978:57) because it is difficult to discern how the variables affect calculations for many of the dimensions.

When assemblages from 29SJ 629 were run against others from dated contexts, they appear to confirm the temporal ordering suggested by other means (e.g., architecture, ceramic types, and a few chronometric dates). Those from the trash unit just above the Pithouse 2 floor (Assemblage 153) and the Pithouse 3 floor (Assemblage 157) closely plotted with chronometric-dated assemblages in the late A.D. 900s and early A.D. 1000s (Figure 8.2), as expected (Windes 1987a:Figures 8.6-8.7).

Summary and Conclusions

Understanding the chronology of a long-occupied site is a difficult task, even with numerous

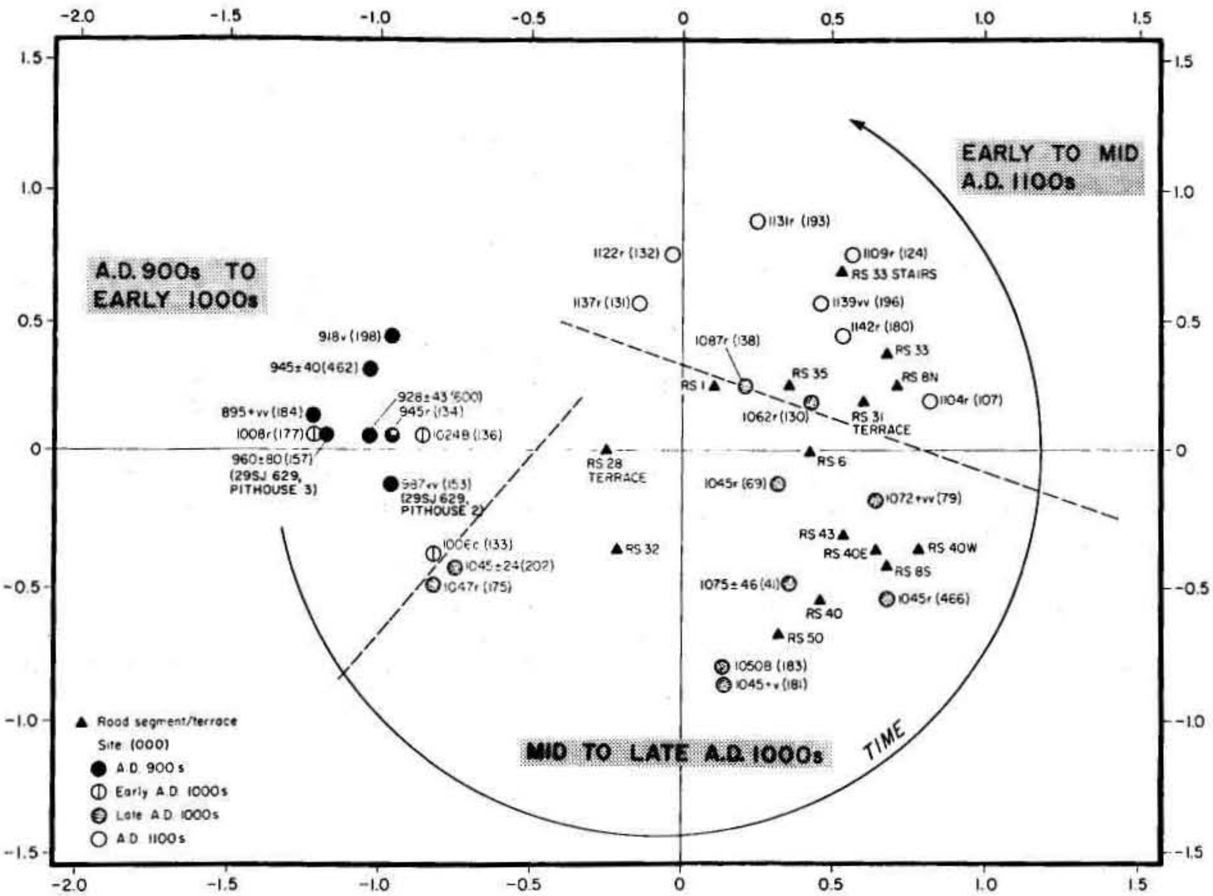

Figure 8.2. ***Multidimensional scaling plot showing the temporal ordering of selected ceramic assemblages with samples from Pithouse 2 (153) and Pithouse 3 (157) using the KYST-2A program in 5-dimensional space. Stress factor is .12. The 2 x 1 dimension is shown (assemblage locations are in Windes [1987a:Tables 8.16-8.17] NPS 310/82808 B).***

chronometric dates. In these circumstances, a single dating method can seldom mark all major cultural episodes at a site. Thus, it is necessary to rely on as many chronometric methods as possible to refine and cross-check the timing of cultural events. Many dating methods fail to provide adequate temporal control because they are inherently imprecise for fine resolution. Nevertheless, when large numbers of dates from these methods (e.g., radiocarbon and obsidian hydration) can be obtained from the same proveniences and checked for contemporaneity, averaged results can yield confident, useful, short periods of time to buttress and expand on inferences made from tree-ring dates, if the latter are present. Statistical confidence can only be achieved when clusters of dates are derived.

Although considerable effort and cost was expended to refine the 29SJ 629 chronology, the end result was one of disappointingly few, reliable dates. Our archeomagnetic results were particularly bothersome in that they had the potential for dating almost every excavated room floor at the site. The efforts were not fruitless, however, and a reliable chronological interpretation can be made for the site but not at the decennial levels for which we had hoped. Seriation and cross-dated ceramic assemblages permitted an overall temporal framework to be applied to the site, with some checks provided by chronometric results. The results of the seriation verified the temporal framework derived from the absolute dates and helped decipher some of the internal complexity of the site occupation.

Overall, the dates help verify use of the site for a period primarily between A.D. 950 and 1050, followed by abandonment. The most reliable date was the latest tree-ring date at A.D. 987vv, which confirms major reconstruction in Pithouse 2 at about A.D. 1000. This date is particularly important because it may mark some important period of change that first resulted in new occupations within the Fajada Gap Community and, shortly afterwards, widespread house abandonments.

Although tenuous, chronometric results suggest some early use of the site by the early A.D. 900s, if not earlier, that coincides with the earliest site ceramics (Kiatuthlanna Assemblage). After a possible hiatus in occupation during the late A.D. 1000s, there was a limited reoccupation in the early A.D. 1100s. No reliable chronometric results were obtained from this later occupation. This event marks a number of changes that took place throughout the canyon, which suggest major societal changes. Domestic habitation apparently did not occur at the site during the last occupation, when only a kiva and, possibly, Room 1 were built. After the early A.D. 1100s, 29SJ 629 was abandoned for good, aside from some minimal use of it in the past 50 years.

Probably the most important lesson learned from the dating analyses is that reliable, averaged, absolute dates can be obtained only if heavy emphasis is placed on cluster dating of architectural and ceramically cohesive units instead of the oft-favored approach of obtaining single, scattered dates for a site as happened initially at 29SJ 629. Single dates cannot be statistically verified without companion results. A different story, however, may have been possible if more reliable archeomagnetic results could have been obtained. In the Chacoan context, at least, the KYST seriation demonstrates that ceramics can provide reliable, short-period, temporal control for much of the Bonito phase when mixed assemblages can be recognized and avoided or culled.

9

COMMUNITY SETTLEMENT IN THE FAJADA GAP AREA

Introduction

Understanding the rise and complex development of the Chacoan Phenomenon is dependent, to a large degree, on understanding small-house site dynamics and their relationship to greathouses. The precise nature of community development of small houses and greathouses is poorly understood, although it has received increased attention by archeologists (e.g., Breternitz and Doyel 1987; Fowler et al. 1987; Irwin-Williams and Baker 1991; Marshall et al. 1979; Powers et al. 1983). While proximity alone does not define a community of sites, it does provide a reasonable starting point for its investigation.

In this chapter the broad perspective of the Spadefoot Toad Site (29SJ 629) as part of a larger aggregated community, is explored. The identity of various Chaco Canyon communities is first covered with an emphasis on two of them: the one in the Fajada Gap area where 29SJ 629 and Marcia's Rincon are located, and briefly, a newly discovered one near the east end of the canyon. Difficulties in the assignment of specific periods of site occupation, the duration and permanency of occupations, and the population size of communities are also discussed. In addition, two craft activities--pottery and turquoise jewelry production--are examined as potential widespread community activities that were first identified as major small-house components by McKenna (1984:386) at nearby 29SJ 1360. In light of the clear evidence for turquoise jewelry making, 29SJ 629 provides a starting point to examine the extent and role of these two crafts in the local community and in the Chacoan Phenomenon.

Although it is not possible to reexamine all the small houses in Chaco Canyon for this report, those that cluster in Fajada Gap (Figure 9.1) provide an ideal community to study--54 late Pueblo I, Pueblo II, and early Pueblo III house sites. Spatially distinct architectural remains of non-contiguous surface roomblocks are considered as separate houses for this report, although they may have received a single survey site number. On the same site, multiple houses may have seen coeval use, but generally, an earlier house could be seen offset or partly underneath a later roomblock, and these are treated as separate houses without a continuity in occupation. All of the park sites in the Fajada Gap sample, except for those five (29SJ 2772-29SJ 2774, 29SJ 2786, and 29SJ 2809) inventoried in 1984 by Robert Powers (1990) during the survey of the new boundary areas, were inventoried by the author in 1972 and reexamined by him in 1988-1989 for this report. Furthermore, houses on adjacent Navajo Tribal and state lands south of the park were inventoried for the first time for this study (sites 29SJ 3006-29SJ 3021). All these sites are also inventoried under the state survey files in the Laboratory of Anthropology (Appendix B).

Chaco Canyon exhibits a widespread occupation in the A.D. 900s and early A.D. 1000s, constituting a large Anasazi community. It parallels regional trends toward an expansion of Anasazi settlement in terms of house frequency and area extent, particularly around the San Juan Basin (i.e., Dean 1988:41; Gillespie and Powers 1983:21; Judge 1989; Judge et al. 1981:78). Despite the rise of large A.D. 900s communities, many areas remain practically devoid of

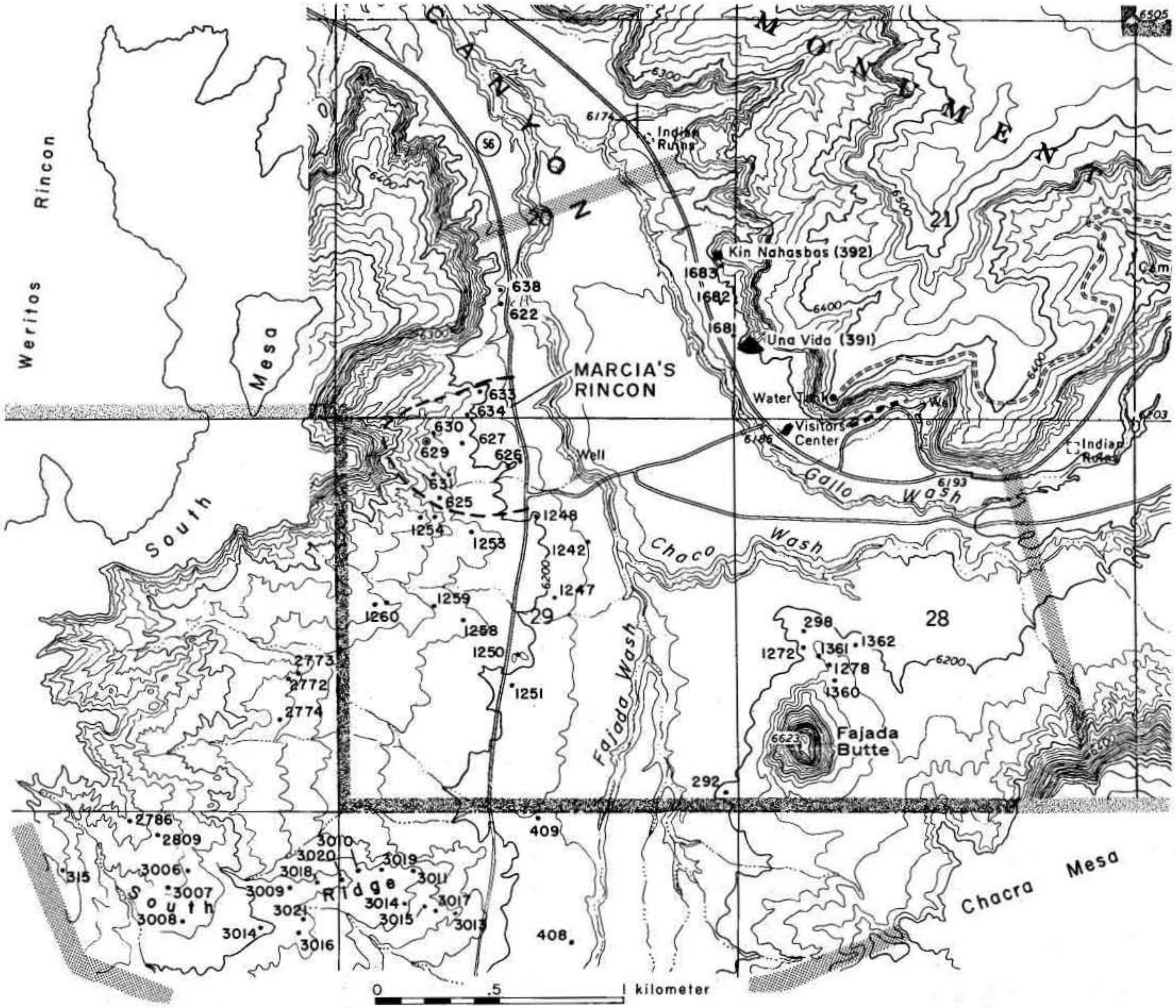

Figure 9.1. *House sites in the Fajada Gap area, Chaco Canyon, A.D. 875-1150. (Stippled lines mark approximate community area within canyon) (NPS 310/82783 A).*

permanent occupation. There are notable clusters of early houses in the Rio Puerco of the East (Washburn 1974:325), particularly around Guadalupe Ruin (Irwin-Williams and Baker 1991), and in the Red Mesa Valley between Grants and Gallup, New Mexico (Marshall et al. 1979), which experience nearly a ten-fold increase in sites, especially of residential houses (Scheick 1983:638). A number of house clusters arise in the A.D. 900s on the northern slopes of the Dutton Plateau and the eastern Chuska Mountain slopes (Marshall et al. 1979). In most, if not all cases, these areas became the locus of a contemporary or later abnormally large structure now identified as a Chacoan greathouse (Windes and Ford 1992). The rise of these communities are not unique to the San Juan Basin. Mesa Verde, for instance, reveals settlement densities comparable to Chaco Canyon (Hayes 1964:Maps 5-6; Rohn 1977:275; Smith 1987:66, Figure 31) that followed the abandonment of the huge Pueblo I settlements in the Dolores River Valley, Colorado, at around A.D. 900 or 920 (Kane 1984:51).

Chaco Canyon Communities

In Chaco Canyon, Pueblo II small-house sites of the A.D. 900s and early A.D. 1000s (Early Bonito phase) are widespread in a strip from the eastern end of Chaco Canyon near Pueblo Pintado to just west of South Gap, not far from Pueblo Bonito, a distance of 31 km. Sites are sparse further west 2 km in the canyon, to Peñasco Blanco and beyond, until the large community at Padilla Well, adjacent to the Chaco "River," is encountered 3.7 km southwest of Peñasco Blanco. Small A.D. 900s houses are concentrated at the mouths of four deep canyons that break through the southern escarpment (Chacra Mesa) along the south side of the canyon. It is true that a preference for small-house occupation favors the south side, probably because the topography creates better settlement and subsistence conditions (Chapter 2). Although a north-south dichotomy of greathouse/small-house settlement has been emphasized for the canyon (e.g., Cordell 1984:255; Martin and Plog 1973:109), in the A.D. 900s at least, greathouses were initially built on both sides of the canyon (two on the north and two on the south side), and at least two others were eventually built there.

It is significant that within three of the four densest clusters of small sites, the earliest greathouses of the Bonito phase are found: the greathouse at the East Community (at the east end of the canyon; Appendix F), Una Vida-Kin Nahasbas at Fajada Gap, and Pueblo Bonito at South Gap, with Peñasco Blanco located at a point between the clusters at South Gap and Padilla Well. While it is not possible to date exactly the arrival of the greathouses and the dense settlements of small houses, their arrival appears to have been approximately coeval.

The Pueblo I Occupation

Results of the 1972 inventory survey (Hayes 1981:75) suggested that site frequency in Chaco Canyon stabilized during the Pueblo I period (A.D. 700-900) and then declined during the following periods, as the inhabitants aggregated into fewer but larger houses. The initial premise of a decline in site number may be flawed because of the discrepancy between the survey crews' textbook knowledge of Pueblo I, their lack of excavation experience, and the actual field reality of Pueblo I sites. Naturally, the subtle surface remains of the houses and the ceramic complexities were not readily understood until considerable excavation had followed.

Both architecture and ceramics heavily biased site frequency in favor of the Basketmaker III and Pueblo I periods. Upright slabs and an abundance of plain gray ceramics tended to place sites within the Basketmaker period, when some of these sites were actually classic Pueblo I houses. More importantly, the majority of A.D. 900s houses were classified as Pueblo I-Pueblo II because of the widespread ceramics of plain gray, neckbanded, Red Mesa Black-on-white and earlier painted wares, an assemblage that characterizes A.D. 900s Chacoan occupations--a bias heavily influenced by the author's survey records for the period. While it is true that some occupations may have begun in the late A.D. 800s, the primary occupations of the majority of these houses were A.D. 900s (early Pueblo II). Thus, the Pueblo I period, particularly in the A.D. 700s and for most of the A.D. 800s, may have yielded an over-inflated house count (Hayes 1981:Figure 15; Vivian 1989:Figure 2, 1990:Figure 6.12). Furthermore, wide and narrow neckbanded pottery has been touted in textbooks and reports as the time marker for Pueblo I (e.g., Cordell 1982:66; Hayes 1964:44; Willey 1966:213-214), but in Chaco Canyon, at least, these became predominant on sites only by the very early A.D. 900s when Red Mesa Black-on-white made its initial appearance (see Tables 9.1-9.2 for this trend)--that is, in the early Pueblo II period. Some, however, also considered Red Mesa Black-on-white to have been a Pueblo I indicator (Hawley 1937:36; Marshall et al. 1979:64, 121-123), but its association with tree-ring dates in the A.D. 900s and 1000s in the San Juan Basin marked it as Pueblo II. Classic, arc-shaped, single component Pueblo I sites excavated in Chaco Canyon yielded no neckbanded pottery or Red Mesa Black-on-white, nor did those resurveyed in Fajada Gap.

While the settlement size was uncertain for A.D. 700s and A.D. 800s in Chaco Canyon, the norm appeared to be small, one-to-two family residential house units scattered throughout the canyon and adjacent areas. This impression was supported by the similar units recorded in the recent sample area in Fajada Gap, the few excavated in the 1970s (for a summary see McKenna 1984), and the absence of large houses resembling those north of the San Juan River. The largest Pueblo I house in Chaco Canyon appeared to have been the initial construction of the Pueblo Bonito greathouse, tree-ring dated in the A.D. 860s and 890s (Windes and Ford 1991, 1992). This unit comprised more than 50 rooms. Possibly, Casa del Rio (Marshall et al. 1979:31-32), just west of Chaco Canyon (Figure 1.1), was another large Pueblo I house.

Based on the resurvey of Fajada Gap in 1988, the arrival of greathouses and the numerous small houses in the A.D. 900s may have been preceded by only a small to moderate Pueblo I (A.D. 700-900) population in Chaco Canyon. In Fajada Gap, the few pristine houses recorded in the sample area were all small, one-to-two family size units on top of ridges, nearly all outside the park. These small, early houses seem common outside the park and beyond, although many could be buried by later occupations within the canyon. The few excavated in Fajada Gap and at the mouth of Werito's Rincon were 1-2 resident units (Windes 1976a, 1976b), except for 29SJ 627 in Marcia's Rincon (Truell 1992), which was twice as large. It was apparent from the excavated and recent survey sample (29SJ 627 is, again, an exception) that generally the Pueblo I houses were occupied for only a short time. The houses appear architecturally simple, without extensive remodeling, and there was little trash. In contrast, houses of the A.D. 900s period and later (Tables 9.1-9.3) typically revealed trash densities 5-10 times greater than for the earlier sites. Nowhere in Chaco Canyon was there evidence of the large aggregations of Pueblo I sites and huge houses that characterized areas north of the San Juan River, best known by the work in the Dolores River Valley, Colorado, (e.g., Kane and Robinson 1988; Lipe et al. 1988) and Site 13 on Alkali Ridge, Utah (Brew 1946). The San Juan Basin also seemed practically devoid of these settlements, with the exception of Skunk Springs, on the Chuskan slope (Marshall et al. 1979:109-111; Windes and Ford 1992).

Identifying the Pueblo II Occupation

With experience, the surface evidence for Pueblo II houses was easily recognizable, although this was not the case during the initial stages of the Chaco Project. Both architecture and ceramics constituted the primary variables for recognition of these sites occupied during the Pueblo II period. Often these variables were obscured or buried by later occupations. As a result, sometimes judgments had to be made from one class of variables or the other. Although our general perceptions of ceramic time and house recognition were reasonable in 1972, experience has sharpened the subtle distinctions to be made in the cultural record, as well as our understanding of ceramic chronology that we did not possess in the early 1970s.

Architecture

House architecture changes noticeably from the A.D. 800s through the late A.D. 1000s. Three styles were apparent which could be used to separate sites temporally. The key architectural indicator for sites built in the A.D. 700s and 800s were the wall bases constructed of upright slabs that sometimes jutted above the surface to mark contiguous storage and living rooms. An arc of rooms could often be perceived even when the majority of the wall bases were buried. The upper walls were primarily mud and seldom left any mound relief once they had disintegrated. In the A.D. 900s, however, blocks of stone formed the bases of the mud walls that were composed of numerous small, tabular spalls--a widespread trait also noted in the Mesa Verde region for the A.D. 900s (Rohn 1977:237; Smith 1987:62). After abandonment of the house, these walls often

Table 9.1. Ceramic midden samples from unexcavated sites occupied between A.D. 875 and 925 in the Fajada Gap Community.[a]

	Sites													
	29SJ 315		29SJ 622[b]		29SJ 1250		29SJ 2786[c]		29SJ 2809[c]		29SJ 2809[d]		29SJ 3006	
Ceramic Type	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
CIBOLA CULINARY		[71]		[81]		[75]		[72]		[75]		[74]		[92]
Lino Gray	3	2	7	2	15	7	18	5	7	2	15	8	21	6
Plain gray	91	62	237	75	141	64	214	62	217	69	119	62	297	85
Wide neckbanded	6	4	1	T	1	T	13	4	10	3	1	1	-	-
Narrow neckbanded	2	1	3	1	7	3	4	3	3	1	6	3	-	-
Neck indented corrugated	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Unclassified indented corrugated	-	-	4	1	1	T	-	-	-	-	-	-	-	-
Unclassified rim fillets	1	1	1	T	-	-	-	-	-	-	1	1	1	T
CHUSKA CULINARY				[1]		[1]		[4]		[1]		[2]		[T]
Bennett Gray	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Plain gray	-	-	3	1	2	1	9	3	4	1	3	2	1	T
Sheep Springs/Tocito Gray	-	-	-	-	-	-	2	1	-	-	-	-	-	-
Capt. Tom Corrugated	-	-	-	-	-	-	1	T	-	-	-	-	-	-
Unclassified indented corrugated	-	-	1	T	-	-	1	T	-	-	-	-	-	-
CIBOLA WHITEWARE		[16]		[8]		[19]		[12]		[23]		[17]		[3]
La Plata B/w	1	1	4	1	2	1	1	T	-	-	-	-	2	1
Whitemound B/w	3	2	1	T	7	3	5	1	2+	1	2	1	4	1
Kiatuthlanna B/w	7	5	5	2	4	2	1	T	-	-	1	1	-	-
Unclassified BMIII-PI B/w	-	-	3	1	5	2	11	3	68	22	8	4	5	2
Red Mesa B/w	4	3	5	2	16	7	14	4	-	-	19	10	-	-
Escavada/Puerco B/w	-	-	-	-	1	T	-	-	-	-	-	-	-	-
Gallup B/w	-	-	3	1	3	1	-	-	-	-	-	-	-	-
Unclassified PII-PIII B/w	8	5	5	2	4	2	11	3	1	T	3	2	1	T
UNCLASSIFIED WHITEWARE	18	(12)	25	(8)	8	(4)	31	(9)	1	(T)	13	(7)	8	(2)
CHUSKA WHITEWARE						[T]		[1]						
Pena B/w	-	-	-	-	-	-	1	T	-	-	-	-	-	-
Tunicha B/w	-	-	-	-	-	-	2	1	-	-	-	-	-	-
Unclassified carbon B/w	-	-	-	-	1	T	-	-	-	-	-	-	-	-
TUSAYAN WHITEWARE								[1]		[T]		[1]		[T]
Lino B/g	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Kana'a B/w	-	-	-	-	-	-	1	T	-	-	1	1	1	T
Unclassified whiteware	-	-	-	-	-	-	1	T	1	T	-	-	-	-
SMUDGED WARE	2	(1)	-	-	-	-	1	(T)	-	-	-	-	6	(2)
SAN JUAN REDWARE				[2]		[T]		[1]		[T]				[T]
Unclassified redware	-	-	6	2	1	T	4	1	1	T	-	-	1	T

Table 9.1. *(continued)*[a]

	Sites													
	29SJ 315		29SJ 622[b]		29SJ 1250		29SJ 2786[c]		29SJ 2809[c]		29SJ 2809[d]		29SJ 3006	
Ceramic Type	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
CHUSKA REDWARE														
Sanostee B/r	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Totals	146	99	314	99	219	97	346	98	315	99	192	103	348	99
Sherd Density (per m²)	0.1		--		0.9		11.5		1.8		5.5		4.8	

[a] T = trace (less than 0.5%). Ware percentages = [ ]; combined ware and type percentages = ( ).
[b] Sample from 1972 survey and 1983 tests. Densities unknown.
[c] Sample of house and midden from 1984 survey by Robert Powers .
[d] 29SJ 2809 resampled in 1988 by Windes.

Table 9.1. (continued)[a]

	Sites												Table Totals	
	2SJ 3007		29SJ 3008		29SJ 3011		29SJ 3016		29SJ 3018		29SJ 3020			
Ceramic Type	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
CIBOLA CULINARY		[80]		[89]		[83]		[92]		[72]		[86]		[81]
Lino Gray	29	7	19	8	8	5	20	7	10	5	14	5	186	5
Plain gray	293	72	193	80	124	77	232	85	141	67	209	79	2,508	73
Wide neckbanded	2	T	2	1	1	1	-	-	2	1	1	T	40	1
Narrow neckbanded	-	-	-	-	1	1	-	-	4	2	1	T	31	1
Neck indented corrugated	-	-	-	-	-	-	-	-	2	1	-	-	2	T
Unclassified indented corrugated	-	-	-	-	-	-	-	-	-	-	1	T	6	T
Unclassified rim fillets	-	-	-	-	1	1	-	-	-	-	-	-	5	T
CHUSKA CULINARY		[9]				[1]				[3]		[2]		[2]
Bennett Gray	1	T	-	-	-	-	-	-	-	-	1	T	2	T
Plain gray	33	8	-	-	2	1	-	-	7	3	4	2	68	2
Sheep Springs/Tocito Gray	2	T	-	-	-	-	-	-	-	-	-	-	4	T
Capt. Tom Corrugated	-	-	-	-	-	-	-	-	-	-	-	-	1	T
Unclassified indented corrugated	-	-	-	-	-	-	-	-	-	-	-	-	2	T
CIBOLA WHITEWARE		[6]		[7]		[6]		[5]		[6]		[7]		[10]
La Plata B/w	3	1	1	T	1	1	2	1	-	-	1	T	18	T
Whitemound B/w	7	2	9	4	3	2	6	2	4	2	5	2	58	2
Kiatuthlanna B/w	1	T	-	-	-	-	2	1	2	1	5	2	28	1
Unclassified BMIII-PI B/w	12	3	6	2	3	2	1	T	3	1	4	2	129	4
Red Mesa B/w	-	-	-	-	-	-	2	1	4	2	1	T	65	2
Escavada/Puerco B/w	-	-	-	-	-	-	-	-	-	-	-	-	1	T
Gallup B/w	-	-	-	-	2	1	-	-	-	-	2	1	10	T
Unclassified PII-PIII B/w	-	-	-	-	1	1	1	T	-	-	-	-	35	1
UNCLASSIFIED WHITEWARE	19	(5)	9	(4)	11	(7)	4	(1)	31	(15)	15	(6)	193	(6)
CHUSKA WHITEWARE		[T]												[T]
Pena B/w	-	-	-	-	-	-	-	-	-	-	-	-	1	T
Tunicha B/w	-	-	-	-	-	-	-	-	-	-	-	-	2	T
Unclassified carbon B/w	1	T	-	-	-	-	-	-	-	-	-	-	2	T
TUSAYAN WHITEWARE		[T]				[2]		[T]		[T]				[T]
Lino B/g	-	-	-	-	3	2	-	-	-	-	-	-	3	T
Kana'a B/w	1	T	-	-	-	-	1	T	1	T	-	-	6	T
Unclassified whiteware	-	-	-	-	-	-	-	-	-	-	-	-	2	T
SMUDGED WARE	1	(T)	2	(1)	1	(1)	3	(1)	-	-	-	-	16	(T)
SAN JUAN REDWARE		[1]												[T]
Unclassified redware	1	(1)	-	-	-	-	-	-	-	-	-	-	14	T

Table 9.1. *(continued)*[a]

	Sites												Table Totals	
	2SJ 3007		29SJ 3008		29SJ 3011		29SJ 3016		29SJ 3018		29SJ 3020			
Ceramic Type	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
CHUSKA REDWARE		[T]												[T]
Sanostee B/r	1	T	-	-	-	-	-	-	-	-	-	-	1	T
Totals	407	98	241	100	162	103	274	99	211	100	264	99	3,439	98
Sherd Density (per m²)	5.1		3.7	0.6			1.4		0.4		3.2		1.16	

[a] T = trace (less than 0.5%). Ware percentages = [ ]; combined ware and type percentages = ( ).

Table 9.2. Selected midden ceramic samples from the Fajada Gap Community sites occupied in the A.D. 900s.[a]

	Sites											
	29SJ 392		29SJ 625		29SJ 626W		29SJ 631		29SJ 633		29SJ 634	
Ceramic Type	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
CIBOLA CULINARY		[50]		[43]		[54]		[52]		[47]		[38]
Lino Gray	1	T	1	T	-	-	1	T	-	-	1	T
Plain gray	118	31	241	34	166	45	96	39	104	30	75	19
Wide neckbanded	13	3	20	3	7	2	5	2	18	5	21	5
Narrow neckbanded	35	9	23	3	18	5	11	4	17	5	31	8
Neck indented corrugated	1	T	2	T	2	1	-	-	4	1	1	T
Unclassified indented corrugated	16	4	16	2	2	1	9	4	12	3	10	3
PII indented corrugated rim	-	-	-	-	-	-	-	-	2	1	-	-
PII-III indented corrugated rim	-	-	-	-	-	-	1	T	-	-	-	-
Unclassified rim fillet	5	1	4	1	7	2	4	2	4	1	8	2
CHUSKA CULINARY		[5]		[7]		[6]		[7]		[10]		[5]
Plain gray	8	2	23	3	11	3	5	2	15	4	10	3
Sheep Springs/Tocito Gray	1	T	4	1	4	1	1	T	3	1	-	-
Capt. Tom Corrugated	4	1	9	1	4	1	2	1	5	1	2	1
Neck indented corrugated	-	-	1	T	1	T	-	-	1	T	1	T
Unclassified indented corrugated	4	1	6	1	4	1	4	2	8	2	4	1
Blue Shale Corrugated rim	-	-	-	-	-	-	-	-	-	-	-	-
Unclassified rim fillet	3	1	4	1	-	-	2	1	1	T	2	1
MISCELLANEOUS CULINARY[b]	—	—	1	(T)	—	—	2	(1)	—	—	—	—
Subtotals	209	54	355	50	226	61	144	59	194	57	166	43
CIBOLA WHITEWARE		[28]		[27]		[22]		[24]		[24]		[32]
La Plata B/w	2	1	2	T	1	T	-	-	-	-	-	-
Whitemound B/w	-	-	7	1	5	1	3	1	2	1	-	-
Kiatuthlanna B/w	1	T	4	1	1	T	1	T	-	-	-	-
Unclassified BMIII-PI B/w	-	-	-	-	-	-	-	-	-	-	-	-
Red Mesa B/w	47	13	89	13	40	11	36	15	43	13	84	22
Escavada/Puerco B/w	1	T	-	-	-	-	1	T	-	-	1	T
Gallup B/w	-	-	5	1	-	-	3	1	5	1	-	-
Chaco B/w	-	-	-	-	-	-	2	1	1	T	-	-
Chaco-McElmo B/w	-	-	-	-	-	-	1	T	-	-	-	-
Unclassified PII-PIII B/w	54	14	81	11	35	9	12	5	32	9	39	10
UNCLASSIFIED WHITEWARE	50	(13)	146	(21)	59	(16)	39	(16)	62	(18)	90	(23)

Table 9.2. (continued)

Ceramic Type	29SJ 392		29SJ 625		29SJ 626W		29SJ 631		29SJ 633		29SJ 634	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
CHUSKA WHITEWARE		[2]		[1]		[1]				[1]		[1]
Pena B/w	-	-	-	-	-	-	-	-	-	-	-	-
Tunicha B/w	4	1	-	-	-	-	-	-	-	-	-	-
Burnham and Newcomb B/w	2	1	1	T	-	-	-	-	-	-	1	T
Unclassified carbon B/w	-	-	3	T	4	1	-	-	3	1	1	T
Drolet B/w	-	-	-	-	-	-	-	-	-	-	-	-
TUSAYAN WHITEWARE		[T]		[1]		[T]		[T]				[1]
Lino B/g	-	-	-	-	-	-	-	-	-	-	-	-
Kana'a B/w	-	-	3	T	1	T	1	T	-	-	2	1
Unclassified whiteware	1	T	1	T	-	-	-	-	-	-	-	-
SMUDGED WARE	-	-	1	(T)	-	-	-	-	-	-	-	-
SAN JUAN REDWARE		[1]		[1]								[T]
Abajo/Bluff R/o	4	1	-	-	-	-	-	-	-	-	-	-
Unclassified redware	1	T	10	1	-	-	-	-	-	-	1	T
CHUSKA REDWARE						[T]				[T]		
Sanostee B/r	-	-	-	-	1	T	-	-	1	T	-	-
TSEGI ORANGEWARE												
Unclassified orangeware	-	-	-	-	-	-	-	-	-	-	-	-
WHITE MOUNTAIN REDWARE								[1]				
Unclassified redware	—	—	—	—	—	—	2	1	—	—	—	—
Totals	376	98	708	99	373	100	245	98	343	97	385	99
Sherd Density (per m²)	—		43.1		19.5		24.4		42.9		48.1	

[a] T = trace (less than 0.5%). Samples do not necessarily reflect the entire site occupation. Sample from 29SJ 392 is from excavated deposits. Ware percentages = [ ]; combined ware and type percentages = ( ).
[b] Sherd or San Juan rock tempered.

Table 9.2. (continued)

	Sites											
	29SJ 1242		29SJ 1248		29SJ 1254W		29SJ 1260E		29SJ 1260W		29SJ 1360	
Ceramic Type	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
CIBOLA CULINARY		[50]		[45]		[52]		[62]		[48]		[47]
Lino Gray	4	1	1	T	-	-	3	1	5	2	-	-
Plain gray	278	37	89	32	128	33	205	52	126	41	80	31
Wide neckbanded	25	3	9	3	15	4	15	4	10	3	7	3
Narrow neckbanded	58	8	16	6	30	8	21	5	5	2	28	11
Neck indented corrugated	4	T	5	2	4	1	-	-	-	-	-	-
Unclassified indented corrugated	6	1	4	1	22	6	-	-	-	-	5	2
PII indented corrugated rim	-	-	-	-	-	-	-	-	-	-	1	T
PII-III indented corrugated rim	-	-	-	-	-	-	-	-	-	-	-	-
Unclassified rim fillet	3	T	3	1	3	1	2	1	4	1	1	T
CHUSKA CULINARY		[7]		[9]		[2]		[7]		[8]		[4]
Plain gray	26	3	8	3	11	3	16	4	18	6	2	1
Sheep Springs/Tocito Gray	1	T	1	T	-	-	2	1	2	1	1	T
Capt. Tom Corrugated	16	2	11	4	9	2	7	2	4	1	5	2
Neck indented corrugated	3	T	1	T	-	-	-	-	-	-	-	-
Unclassified indented corrugated	4	1	4	1	4	1	-	-	-	-	1	T
Blue Shale Corrugated rim	-	-	-	-	-	-	-	-	-	-	-	-
Unclassified rim fillet	3	T	-	-	-	-	1	T	1	T	1	T
MISCELLANEOUS CULINARY		—	2	(1)	—	—	—	—	—	—	1	(T)
Subtotals	431	57	154	55	226	58	272	69	175	57	133	51
CIBOLA WHITEWARE		[27]		[27]		[28]		[17]		[21]		[34]
La Plata B/w	-	-	3	1	-	-	2	1	-	-	-	-
Whitemound B/w	1	T	-	-	1	T	4	1	5	2	-	-
Kiatuthlana B/w	5	1	-	-	3	1	5	1	4	1	-	-
Unclassified BMIII-PI B/w	-	-	-	-	-	-	2	1	-	-	-	-
Red Mesa B/w	132	18	53	19	64	16	31	8	32	10	52	20
Escavada/Puerco B/w	-	-	-	-	-	-	-	-	-	-	-	-
Gallup B/w	1	T	2	1	2	1	-	-	-	-	1	T
Chaco B/w	-	-	-	-	1	T	-	-	-	-	-	-
Chaco-McElmo B/w	-	-	-	-	1	T	-	-	-	-	-	-
Unclassified PII-PIII B/w	64	9	18	6	37	9	22	6	22	7	36	14
UNCLASSIFIED WHITEWARE	95	(13)	43	(15)	54	(14)	53	(13)	61	(20)	37	(14)

Table 9.2. (continued)

Ceramic Type	Sites: 29SJ 1242 No.	29SJ 1242 %	29SJ 1248 No.	29SJ 1248 %	29SJ 1254W No.	29SJ 1254W %	29SJ 1260E No.	29SJ 1260E %	29SJ 1260W No.	29SJ 1260W %	29SJ 1360 No.	29SJ 1360 %
CHUSKA WHITEWARE		[T]		[1]		[T]		[T]		[1]		[T]
Pena B/w	-	-	-	-	-	-	-	-	-	-	-	-
Tunicha B/w	-	-	-	-	-	-	-	-	-	-	-	-
Burnham and Newcomb B/w	-	-	-	-	-	-	-	-	-	-	-	-
Unclassified carbon B/w	1	T	2	1	1	T	1	T	4	1	1	T
Drolet B/w	-	-	-	-	-	-	-	-	-	-	-	-
TUSAYAN WHITEWARE		[1]		[1]		[T]		[1]		[1]		
Lino B/g	3	T	-	-	-	-	1	T	1	T	-	-
Kana'a B/w	4	1	2	1	1	T	2	1	1	T	-	-
Unclassified whiteware	-	-	-	-	-	-	-	-	-	-	-	-
SMUDGED WARE	3	(T)	-	-	-	-	-	-	1	(T)	-	-
SAN JUAN REDWARE		[T]		[1]		[T]						[1]
Abajo/Bluff R/o	1	T	3	1	-	-	-	-	-	-	-	-
Unclassified redware	9	1	-	-	1	T	-	-	-	-	2	1
CHUSKA REDWARE		[T]										
Sanostee B/r	2	T	-	-	-	-	-	-	-	-	-	-
TSEGI ORANGEWARE												
Unclassified orangeware	-	-	-	-	-	-	-	-	-	-	-	-
WHITE MOUNTAIN REDWARE												
Unclassified redware												
Totals	752	99	280	99	392	100	395	102	306	98	262	99
Sherd Density (per m^2)	16.2		25.3		39.2		35.9		15.5		40.9	

[a] T = trace (less than 0.5%). Ware percentage = [ ]; combined ware and type percentage = ( ). Sample from 29SJ 1242 combines 1982 and 1988 transects. Sample from 29SJ 1360 is from east transect.

Table 9.2. (continued)

	Site											
	29SJ 1362		29SJ 3009		29SJ 3010[b]		29SJ 3014		29SJ 3019[c]		Table Totals	
Ceramic Type	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
CIBOLA CULINARY		[47]		[66]		[42]		[57]		[59]		[50]
Lino Gray	2	1	5	2	-	-	2	1	1	1	24	T
Plain gray	106	36	169	56	76	31	129	44	75	43	2,261	37
Wide neckbanded	12	4	19	6	5	2	13	4	12	7	226	4
Narrow neckbanded	18	6	3	1	16	7	14	5	2	1	346	6
Neck indented corrugated	1	T	1	T	3	1	1	T	-	-	29	T
Unclassified indented corrugated	2	1	-	-	1	T	1	T	12	7	118	2
PII indented corrugated rim	-	-	-	-	-	-	-	-	-	-	3	T
PII-III indented corrugated rim	-	-	-	-	-	-	-	-	-	-	1	T
Unclassified rim fillet	-	-	2	1	-	-	5	2	1	1	56	1
CHUSKA CULINARY		[1]		[3]		[5]		[2]		[5]		[6]
Plain gray	6	2	8	3	5	2	7	2	-	-	179	3
Sheep Springs/Tocito Gray	2	1	1	T	-	-	-	-	1	1	24	T
Capt. Tom Corrugated	-	-	1	T	6	2	-	-	3	2	83	1
Neck indented corrugated	-	-	-	-	1	T	-	-	3	2	12	T
Unclassified indented corrugated	-	-	-	-	1	T	-	-	-	-	44	1
Blue Shale Corrugated rim	-	-	-	-	-	-	-	-	1	1	1	T
Unclassified rim fillet	-	-	-	-	-	-	-	-	-	-	18	T
MISCELLANEOUS CULINARY[d]	1	(T)	—	—	—	—	—	—	—	—	7	T
Subtotals	150	50	209	69	114	47	172	59	111	64	3,440	56
CIBOLA WHITEWARE		[29]		[15]		[36]		[22]		[18]		[25]
La Plata B/w	-	-	-	-	-	-	-	-	-	-	10	T
Whitemound B/w	-	-	3	1	-	-	2	1	-	-	33	1
Kiatuthlanna B/w	1	T	6	2	-	-	1	T	2	1	34	1
Unclassified BMIII-PI B/w	-	-	-	-	-	-	3	1	4	2	9	T
Red Mesa B/w	38	13	25	8	55	23	26	9	8	5	855	14
Escavada B/w	-	-	-	-	-	-	-	-	1	1	4	T
Gallup B/w	-	-	-	-	5	2	-	-	4	2	28	T
Chaco B/w	-	-	-	-	-	-	-	-	-	-	4	T
Chaco-McElmo B/w	-	-	-	-	-	-	-	-	-	-	2	T
Unclassified PII-PIII B/w	46	15	11	4	26	11	31	11	13	7	579	9
UNCLASSIFIED WHITEWARE	62	(21)	42	(14)	39	(16)	51	(18)	31	(18)	1,014	(17)

Table 9.2. (continued)

	Site											
	29SJ 1362		29SJ 3009		29SJ 3010[b]		29SJ 3014		29SJ 3019[c]		Table Totals	
Ceramic Type	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
CHUSKA WHITEWARE				[1]				[1]				[1]
Pena B/w	-	-	1	T	-	-	-	-	-	-	1	T
Tunicha B/w	-	-	-	-	-	-	1	T	-	-	5	T
Burnham and Newcomb B/w	-	-	-	-	-	-	-	-	-	-	4	T
Unclassified carbon B/w	-	-	1	T	-	-	2	1	-	-	24	T
Drolet B/w	-	-	2	1	-	-	1	T	-	-	3	T
TUSAYAN WHITEWARE				[T]								[T]
Lino B/g	-	-	-	-	-	-	-	-	-	-	5	T
Kana'a B/w	-	-	1	T	-	-	-	-	-	-	18	T
Unclassified whiteware	-	-	-	-	-	-	-	-	-	-	2	T
SMUDGED WARE	-	-	1	(T)	1	(T)	-	-	-	-	7	(7)
SAN JUAN REDWARE				[T]		[T]						[T]
Abajo/Bluff R/o	-	-	-	-	-	-	-	-	-	-	9	T
Unclassified redware	-	-	1	T	1	T	-	-	-	-	26	T
CHUSKA REDWARE						[T]						[1]
Sanostee B/r	-	-	-	-	1	T	-	-	-	-	5	T
TSEGI ORANGEWARE		[1]										[1]
Unclassified orangeware	1	T	-	-	-	-	-	-	-	-	1	T
WHITE MOUNTAIN REDWARE												[T]
Unclassified redware											2	T
Totals	298	100	303	99	242	97	290	99	174	102	6,124	97
Sherd Density (per m²)	16.6		32.0		16.1		18.2		1.7		21.37[e]	

[a] T = trace (less than 0.5%). Ware percentage = [ ]; combined ware and type percentage = ( ).
[b] Sample from the south trash areas.
[c] Refuse in exposed alluviated flats. Majority of refuse presumably buried.
[d] Sherd or San Juan rock tempered.
[e] Site 29SJ 3019 excluded.

Table 9.3. Selected midden ceramic samples from the Fajada Gap Community sites occupied between A.D. 975 and A.D. 1050.[a]

	Sites											
	29SJ 292		29SJ 409		29SJ 626E[b]		29SJ 1253		29SJ 1254E		29SJ 1272	
Ceramic Type	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
CIBOLA CULINARY		[59]		[35]		[47]		[46]		[58]		[49]
Lino Gray	3	2	1	T	2	T	2	1	-	-	-	-
Plain gray	48	26	28	13	402	31	75	36	80	38	55	21
Wide neckbanded	5	3	8	4	10	1	1	T	3	1	1	T
Narrow neckbanded	18	10	10	5	123	10	6	3	10	5	23	9
Neck indented corrugated	-	-	1	T	-	-	2	1	2	1	-	-
Unclassified indented corrugated	33	18	29	13	56	4	10	5	27	13	48	18
Indented corrugated rims[c]												
PII	-	-	-	-	5	T	-	-	-	-	-	-
PII-III	-	-	-	-	-	-	-	-	-	-	-	-
PIII	-	-	-	-	-	-	-	-	-	-	-	-
Unclassified rim fillet	2	1	1	T	-	-	-	-	2	1	3	1
CHUSKA CULINARY		[5]		[10]		[13]		[4]		[7]		[4]
Bennett Gray	-	-	-	-	-	-	-	-	-	-	-	-
Plain gray	1	1	4	2	27	2	3	1	7	3	2	1
Sheep Springs/Tocito Gray	-	-	-	-	-	-	-	-	-	-	-	-
Capt. Tom Corrugated	2	1	5	2	23	2	2	1	1	T	-	-
Neck indented corrugated	-	-	-	-	-	-	-	-	1	T	-	-
Unclassified indented corrugated	7	4	10	5	99	8	4	2	6	3	5	2
Blue Shale Corrugated rim	-	-	2	1	3	T	-	-	-	-	-	-
Unclassified rim fillet	-	-	1	T	10	1	-	-	-	-	3	1
MISCELLANEOUS CULINARY[d]	-	-	1	(T)	-	-	-	-	-	-	-	-
Subtotals	119	64	101	45	760	59	105	50	139	66	140	53
CIBOLA WHITEWARE		[22]		[39]		[25]		[27]		[18]		[32]
La Plata B/w	-	-	-	-	-	-	1	T	2	1	-	-
Whitemound B/w	-	-	-	-	4	T	-	-	-	-	-	-
Kiatuthlanna B/w	-	-	2	1	-	-	-	-	-	-	-	-
Unclassified BMIII-PI B/w	-	-	-	-	-	-	-	-	-	-	-	-
Red Mesa B/w	23	12	53	24	114	9	22	11	17	8	37	14
Escavada B/w	-	-	-	-	1	T	2	1	-	-	-	-
Puerco B/w	1	1	1	T	1	T	4	2	1	T	-	-
Gallup B/w	2	1	8	4	12	1	5	2	6	3	11	4
Chaco B/w	-	-	-	-	-	-	-	-	1	T	-	-
Chaco-McElmo B/w	-	-	-	-	-	-	2	1	-	-	-	-
Unclassified PII-PIII B/w	15	8	23	10	192	15	21	10	11	5	36	14
UNCLASSIFIED WHITEWARE	22	(12)	29	(13)	179	(14)	39	(19)	33	(16)	38	(14)

Table 9.3. (continued)

	Sites											
	29SJ 292		29SJ 409		29SJ 626E[b]		29SJ 1253		29SJ 1254E		29SJ 1272	
Ceramic Type	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
CHUSKA WHITEWARE		[1]		[2]		[T]		[3]		[T]		
Newcomb B/w	2	1	1	T	-	-	1	T	-	-	-	-
Chuska B/w	-	-	4	2	-	-	-	-	-	-	-	-
Toadlena B/w	-	-	-	-	-	-	-	-	-	-	-	-
Unclassified carbon B/w	-	-	-	-	5	T	6	3	1	T	-	-
Unclassified mineral B/w	-	-	-	-	-	-	-	-	-	-	-	-
TUSAYAN WHITEWARE						[T]						
Lino B/g	-	-	-	-	-	-	-	-	-	-	-	-
Kana'a B/w	-	-	-	-	1	T	-	-	-	-	-	-
MESA VERDE WHITEWARE						[T]						[T]
Cortez and Mancos B/w	-	-	-	-	2	T	-	-	-	-	-	-
McElmo B/w and Mesa Verde B/w	-	-	-	-	-	-	-	-	-	-	1	T
Unclassified whiteware	-	-	-	-	-	-	-	-	-	-	-	-
SMUDGED WARE	-	-	-	-	5	(T)	-	-	-	-	-	-
SAN JUAN REDWARE		[1]				[1]						[1]
Unclassified redware	1	1	-	-	9	1	-	-	-	-	2	1
CHUSKA REDWARE												
Sanostee B/r	-	-	-	-	-	-	-	-	-	-	-	-
TSEGI ORANGEWARE						[T]						
Unclassified orangeware	-	-	-	-	1	T	-	-	-	-	-	-
WHITE MOUNTAIN REDWARE												
Puerco B/r	-	-	-	-	-	-	-	-	-	-	-	-
Wingate B/r	-	-	-	-	-	-	-	-	-	-	-	-
Unclassified redware	-	-	-	-	-	-	-	-	-	-	-	-
Totals	185	101	222	100	1,286	99	208	99	211	98	265	100
Sherd Density (per m^2)	7.7		0.6		–		4.4[e]		8.8		42.7	

[a] T = trace (less than 0.5%). Samples do not necessarily reflect the entire site occupation. Ware percentages = [ ]; combined ware and type percentage = ( ).
[b] Sample is from testing the eastern midden deposits in 1983.
[c] Based on rim flare.
[d] Sherd or San Juan rock tempered.
[e] Ceramic area disturbed by construction of great kiva?

Table 9.3. (continued)

	Sites											
	29SJ 1278		29SJ 1361		29SJ 1681		29SJ 1683		29SJ 2773		29SJ 2774	
Ceramic Type	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
CIBOLA CULINARY		[41]		[43]		[42]		[32]		[49]		[58]
Lino Gray	-	-	-	-	-	-	-	-	-	-	2	1
Plain gray	43	15	48	16	87	21	76	12	187	31	75	23
Wide neckbanded	8	3	-	-	9	2	5	1	8	1	-	-
Narrow neckbanded	18	6	26	9	34	8	41	7	57	9	11	3
Neck indented corrugated	-	-	-	-	-	-	-	-	14	2	1	T
Unclassified indented corrugated	44	16	48	16	41	10	63	10	33	5	96	29
Indented corrugated rims[b]												
PII	-	-	-	-	1	T	4	1	-	-	2	1
PII-III	1	T	1	T	-	-	-	-	-	-	2	1
PIII	-	-	-	-	1	T	-	-	-	-	-	-
Unclassified rim fillet	2	1	5	2	4	1	5	1	-	-	-	-
CHUSKA CULINARY		[9]		[10]		[11]		[12]		[11]		[3]
Bennett Gray	-	-	-	-	-	-	-	-	-	-	1	T
Plain gray	3	1	6	2	17	4	13	1	20	3	3	1
Sheep Springs/Tocito Gray	-	-	-	-	-	-	1	T	-	-	-	-
Capt. Tom Corrugated	4	1	-	-	14	3	9	1	12	2	1	T
Neck indented corrugated	-	-	-	-	1	T	-	-	1	T	-	-
Unclassified indented corrugated	16	6	25	8	10	2	49	8	32	5	5	2
Blue Shale Corrugated rim	1	1	-	-	1	T	3	T	1	T	-	-
Unclassified rim fillet	2	1	-	-	2	T	1	T	-	-	-	-
MISCELLANEOUS CULINARY[c]	-	-	-	-	2	(T)	1	-	-	-	-	-
Subtotals	142	51	159	53	224	53	271	44	365	60	199	60
CIBOLA WHITEWARE		[33]		[30]		[23]		[31]		[27]		[22]
La Plata B/w	-	-	-	-	-	-	-	-	-	-	-	-
Whitemound B/w	-	-	-	-	-	-	-	-	-	-	-	-
Kiatuthlanna B/w	-	-	-	-	-	-	-	-	-	-	-	-
Unclassified BMIII-PI B/w	-	-	1	T	-	-	-	-	3	T	1	T
Red Mesa B/w	40	14	35	12	35	8	63	10	72	12	7	2
Escavada B/w	-	-	-	-	1	T	1	T	-	-	4	1
Puerco B/w	2	1	-	-	1	T	5	1	-	-	6	2
Gallup B/w	10	4	17	6	8	2	33	5	21	3	11	3
Chaco B/w	1	T	-	-	-	-	1	T	-	-	-	-
Chaco-McElmo B/w	1	T	-	-	2	T	1	T	-	-	-	-
Unclassified PII-PIII B/w	38	14	37	12	51	12	88	14	71	12	42	13
UNCLASSIFIED WHITEWARE	40	(14)	47	(16)	83	(20)	128	(21)	67	(11)	47	[14]

Table 9.3. (continued)

	Sites											
	29SJ 1278		29SJ 1361		29SJ 1681		29SJ 1683		29SJ 2773		29SJ 2774	
Ceramic Type	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
CHUSKA WHITEWARE		[T]		[T]		[2]		[3]		[1]		[1]
Pena B/w	-	-	-	-	-	-	1	T	-	-	-	-
Tunicha B/w	-	-	-	-	3	1	1	T	-	-	-	-
Newcomb B/w	-	-	-	-	-	-	3	T	2	T	-	-
Chuska B/w	1	T	1	T	-	-	-	-	-	-	1	T
Toadlena B/w	-	-	-	-	-	-	-	-	-	-	-	-
Unclassified carbon B/w	-	-	-	-	5	1	9	1	2	T	3	1
Unclassified mineral B/w	-	-	-	-	-	-	1	T	-	-	-	-
Unclassified whiteware	-	-	-	-	-	-	4	1	-	-	-	-
TUSAYAN WHITEWARE						[T]		[T]		[T]		
Lino B/g	-	-	-	-	-	-	-	-	1	T	-	-
Kana'a B/w	-	-	-	-	1	T	1	T	-	-	-	-
MESA VERDE WHITEWARE		[T]				[T]		[T]		[T]		[T]
Cortez/Mancos B/w	-	-	-	-	1	T	1	T	3	T	1	T
McElmo B/w and Mesa Verde B/w	1	T	-	-	-	-	-	-	-	-	-	-
SMUDGED WARE	-	-	1	[T]	2	[T]	1	[T]	-	-	-	-
SAN JUAN REDWARE		[T]		[1]		[T]		[T]		[T]		
Unclassified redware	1	T	2	1	2	T	2	T	3	T	-	-
CHUSKA REDWARE						[T]						
Sanostee B/r	-	-	-	-	1	T	-	-	-	-	-	-
TSEGI ORANGEWARE				[T]		[T]						
Unclassified orangeware	-	-	1	T	1	T	-	-	-	-	-	[2]
WHITE MOUNTAIN REDWARE		[1]				[T]						
Puerco B/r	1	T	-	-	-	-	-	-	-	-	-	-
Wingate B/r	2	1	-	-	-	-	-	-	-	-	-	-
Unclassified redware	-	-	-	-	1	T	-	-	1	-	6	2
Totals	280	99	301	100	422	95	610	95	610	96	328	99
Sherd Density (per m²)	40.9		16.7		3.6[d]		12.2		31.9		32.8	

[a] T = trace (less than 0.5%). Samples from 29SJ 2773 (Transect 1) and 29SJ 2774 (Grid 2) are from Powers 1984 survey. Ware percentages = [ ]; combined ware and type percentages = ( ).
[b] Based on rim flare (see Toll and McKenna, this report).
[c] Sherd or San Juan rock tempered.
[d] Sample from large pothole area.

Table 9.3. (continued)

Ceramic Type	29SJ 3010 No.	29SJ 3010 %	29SJ 3012 No.	29SJ 3012 %	29SJ 3013 No.	29SJ 3013 %	29SJ 3015W No.	29SJ 3015W %	29SJ 3015E No.	29SJ 3015E %	29SJ 3017 No.	29SJ 3017 %	Table Totals No.	Table Totals %
CIBOLA CULINARY		[48]		[48]		[41]		[48]		[31]		[44]		[45]
Lino Gray	-	-	-	-	-	-	-	-	-	-	-	-	10	T
Plain gray	27	16	93	16	61	23	7	3	11	4	17	6	1,420	21
Wide neckbanded	-	-	6	1	2	1	-	-	-	-	4	1	70	1
Narrow neckbanded	13	8	68	12	26	10	10	4	7	3	13	5	514	8
Neck indented corrugated	-	-	3	1	2	1	-	-	1	T	-	-	26	14
Unclassified indented corrugated	33	19	97	17	12	4	107	40	58	22	77	28	912	T
Indented corrugated rims[b]														
PII	1	1	2	T	1	T	-	-	1	T	2	1	19	T
PII-III	-	-	-	-	-	-	-	-	-	-	2	1	6	T
PIII	-	-	-	-	-	-	-	-	1	T	-	-	2	T
Unclassified rim fillet	7	4	5	1	6	2	3	1	2	1	7	3	54	T
CHUSKA CULINARY		[5]		[12]		[6]		[9]		[13]		[9]		[10]
Bennett Gray	-	-	-	-	-	-	-	-	-	-	-	-	1	T
Plain gray	-	-	3	1	3	1	4	1	-	-	-	-	116	T
Sheep Springs/Tocito Gray	-	-	-	-	-	-	-	-	-	-	-	-	1	2
Capt. Tom Corrugated	3	2	9	2	2	1	-	-	2	1	5	2	94	T
Neck indented corrugated	5	3	-	-	-	-	-	-	-	-	-	-	8	1
Unclassified indented corrugated	-	-	49	9	10	4	20	7	31	12	16	6	394	T
Blue Shale Corrugated rim	-	-	3	1	-	-	-	-	-	-	1	T	15	6
Unclassified rim fillet	-	-	5	1	-	-	-	-	-	-	2	1	26	T
														T
MISCELLANEOUS CULINARY[c]	1	(1)	2	(T)	-	-	-	-	1	(T)	2	(1)	10	(T)
Subtotals	90	53	345	63	125	47	151	57	115	44	148	54	3,698	55
CIBOLA WHITEWARE		[33]		[29]		[11]		[26]		[31]		[32]		[28]
La Plata B/w	-	-	-	-	-	-	-	-	-	-	-	-	3	T
Whitemound B/w	-	-	-	-	-	-	-	-	-	-	-	-	4	T
Kiatuthlanna B/w	-	-	-	-	-	-	-	-	-	-	-	-	2	T
Unclassified BMIII-PI B/w	-	-	-	-	-	-	-	-	-	-	-	-	5	T
Red Mesa B/w	34	20	67	12	29	11	9	3	11	4	20	7	688	10
Escavada B/w	-	-	-	-	-	-	-	-	-	-	1	T	10	T
Puerco B/w	1	1	-	-	-	-	10	4	6	2	4	1	43	1
Gallup B/w	9	5	40	7	11	4	18	7	20	8	35	13	277	4
Chaco B/w	-	-	1	T	-	-	8	3	2	1	1	T	15	T
Chaco-McElmo B/w	1	1	-	-	-	-	1	T	4	2	-	-	12	T
Unclassified PII-PIII B/w	11	6	56	10	38	14	24	9	37	14	26	9	817	12
UNCLASSIFIED WHITEWARE	20	(12)	62	(11)	60	(22)	36	(13)	50	(19)	36	(13)	1,016	(15)

Table 9.3. (continued)

	Sites												Table Totals	
	29SJ 3010		29SJ 3012		29SJ 3013		29SJ 3015W		29SJ 3015E		29SJ 3017			
Ceramic Type	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
CHUSKA WHITEWARE				[T]		[T]		[2]		[1]		[T]		[1]
Pena B/w	-	-	-	-	-	-	-	-	-	-	-	-	1	T
Tunicha B/w	-	-	-	-	-	-	-	-	-	-	-	-	4	T
Newcomb B/w	-	-	-	-	-	-	-	-	-	-	-	-	9	T
Chuska B/w	-	-	1	T	1	T	1	T	1	T	-	-	11	T
Toadlena B/w	-	-	-	-	-	-	3	1	-	-	-	-	7	T
Unclassified carbon B/w	-	-	-	-	- -	-	1	T	1	T	1	T	34	1
Unclassified mineral B/w	-	-	-	-		-	-	-	-	-	-	-	1	T
TUSAYAN WHITEWARE						[T]								[T]
Lino B/g	-	-	-	-	-	-	-	-	-	-	-	-	1	T
Kana'a B/w	-	-	-	-	1	T	-	-	-	-	-	-	4	T
MESA VERDE WHITEWARE								[T]		[T]				[T]
Cortez/Mancos B/w	-	-	-	-	-	-	-	-	-	-	-	-	8	T
McElmo B/w & Mesa Verde B/w	-	-	-	-	-	-	-	-	-	-	-	-	2	T
Unclassified whiteware	-	-	-	-	-	-	1	T	1	T	-	-	2	T
SMUDGED WARE	-	-	-	-	-	-	-	-	1	(T)	1	(T)	11	(T)
SAN JUAN REDWARE		[1]				[1]								[T]
Unclassified redware	1	1	-	-	2	1	-	-	-	-	-	-	25	T
CHUSKA REDWARE														[T]
Sanostee B/r	-	-	-	-	-	-	-	-	-	-	-	-	1	T
TSEGI ORANGEWARE		[1]						[1]		[1]				[T]
Unclassified orangeware	2	1	-	-	-	-	3	1	3	1	-	-	11	T
WHITE MOUNTAIN REDWARE		[1]						[T]		[3]				[T]
Puerco B/r	-	-	-	-	-	-	1	T	1	T	-	-	3	T
Wingate B/r	-	-	-	-	-	-	-	-	1	T	-	-	3	T
Unclassified redware	1	1	-	-	-	-	-	-	5	2	2	1	15	T
Totals	170	102	572	102	267	99	267	97	259	96	275	98	6,743	97
Sherd Density (per m²)	5.0		5.7[d]		26.7		35.6		43.2		22.9		7.32	

[a] T = trace (less than 0.5%). Sample from 29SJ 3010 is from the east refuse area. Ware percentages = [ ]; combined ware and type percentages = ( ).
[b] Based on rim flare (see Toll and McKenna, this report).
[c] Sherd or San Juan rock tempered.
[d] Average of two transects with densities of 3.5 and 22.0 sherds/m².

formed a very low mound filled with spalls and collapsed wall mud, although rarely did the house surface reveal traceable walls unless the foundation stones were exposed (as they were at 29SJ 629). In the mid A.D. 1000s and afterwards, house walls were built of tabular and block sandstone masonry that left a prominent mound of stone rubble after collapse, again paralleling events elsewhere (Hayes 1964:93-94; Smith 1987:63). These changes in architecture could be traced at 29SJ 627, which revealed occupation that spanned the periods under scrutiny here (Truell 1992).

Ceramics

Ceramic assemblage change coincided with changes in the house construction patterns discussed above. The early sites (A.D. 800s) revealed assemblages overwhelmingly dominated by plain gray sherds, generally without the Chuskan wares that later were brought into Chaco Canyon in increasingly larger numbers (Toll and McKenna, this report). Painted ceramics from the A.D. 800s were rare and not noticeably different from the plain gray ceramics (Table 9.1). Red Mesa black-on-white made its first appearance by about A.D. 900 in these early assemblages. By the A.D. 900s, the diversity of the assemblages increased, dominated by plain gray and Red Mesa Black-on-white sherds (Tables 9.2-9.3). Wide and narrow neckbanded sherds were also common, followed by a small increase in Chuskan pottery over the preceding period.

Chuskan culinary ceramics in the late A.D. 900s/early A.D. 1000s assemblages were almost exclusively comprised of Capt. Tom Corrugated vessels, a narrow neckbanded style with clapboard, neck coils that were often incised across the coils with a sharp tool (Plate 8.9A; Peckham 1989; Peckham and Wilson 1964; Windes 1978). This type of vessel seemed to have been the exclusive domain of Chuskan potters, who may have held the trade monopoly for these vessels sent to Chaco Canyon.

Indented corrugated sherds, particularly those with trachyte temper (e.g., Chuskan ware), were present in traces by the late A.D. 900s or early A.D. 1000s but increased to dominant frequencies by the late A.D. 1000s. The block masonry houses were coeval with assemblages dominated by overall indented corrugated and Gallup Black-on-white ceramics beginning at about A.D. 1040 or 1050. Assemblages dominated by Red Mesa Black-on-white ceramics, but with some early Gallup Black-on-white or Red Mesa/Gallup stylistic types, reflected occupation in the early A.D. 1000s (Table 9.3), although mixed assemblages, indicative of both A.D. 900s and middle A.D. 1000s, were also possible.

House Patterns

Regional variation of Anasazi small-house patterns for the A.D. 900s and 1000s is not well known because of the small number of contemporary houses excavated in the various Anasazi districts. An exception is the work conducted on Black Mesa, Arizona, where numerous sites have been excavated (e.g., Plog and Powell 1984; Powell 1983). A formalized house plan also appears early in the Chacoan cultural history with the establishment of an arc of surface storage and living rooms at Pueblo I period sites. The Pueblo I house pattern was widespread on the Colorado Plateau, but in later centuries house patterns became more diverse.

In Chaco Canyon, there is also considerable homogeneity in house-site layout, although it differs from those of Black Mesa and can be traced from the regional Pueblo I pattern. In effect, there are bands of activity areas that extend southeast to northwest (or vice versa): a trash deposition area on the southeast side (or south or east sides), a multifunctional pitstructure, surface multifunctional outdoor and indoor work areas, and finally, fully enclosed surface storage rooms fronted by living rooms at the northwestern side (or north or west sides). Off to one side of this arrangement, between the central pitstructure and the surface work areas was another, but smaller, pitstructure that may be analogous to the Black Mesa mealing rooms, although those excavated in Chaco Canyon lack evidence for mealing bins, except for Kiva D at 29SJ 627. This auxiliary Chacoan pitstructure often appears to have been built in the later A.D. 900s, or later, after the initial site occupation.

The larger sites (i.e., 29SJ 627) may contain two or three times as many rooms and residence units as the small sites. These reveal greater complexity in terms of remodeling and a site history that the smaller sites fail to exhibit, although both appear to reflect long occupation spans. Again, based on proximity and sharing of site facilities, the social distance between the residence units must be considered minimal; therefore, closely associated (Hillier and Hanson 1984; Stephens 1985). But the relationship between the few large sites and the cluster of small sites nearby, if any, is poorly understood.

Marcia's Rincon provides an example of small-house organization that might be representative of the Pueblo II, late A.D. 900s/early A.D. 1000s occupation in Chaco Canyon. It is apparent from the excavated and unexcavated sites in Marcia's Rincon that one site, 29SJ 627 (Truell 1992), dominates the others in terms of size. The site is approximately twice the size of those that encircle it, and it is the oldest and longest occupied. It comprised 4-5 households, surrounded by several smaller houses of 2 households each.

The size of the surrounding small sites, however, based on actual and estimated room counts (6-8 per site) is very uniform. It is uncertain if dual households in the smaller houses started simultaneously, although both appear present until the end of the site occupation. Considering the proximity of the two residence units and their shared space at the site, it is reasonable to postulate that the two units are closely related, perhaps as an extended family. Because two social units are common, offspring of the initial family may be staying in residence with their spouse and children. If house construction is the domain of men, then the dissimilar construction traits in the two household areas at 29SJ 724 (Windes 1976b) suggests that a possible matrilocal residence pattern may be common.

Some aspects of the material culture and human remains also offer contrasts between the largest site and the others, although the excavated sample is inadequate. Excavation events, however, do not allow for the excavated small houses to be examined and analyzed synchronously, leading to noncomparable results. 29SJ 629 and 29SJ 627 have been much compared during the Chaco Project, but 29SJ 625 (the 3-C Site) was excavated in 1939 and 1949 and the cultural material is lost, while 29SJ 626 (East House) was excavated as part of a road-mitigation project in 1983-1984. Much of the material from 29SJ 626 East has not yet been analyzed and reported. The inadequacy of the data greatly hampers comparison and forces heavy reliance on the size and location of the sites in the sample area.

To assess the problem of community organization more closely, all 54 small-house sites (some with multiple houses) were reexamined in the Fajada Gap area. It was not difficult to isolate the community: there was a rapid drop-off in site density of Pueblo II and Pueblo III houses once beyond the gap--a pattern typical of Chacoan communities (Breternitz and Doyel 1987:184). Topographically, Fajada Butte might be envisioned as the center of the community area, perhaps in a sacred sense, although spatially it borders the southeastern margins of the small-house settlement. Recently, a formalized stair-and-ramp approach at the top and base of the butte, which aligns with a prehistoric road, has been discovered and mapped (Ford, Appendix H). Ceramics suggest that it might have been initially contemporary with the A.D. 900s occupation and may mark special activities on the butte, perhaps in conjunction with the solstice marker (Sofaer et al. 1979), that are community related.

An overall examination of the sample area from the 1972 survey notes revealed a few large houses and several small houses that appeared similar to the size dichotomy noted in Marcia's Rincon and other regions (e.g., Gorman and Childs 1981; Phillips 1972). Could these represent distinct communities or sub-communities of small houses clustered about a larger site? Visual inspection of the location of these sites (Figure 9.1) suggested that clustering along small run-off areas occurred with one or two larger houses associated with each cluster. Clearly, caution must be exercised because alluviation and later sites built over some earlier sites may bias results. The size of 29SJ 627, for instance, remained a lesson to us after it was surveyed by the author in 1972 as a mere three-plus rooms. Nevertheless, the vast majority appeared to have been built on top of ridges, where estimates were more reliable.

At least three structures of approximately contemporary age must have integrated the small communities in the area. 29SJ 1253 is an isolated great kiva built on a ridge that overlooks the several suggested small sub-communities. The two nearby greathouses of Kin Nahasbas and Una Vida, each with a great kiva, may have also been part of the overall Fajada Gap Community. The small population that might have inhabited Kin Nahasbas and the position of the great kiva there, outside walled barriers, enhances the probability that outsiders, probably from the small sites, used the great kiva (Mathien and Windes 1989). Thus, social continuity between the greathouses and small houses is envisioned as a distinct probability (cf. Vivian 1989, 1990), which follows the community cluster model for the Pueblo I development of the Dolores area (Lipe and Kohler 1988).

In Fajada Gap, where Marcia's Rincon Community is of direct importance to this study, almost every ridge contains Pueblo II houses. Often a prodigious amount of trash is spread to the east, southeast, or south of the roomblock and pitstructures. In about half the cases, these sites do not exhibit occupations after A.D. 1050, although a new house may have been built nearby. Thus, inferences about the Pueblo II habitation should be relatively reliable. In contrast, sites in the Pueblo Bonito area are plagued with later constructions and occupations (Lekson 1988; Windes 1987a:402-403) that obscure the Pueblo II settlements and make settlement estimates tenuous. Pueblo II sites east of the Fajada Gap settlements (to Pueblo Pintado) reveal few later occupations, except for easily distinguished block-masonry houses built on top of the early houses and associated with Mesa Verde Black-on-white pottery. Late A.D. 1000s and early A.D. 1100s houses in the eastern half of Chaco Canyon (east of the park boundary to near Pueblo Pintado) appear, from recent reconnaissance, to be far fewer in number than the A.D. 900 houses.

Settlement Distribution Within the Fajada Gap Community

A high density of sites in the Fajada Gap area has been recognized since the earliest archeological work in Chaco Canyon, but what this meant in terms of settlement was not investigated. Recent work provided the first tentative assessment of these sites as part of a larger community that has been termed here as the Fajada Gap Community (FGC). Three research questions were addressed by the recent work: 1) Were there definable spatial limits to the numerous sites in Fajada Gap? 2) Was there spatial clustering of individual houses that may have represented sub-communities and, if so, did it change through time? 3) Did house size, house orientation, or house location change through time, possibly as a function of socio-economic changes?

Limits of the Community

The vast majority of the distinct house mounds in Chaco Canyon are Pueblo II and early Pueblo III (A.D. 900-1140). Although there has long been the perception that these small-house sites formed a continuous band throughout Chaco Canyon, particularly along the 10 km strip between the Fajada Gap/Una Vida and South Gap/Pueblo Bonito areas (e.g., Lekson 1988:78-88), such is not the case. There are areas where these houses are rare or absent for some distance. A noticeable break of 720 m in occupation occurs between Una Vida and Hungo Pavi where the canyon jogs sharply northwest from Una Vida (Windes 1987a:396, Figure 11.2) and isolates the FGC houses from those further west towards Hungo Pavi and Pueblo Bonito.

Other unoccupied stretches of land around Fajada Gap also distinguish the site community illustrated in Figure 9.1. Contrary to expectations, it is also surprising to find that east of Fajada Butte, for 1 km or more, houses do not continue along the ridges running north from Chacra Mesa. Aside from social explanations for their absence, other conditions may have made this area unattractive. Exposure during the colder months of the year is not ideal because of late sunrises caused by the towering massif of Chacra Mesa directly to the south, southeast, and east. The ridges, normally an attractive setting for occupation, are high, narrow, and often gravelly, unlike those broad, low, sandy ridges favored to the west. Finally, the area is less suitable for storm runoff and flood water farming than areas to the west. For whatever reasons, the gap in settlement separates the FGC from those houses scattered to the east in Chaco Canyon.

Likewise, settlement does not extend for 1 km or more along the other ridges extending southeast and southwest from Fajada Gap along the southern faces of Chacra Mesa, although these seem suitable for occupation. Thus, settlement within Fajada Gap can be considered a spatially discrete area covering at least 966 hectares and containing approximately 54 late Pueblo I, Pueblo II, and early Pueblo III house sites (Figure 9.1).

Sub-communities

To return to the primary emphasis of this chapter, analyses revealed that 29SJ 629 was spatially associated with a large number of similar sites, designated as Sub-community B (SC B) for this report, of which Marcia's Rincon was only a part. Spatial relationships were determined through use of cluster analyses using the SAS program Cluster (SAS Institute 1985:255-316) and the average linkage method (standardized variable) on the Universal Transverse Mercator (UTM) coordinates for individual houses (not sites) in each temporal period. A peak greater than 2.00 defined by the Cubic Clustering Criterion (CCC) statistic defined good clustering levels (see Saule 1983 for the logic behind this technique) (Table 9.4).

Of course, the houses within each cluster may not be coeval, but our excavations revealed that occupations were particularly lengthy and generally would overlap the ranges used here. Nevertheless, demonstrating coeval occupations remains a problem.

Understandably, the earliest period sites do not cluster because few were recognized until work commenced along South Ridge outside the park's south boundary. Those inside the park are mostly tabulated from excavated data (six sites), although a few others exist which are not examined as part of this report. There are probably few pristine, single-component sites of this period inside the study area, however, except for South Ridge (nine sites). Nevertheless, the location of these early sites suggests the incipient beginnings of the sub-communities defined in the following periods (Figure 9.2). The early single-component sites were all 1-2 family domiciles with little trash, suggesting short occupations. Ceramics suggest that the many such structures on South Ridge form continuous links of occupation through the A.D. 800s-early A.D. 900s, as if a single group was simply moving residences every few years.

By Period 2 (Figure 9.3), however, early Pueblo II houses increase in numbers, and they form five sub-communities or neighborhoods (i.e., Breternitz and Doyel 1987:186) that are designated A through E. The largest (SC B: 14 houses) incorporates Marcia's Rincon and the sites excavated there (29SJ 625, 29SJ 626 East House, 29SJ 627, 29SJ 629, and 29SJ 633), as well as others on the ridges to the south (Figure 9.6). The second largest cluster (SC D: 7 houses) is along South Ridge (Figure 9.7), while the remainder are composed of five or less houses. The latter three clusters are located between the two largest clusters (SC E; Figure 9.8), at the foot of Fajada Butte (SC A; Figure 9.9), and between the two greathouses of Una Vida and Kin Nahasbas (SC C; Figure 9.10).

The clusters remain stable in Period 3 (Figure 9.4), although there is an odd linear arrangement of houses that tighten spatially over the previous period along South Ridge (SC D) and are dominated by a very large house (29SJ 3013) of about 20 or more rooms with surprisingly little trash visible. Because of the difficulty in ceramically separating Period 4 from Period 5 houses, these are combined for analysis. The plots reveal the same sub-communities formed in earlier periods (Figure 9.5). When Periods 4 and 5 are run separately, however, Period 4 sites cluster as before (similar to the plot in Figure 9.5), but no clusters are defined for Period 5. Interestingly, it is the Period 5 houses, occupied in the early A.D. 1100s, that have been suspected as reflective of major societal shifts in the cultural continuity of the Chaco Phenomenon (Toll 1985:483-489; Windes 1987a:413-414). On the other hand, bias probably exists against recognition of this occupation, which is often confined ceramically to the house mound. Because of few sherds, examination of the house rubble was not generally conducted. Accurate delineation of the use of space in these late houses, many of them reoccupied or remodeled structures, would be difficult without recourse to excavation.

In summary, by the A.D. 800s and certainly by the A.D. 900s, there are definable aggregates of small houses in Fajada Gap that mark the beginning continuity of long-term use of specific areas for occupation. Competition and the necessity of building close to the harvest (Hack 1942:28; Preucel 1988:25; Washburn 1974:320, 331) suggest that arable lands were close to the residences. Thus, long-term residence in the same areas, though it be intermittent at times (Preucel 1988), suggests social integration among the house groups and control of the surrounding arable lands (Chapter 2) that would be expected from high populations crowded on the limited arable lands.

Table 9.4. Results of small-house location cluster analyses by period.

CCC Peak	Period: A.D.	No. of Houses Occupied	No. of House Clusters	Figure No.
0.07	1: 800-925	19	none	9.2
5.53	2: 925-975	32	5	9.3
5.28	3: 975-1050	40	5	9.4
2.56	4: 1050-1100	30	5	-
1.82	5: 1100-1150	25	none	-
2.88	4/5: 1050-1140	32	5	9.5

Aside from the two greathouses, the only obvious integrative or community structure within the small-house settlement is the great kiva at 29SJ 1253, which appears to have displaced a Period 2 or Period 3 small house in the A.D. 1000s. It must have served the Fajada Gap Community, or at least the largest sub-community (SC B) in which it was located, including the sites from Marcia's Rincon (e.g., 29SJ 629), with a population estimated at over 100 people. The earliest great kiva in the community is located at Kin Nahasbas (Mathien and Windes 1989) and dates to Period 3 (A.D. 975-1050), although the greathouse is too small for sole resident use of the great kiva. Thus, the Kin Nahasbas great kiva could also have been used by part or all of the Fajada Gap small-house community residents in the A.D. 900s. Without better chronological placement of the three kivas in Fajada Gap (29SJ 1253 and those at Kin Nahasbas and Una Vida), it is not possible to be sure how many great kivas were used at any one time and by what potential sub-communities, although great kiva alliance must have shifted as new ones were built and old ones abandoned. Finally, the larger sites within each subcommunity also may have integrated social and political elements with the adjacent smaller house occupants, although this remains untested.

House Size

Earlier work (Hayes 1981:50-51) suggests that there was a gradual increase in house size in Chaco Canyon that offset declining house numbers in terms of estimating population numbers. Given the long occupations evident in many of the Chacoan houses, a trend towards increased house size seems logical. The Fajada Gap Community study, however, suggests different trends. A few houses grew larger, but most remained small.

For this study, room numbers were calculated in two ways. The back wall length, typically the most visible alignment of the spall and mud houses was determined, divided by the mean room length (3.07 m, sd=0.42, CV=13.8%) of the back storage rooms in the five excavated contemporary sites (29SJ 625, 29SJ 626 East, 29SJ 627, 29SJ 629, and 29SJ 1360) and then multiplied by 1.5 to yield the estimated total number of living and storage rooms, commonly occurring in a 1:2 ratio (Kane 1988:19-20). Often these existed in a 1:1 ratio, like at 29SJ 627; therefore, these calculations must be considered conservative. Block-masonry house rooms were calculated from wall alignments and average room sizes were observed in excavated sites.

The largest number of houses occurred in the late A.D. 900s-early A.D. 1000s period (40 houses), although it was assumed that actual numbers for the early A.D. 1100s was larger than estimated because of widespread occupations in and over earlier-built houses. At worst, house frequency may have leveled off or fluctuated over the period examined. The general impression from Hayes' (1981) inventory survey, was that late A.D. 1000s and early A.D. 1100s houses were larger than their earlier

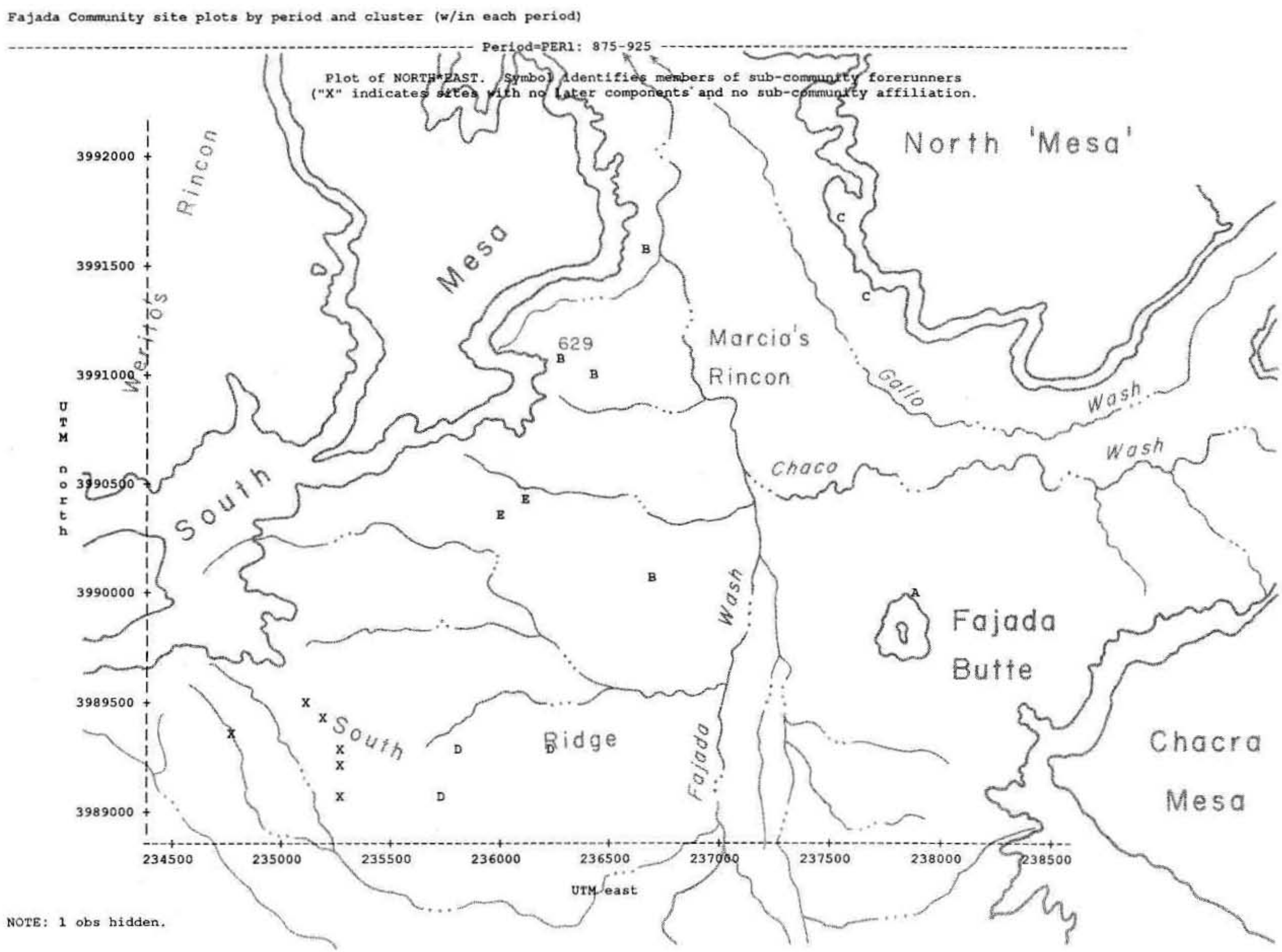

Figure 9.2. ***Fajada Gap Community site plots by cluster: A.D. 875-925 (NPS 310/82784 A).***

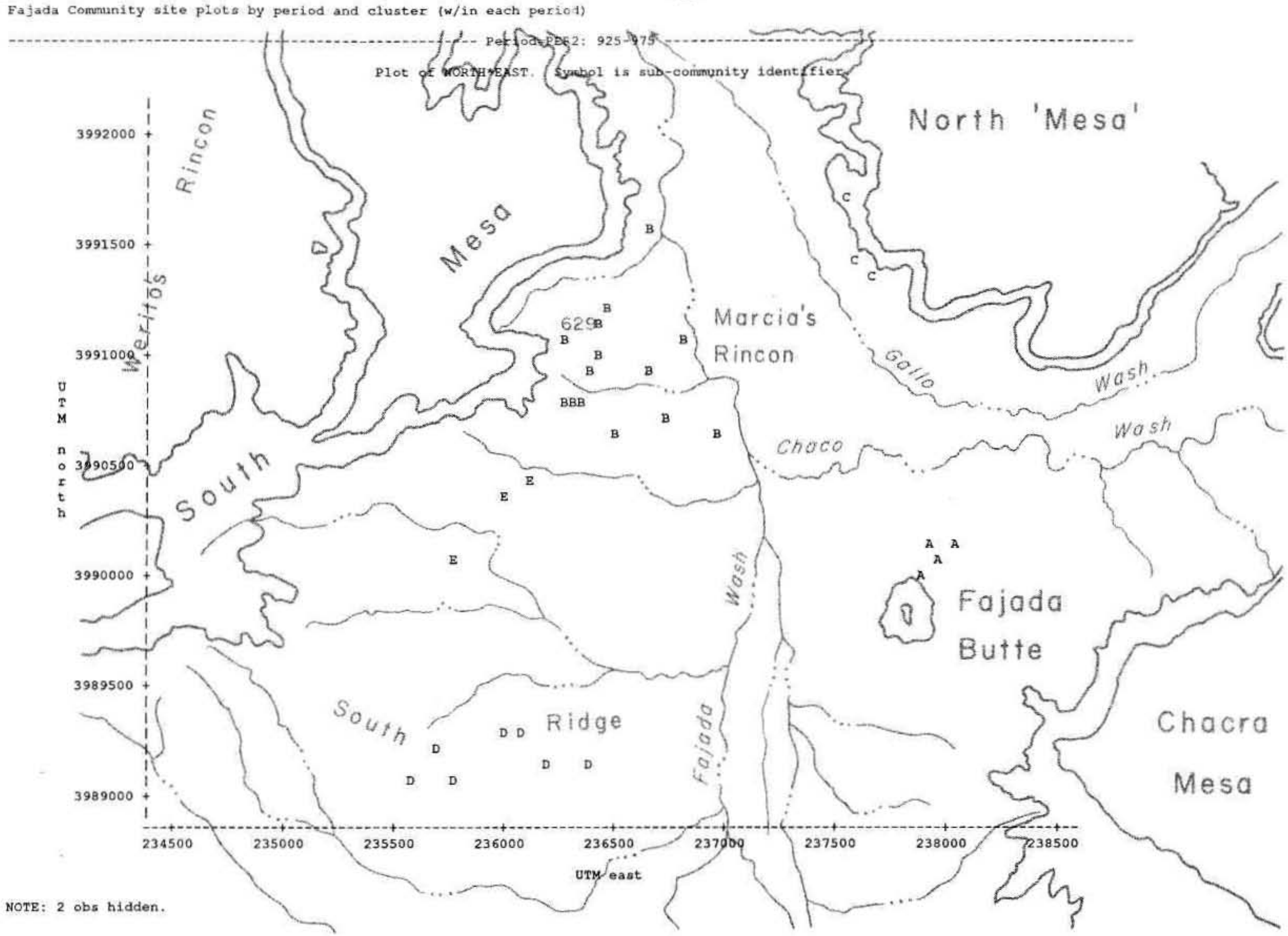

Figure 9.3. Fajada Gap Community site plots by cluster: A.D. 925-975 (NPS 310/82785 A).

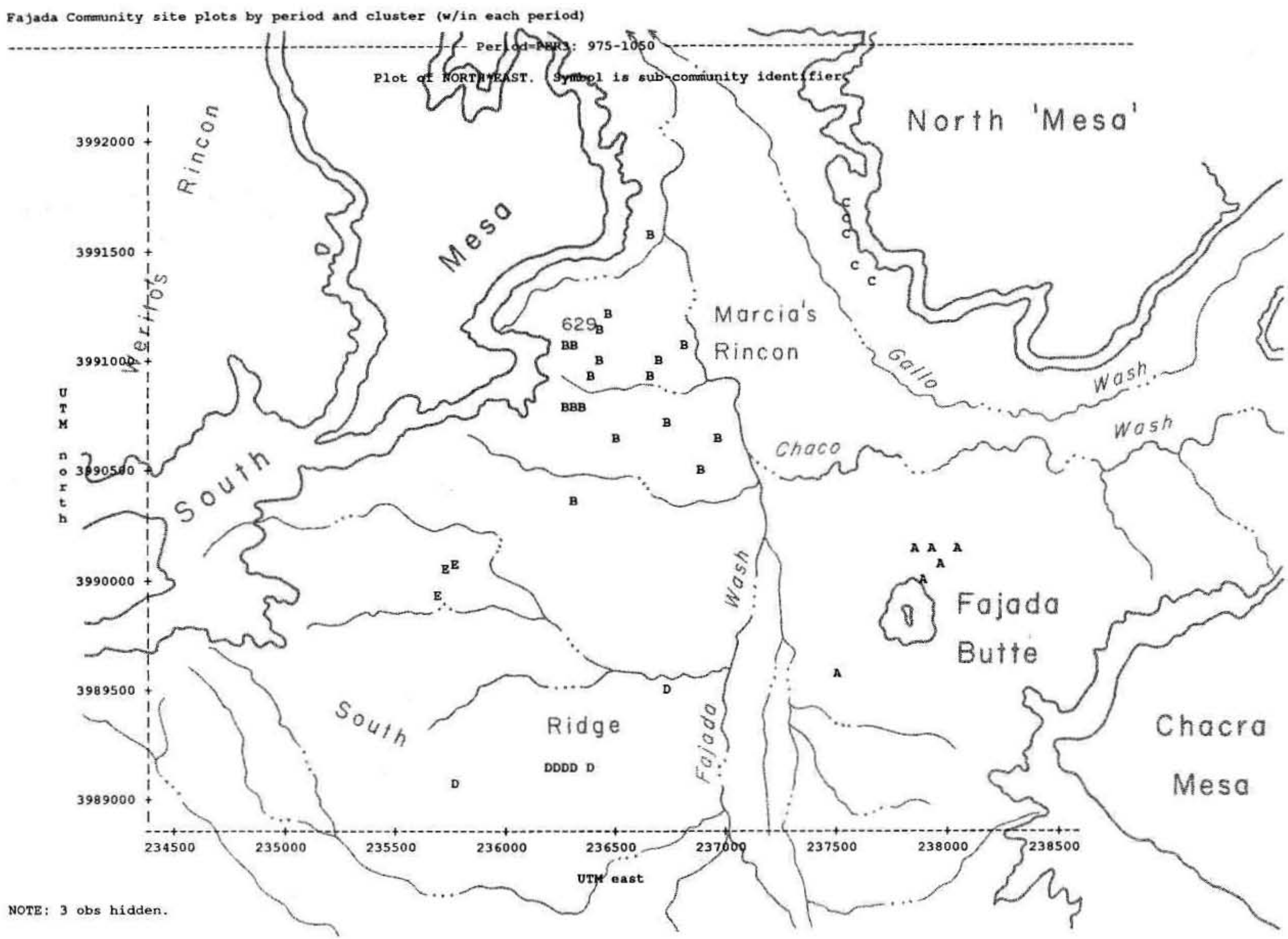

Figure 9.4. *Fajada Gap Community site plots by cluster: A.D. 975-1050 (NPS 310/82786 A).*

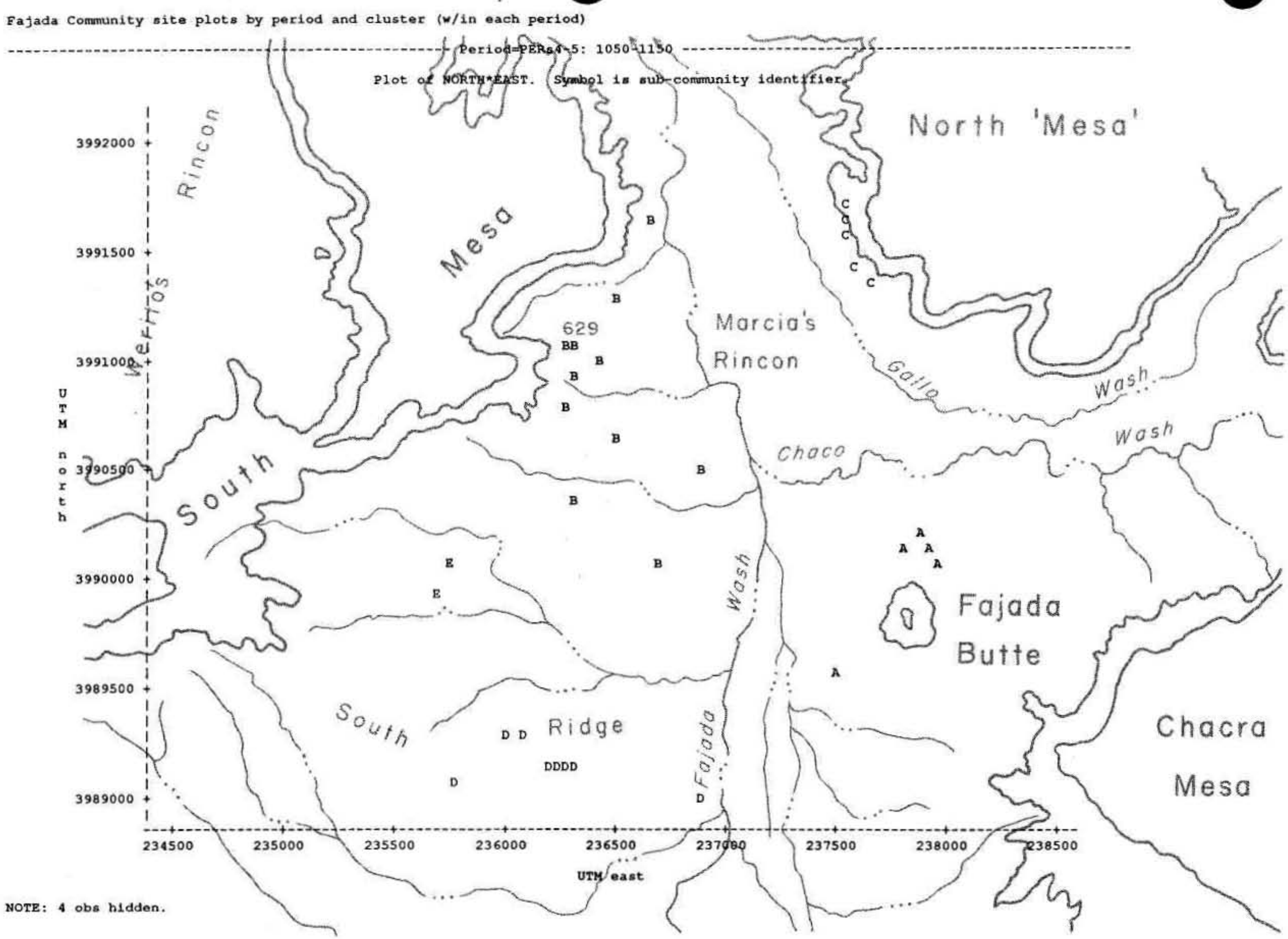

Figure 9.5. Fajada Gap Community site plots by cluster: A.D. 1050-1150 (NPS 310/82787 A).

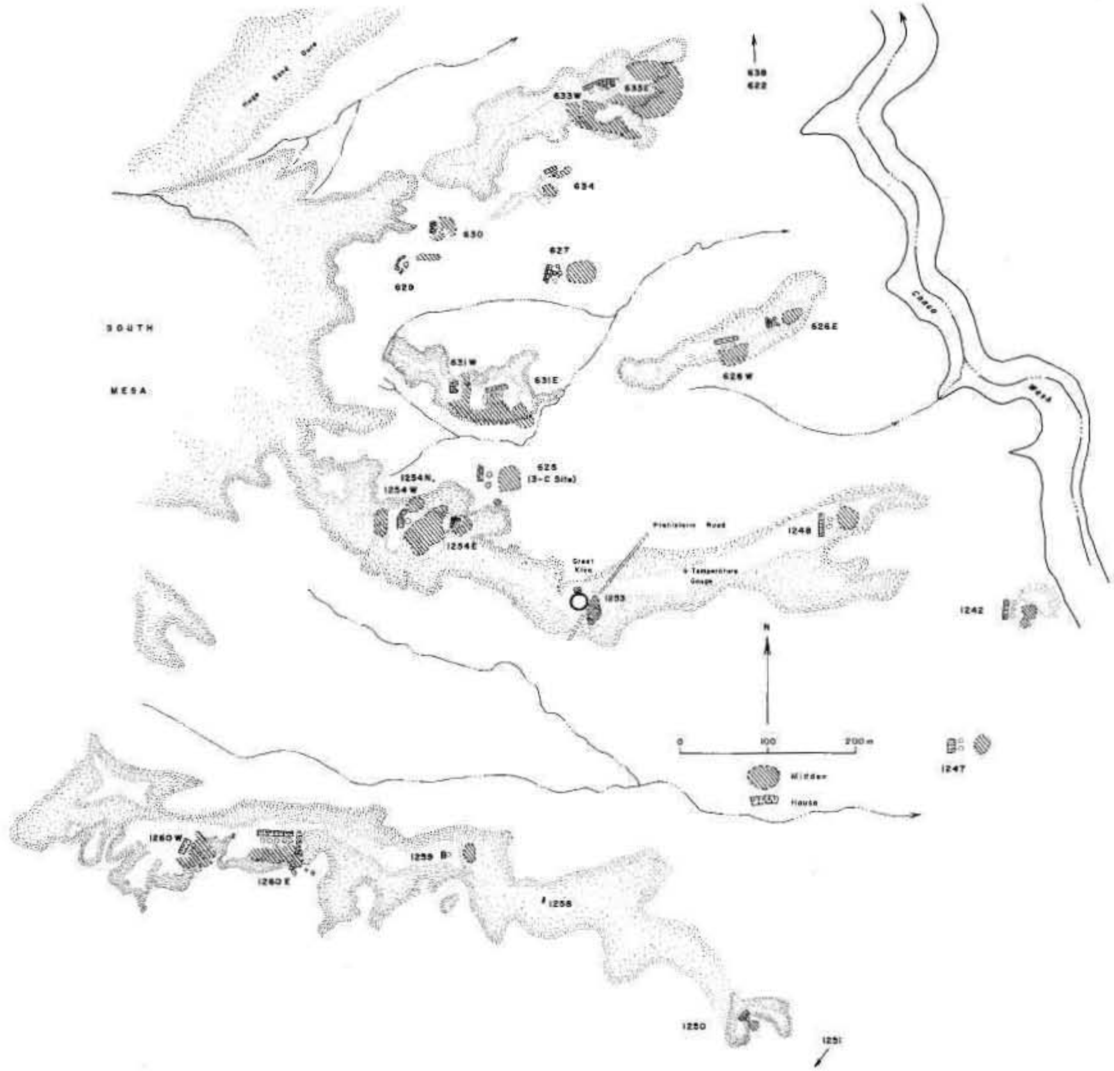

Figure 9.6. ***The Marcia's Rincon Fajada Gap Subcommunity B (drawn from unrectified aerial photos) (NPS 310/82789 A).***

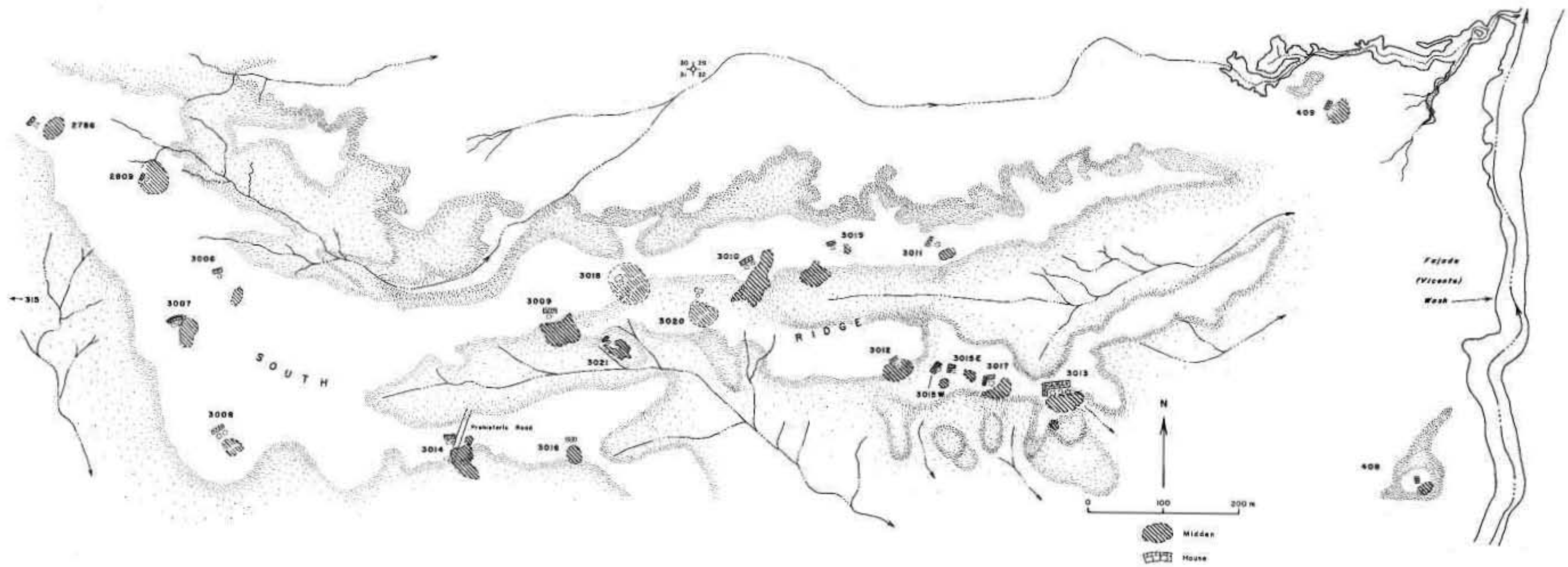

Figure 9.7. The South Ridge Fajada Gap Subcommunity D (drawn from unrectified aerial photos) (NPS 310/82791 A).

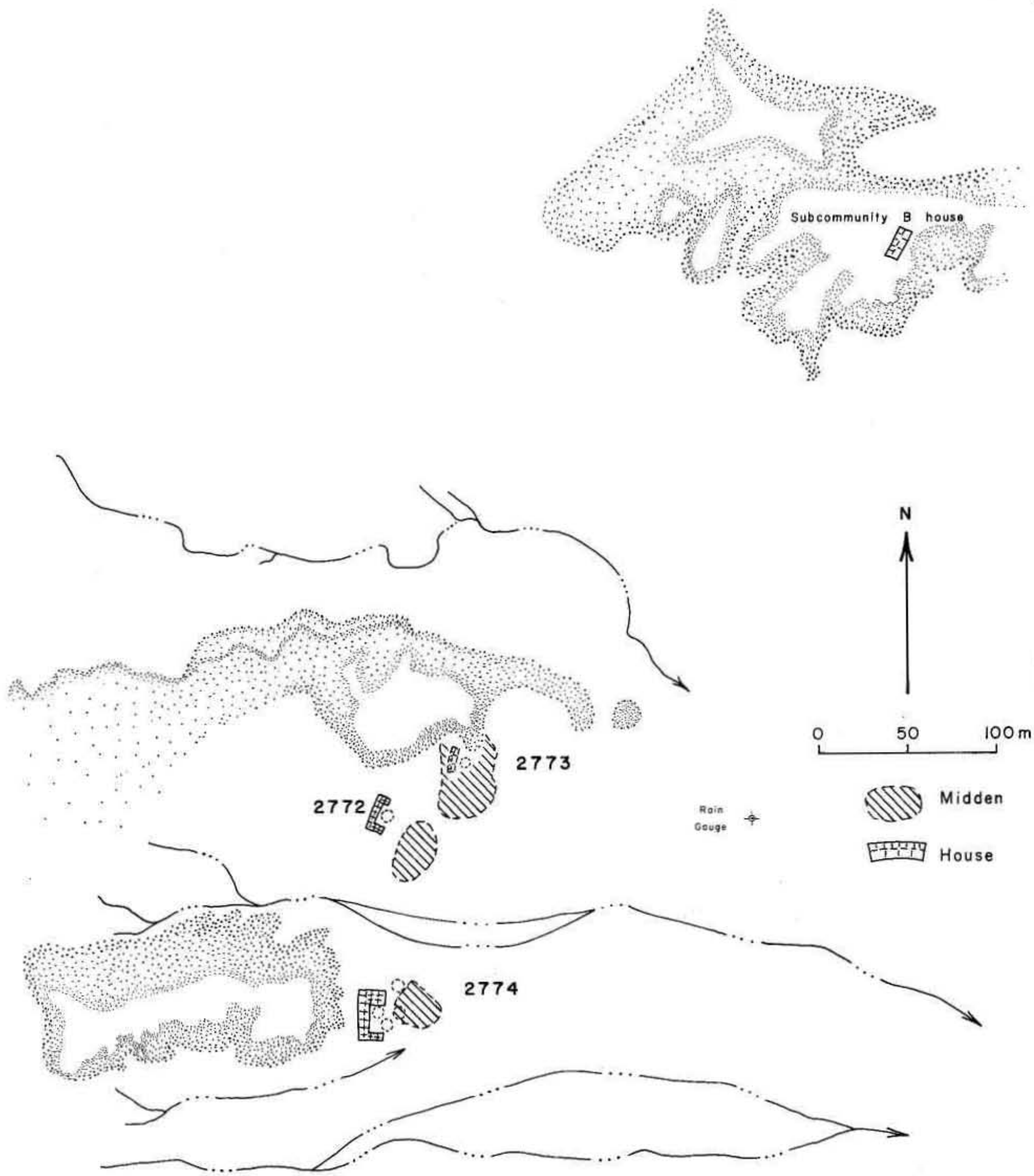

Figure 9.8. *The small Fajada Gap Subcommunity E between South Ridge and Marcia's Rincon group (drawn from unrectified aerial photos). House 1260W in subcommunity B visible in upper right corner (NPS 310/82792 A).*

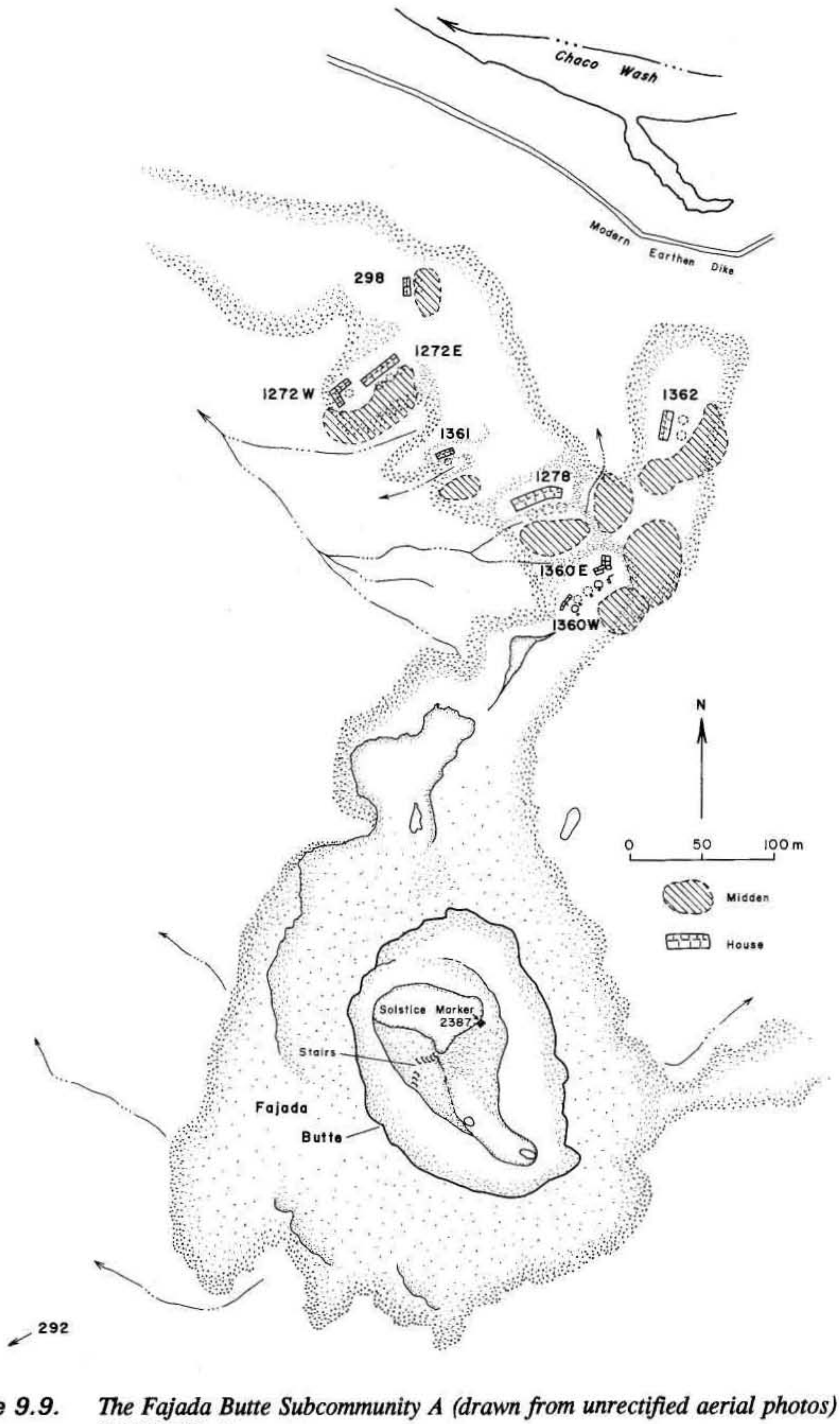

Figure 9.9. *The Fajada Butte Subcommunity A (drawn from unrectified aerial photos) (NPS 310/82788 A).*

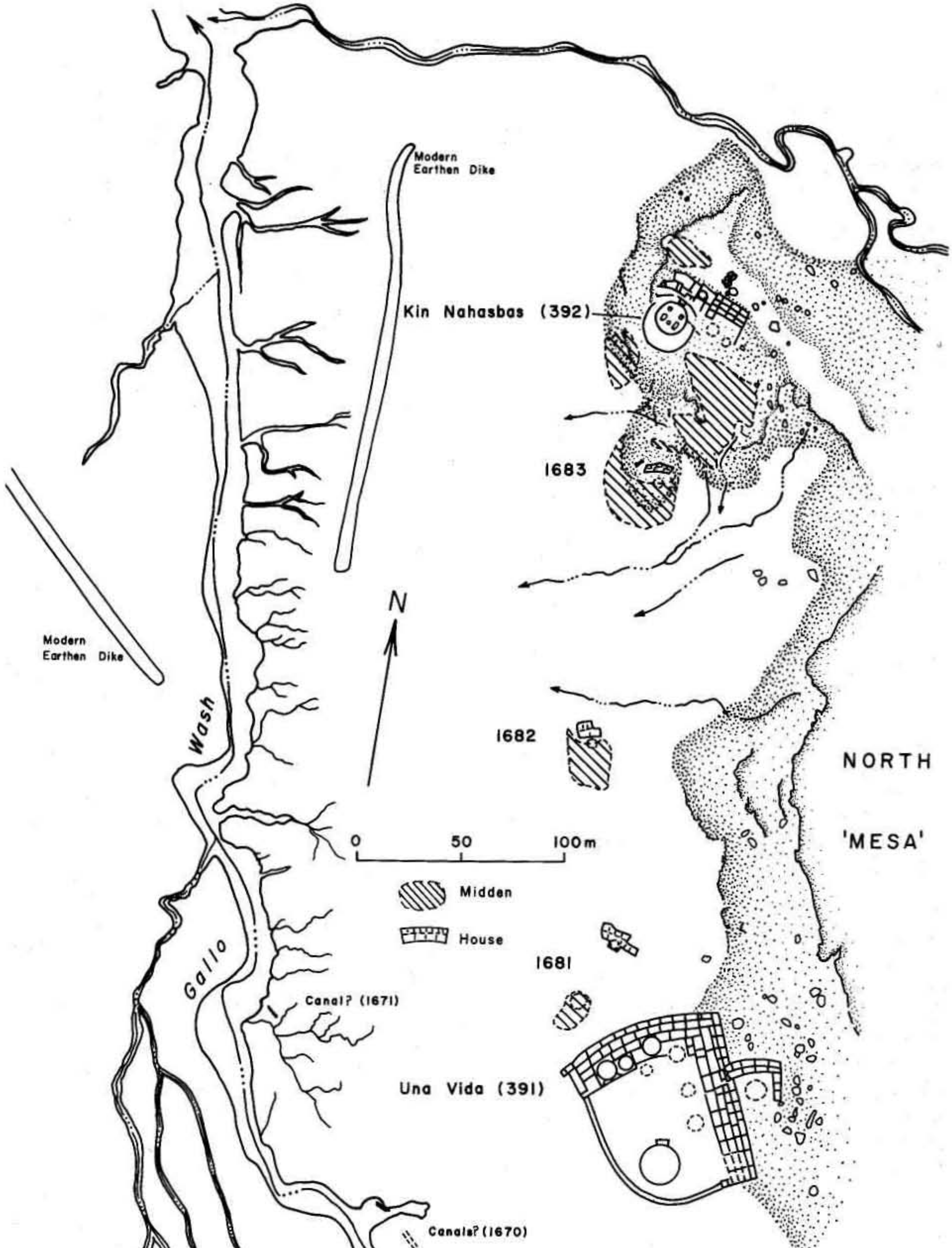

Figure 9.10. The greathouse Fajada Gap Subcommunity C (drawn from unrectified aerial photos) (NPS 310/82790 A).

counterparts (i.e., Judge 1989:Table 5). Part of this impression may be biased by the large mounds of stone rubble that characterized the later sites (see discussion on surface remains above) in contrast to the pre-A.D. 1050s sites that exhibited little mound relief and rubble, making it more difficult to estimate room number. When Table 9.5 was examined by time period, subcommunity, and overall community means, there was little difference in mean room frequencies between categories (excluding the two greathouses). T-tests confirm that generally there were not significant differences (at the 0.05 level of confidence) in room numbers among periods except between the A.D. 800s and A.D. 900s houses ($t_{2\ tail}=2.1$, df=29, p=0.04) where a substantial increase in room number is noted for the later period over the A.D. 800s. It may also be notable that occasional "oversized" small houses (e.g., 29SJ 627 in Marcia's Rincon, and 29SJ 621, 29SJ 1248, and 29SJ 3013) characterized all time periods examined except for the earliest, perhaps accounting for the average small size of the A.D. 800s houses. This difference, however, may have been a product of long occupation in some houses that hid the earlier A.D. 800s occupation from tabulation. Overall, the trend revealed increased house size after the A.D. 800s and leveling off or decreasing in size by the late A.D. 1000s or early A.D. 1100s.

Overall, small houses exhibited between six and ten estimated rooms (five to nine in the A.D. 800s), representing two to three families or resident units, with a few larger houses (14+ rooms) in each larger house cluster. In the A.D. 900s and 1000s, this pattern was clearest in Marcia's Rincon, where 29SJ 627 dominates the surrounding smaller houses like 29SJ 625, 29SJ 626 (East and West houses), and 29SJ 629 (i.e., McKenna 1984:384). When the Rincon was incorporated within the plotted subcommunity, 29SJ 627 remains largest, although there were two unexcavated houses with about 14 rooms each. Given the number of sites where room numbers could not be determined, a pattern of one large house surrounded by several smaller houses, as observed in Marcia's Rincon, remained tenuous. If this pattern is upheld by additional studies, however, it may be evidence for socio-political structuring within the subcommunities (e.g., Phillips 1972; Woodman 1987:170-173). The larger small-houses probably contained resident numbers that approached levels of decision-making stress that caused group factionalism and restructuring of decision-making authority (Johnson 1982). Without higher order decision-makers, these potential problems also would have existed in the greathouses. Were the latter integrative loci for the subcommunity or did they function as the "home" residence for special task groups located in the surrounding houses? Aside from site size, some indicators, such as the high number of anvils, the scarce turquoise debris, and the number of complete turquoise artifacts, also suggested that 29SJ 627 was dissimilar from the other small sites examined. The variation in size of house sites, including the greathouses, may simply represent a number of different hierarchial levels and house functions that integrate every Chacoan community (cf., McKenna 1984:384).

Community Population

The approximate size of the population in Chaco Canyon is critical to our understanding of social complexity and the impacts upon the marginal resources there. Indeed, the question of size and permanency has important ramifications to all models of the Chaco Phenomenon and is one that has not been resolved. It is clear that house frequency in the Fajada Gap area increased dramatically in the A.D. 900s and the A.D. 1000s during the Bonito phase, but poor temporal control does not allow certainty in assessing coeval occupation or use of the many sites assigned to the community. Excavations reveal, however, that Chacoan houses typically experienced long occupations, perhaps intermittent at times, which bias estimates of population sizes. Thus, the estimates that follow must be considered, at best, approximate, and inflated. The post-A.D. 1050 periods, in particular, must be viewed with great caution because of the rebuilding and reoccupation of old buildings by subsequent populations--problems that distorted initial views of small-house occupation at the well-known and highly discussed Bc 50, Bc 51, and Bc 59 houses across from Pueblo Bonito. Study of the Fajada Gap and the East Chaco Communities make it clear that post-A.D. 1050s houses are often built over the A.D. 900/early A.D. 1000 houses, have different orientations that suggest a hiatus in occupation, and yield traces of Mesa Verde Black-on-white pottery, suggesting even later reoccupations in the secondary houses (e.g., as demonstrated at 29SJ 633; Mathien 1991). The effect of this mounding produces sites of impressive size and more rooms

Table 9.5. Fajada Gap Community sites by period and sub-community cluster.[a]

Site	Cluster	Number of Rooms	Orientation (in degrees)
A.D. 800-925			
29SJ 315	-	5	149
29SJ 391	-	12	155
29SJ 392	-	?	?
29SJ 622	-	?	122
29SJ 627	-	12?	99
29SJ 629	-	3	109
29SJ 1250	-	5	150
29SJ 1260 E	-	?	171
29SJ 1260 W	-	?	122
29SJ 1360 W	-	?	165
29SJ 2786	-	6	130
29SJ 2809	-	9	157
29SJ 3006	-	5	?
29SJ 3007	-	6	171
29SJ 3008	-	9	?
29SJ 3011	-	?	159
29SJ 3016	-	?	?
29SJ 3018	-	?	?
29SJ 3020	-	?	?
Totals	Mean:	7.2	143.0
n = 19	sd:	3.1	23.9
	CV%:	43.3	16.7
A.D. 925-975			
29SJ 1278	A	?	?
29SJ 1360 E	A	15	101
29SJ 1360 W	A	?	165
29SJ 1361	A	5	161
29SJ 1362	A	11	103
n = 5	Mean:	10.3	132.5
	sd:	5.0	35.3
	CV%:	48.7	26.6

Table 9.5. (continued)

Site	Cluster	Number of Rooms	Orientation (in degrees)
29SJ 622	B	5	145
29SJ 625	B	6	96
29SJ 626 W	B	6	166
29SJ 627	B	11?	99
29SJ 629	B	9	109
29SJ 631 E	B	14	167
29SJ 633 W	B	9	165
29SJ 634	B	6	155
29SJ 1241	B	?	?
29SJ 1242	B	11	94
29SJ 1248	B	14	97
29SJ 1253	B	6	122
29SJ 1254 E	B	9	100
29SJ 1254 N	B	?	115
n = 14	Mean:	8.83	125.4
	sd:	3.2	29.7
	CV%:	35.7	23.7
29SJ 391	C	98	135/237[b]
29SJ 392	C	?	202
29SJ 1681	C	?	?
n = 3	Mean:	-	-
29SJ 3009	D	9	170
29SJ 3010	D	9	152
29SJ 3012	D	12	150
29SJ 3013	D	20	173
29SJ 3014	D	6	188
29SJ 3019	D	?	?
29SJ 3021	D	?	117
n = 7		11.2	158.3
	Mean:	4.5	24.7
	sd:	47.8	15.6
	CV%:		

Table 9.5. (continued)

Site	Cluster	Number of Rooms	Orientation (in degrees)
29SJ 1260 E	E	21	171
29SJ 1260 W	E	9	122
29SJ 2773	E	?	97
n = 3	Mean: sd: CV%:	15.0 8.5 56.6	130.0 37.6 29.0
Totals n = 32	Mean: sd: CV%:	10.1[c] 4.5 44.2	137.9 33.9 24.6
<u>A.D. 975-1050</u>			
29SJ 292	A	8	176
29SJ 1272 E	A	11	152
29SJ 1278	A	?	?
29SJ 1360 E	A	15	101
29SJ 1360 W	A	?	165
29SJ 1361	A	5	161
29SJ 1362	A	11	103
n = 7	Mean: sd: CV%:	10.0 3.7 37.4	143.0 32.7 22.9
29SJ 622	B	5	145
29SJ 625	B	6	96
29SJ 626 E	B	6	102
29SJ 626 W	B	9	165
29SJ 627	B	18	99
29SJ 629	B	9	109
29SJ 630	B	8	100
29SJ 631 E	B	14	167
29SJ 633 W	B	9	165
29SJ 634	B	6	155
29SJ 1241	B	?	?
29SJ 1242	B	11	94
29SJ 1247	B	?	?
29SJ 1248	B	14	97
29SJ 1253	B	6	122
29SJ 1254 E	B	9	100
29SJ 1254 W	B	?	115
29SJ 1259	B	?	?
n = 18	Mean: sd: CV%:	9.3 3.8 40.8	122.1 28.8 23.6

Table 9.5. (continued)

Site	Cluster	Number of Rooms	Orientation (in degrees)
29SJ 391	C	98	135/237[b]
29SJ 392	C	?	202
29SJ 1681	C	?	?
29SJ 1682	C	?	?
29SJ 1683	C	6	175
n = 5	Mean:	52.0	188.5
	sd:	65.1	19.1
	CV%:	125.1	10.1
29SJ 409	D	6	109
29SJ 3012	D	12	150
29SJ 3013	D	20	173
29SJ 3015 E	D	?	?
29SJ 3015 W	D	?	?
29SJ 3017	D	?	?
29SJ 3021	D	?	117
n = 7	Mean:	12.7	137.3
	sd:	7.0	29.7
	CV%:	55.5	21.6
29SJ 2772	E	?	111?
29SJ 2773	E	8	97
29SJ 2774	E	6	90
n = 3	Mean :	7.0	99.3
	sd:	1.4	10.7
	CV%:	20.2	10.8
Totals	Mean:	9.5	131.4
n = 40	sd:	4.1	33.2
	CV%:	42.9	25.4

Table 9.5. (continued)

Site	Cluster	Number of Rooms	Orientation (in degrees)
A.D. 1050-1140			
29SJ 292	A	?	176
29SJ 298	A	8	90
29SJ 1272 W	A	12	140
29SJ 1278	A	20	162
29SJ 1361	A	?	161
n = 5	Mean:	13.3	145.8
	sd:	6.1	33.7
	CV%:	45.8	23.1
29SJ 627	B	18	99
29SJ 629	B	1	-
29SJ 630	B	?	100
29SJ 631 W	B	16	105
29SJ 633 E	B	14	175
29SJ 638	B	6	?
29SJ 1247	B	8	98
29SJ 1251	B	4	99
29SJ 1253	B	?	122
29SJ 1254 E	B	?	100
29SJ 1254 W	B	?	104
29SJ 1259	B	8	92
n = 12	Mean:	9.2	109.4
	sd:	5.7	24.4
	CV%:	61.3	22.2
29SJ 391	C	107	135/237
29SJ 392	C	35	198
29SJ 1681	C	16	191
29SJ 1682	C	8	212
29SJ 1683	C	?	175
n = 5	Mean:	41.5	194.0
	sd:	45.1	15.4
	CV%:	108.7	7.9

Table 9.5. (continued)

Site	Cluster	Number of Rooms	Orientation (in degrees)
29SJ 408	D	14	176?
29SJ 2772	D/E	6	115
29SJ 2774	D/E	?	90
29SJ 3010	D	?	152
29SJ 3012	D	?	150
29SJ 3015 E	D	10	180
29SJ 3015 W	D	16	121
29SJ 3017	D	14	153?
29SJ 3019	D	6	157?
29SJ 3021	D	6	117
n = 10	Mean:	10.3	141.1
	sd:	4.4	29.1
	CV%:	42.6	20.6
Totals[b]	Mean:	11.1	138.3
n = 32	sd:	4.8	37.5
	CV%:	43.6	27.1

[a] Mean totals may vary because of missing values.
[b] Orientation excluded from all totals.
[c] Greathouse rooms at Una Vida (391) and Kin Nahasbas (392) excluded from overall totals.
[d] Una Vida (391), Kin Nahasbas (392), and 629 excluded from totals.

than were probably in use for any single period of time.

There have been many approaches to estimating prehistoric populations and all are fraught with untestable assumptions (Hassan 1978; Powell 1988; Schlanger 1987). House frequency can serve as a rough indicator of population if each house has an equal number of rooms (Eighmy 1981). Here, an approximate calculation of total rooms and predicted number of living rooms/households (based on a sample of excavation results) allows some idea of the approximate maximum number of people in the Fajada Gap Community (Table 9.6), if permanency is assumed. If we assume nuclear families of about five persons per household (e.g., Hayes 1981:49-50; Schlanger 1987:599), the Fajada Gap Community might have had a maximum community of up to 900 persons during the late A.D. 900s/early A.D. 1000s, the period of maximum room number. This figure is undoubtedly considerably lower, however, considering the problems of inflated coeval occupations and the possibility, at times, of seasonal or intermittent occupations, suggested by the many east-facing houses.

It is suggested that during the late A.D. 900s/1000s, when 29SJ 629, 29SJ 625, 29SJ 626 East, 29SJ 627, and 29SJ 1360 were most active, population centers existed in five loci along Chaco Wash (at its head, at the East Community, Fajada Gap, South Gap, and Padilla Well) and consisted of several hundred persons each. The size of these communities are within world-wide puebloan community sizes, as defined by Gilman (1983:101), and large enough to provide relative autonomy from the social necessity of marriage ties with more distant communities (Plog 1980:136). Permanent residents in the associated greathouses may have been few in number (e.g., Windes 1984; 1987a), although this is a controversial topic among investigators (cf., Reyman 1989; Vivian 1984, 1989, 1990), and its resolution is central to an understanding of population dynamics and carrying capacities in Chaco Canyon.

House Orientation

Archeologists have long known that pueblos were mostly oriented within a small directional arc, probably in response to morning sunrise and passive solar energy requirements. Southwestern examples, particularly nearby Pueblo Bonito (e.g., Knowles 1974; Scurlock and Jacobsen 1981), were touted in the passive energy literature. The house orientation, or siting, may combine social and practical aspects that reflected the expected duration of house occupation (e.g., permanent or seasonal). A small example of sites recorded during the 1972 inventory survey revealed that Pueblo II houses in Chaco Canyon generally faced southeast between approximately 145° and 150° (Hayes 1981:28-29, Figure 39). House orientation within the Fajada Gap Community was recorded again to examine what patterning, if any, might have been informative of seasonal building episodes (e.g., Rocek 1988), community preferences, or other aspects of shared social values and social cohesion. Based on excavation and a preference for trash deposition to the southeast of the house, it was assumed that houses did not face towards the north and northwest. Therefore, house orientation was determined by the angle perpendicular from the house back wall to the southeastern quadrant. Early houses (pre-A.D. 900 were not consistently recorded in the sample, however. A few houses were built in an "L-shape" that thwarted determination of orientation unless the earliest component could be determined (e.g., as at 29SJ 629) but the majority of the houses faced only one direction (e.g., at 29SJ 3013).

A histogram (Figure 9.11) suggests that Fajada Gap houses were oriented toward one of two arcs of direction: an east-southeast direction (mean=105°, sd=11.2°, CV%=10.6, range=90°-130°) or a south-southeast direction (mean=162°, sd=11.1°, CV%=6.8, range=145°-188°). One house faced 140° and was not included in the calculations. There were preferences within subcommunities for a single direction, and overall it was clear that house orientation was not randomized within the east-to-south direction quadrant. Subcommunity B houses, for instance, generally were oriented east, while those in SC A and SC D favored a south-southeast direction, although there was some change in these orientations through time. For whatever reasons, there was an apparent widespread consensus among builders that just two directions were "proper" for house orientation, and these directions were maintained for over 250 years within the Fajada Gap Community. Of the 56 small houses with a determined siting, 30 faced the south quadrant, 25 faced east, and one was indeterminant. Although the overall physiographic setting within South Gap was

Table 9.6. Room and household estimates for the Fajada Gap Community.[a]

Time Period	No. of Houses Occupied	No. of Houses with Est. Rooms	Mean No. of Rooms per House	Range: Total Rooms	Max. Total Households[b]	No. of sub-community Clusters
SMALL HOUSES						
800-925	19+	10	7.2 $\pm$ 3.1	78-196+	26-65 $\bar{x}$=46+ 39-98 $\bar{x}$=69+	0
925-975	32	22	10.1 $\pm$ 4.5	179-467	60-156 $\bar{x}$=108 90-234 $\bar{x}$=162	5
975-1050	40	25	9.5 $\pm$ 4.1	216-544	72-181 $\bar{x}$=127 108-272 $\bar{x}$=199	5
1050-1150	32	20	11.1 $\pm$ 4.8	202-509	67-170 $\bar{x}$=119 101-255 $\bar{x}$=178	5
GREATHOUSES (Una Vida, Kin Nahasbas)						
800-925	1?	-	-	6-12	3?	-
925-975	2	-	-	40	14	-
975-1050	2	-	-	40	14	-
1050-1150	2	-	-	71	?	-

[a] Estimates are considered maximum and inflated.

[b] Total households derived by calculating ratio of one and two storage rooms per habitation room. Total number of houses in sample is 60 within the defined 966 hectare area.

NOTE: To calculate actual population, multiply total households by 5 persons each.

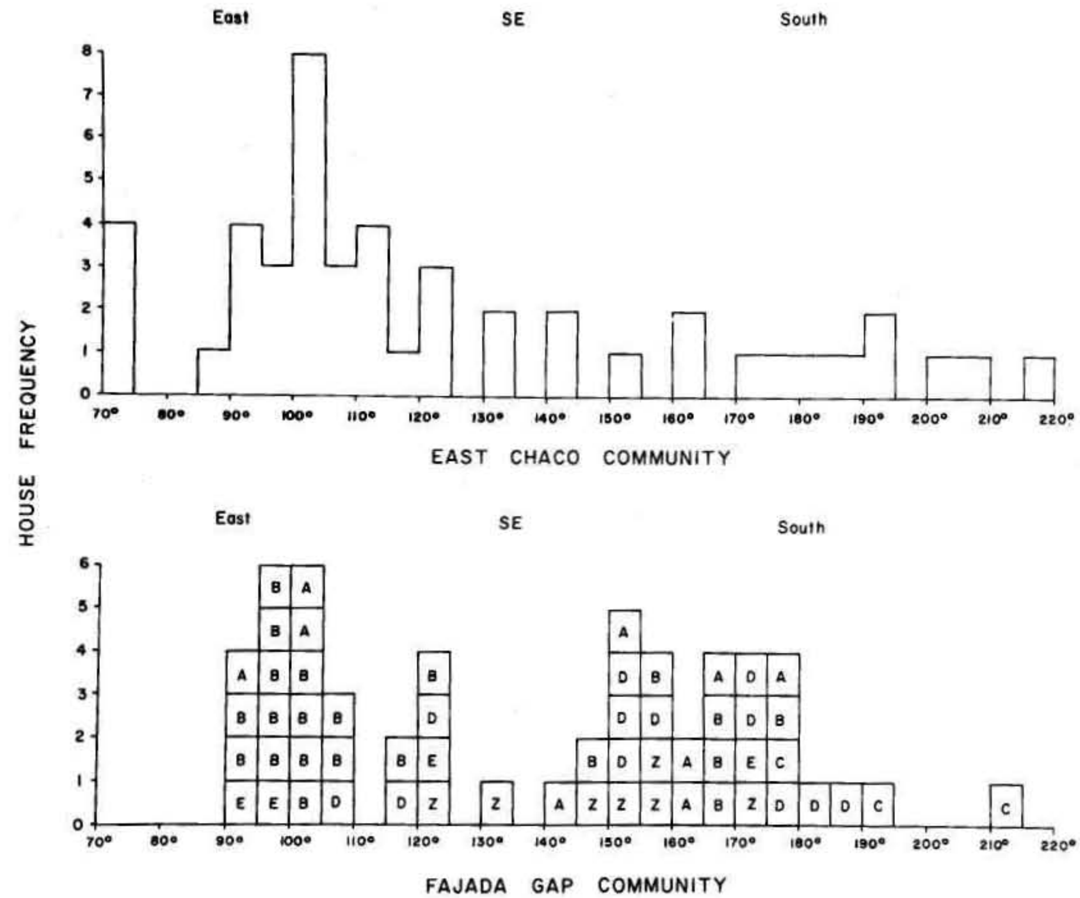

Figure 9.11. *Histograms of house orientations from true north in the Fajada Gap Community (subcommunity houses marked by letter) and the East Chaco Community (A.D. 900-1300 occupations) (NPS 310/82793 A).*

similar (most occupied ridges run roughly northwest-southeast), it was improbable that land form alone was responsible for the clustered orientation preference. Instead, the two directions might reflect seasonal constructions and occupations related to sunrise and passive solar energy (e.g., Rocek 1988:531).

There was sometimes a preference in later communities for the small houses to face towards the greathouse, as in the Aztec Community (Stein and McKenna 1988:40), but there was no such pattern around Fajada Gap. Siting toward the greathouses in the Fajada area simply may have been impractical or based on passive energy principles for house construction, which overrode social concerns--a practice also noted for the East Chaco Community sites (Appendix F).

We can assume that by A.D. 800s, if not earlier, with the advent of aboveground rooms, knowledge of passive solar energy requirements were well known among the Anasazi. The most efficient construction of solar-heated rectangular buildings for year-round or winter occupation is one sited along an east-west axis to face within 20°-30° from true south (Better Homes and Gardens 1983:15; Schepp and Hastie 1985:60; Total Environmental Action and Los Alamos National Laboratory 1984:20-21). In these, living quarters are best located on the south side buffered from the cooler north side by infrequently used space (Mazria 1979:91-92). Many Anasazi sites are oriented in exactly this manner, including a major segment of the Fajada Gap Community houses, as well as the historic pueblos, such as the pueblo of Acoma (Knowles 1974; Watson 1977:3).

Houses oriented in this manner gain little heat from the long-arched path of the summer sun because the short east and west walls do not receive large amounts of the morning and afternoon sun; instead, the large southern house-face intercepts maximum sunlight in the winter, but must be shaded during the warmer months (Schepp and Hastie 1985:60). For instance, the influx of new houses built during the early A.D. 1100s near Pueblo Bonito and Chetro Ketl cluster along the base of the south-facing cliff (Windes 1987a:403) where solar advantages are maximized (Knowles 1974; Scurlock and Jacobsen 1981). Another early A.D. 1100s Chacoan community, behind the Aztec Ruins, also faces generally south (Stein and McKenna 1988:Table 2), although the late small houses in the Bis sa'ani Community near Chaco Canyon, reveal a wide diversity of sitings (Dykeman 1982:853-855). Houses facing the southern arc (150°-220°) are presumed to have been built for yearlong or winter occupation. In Chaco Canyon, at least, it seems less likely that a winter seasonal occupation would have been preferred given the extreme winter temperatures that occur (Chapter 2) and the presumed scarcity of wood and other resources.

Many of the Fajada Gap Community sites violate this basic passive solar heating principle, however, and face nearly due east. For this reason, it is argued that these houses were not initially intended for year-round occupation but for use during the warmer months, a reasonable assumption based on solar efficiency (William A. Gross, Mechanical Engineer, University of New Mexico, personal communication 1989). The warm early morning sun illuminates and warms the house interiors and outdoor areas after the cool nights, but then are protected from the later hot sun by ramada shades, like those found at 29SJ 299, 29SJ 627, 29SJ 629, 29SJ 724, and 29SJ 1360. The small exposed north walls receive minimum exposure during the heat of the day, although late afternoon summer sunshine against the west wall could be a problem. This problem could have been reduced by extending the roof beams to form balcony shades, which have been found along the north and northwest back walls of the south-facing greathouses in Chaco Canyon (e.g., Lekson 1984:37). Balconies have not been recognized in Chacoan small-house architecture, and are unlikely to be so considering their non-enduring type of architecture.

We might expect residence patterns to be affected by changing environmental conditions, which might be reflected in house orientations. Such appears not to be the case with the Fajada Gap Community data. Little difference appears between periods in orientation preference, nor is there a correlation between house size and orientation. Orientation preference, however, may be complicated by shifting occupation permanency after the house was built, such as is suspected for 29SJ 629, where builders were loath to forsake their initial investment in construction.

The living room construction at 29SJ 629 suggests that there is a shift in solar preference after the initial house construction. Neither of the two living rooms, probably built in the late A.D. 900s, were placed in the usual location in front of the older storage rooms between the original roomblock and the primary pithouse. Instead, Room 9 was added to the southern end of the roomblock and slightly extended beyond all other rooms. Room 3 formed an odd disjuncture and angle with the older storage rooms, which at first was perplexing, but that was explained as idiosyncratic behavior sometimes found in house construction. Both rooms, however, take advantage of the winter sun. This is particularly relevant because neither room was fully enclosed. The problem remains complex, because the two rooms were not suitable for bad weather, but even during the colder months, the days can be pleasant if the sun is out and advantage is taken of passive solar energy. Nevertheless, the two living rooms were still provided protection from the summer heat: Room 9 was buffered on the west by storage Room 8 and the postholes in "Room 4" mark some kind of structure behind Room 3 that could have provided shade.

Awareness of solar principles is also important for strategies affecting food storage (Gilman 1983:125). Stored food must be kept in well-insulated facilities receiving minimal solar radiation; these are best built facing south, like Rooms 1-2 at the site. Initial storage in Rooms 5-7, which face east, was afforded solar protection because of semi-subterranean construction. The best locations for long-term food storage, however, are probably the large, plaza, bell-shaped pits shaded by the ramada.

The East Chaco Community (Appendix F), coeval with the Fajada Gap Community, is more informative of occupational permanency because of the self-imposed constraints of site location. Houses there are grouped within two arcs of direction (Figure 9.11), but most are built on north-facing ridges so close to Chacra Mesa that the days are shortened from direct sunlight during the colder months of late October through February. Either practicality for locating houses was ignored or prevented for unknown reasons, or the majority of them were built primarily for occupancy during the warmer months. Preliminary results indicate that the A.D. 900s-early 1000s houses were sited east, although later Mesa Verdean houses often faced south.

Nearest Neighbor Spacing

A gradual tightening of house location groups was expected through time if the longevity of land ownership remained constant within each subcommunity and because of internal community growth. Topographic constraints probably have some effect on house spacing, but social continuity and cohesion can also be important factors (Hillier and Hanson 1984). The distance between houses was used as a measure to examine spatial relationships through time [see Orcutt (1987) for another example of aggregation and spacing]. In this exercise, the nearest neighbor for each site by time period was computed using the house backwall UTM coordinates. Results were inconclusive (Table 9.7).

Nearest neighbors were relatively close for the entire period examined, ranging between 18 and 653 m for all but the earliest period. The earliest period was biased because of presumed missing data (except for SC D and group "Z" farther west on South Ridge). Houses were generally no more than 300 to 500 m apart and, of course, most were much closer than that. At times, subcommunity houses were closely spaced. Mean distances within subcommunities were within 100 to 200 m, with few exceptions. Overall, the coefficient of variation for the spacing of some sub-communities suggested significant departure from randomness. At the same time among two Chacoan communities along the Rio Puerco (Baker and Durand 1991), aggregation and randomness of settlement varied much more than was seen in the relatively stable Fajada Gap Community. A nearest neighbor statistic could prove useful with this data (see the use of this statistic by Baker and Durand 1991, and Washburn 1974 applied to community settlement patterns along the Rio Puerco) except that determining accurate spatial limits of each subcommunity and the overall area was not possible (Pinder et al. 1979 provides cautions regarding this statistic). Undoubtedly, other factors besides social distance, such as topography, wind direction, arable lands, and soils, affected house spacing, but there was little comparative data from other contemporary Chacoan communities in which to assess regional patterns.

Craft Production at 29SJ 629 and in the Small-House Community

Turquoise Jewelry Production

Chaco Canyon has long been famous for the amount of turquoise found there. More than any singular event in archeology, the 56,000 pieces of turquoise recovered from a burial room in Pueblo Bonito by Pepper (1909, 1920) focused attention on Chaco Canyon as an important place for turquoise. The widespread extent of turquoise in Chaco Canyon stands in contrast to contemporary settlements elsewhere on the Colorado Plateau (Mathien 1981a:Tables 9-12; Snow 1973:Figures 1-4). Even in the San Juan Basin, the scarcity of reported turquoise has virtually ceded the role of a turquoise center to Chaco Canyon. But the validity of this view needs reappraisal. Although turquoise is often found on small-house sites, as well as in the greathouses, less is known of its context and its spatial and temporal distribution. Its distribution within various Chacoan communities, for instance, is virtually unknown.

Turquoise in Excavated Fajada Gap Sites

Craft production at 29SJ 629 was evident from the thousands of bits and pieces of turquoise found at the site (Mathien, this report). It was clear from the more than 60 bead fragments broken during the drilling process (for holes) that bead manufacture was a primary craft activity at the site. Also notable was the near lack of finished turquoise beads. Only two complete turquoise beads were recovered from the site, both from the Trash Midden, and neither exhibited the quality of workmanship typical of those manufactured at the site. The fragments of two other

Table 9.7. *Distances between nearest neighbors within subcommunities of the Fajada Gap Community through time.*

Subcommunity	A[a]	B[b]	C	D	E	Z
A.D. 800-925:						
No. of sites	1	4	2	4	2	6
Means (m)	-	494	379	163	111	142
Std. dev.	-	410	0	189	0	114
Minimum	-	171	379	18	111	64
Maximum	-	1,025	379	415	111	366
CV%:		83.0	-	116.0	-	80.3
A.D. 925-975:						
No. of sites	5	14	3	7	3	-
Means (m)	95	160	162	146	202	
Std. dev.	6	92	132	52	156	
Minimum	89	60	86	87	111	
Maximum	103	393	314	228	382	
CV%:	6.3	57.5	81.5	35.6	77.2	
A.D. 975-1050:						
No. of sites	7	18	5	7	3	-
Means (m)	159	137	81	166	70	
Std. dev.	184	99	9	199	34	
Minimum	78	49	71	22	50	
Maximum	576	393	91	484	109	
CV%:	115.7	72.3	11.1	119.9	48.6	
A.D. 1050-1150:						
No. of sites	5	12	5	8	2	-
Means (m)	195	240	81	153	109	
Std. dev.	256	147	9	195	0	
Minimum	74	54	71	22	109	
Maximum	653	472	91	581	109	
CV%:	131.3	61.3	11.1	127.5	-	

[a] "Zero" distance between 29SJ 1360E and 29SJ 1360W excluded from statistics in periods A.D. 925-1050.
[b] "Zero" distance between 29SJ 1254E and 29SJ 1254S excluded from statistics in the A.D. 1050-1150 period.

finished beads were recovered from the sand layer (Layer 6) on the floor of Pithouse 2, which was littered with turquoise microchips, and a microdrill, a lapidary lapstone (Volume II, Plate 4.12), two sandstone files (Volume II, Plate 4.13), and a bead blank that attested to workshop activities there. Finally, another two bead fragments came from Plaza Other Pit 1, which was littered with debris from turquoise bead production.

Excavations at nearby 29SJ 626 East also revealed scraps of turquoise and beads broken during the manufacturing process, although in far less quantities than at 29SJ 629. Just one tiny (2 mm diameter) turquoise bead was recovered at 29SJ 626 East, despite extensive fine screening. Whether these two small-house sites were typical of the occupation in Chaco Canyon was uncertain, although workshops were known from a number of sites (Mathien 1981a; 1984:182; this report).

A number of contemporary small-house sites have been excavated in the Fajada Gap area, but none have rivaled 29SJ 629 in the amounts of turquoise observed. Turquoise scrap, pendants, beads, and tiny chalcedonic drills of 1140 material (see Volume II, Table 3.1) were recovered from 29SJ 1360 (McKenna 1984) and 29SJ 627 (Truell 1992) in moderate quantities. At 29SJ 1360, the scrap included beads broken during drilling and pendant blanks (McKenna 1984:296). Two concentrations of turquoise scrap came from a pithouse bench and the nearby plaza surface (McKenna 1984:Appendix 4, Table 4), locations strikingly similar to the primary concentrations of turquoise at 29SJ 629. Deep, plaza pits filled with turquoise, like OP 1 at 29SJ 629, also might have existed but were missed during the original excavations (McKenna, personal communication 1988).

Completed beads also were recovered from 29SJ 627, but many of these were associated with bead blanks that had not yet been drilled and are assumed to have been associated with the production process. Particularly notable was the set of 24 bead blanks recovered from Kiva G at 29SJ 627, all of the same pale-green material. No scrap was recovered with this set, but it included a turquoise pendant blank (complete except for the hole) and one bead, identical to the others, except that it was drilled and finished. Finally, a room in 29SJ 627 yielded seven tiny chalcedonic drills in association with a cache of flakes and turquoise.

Despite the initial lack of turquoise from excavations at 29SJ 625/3-C Site (Vivian 1965), scrap and broken beads were found recently on ant nests there and in the rooms that were re-excavated in 1976. Six small chalcedony drills (material 1140), 14-25 mm long, similar to those from 29SJ 629 (see Volume II, Table 3.3), were also recovered from the Kiva 2 bench (Vivian 1965:22, 37-38) that may have been for drilling holes in ornaments. Turquoise was also found in the early greathouses. Turquoise scrap and broken bead blanks were recovered from the A.D. 900s deposits at Kin Nahasbas (Mathien and Windes 1989), at Una Vida, across from 29SJ 629, as well as from the East Chaco greathouse.

It is hard to imagine that quantities such as are found at 29SJ 629 were missed at other excavated sites. The smaller quantities at 29SJ 626 East, however, would not have been recovered were it not for extensive 1/16-in. mesh fine-screening. Because little, if any, systematic fine-screening was practiced at other excavated small sites in Chaco Canyon, turquoise could have existed at all these sites. Nevertheless, in order to assess the extent of potential craft specialization at sites contemporary to 29SJ 629 in the A.D. 900s and early A.D. 1000s, a systematic surface examination of sites was carried out in 1988-1989 in the Fajada Gap small-house community.

The Ant Nest Survey

The foraging habits and widespread nests of the harvester ant, Pogonomerymx, in Fajada Gap provided an ideal focus for sampling the presence of turquoise and beads at sites (Appendix D), where otherwise detecting its presence was nearly impossible even by intensive low-crawling through the brush and thistle. While sampling the extensive small-house community in Fajada Gap for house size and occupation period (see above), every ant nest in and around each site was examined. This strategy revealed turquoise scrap on 94 percent (30 of 32) of the sites contemporary with 29SJ 629 in the A.D. 900s and early A.D. 1000s (Table 9.8). Cultural material was seldom observed on nests located outside the site perimeters.

Table 9.8. Ornaments and other materials on ant nests built on Pueblo II sites (A.D. 900-early A.D. 1000s) in the Fajada Gap area, Chaco Canyon.[a,b]

Site No.	Turquoise Beads	Turquoise Scrap	Turquoise Other	Turquoise Total	Black Stone Beads	White/Gray Stone/Shell Beads	Tiny Drills	Azurite/ Malachite[b]	Total No. of Nests
29SJ 292	1m	4	1	6	2c	1f	-	-	6
29SJ 409	-	-	-	0	-	1c	-	-	9
29SJ 625[c]	1m	2	-	3	-	-	-	1 Az	5
29SJ 626 W	1m	11	-	12	1f,1c	1c	-	1 Ma	12
29SJ 630	1m	2	-	3	-	-	1	2 Az	8
29SJ 631	-	1	-	1	1c	-	-	1 Az	8
29SJ 633 W	1m	4	-	5	-	2c	1	-	3
29SJ 634	-	1	-	1	-	-	1	-	3
29SJ 1242	-	10	-	10	1c	-	6	-	12
29SJ 1248	-	2	1	3	-	-	-	-	11
29SJ 1253	-	4	-	4	4c	5c,4f	-	-	16
29SJ 1254 E	-	-	1	1	-	-	-	-	5
29SJ 1254 W	-	3	-	3	1c	2c	1	-	20
29SJ 1260 E	-	2	-	2	-	-	-	1 Ma	8
29SJ 1260 W	-	1	-	1	-	-	-	-	13
29SJ 1272	1m	15	-	16	1c,1f	3c	-	-	12
29SJ 1360[c]	1m	1	-	2	1c	-	-	-	4
29SJ 1361	-	2	-	2	1c	-	-	-	4
29SJ 1362	1m	3	-	4	1m	-	-	-	14
29SJ 2772	-	3	1m	4	-	2c	-	1 Ma	4

Table 9.8. (continued)

Site No.	Turquoise Beads	Turquoise Scrap	Turquoise Other	Turquoise Total	Black Stone Beads	White/Gray Stone/Shell Beads	Tiny Drills	Azurite/ Malachite[b]	Total No .of Nests
29SJ 2773	-	2	-	2	-	-	-	-	5
29SJ 2774	1m	4	-	5	-	-	-	3 Az	8
29SJ 2786	-	3	1	4	-	-	-	3 Az	6
29SJ 3009	-	4	-	4	-	-	-	-	6
29SJ 3010	-	4	-	4	-	1c	-	-	13
29SJ 3012	-	2	-	2	1c,1f	2c,2f	-	-	8
29SJ 3013	-	2	-	2	-	-	-	-	14
29SJ 3014	1c,1m	5	-	7	-	-	-	2 Az	8
29SJ 3015	1c,3m	15	1	20	1c	1c	-	-	9
29SJ 3017	1c,1f,1m	5	-	8	1c	1c	-	1 Az	10
29SJ 3019	-	-	-	0	-	-	-	-	3
29SJ 3021	2m	4	-	6	-	-	-	-	5
Totals	n = 32			145	31	28	10	16	272
Mean				4.59	0.63	0.88	0.31	0.50	8.5

[a] c = complete, f = fragment, and m = broken during manufacture (includes 1 pendant). Recorded in 1988 and 1989.
[b] Az = azurite and Ma = malachite.
[c] Post-excavational ant nest finds.

Although nests were segregated on the sites by area (house, plaza, and midden), it was not possible to tell exactly where on the sites turquoise was collected by the ants because of the extent of their foraging distance (up to 43 m or more from the nest). Turquoise was more likely to be found on the midden nests, but it was also frequently present on the house and plaza nests. It was surprising to find so much in the midden nests, but its presence may not accurately reflect turquoise discard in refuse. If turquoise was worked in the plaza and pithouse, then it could have been washed downslope to the middens or collected from the plaza by the ants. Besides, the greater number of ant nests on a site increased the probablity of finding turquoise, and generally, there were more ant nests in the midden area because of the great extent of the middens compared to the house and plaza areas.

On the cautionary side, turquoise is historically known to have been ritually placed on prehistoric sites, a practice still conducted by the Zuni. Nevertheless, its widespread extent on Chacoan sites, its finding in primary excavational contexts, the association of microdebris and jewelry-making tools in and on the sites, and its differential temporal distribution on prehistoric sites indicates that the turquoise examined in this study is in its primary prehistoric setting. None of the turquoise examined on these sites reveal modification by modern tools, although some modern-worked turquoise is associated with shrines on Hosta Butte, a probable Chacoan shrine area.

Turquoise Distribution within the Fajada Gap Community

Aside from the presence of turquoise on these sites, beads broken during drilling were observed on 13 (41 percent) of the 32 sites. Few (three) whole or finished turquoise beads were observed, despite the abundance of turquoise noted on the sites. Turquoise pendant fragments and pendant blanks were also rare with just five pieces noted. Much of the turquoise debris revealed ground facets and part of the parent rock matrix. Several sites within a large A.D. 900s community at the east end of Chaco Canyon, which included an A.D. 900s greathouse (Appendix F), also revealed a similar turquoise distribution. The absence of turquoise on some of these East Chaco sites may be attributed to the scarcity of active ant nests in the site area. Nevertheless, turquoise was recovered from a few eroded, abandoned ant nests, suggesting a turquoise industry was prevalent in the site community.

Turquoise was rare from early Anasazi sites (Windes 1992), including those excavated in Chaco Canyon (Mathien 1981a). Fajada Gap sites occupied just prior to A.D. 925 were almost devoid of turquoise (20 percent of a sample of 11 sites had turquoise), which usually consisted of finished pieces (Table 9.9), but it was common on those occupied after A.D. 950 and during the early A.D. 1000s. A sample of 15 single component sites occupied in the early A.D. 1100s revealed 40 percent with turquoise--a significant decline from earlier periods (Table 9.9). The shift in the selection of turquoise to other materials for ornament production before and after the A.D. 900-early 1000 period seems significant and may mark changes in the socio-economic-religious organization of Chacoan culture (Table 9.10). Sites occupied in the A.D. 1200s appear to contain little turquoise, although they have not been systematically examined.

It was surprising that finished products of turquoise were rarely found at the small houses, although it was difficult to assess the bias caused by people collecting turquoise off the ant hills. Only five pendants and three finished beads were found during the ant nest survey and only five finished beads (two broken) were recovered during the excavations at 29SJ 629, 29SJ 1360 and 29SJ 626 East, despite the presence of dozens broken during manufacture. From the evidence, we can conclude that the primary artifacts produced at A.D. 900s-early A.D. 1000s small houses were turquoise beads and, possibly, small pendants (e.g., about 7 by 5 mm in size). Pieces to be inlaid in jewelry were a rare commodity at these small houses, although they were frequent in greathouse collections. Otherwise, turquoise scrap and unfinished ornaments recovered from the greathouses suggested that beads and small pendants were also produced there.

The overall impression, then, was that during the A.D. 900s and early A.D. 1000s in Chaco Canyon, participation in turquoise jewelry manufacture was universal, or nearly so. The evident abandonment of many of these small houses by the middle of the A.D. 1000s (Windes 1987a:393-402), including 29SJ

Table 9.9. Ornament material on ant nests on Pueblo I and early Pueblo III sites.[a,b]

Site No.	Turquoise Beads	Turquoise Scrap	Turquoise Other	Turquoise Total	Black Stone Beads	White/Gray Stone/shell Beads	Red Stone Beads	Other/ Azurite/ Malachite[b]	Total No. of Nests
A.D. 800-900 (PI):									
29SJ 315	-	-	-	0	-	-	-	1 calcite p.	3
29SJ 622	-	-	-	0	-	-	-	-	?
29SJ 1250	-	-	-	0	-	-	-	-	2
29SJ 2809	-	-	-	0	-	-	-	-	5
29SJ 3006	-	-	-	0	-	-	-	-	6
29SJ 3007	-	-	2 matrix	2	-	-	-	-	4
29SJ 3008	-	-	-	0	-	-	-	-	3
29SJ 3011	-	1	-	1	-	-	-	-	6
29SJ 3016	-	-	-	0	-	-	-	-	6
29SJ 3018	-	-	-	0	-	-	-	-	5
29SJ 3020	-	-	-	0	-	-	-	-	3
Totals	(n = 11)			3	0	0	0	1	43
Mean				0.27	0	0	0	0.09	4.30
A.D. 1100-1140 (PIII):									
29SJ 263	-	-	-	0	-	-	-	1 Ma	2
29SJ 264	1m	-	-	1	-	-	-	-	5
29SJ 722	-	1	-	1	-	-	-	-	6
29SJ 1697	-	-	-	0	2c	-	-	-	5
29SJ 1907	-	-	-	0	1c	-	-	-	1
29SJ 1911	-	-	-	0	-	-	-	-	3
29SJ 1914	-	-	-	0	-	2c,1f	-	-	3
29SJ 1915	-	-	-	0	-	-	-	-	1
29SJ 1916	-	-	-	0	-	-	-	-	1
29SJ 1917	-	1	-	1	1c	2c	-	-	1
29SJ 1918	-	-	-	0	-	4c	-	-	1
29SJ 1920	-	1	1 inlay	2	1f,3c	3c	-	-	4
29SJ 1922	-	-	-	0	-	-	-	1 Az	1
29SJ 1936	-	-	1 disc	1	1c	-	1c	-	1
29SJ 1937	-	1	-	1	-	3c,2f	-	-	2
Totals	(n = 15)			7	9	17	1	2	37
Mean				0.47	0.6	1.13	0.07	0.13	2.47

[a] c = complete, f = fragment, and m = broken during manufacture. Recorded in 1988 and 1989.
[b] Az = azurite, Ma = malachite, and p = pendant.

Table 9.10. Chi-square results of turquoise presence and absence on sites by time period in Chaco Canyon.[a]

Time Period	Turquoise on Sites: Present	Turquoise on Sites: Absent	Site Totals
A.D. 800s	2 (7.2)	9 (3.8)	11
A.D. 900s-early 1000s	30 (21.0)	2 (11.0)	32
A.D. 1100s	6 (9.8)	9 (5.2)	15
Totals	38	20	58

$\chi^2 = 26.5$ Expected < 5 = 1
df = 2 Expected < 1 = 0
p = 0.0000
(Reject H_o)

Time Period	Ornament Material on Sites: Turquoise Only	Non-Turq. Only	Both	None	Site Totals
A.D. 800s	2 (3.4)	1 (1.2)	0 (3.8)	8 (2.7)	11
A.D. 900s-early 1000s	14 (9.9)	1 (3.3)	16 (11.0)	1 (7.7)	32
A.D. 1100s	2 (4.7)	4 (1.6)	4 (5.2)	5 (3.6)	15
Totals	15	6	22	14	58

$\chi^2 = 32.7$ Expected < 5 = 8
df = 6 Expected < 1 = 0
p = 0.00001
(Reject H_o)

[a] Expected values in parentheses.

625, 29SJ 626 East, 29SJ 629, and 29SJ 1360, made it difficult to assess turquoise production during the Classic period between A.D. 1050-1100, when turquoise may have been abundant in greathouses.

Turquoise Distribution in the San Juan Basin

Besides Chaco Canyon, turquoise production debris was also widespread on sites in A.D. 900s and early A.D. 1000s Chacoan communities throughout the southern half of the San Juan Basin (Windes 1992). Communities at Guadalupe (Merrin 1992), Kin Ya'a, Casamero, and Skunk Springs have been systematically examined (Table 9.11), while cursory inspections of sites at Muddy Water, Standing Rock, and Peach Springs (see Marshall et al. 1979; Powers et al. 1983 for community locations) also revealed widespread turquoise debris. Mathien (1984:182) also noted the presence of turquoise at the Andrews Community, near Casamero. Except for the Guadalupe Community, where evidence of white stone bead production also was widespread (Table 9.11; Merrin 1992), bead production utilizing other types of materials besides turquoise were not found. Thus, it appeared that turquoise bead production during the A.D. 900s and early A.D. 1000s, was well-established throughout the southern half of the San Juan Basin.

Turquoise Sources

There were no local sources of turquoise in or around Chaco Canyon or in the San Juan Basin. Therefore, there must have been considerable amounts of the material brought in from elsewhere. Efforts at identifying the Chacoan sources have not been successful (Harbottle and Weigand 1987; Mathien 1981b), but the Cerrillos Mines, near Santa Fe, New Mexico, 185 km to the east of Chaco Canyon, have often been seen as probable candidates for much of the Chacoan turquoise (Harbottle and Weigand 1992:81; Weigand et al. 1977:32). This was strengthened by the discovery of sites near the mines with dominant amounts of Cibola-tradition ceramics, particularly Red Mesa Black-on-white, and quantities of turquoise (Wiseman and Darling 1986). These investigators suggested that the ceramics revealed strong ties to Mt. Taylor, an area with Chacoan outliers and roads leading toward Chaco Canyon.

According to Zuni traditions, sources for turquoise, malachite, and azurite were mined prehistorically in the Zuni Mountains, 91 km south of Chaco (Benedict 1935:Vol. II:202; Ferguson and Hart 1985:49, 127; Hart 1983:7). The Zunis also mined these materials in the White Mountains in eastern Arizona and at Cerrillos, New Mexico, although at times the Rio Grande Pueblos denied them historic access to the latter mines (Bennett 1970:43, 46; Gifford 1940:125; Green 1990:368; Hart 1984:5). Zuni stories refer to turquoise mining near the Zuni Salt Lake, where Turquoise Man lived after leaving the Zuni Mountains (Benedict 1935:Vol. I:30, 44; Hart, personal communication 1992). Finally, Edmund Ladd reported that the Zuni once mined turquoise on Pia Mesa in the Zuni area (Hart 1984:9).

A source of turquoise in the Zuni Mountain region or to the southwest would have a major impact on understanding the socio-economic importance of the rise of turquoise production in Chaco Canyon and the San Juan Basin. It is in the broad valleys just north of the Zuni Mountains and present-day Interstate Highway 40 that Chacoan communities reveal widespread turquoise production. While there is little present knowledge of turquoise sources in the region, the possibility of old mines is not easily dismissed. Because turquoise is formed by near-surface waters percolating through altered igneous or sedimentary rocks in association with copper minerals and calcium phosphate (Northrup 1975:52), it may have come from once-exposed deposits near Mt. Sedgwick. Surficial copper, gold, and silver deposits have been found there (N.M. Bureau of Mines and Mineral Resources 1958) and were mined by the Zunis (Hart 1984:12, 21, 38-39).

Cushing observed extensive evidence of malachite and azurite mining in the area where Zunis, Lagunas, and Acomas had long obtained these minerals for paint (Green 1990:66-89, 366). Cushing also observed sparse amounts of turquoise (Green 1990:89). A U.S. Forest Service survey located one of these mines in association with a Pueblo II house (Garber 1983; Hart 1984:38-39), apparently one visited by Cushing (Green 1990:365-366). Inspection of this site by the author revealed two large shallow pits scattered with malachite and azurite, and a nearby house, both with sparse Cibolan Pueblo II ceramics (Red Mesa and Gallup Black-on-whites). More shallow historic and prehistoric pit mines

Table 9.11. *Ornaments and other materials on ant nests built on early Pueblo II sites (A.D. 900-early A.D. 1000s) in outlying communities in and around the San Juan Basin.*[a]

No.	Turquoise Beads	Turquoise Scrap	Turquoise Pendant	Turquoise Total	Black Stone Beads	White Stone/Shell Beads	Azurite/ Malachite	Ground Red Shale	Total No.of Site Nests
Casamero Area:									
LA 18756	-	3	-	3	-	-	-	-	5
LA 18758	-	1	-	1	2c,2f	-	2 Ma	-	3
LA 18764	-	1	-	1	-	-	1 Az 1 Ma	-	6
LA 18765	-	1	-	1	1f	-	-	-	3
LA 18766	-	1	-	1	1c	-	1 Az 2 Ma	-	4
LA 18768[b]	1m	1	-	2	2c,1f	1c	1 Az 1 Ma	-	6
LA 66030	-	1	-	1	-	-	-	-	3
LA 66031	-	1	-	1	-	-	-	-	4
LA 66051	-	1	-	1	-	1f	1 Ma	-	4
LA 67154	-	-	-	0	-	-		-	2
Total				12	9	2	3 Az 7 Ma	0	40
Mean				1.2	0.9	0.2	0.3 0.7		4.0
Kin Ya'a Area:									
29Mc 122	-	1	-	1	-	-	2 Az	-	13
29Mc 123	1m	3	-	4	-	-	2 Az	1	13
29Mc 125	-	12	-	12	-	-	2 Az	1pm	7
29Mc 129	-	-	-	0	-	1f	-	-	3
29Mc 131[c]	-	1	-	1	-	-	1 Az	-	7
29Mc 132	1m	4	-	5	-	-	-	-	12
29Mc 132 N	-	1	-	1	-	-	-	-	3
29Mc 145	1m	2	-	3	-	-	-	-	4
29Mc 153	-	-	-	0	-	-	-	-	6
29Mc 154	-	4	-	4	-	-		1	7
Total				31	-	1	7 Az	3	75
Mean				3.1		0.1	0.7	0.3	7.5

Table 9.11. (continued)

Site No.	Turquoise Beads	Turquoise Scrap	Turquoise Pendant	Total	Black Stone Beads	White Stone/Shell Beads	Azurite/ Malachite	Ground Red Shale	Total No. of Site Nests
Chaco River Area:									
Casa del Rio (LA 17221)	2c, 3m	33	-	38	6c,1f	4	1 Az	1	8
Guadalupe Ruin Area:[d]									
ENMU 838[e]	-	1	-	1	-	3m	-	-	1
ENMU 839	-	-	-	0	-	-	-	-	1
ENMU 841/3389	-	2	-	2	-	-	-	-	1
ENMU 843	-	8	-	8	-	2c 1s	-	-	6
ENMU 844	1m	8	-	9	-	-	-	-	2
ENMU 846[e]	1m	5	1f	7	-	-	-	-	2
ENMU 848	-	5	-	5	1c	1c 1m	-	-	3
ENMU 851[e]	1m	10	-	11	-	1c, 1f, 4m, 2s	-	-	4
ENMU 852 A	-	13	-	13	-	2f, 1m	-	-	3
ENMU 852 B	-	6	-	6	-	-	-	-	2
ENMU 882[e]	1m	6	-	7	-	1c	-	-	1
ENMU 886	-	-	-	0	-	-	-	-	2
ENMU 3390	-	2	-	2	1c	-	-	-	2
ENMU 3392	-	3	-	3	-	3f, 2m, 2s	-	-	1
ENMU 7108	-	1	-	1	1c	1f	-	-	1
Total				75	3	4c, 7f, 12m, 5s	0	0	34
Mean				5.0	0.2	1.9			2.1

Table 9.11. *(continued)*

Site No.	Turquoise Beads	Turquoise Scrap	Turquoise Pendant	Total	Black Stone Beads	White Stone/Shell Beads	Azurite/ Malachite	Ground Red Shale	Total No. of Site Nests
Skunk Springs Community[f]									
LA 7011	1m	2	-	3	-	1f	-	-	3
LA 7012	2m	2	-	4	-	2c,1f	1 Az	-	6
LA 7013	-	-	-	0	-	-	-	-	2
LA 7016	-	-	-	0	-	1f	-	-	7
LA 7017	1c, 1m	3	-	5	2c	3c	-	-	15
LA 7018	1m	3	-	4	-	3c,1f	-	-	4
LA 7021	-	3	-	3	-	1c	1 Az	1c[g]	3
LA 7022	1c	4	1f	6	-	-	1 Az	-	3
LA 7024	-	1	-	1	-	1c	1 Az	-	2
LA 7025	-	-	-	0	-	-	2 Az	-	6
LA 7035	1m	4	1m	6	-	-	-	-	3
LA 7037	1m	1	-	2	1c	-	1 Az	-	2
Total				34	3	10c,4f	7	1	56
Mean				2.8	0.3	1.3	0.6	0.1	4.7

[a] c = complete, f = fragment, m = broken or unfinished during manufacture, p = pendant, s = scrap. Recorded in 1989, 1990, and 1991.
[b] Multicomponent site with cultural material primarily in the late A.D. 1000s.
[c] Also yielded plastic beads (aqua = 1, blue = 1, red = 5).
[d] About half of turquoise exhibited stone matrix. White bead scrap undercounted.
[e] Multicomponent site with additional occupations in the late A.D. 1000s and A.D. 1200s.
[f] LA 7030, an early A.D. 1100s site, had 17 beads but no turquoise. Likewise, LA 7009, a post A.D. 900s site, had 3 beads and no turquoise. LA 7017-7018 also exhibited some A.D. 1000s ceramics.
[g] A red shale bead.

yielding malachite and azurite were also found scattered nearby. Chrysocolla, a hard blue copper silicate, sometimes mistaken for turquoise, was also present. This mineral was obtained by the Navajo in the 1920s and 1930s from the area (T12N, R14/15W) for making jewelry (Charles Maxwell, U.S. Geological Survey geologist, personal communication to David Love 1991), although none has been identified from Chacoan sites. Another source of chrysocolla, azurite, and malachite close to Chaco Canyon was in the Nacimiento Mountains, near Cuba, New Mexico (Howard 1967:169-170).

The Use of Turquoise

The widespread amounts of turquoise found in Chaco Canyon have caused much speculation as to its final destination. One school of thought believes that it was destined for Mesoamerica because Chacoan and Mesoamerican turquoise may have come from the same source (Harbottle and Weigand 1992; Weigand et al. 1977:22). This exchange remains to be demonstrated, however. If finished turquoise was a medium of exchange, as some have suggested (e.g., Judge 1979, 1989; Rafferty 1990; Tainter and Gillio 1980:108, 112), then we should expect its appearance in societies peripheral to Chaco Canyon, particularly those where contact was evident in other forms of goods (ceramics, lithics, timbers, etc.), where resources may have been obtained, and by roads. Nevertheless, there seemed to be a scarcity of turquoise in those regions that showed close ties with Chaco Canyon in other economic realms, particularly the Kayenta and San Juan/Mesa Verde regions. If there was a turquoise source in the Zuni Mountains, we would expect it to be fairly abundant on sites in the southern periphery on the San Juan Basin, and preliminary research suggested that this is so (Table 9.11).

The ultimate destination of the finished turquoise is unclear. While the small houses are poor in finished turquoise products, the greathouses are not. Additionally, both finished turquoise items and scrap are commonly recovered from ritual contexts: in the kiva pilasters and niches (e.g., Judd 1954; 1959; Hewett 1936; Windes 1987b), in shrines (Hayes and Windes 1975; McKenna and Windes 1975), under roof support beams and great kiva posts (e.g., Windes 1975, field observation 1990), and with burials (Akins 1986; Pepper 1920). The ritual significance of blue and green to native Southwestern cultures is well known and may explain why turquoise jewelry was not used at the small sites, but is common in greathouses and ritual contexts. A major use of turquoise, then, must have been for ritual and ceremony within the Chacoan system, as well as for items of prestige and status.

Non-turquoise Bead Manufacture

Finely-made, small, black and white stone beads, rather than turquoise, were procured by small-house residents for personal and daily use. Tiny black stone beads were common from A.D. 900s sites (Table 9.8). These required equal or greater skills in their manufacture than turquoise because of their tiny size (less than 3 mm diameter) and holes, and the hard material, which sometimes splits along fine bedding planes in the stone. Their frequent presence on ant hills of the A.D. 900s sites, in 29SJ 629 and 29SJ 626 East, and 3,889 found with Burial 2 at 29SJ 1360 (McKenna 1984:289, Figure 5.3) was eloquent testimony of their use by small-house residents in Fajada Gap. Burial 2, in fact, was a woman wearing the heishi necklace at the time of her death (McKenna 1984:355). Another female burial at nearby Bc 59 (Akins 1986:128) also contained a similar heishi necklace. These necklaces also occurred in greathouses (e.g., Hewett 1936).

The lack of bead debris for materials other than turquoise is striking, particularly for those materials that contrast with other native and cultural materials on the Chaco Canyon sites. Despite the popularity of black bead necklaces at the small houses, debris from black stone, bead manufacture has not been found except for a possible single tiny piece, with a partial drill-hole, discovered in 1988 on an ant nest at 29SJ 1362. Black bead debris would be difficult to discover amid the profusion of other tiny black materials that cover the sites in Fajada Gap (e.g., black gravels, flakes of shale, charcoal, etc.), but white and particularly, red materials used for bead manufacture are easily seen.

The present survey of ant nests in Fajada Gap revealed a number of white stone and shell beads, while a large number of white and red beads were recovered from the 29SJ 626 East excavations in 1983. White beads are also fairly common from other excavations in Chaco Canyon (e.g., from nearby Una Vida and Kin Nahasbas) and from the surface of sampled early A.D. 1100s small-house sites (Table 9.9). In fact, Judd (1954:87) maintained that "shell beads were more numerous than turquoise at any Pueblo ruin." Despite the widespread occurrence of these non-turquoise beads and the increased scrutiny of ant nests and 1/16 in. screening, debris from their manufacture has not been detected.

South of Chaco Canyon, near Prewitt, New Mexico, in the Red Mesa Valley, sites contemporary with 29SJ 629 suggested that jewelry other than turquoise was also highly prized and mostly recovered from burials (Sense 1964:88). A burial from one site yielded a 3.7 m-long necklace of black and white beads, and numerous other lignite, red shale, and claystone jewelry items that were thought to have been made locally (Switzer 1970). Five turquoise pendants, however, were part of the necklace that was similar to those recovered from 29SJ 629. Turquoise pendants apparently were made in the Chuska Mountains and the Red Mesa Valley (Chapman 1983; Eck 1982:1123; Sense 1964:90-91), as well as in the Fajada Gap Community. Evidence of red shale, travertine, and turquoise ornament manufacture in the Red Mesa Valley and the Chuskas (Chapman 1983; Eck 1982:1123; Sense 1964:90-91) and white bead debris in the northern Rio Grande region and around Guadalupe Ruin (Merrin 1992) indicated that jewelry manufacturing was widespread. Thus, Chaco Canyon's role as an important place for the regional dispersal of turquoise craft items was unwarranted.

We can deduce from these observations that turquoise jewelry was made at the small-house and greathouse sites in Chaco Canyon, but not non-turquoise jewelry. Non-turquoise jewelry was brought into small houses and worn by the residents, while finished turquoise items were taken out. Although the materials for black, white, and red stone beads and other types of jewelry was locally available, jewelry production of these was either non-local or produced locally by a few craftsmen. Clearly, the value and use of these various materials differed.

The quality of bead manufacture noticeably differs between materials and across time. The black beads made in the A.D. 900s are fine, tiny beads of exquisite workmanship (<3 mm). The turquoise beads from this period are also small and well-made, but not always to the degree of the black ones. By A.D. 1050 and into the early A.D. 1100s, however, beads tend to be large (> 4 mm), indicating less time and skill in their production, and are dominated by white or gray stone, suggesting a resource shift in their production, a change in production area, or a change in societal or religious preference. For instance, large, white beads are particularly common on great kiva floors of this period, including those at Kin Nahasbas, Casa Rinconada, and Chetro Ketl.

Pottery Production

Aside from widespread household production of turquoise jewelry, small-house occupants also may have produced some pottery. Ceramic production has received much scrutiny by investigators of the Chaco Phenomenon, and the issue of ceramic specialization is still debated. It is clear that starting sometime in the late A.D. 900s or early A.D. 1000s, Chuskan wares are imported into Chaco Canyon in increasingly large numbers. The culinary wares reach nearly half of the total culinary vessels used by the late A.D. 1000s and early A.D. 1100s (Toll and McKenna 1987, this volume; Toll 1981, 1985). By this late period, certain forms, like cylindrical jars, have been perceived as products of a few "specialist" potters (Washburn 1980), although close examination of these shows that they are quite diverse and probably not manufactured by a limited few from a small geographical area (Toll 1990). These are mostly associated with a few greathouses, but the cylinder jar fragment found at 29SJ 1360 (McKenna 1984:187, 389) in the Fajada Gap Community makes the dichotomy between greathouse and small-house production and access much less clear.

The lack of prehistoric wood (e.g., Samuels and Betancourt 1982; Windes and Ford 1991) for firing pottery in the Pueblo II-III period may have been a detriment to local pottery production (Toll 1981:93: Warren 1976:55). Nevertheless, there was evidence that local production did occur and probably was fairly widespread. The increasing amount of foreign vessels entering the canyon by the A.D. 1000s argued for a relatively lessened local production, but actual numbers could have remained stable. It was possible, as McKenna and Toll (1984:203-206) have argued, that site production was limited and that the bulk of the items in use were made non-locally.

Evidence of pottery production is limited to unfired lumps of clay and parts of unfired vessels, but firing sites in Chaco Canyon have, thus far, eluded discovery unless it was the highly oxidized ovens found in some sites (Windes 1987b:417, 424). The presence of tools used in pottery making, an unusual diversity of forms, and a relatively low variability in certain attributes of the pottery have suggested on-site production in 29SJ 1360 (McKenna 1984:203), a site contemporary with 29SJ 629. The unfired clay handle recovered from Room 2, the unfired clay pipe from the Kiva (Plate 5.2A), and the unfired, miniature bifurcated-basket effigy from Plaza Other Pit 14 suggest some production at 29SJ 629. Another site contemporary with 29SJ 629, nearby 29SJ 626 East, also yielded an unfired, clay, bifurcated-basket effigy that is a rare and specialized form that previously has only been recovered in Chaco Canyon from the Chacoan greathouses of Pueblo Bonito, Pueblo del Arroyo (Judd 1954:316-320), Talus Unit (Chaco Collections, Artifact C-43128), and Kin Kletso (Chaco Collections, Artifact C-1018).

Lumps of raw clay and coils of clay were also recovered from 29SJ 626 East and may represent potter's materials. In-between 29SJ 629 and 29SJ 626 East was a late Basketmaker III or Pueblo I pithouse site (29SJ 628) that yielded three unfired pipes. Another unfired pipe was recovered from 29SJ 721, a Pueblo I site 2 km down canyon from 29SJ 629. Surprisingly, given its size and amount of materials recovered, 29SJ 627, in the same vicinity, yielded no instances of pottery materials. Nevertheless, the finds in Marcia's Rincon tended to support some local pottery production that occurred at the small sites, particularly for the sites occupied in the early A.D. 1000s and earlier. The few items recovered suggested that local residents made specialized or rare small items but imported the more common and large vessels for daily use. If wood was becoming increasingly scarce, then production of small items would have been much easier given a scarcity of fuel. The contexts of the unfired pieces, however, suggest that small item production was the norm prior to when wood depletion (Samuels and Betancourt 1982) became a problem.

Summary

The role of 29SJ 629 within a larger, contemporary community of large and small sites is important to understand the socio-economic and political dynamics of Chacoan society. This chapter has focused on two aspects of this relationship: defining the Fajada Gap Community and 29SJ 629's place in it, and the extent of community household crafts and their importance in the larger framework of explanatory models of the Chacoan system. In the following section, Chapter 10, the role of 29SJ 629 in a community context and an overview conclude the Volume I report.

10

THE SPADEFOOT TOAD SITE IN COMMUNITY CONTEXT

This chapter summarizes the primary aspects of the Spadefoot Toad Site (29SJ 629) with respect to Chacoan settlement. While a primary objective of the Chaco Project and this report was to present the wealth of information gleaned from excavations at a small-house in Chaco Canyon (Judge 1975), an effort also must be made to integrate these findings into a broader view of Chacoan society, particularly in Chaco Canyon. Studies of the architecture and material culture help to contribute to understanding site processes as well as the role of 29SJ 629 within the surrounding Fajada Gap Community. This community was one of many aggregated settlements of small houses and a greathouse that characterize the rise of Chacoan society in northwestern New Mexico by the A.D. 900s.

Much of our early understanding of small-house Chacoan settlement derived from work outside Chaco Canyon (Gladwin 1945; Roberts 1939) or from extensive work in complex sites near Pueblo Bonito with multiple occupations and extensive remodelings (see McKenna and Truell 1986 for a summary). Despite the extensive work in Chaco Canyon over the past century, only a handful of sites (9 of 71 excavated sites) contained components attributed to the A.D. 900s and 1000s (Truell 1986:Table 2.1), when 29SJ 629 was occupied. The majority were located in the Fajada Gap area, for which there is a growing body of literature for understanding small-house settlement (e.g., Mathien 1991; McKenna 1984; Truell 1992; Vivian 1965). It is these small-house occupations, which coincide with the rise of greathouses and the Early Bonito phase (Lekson 1988; Windes and Ford 1992), that reflect the development of Chacoan communities.

Material culture and architectural attributes have promoted much of the syntheses for modeling Chacoan society, particularly for explaining the dissimilarities between small-house sites and the very large structures known as greathouses. Emphasis upon the role and development of the greathouses had received inordinate attention for explaining the development of the Chacoan system, although greathouses were clearly major components of a larger system. Less work was attempted to examine the small houses within the broader context of a community or regional system linking small and large sites.

Correlates of Material Culture

The Spadefoot Toad Site yielded a wide diversity of cultural materials, approximately 50,000 items (Volume II, Table I.1). Among these were numerous materials related to subsistence activates and tools used for processing, procurement, and craft activities. Generally, these comprised the material culture common to the vast majority of Anasazi households found throughout the Colorado Plateau. Detailed accounts of the artifactual and biological analyses for these materials at the site are found in Volume II, and the interested reader should refer to these for in-depth discussions.

Particularly evident at 29SJ 629 and those small-house sites contemporary with it in Chaco Canyon were large inventories of tools, features, and paleobotanical remains that indicate a reliance on maize horticulture. Manos and metates, or their fragments, and hammerstones, used for the processing of seed foods or for maintenance of the grinding tools, were in ample abundance. In addition, food processing loci, marked by the presence of firepits, metate rests, formal grinding bins, and metate catchment basins comprised many of the recognized activity areas at the site. Also, much of the site architecture--from large, bell-shaped pits to featureless rooms--was created for food storage. Finally, the widepread evidence of maize at the site also attested to its importance for subsistence.

The importance of maize subsistence at the site and in contemporary sites in Chaco Canyon stood in contrast to the earlier Basketmaker III and Pueblo I occupations. This is particularly noteworthy in the numeric contrast of the food processing tool kits (manos, metates, and hammerstones) between the early and later occupations. Although the same tool kits were present during both occupations, their numbers rose dramatically in the A.D. 900s and early 1000s. The difference between the two periods may lie in an increased ability during the later periods to grow greater amounts of food, increased processing and storage efforts, and prolonged site occupations.

Abundant faunal remains at the site marked the importance of wild game procurement. Despite the effects of differential preservation, hunting also must be considered an important subsistence strategy at other contemporary sites. The bulk of meat used by the site inhabitants came from artiodactyls and jack rabbits, followed by lesser quantities of turkeys, prairie dogs, and cottontail rabbits, suggesting reliance on summer hunting strategies (Gillespie, this report). Domestic dogs, perhaps used for hunting, were common at this site and other sites in Fajada Gap. On the other hand, evidence for turkeys was minimal until the latter stages of occupation, and these may have been used primarily for ritual rather than subsistence.

The flaked stone industry at the site also may have reflected the shift from hunting to horticulture by the A.D. 900s. Early sites excavated by the project (McKenna and Truell 1986), which yielded smaller artifact inventories, contained many more formal cutting and scraping tools than later (Pueblo II) sites. Flaked tools at 29SJ 629 and other excavated sites in Fajada Gap were mostly made from expediently used flakes, with little evidence of specialized tool production, except for projectile points. Many of the latter were made of non-local materials and were probably made outside of Chaco Canyon. The high number of points recovered from the Trash Midden suggested that their deposition occurred during the maintenance of hunting equipment when broken points were discarded. The shift in hunting strategies first noted by Akins (1984) during this period also may suggest a heavier reliance on plant foods. Hunting was important, but it was probably eclipsed by horticulture.

Household Craft Production

Much has been written regarding Chacoan ceramic production (e.g., Toll 1981, 1984; Toll and McKenna, 1987, this report; Warren 1976), although it is clear that much of the pottery was increasingly imported into the canyon through time. Some small-house production seems to have occurred but only at 29SJ 1360 is it reasonable to suggest that production exceeded household demands (McKenna and Toll 1984). Other crafts may also have been made for site export--McKenna (1984), for instance, suggests that bone tools may have been such a specialty at 29SJ 1360. Craft specialization at the greathouses may be a major tenet of increased social complexity and hierarchial differentiation between the large and small sites, but it remains to be demonstrated.

The most unusual aspect of 29SJ 629 and the Fajada Gap Community is the widespread evidence of turquoise jewelry manufacture. This predates by a century, earlier estimates of its widespread use in Chaco Canyon during the Classic Bonito phase in the A.D. 1000s. Although better temporal control is needed to precisely identify when turquoise became widespread, it is apparent that it arrived during the rapid increase in small-house sites in the A.D. 900s. Notably, turquoise is extremely rare on house sites dating prior to A.D. 900, and it is often finished products that suggest manufacture elsewhere. From our work at Kin Nahasbas and Una Vida, and on other early sites, it is apparent that early turquoise manufacture took place at the greathouses as well.

Household craft activities at 29SJ 629 were most apparent from the remains of turquoise bead and pendant production. The ubiquitous presence of turquoise and the numerous beads broken during drilling attest to the importance of the jewelry production. Also, tiny perforators made of chipped stone, grooved and flat lapidary abraders, and small files of sandstone associated with the production debris provide a fuller inventory of the production tools associated with jewelry making. The abundance of the remains at the site make it unique among excavated and tested small sites in Chaco Canyon, nevertheless, turquoise and similar tools have been recovered from all the contemporary excavated sites in Fajada Gap (29SJ 625, 29SJ 626 East, 29SJ 627, 29SJ 629, 29SJ 633, and 29SJ 1360), attesting to widespread household production. The nearly universal presence of turquoise on the sites contemporary with 29SJ 629 in the Fajada Gap area, other communities in Chaco Canyon, and throughout the southern half of the San Juan Basin attest to the community and regional ties of turquoise jewelry production within the Chacoan Phenomenon during the A.D. 900s and 1000s.

Of particular interest is the inferred value of turquoise, where at small-houses finished materials apparently were not kept for consumption or personal use. Instead, other materials, specifically, exquisitely made black stone beads, were procured by small house inhabitants that were made elsewhere. The ultimate destination for the turquoise jewelry is unclear, but primary local use in ritual and ceremony is well-documented at greathouses, kivas, and shrines (Neitzel 1989a, 1989b; Mathien 1981a; Windes 1992). By the early A.D. 1100s, this industry seems to be on the decline and probably terminated as a widespread phenomenon with the Chacoan abandonment at about A.D. 1140, unless it shifted south to the Zuni region where it was so prominent later.

More importantly, turquoise ornament production was not limited to Chaco Canyon in the A.D. 900s and early A.D. 1000s but was a southern regional phenomenon with regional economic or religious implications. Its abundance in Chaco Canyon did not make it a center for full-time craft specialization (cf., Kelley and Kelley 1975), nor did it provide an economic "hedge" as a high-valued trade item (Judge 1989; Neitzel 1989a, 1989b; Rafferty 1990; Tainter and Gillio 1980) against subsistence stress.

Widespread contemporary jewelry production along the peripheries of the San Juan Basin, where precipitation and temperatures were more favorable and predictable for growing surplus foods than Chaco (Figure 2.3, Tables 2.2 2.5), does not suggest a trade imbalance in turquoise commodities at communities outside of Chaco Canyon. Its importance along the southern periphery of the San Juan Basin--in the Red Mesa Valley and along the Dutton Plateau--parallels the suggested source and importance of the chalcedonic-tempered pottery recovered in abundance from 29SJ 629 and contemporary excavated sites (Toll and McKenna, this report) that must have been sent to Chaco Canyon.

Although exploitation of turquoise has been argued as a causal factor in Mesoamerican influence in Chaco Canyon (Harbottle and Weigand 1992; Pailes and Whitecotton 1979:118; Weigand et al. 1977:22), its popularity in the San Juan Basin occurred prior to the rise of the Mexican "World Economy" (Mathien 1981a, 1986; McGuire 1980). Furthermore, the popularity of turquoise inlay in Mesoamerica (e.g., Harbottle and Weigand 1992) does not correspond to the material in the Chacoan small sites, which was mainly from bead and small pendant production. Clearly, other explanations for the rise of turquoise must be sought.

The rise of turquoise jewelry production occurred during times favorable for horticulture. The appearance of aggregated small site communities throughout the San Juan Basin, like that in Fajada Gap, and the possibility of unusual levels of surplus foods (Burns 1983; Sebastian 1988) would have increased the complexity of social relationships and levels of decision making (Johnson 1982). Turquoise production could be linked to institutional stimuli for increasing communication and exchange links, as well as for enhancing socio-religious status (for mesoamerican models explaining the rise of exchange and complexity, see Brumfiel and Earle 1987, Flannery 1968, and Pires-Ferreira and Flannery 1976). It is turquoise jewelry production that most clearly illustrates the integration of small and large houses in Chaco Canyon and the San Juan Basin. The mode of production, however, may be classified as a household industry (Kneebone 1990), for distribution beyond the immediate household but not segregated within areas of the larger community as we might expect for specialized production.

While the best of times and food surplus could explain the rise of turquoise jewelry production, droughts, food shortages, and famine must have remained as constant threats (e.g., Burns 1983:250; Sekaquaptewa 1969:40-44). By some models, scarcity, particularly of productive crop land, creates conditions for the development of craft specialists (Arnold 1975; Cook 1982, 1984), but potential scarcity for Chacoans may also have spurred development of a part-time turquoise industry as a means of converting some commodities into non-perishable goods of high value for future emergencies. Given that the primary resources at small sites were devoted to food production, processing, and storage, turquoise crafts must have been part-time activities. If turquoise was mined from sources adjacent to the San Juan Basin, then down-the-line models (Mathien 1986; Renfrew 1975), at least initially, may explain the spread of turquoise in the San Juan Basin. Certainly the direction of its spread, the sources used, and the sphere of conveyance and exchange must all be determined to further understand the role of turquoise in the Chacoan system.

Settlement Patterns

The Rise of Chacoan Communities

The rise of aggregated settlements in Chaco Canyon and the San Juan Basin are critical components to the rise, development, and eventual demise of the Chacoan Bonito phase. The settlement at Fajada Gap, where 29SJ 629 was located, provides a case study of settlement dynamics. Small houses seem to increase dramatically in the A.D. 900s, along with the rise of local greathouses at the major breaks along the Chacra Mesa where major side drainages flow into the Chaco Wash. These clusters suggest greater community interaction and control of farm land than exercised by widely scattered residential units. These must reflect, in part, an adaptive strategy based on resource availability of farm land and runoff associated with akchin farming (e.g., Nabhan 1983).

The maximum population in the Fajada Gap Community, probably in the neighborhood of several hundred people, occurred in the late A.D. 900s and early A.D. 1000s, with another surge in the early A.D. 1100s. Sebastian and Altschul (1986) suggest that the greatest number of sites occurred during the early A.D. 1000s, rather than the A.D. 900s. Nevertheless, it is this period, rather than the Classic Bonito phase in the late A.D. 1000s, that reveals the greatest number of sites throughout Chaco Canyon.

Many of the small houses investigated by the Chaco Project were first built during this period. By the late A.D. 1000s, however, some areas apparently experienced a drop in site frequency, including Fajada Gap. 29SJ 629 and several others of those investigated were abandoned. The decrease is even more noteworthy in the East Chaco Community, where the majority of small houses were abandoned.

The Pueblo Bonito and South Gap area represent another large Pueblo II small-house occupation within Chaco Canyon, but our knowledge of it is minimal. No pristine Pueblo II small houses have been excavated there that have not been extensively remodeled, reoccupied, or built over by later groups, for instance, the historically important houses of Bc 50, Bc 51, and Bc 59. Unfortunately, excavation in these complex and temporally confusing sites (e.g., Brand et al. 1937; Dutton 1938; Kluckhohn and Reiter 1939; Roberts 1940; Voll 1964) form the basis for some early models interpreting Chaco Canyon small-house occupation, which was distorted by the veneer of the later A.D. 1100s occupation. Nevertheless, South Gap and the Pueblo Bonito area seem to be heavily occupied in the A.D. 1000s and early 1100s (Lekson 1988), perhaps at the expense of other areas.

Small House Residential Units

Predicting the number of family residential units from the frequency of the back-storage rooms is difficult if multiple site-unit patterns exist (i.e., Gorman and Childs 1981). Based on our excavations, two types of surface room suites may have existed. One suite follows the well-known Pueblo I household pattern of a living room connected to one to two storage rooms (e.g., Kane 1986:57, 1988:19-20, Figure 1.6). Space allocated to these two types of rooms typically are about equal or with more space allocated to the living space (e.g., Hayes and Lancaster 1975; Lipe and Kohler 1988:Figure 1.2; McKenna 1986:Figure 1.15). This type of arrangement is characterized by 29SJ 627 (McKenna 1986:Figure 1.18), where living and storage rooms were paired together. This pattern is evident at all the other A.D. 900s small houses excavated, but some also exhibit storage rooms not directly connected to living rooms. At 29SJ 629, these rooms probably initially were used for food storage, but near the end of their use they may have served as loci for jewelry production. The excavated sample of sites, however, is woefully inadequate to be certain if this pattern is widespread.

Nevertheless, the differences are worth pursuing because of the possibility that it represents different kinds of small sites which shared a continuity of function with the contemporary greathouses. If these extraneous storage rooms in some of the small houses are, in fact, "extra" additions not needed for the daily requirements of family households, then they might have had direct parallels with the oversupply of empty, featureless storage rooms found in the greathouses that also are not directly linked to the site residential quarters (Windes 1987a).

The last use of the "extra" storage rooms at 29SJ 629 revealed differences from the storage rooms attached directly to the living rooms. Palynological and macro- and micro-botanical remains (Cully 1985; M. Toll, this report) revealed a high frequency and diversity of economic plant remains in the residential suite storage rooms, particularly for corn. In contrast, the "extra" rooms at 29SJ 629 revealed a paucity of economic ethnobotanical remains that were dominated, instead, by wind-blown, non-economic flora or those that probably derived from roof construction. Artifacts were also sparse in comparison with those from the residential storage rooms. This dichotomy was even greater at Pueblo Alto (Cully 1985:220-221; M. Toll 1987) for the respective types of storage rooms. It must be remembered, however, that at 29SJ 629, at least, the "extra" rooms formed the original core storage rooms at the site before formal residential surface occupation took place, so that these rooms are presumed to have shifted function once the residential suites were built.

The dearth of economic plant remains from the "extra" rooms at 29SJ 629 was compensated for by the presence of turquoise manufacturing debris and tools in the rooms. This debris must be related to similar activities in the adjacent plaza and Pithouse 2. Evidence was found for similar activities at 29SJ 626 East (Windes 1983 field notes), the greathouses of Kin Nahasbas (Mathien and Windes 1989), and Pueblo Alto (Mathien 1987; Windes 1987b), but they could not be pinpointed to a particular locus. Interestingly, at Pueblo Alto, the debris was found outside the big-room suites, which are comparable to the "extra" rooms at 29SJ 629 and 29SJ 626 East, although the association may be only fortuitous. In summary, then, storage rooms connected to living rooms appeared to have been used for food storage. The function of the remaining storage rooms was unclear, but in some cases these were used for craft activities or for the storage of craft equipment.

What is clear is that sites 29SJ 625, 29SJ 626 East, and 29SJ 629 are small and reveal considerable homogeneity in layout and occupational duration. Two coeval habitation rooms and dual mealing basin loci, associated with different areas of the site, indicate that 29SJ 629 was occupied by two families or residential units. The living rooms appear late in the occupation (late A.D. 900s), although we may be seeing the shift from primary residence in Pithouse 2 to additional living space on the surface.

Due to spatial proximity and other similarities (e.g., site layouts, common material culture sources, ornament manufacture, common proximity to arable land), these families may have been integrated into a larger group consisting of 14-18 house groups within the Fajada Gap Community, which included the public community structures of Una Vida and Kin Nahasbas.

Participation in the Marcia's Rincon Subcommunity, as part of a specialized task group associated with the entire Fajada Gap Community, is suggested by 29SJ 629's small size, evidence of jewelry production, and its unusual, but perhaps skewed, young male burial population. Excavation suggests the site underwent changes throughout its occupation, shifting from a seasonal or intermittent, horticultural-based residence in the early or mid-A.D. 900s, to a relatively permanent occupation. Specialized craft activities commenced in the late 900s/early A.D. 1000s, and the site became a place of non-residence, ceremony, and storage in the early A.D. 1100s.

Although it is difficult to ascertain occupational permanence at 29SJ 629 and other contemporary excavated sites, a pattern of dispersal and aggregation probably has always marked Anasazi use of the San Juan Basin and Chaco Canyon. Certainly the eastern siting of many houses, including 29SJ 629, favors warm-weather occupation rather than yearlong occupation. When the aboveground living rooms were added in the late A.D. 900s at 29SJ 629, however, they were located for southward passive solar advantages, suggesting yearly permanency. Likewise, at 29SJ 1360, the eastern roomblock faced in both a southern and eastern direction, suggesting that both warm weather and yearlong occupancy had also occurred as alternative occupancy strategies. Thus, although a house might have been built with one kind of occupation in mind, a shift in occupant permanency could be reflected in subtle changes in construction in the original building rather than investment in a new house.

The North-South Canyon Dichotomy of Settlement and the Importance of Maize Horticulture

Explanatory models have stressed the differences in house size and location as important to rising social complexity because of localized, physiographic advantages for horticulture (e.g., Sebastian 1988; Vivian 1990). Indeed, there is considerable debate whether small and large sites are part of the same, complex system or part of two divergent systems (e.g., Irwin-Williams 1980; Judge 1979, 1989; Kluckhohn 1939; Sebastian 1988; Vivian 1970a, 1990).

During the A.D. 900s, the San Juan Basin sites often clustered in areas where multiple drainages came together, creating ideal locales for akchin farming. We do not know if every house cluster in the A.D. 900s and early 1000s contained both small and large houses, but what we do know suggests that it was typical for both to be present.

It is of considerable interest, then, that the dense Pueblo II occupations in Chaco Canyon were each in close proximity to very early Chacoan greathouses (Pueblo Bonito, Una Vida, and the East Chaco greathouse) and may have developed from in-situ small houses (Windes and Ford 1992). While Una Vida and nearby Kin Nahasbas may have provided considerable continuity to our work in Marcia's Rincon, we failed to anticipate early-on the possibility of excavations there to answer many questions about social and political integration of the nearby small houses. Some work at Una Vida (Akins and Gillespie 1979) and Kin Nahasbas (Mathien and Windes 1989) was done later, but it was not specifically designed to increase our understanding of the role of greathouses in the Fajada Gap Community.

It is true that the majority of greathouses were built along the north side of Chaco Canyon, but during the initial rise of aggregated settlements this dichotomy was not pronounced. The physiography of Chaco Canyon did allow a range of distinct local environmental advantages, but, at best, only half of the early greathouses were built to take advantage of them. Thus, the first greathouses were built in a variety of settings without emphasis to a particular physiographical location. Most of those in the San Juan Basin, including the East Chaco Community greathouse (Appendix F), were built among the clustered small houses.

The East Chaco greathouse could have easily been built on the north side of the canyon, but the location was rejected in favor of other conditions afforded by south-side occupancy. Perhaps the view was a critical factor because the greathouse's elevated position allows considerable line-of-sight within the canyon, not only to its neighboring small sites and a shrine, but also of traffic along the prehistoric roads presumed to have run along the canyon bottom. These same advantages also may have dictated the placement of Kin Nahasbas in the Fajada Gap Community (Mathien and Windes 1989).

Soils and topography within Chaco Canyon undoubtedly were suitable for run-off horticulture during the wetter climatic regimes (Chapter 2). It is expected that the primary fields for house residents in the Fajada Gap Community were located nearby between the ridges and along the Fajada Wash, although more scattered plots may have been utilized along the dunes and drainages leading south from the south sides of Chacra Mesa and its remnants (Cully 1986). Land distribution practices are unknown, although if canals were located adjacent to Fajada Wash, as site 29SJ 2044 suggests, then some community control and maintenance of it was probable.

The drainages in close proximity of the sites would seem to be logical choices for flood-water horticulture; thus, convenient for group use and ownership. For the inhabitants of Marcia's Rincon, the moderately deep, east-west rincon and large sand dune just to the north/northwest of the community (Figure 9.6) must be considered the prime field areas. Remote sensing and extensive testing to discover ditch systems, water control systems, and field areas are necessary, however, to establish the true nature of these areas to better interpret the kind of land tenure.

At present we know little of the microenvironmental differences in Chaco Canyon, although it seems highly varied. Ditches or canals fed from shower runoff, for instance, are not technologically advantageous during dry periods when runoff is reduced. Precipitation during the dry 1960s and 1970s, for example (Table 2.1), would have seldom caused any ditches to run or water to be impounded. It is true that dams, then as now, located along the major run-off areas, could have held limited volumes of water to be released during drier periods, but these are suitable for both sides of the canyon. These could not have retained water over long dry spells, however, particularly in view of the high evaporation rates in the San Juan Basin. The A.D. 900s canal extending down Gallo Canyon past Una Vida and Kin Nahasbas (Gwinn Vivian, personal communication 1987) suggests that technology and knowledge were available from the initial beginnings of the Fajada Gap Community and that water was plentiful enough to make the canal viable. Likewise, a similar system is expected fo the Fajada Wash, where 29SJ 2044 may have been part of a system of water-control.

There are physiographic advantages for horticulture on both sides of Chaco Canyon. These advantages are conditioned by the shifting seasonal direction of the sun against the cliffs, which causes great local variability in the length of the frost-free season. Furthermore, the cliffs possess passive solar energy advantages for houses and crops situated near them, and they affect local weather dynamics. The amount of summer rains, direction of summer storm movement, and the amount of storm run-off are all affected by the cliff and mesa topography. Finally, the local ridge and canyon topography are also critical variables affecting the length of the frost-free season and successful horticulture.

There was probably widespread knowledge in the San Juan Basin of the different environmental niches in which to grow a variety of economic plants, much like the Hopi possess for their region. In the A.D. 900s, all these were probably used. The small rincons located along the north side of the canyon and adjacent to the canals, for instance, may have supported crops unsuitable for growth in the open areas along the south side, and vice versa. Future research to identify these potential areas and the types of economic plants that could grow in them is needed.

Overwhelming evidence attests to the importance of maize horticulture for subsistence strategies in Chaco Canyon. Evidence of maize was widespread within the excavated small sites, as were tools for its processing, and rooms and pits for its storage. But the increase in site density in the Fajada Gap Community may be attributed to the favorable environmental conditions of the A.D. 900s that allowed farming of marginal areas and the growth of surplus food that was seldom possible for lengthy periods in the prior centuries.

Rose et al. (1982) predicted yearly precipitation levels after A.D. 900 for the San Juan Basin and found that the A.D. 900s was one the wettest centuries up until modern times. Using this data, Sebastian (1988:Figure 5a) predicted corn yields that showed several periods of excessive food surplus in the A.D. 900s. These yields would have exceeded storage capabilities in the small houses and must be considered community surplus. Wet times would have allowed expanded occupancy of Chaco Canyon in an otherwise marginal area for horticulture. While it is not clear for the Fajada Gap Community or other communities within Chaco Culture National Historical Park, the settlement at the East Chaco Community (Appendix F), where prior settlement was lacking, was clearly begun by immigrants during this wet period. The time depth noted at many Chacoan communities, may, in fact, be related to reoccurring occupancies during good times followed by abandonment, rather than one of continual settlement. If the former strategy was operative, we need to look at Chacoan communities as a regional phenomenon rather than a unique development that began in Chaco Canyon and was ancestral to communities outside of the canyon (e.g., Breternitz et al. 1982; Warburton and Graves 1992).

Instead of differential control of lands by residents of the contrasting house types (Judge et al. 1981; Sebastian 1988; Vivian 1984, 1990), the location of houses may reflect more pragmatic decisions related to house function, availability of unoccupied lands for horticulture, occupation duration, line-of-site communications, and solar energy-passive heating systems utilizing the tall cliffs. Communities probably exercised all available options to procure successful horticulture and these resulted in a variety of early hydraulic structures to divert and capture water on both sides of the canyon during abnormally wet periods.

Small House Abandonments

Based on the excavation results in Marcia's Rincon and at 29SJ 1360 under Fajada Butte, many of the Fajada Gap Community sites were abandoned in the early A.D. 1000s. There is some basis to believe that occupation continued into the Classic Bonito phase, particularly between A.D. 1050 and 1100 when many researchers believe that the Chaco Phenomenon was at its peak. But this occupation is confined to fewer houses in the Fajada Gap area than those occupied in the A.D. 900s and the early A.D. 1000s. In Marcia's Rincon and at Fajada Butte, only 29SJ 627 of the five Pueblo II houses excavated may have been occupied into the late A.D. 1000s--the others were abandoned in the early A.D. 1000s, which suggests major canyon-wide shifts in occupation. Although the later houses are fewer, they are slightly larger than the earlier houses (Table 9.6), but not significantly. They were not, however, large enough to account for the larger population of the A.D. 900s/early A.D. 1000s.

Based on our excavations, abandonment appeared finalized by deliberate destruction of the household ceramic assemblages, particularly of culinary ware. At 29SJ 626 (East), 29SJ 629, and 29SJ 1360, at least, the stylistically latest cooking jars were left smashed in the primary pitstructure's firepit (e.g., McKenna 1984:Figures 3.4-3.5; Toll and McKenna, this report). These jars contrasted with the bulk of the older style neckbanded and neck indented corrugated jars since they were overall indented, corrugated styles made in the Chuska Mountain region. Temporally, the initial appearance of these jars in Chaco Canyon occurred at about A.D. 1030 to 1040 (Toll and McKenna, this report; Windes 1987a:247). Because they were heavily sooted, the majority of these culinary vessels suggest use as cooking containers. The destruction of these, which must have formed a large part of the total household inventory, may have signaled permanent abandonment.

If abandonment had been part of the seasonal pattern, we might have expected the house to have been sealed and much of the household equipment stored. Instead, the sooted, fragile, and old cooking vessels, in particular, were considered expendable and were broken in some sort of ritual. Newer metates and intact whiteware vessels must have been more prized, for these were seldom left in the sites. Thus, while abandonment may have seemed leisurely and noncatastrophic, the similar destruction of cooking vessels, removal of valued goods at the sites, and the possible burning of structures suggests that return was considered unlikely.

The timing of these abandonments are, by archeological standards, coeval and coincide with a shift to low-frequency environmental variability and longer, drier periods (Figure 2.2). The simulated crop reconstructions by year, between A.D. 652 and 1968, developed by Burns (1983) for the Four Corners region, allow assessment of agricultural good and bad times. For instance, the suggested abandonment of many small houses in the early A.D. 1000s suggested by recent archeological work in the Fajada Gap Community, including 29SJ 629, may be explained by bad times. Burns (1983:198, 222) and Sebastian (1988:Figure 5) identified the early A.D. 1000s (between about A.D. 990 and 1040 depending on storage capabilities) as one of severe or prolonged famine, when population settlement must have been affected.

29SJ 629 appears to have been unused for a period of time and then reoccupied in the early A.D. 1100s when a long, very moist climatic regime appeared between about A.D. 1112 and 1118, and potential food surpluses exceeded domestic needs (Burns 1983; Sebastian 1988). Many new houses were built and others reoccupied in the Pueblo Bonito area. Except for the Kiva, however, there was little recognizable cultural material to mark activities and use of 29SJ 629 during this latest boom time. The early A.D. 1100s occupation at 29SJ 627 was also limited, while 29SJ 625, 29SJ 626 (East), and 29SJ 1360 did not reveal reoccupation.

The many instances of early A.D. 1100s houses built next to or over the early houses in the Fajada Gap and East Chaco Communities also suggests that widespread abandonment of small houses occurred between the early A.D. 1000s and 1100. None of the houses excavated revealed an A.D. 1200s Mesa Verdean occupation, except for nearby 29SJ 633 in Marcia's Rincon. Nevertheless, the very late A.D. 1200s occupation seems to have been widespread in Chaco Canyon (e.g., McKenna 1992; Windes 1987a:397-405) and was particularly prevalent over the early houses in the East Chaco Community.

Concluding Remarks

Primary tasks identified at 29SJ 629 reflected an emphasis on food processing and storage, along with jewelry production. The similar types of houses encountered throughout the Fajada Gap Community and the common presence of ground stone implements (mano and metate fragments) also indicate that food processing and storage were common to the majority, if not all, of the community's small houses.

29SJ 629 was representative of the influx of sites that appeared in large numbers in Chaco Canyon and throughout the southern half of the San Juan Basin in the A.D. 900s. While some sites suggest origins from earlier occupations, there does not seem to be a large enough local population to account for the dramatic rise in house numbers in Chaco Canyon from intrinsic growth, at least, in the A.D. 900s. At the East Community, in particular, almost no earlier Anasazi occupations have been noted in the area prior to A.D. 900. Small Pueblo I sites occupied in the A.D. 700s and 800s are scattered throughout Chaco Canyon and in the middle of the San Juan Basin just south of the canyon but seemingly not in numbers to account for the rise of the several A.D. 900s communities in the canyon. Even more dramatic than the rise in house numbers is the intensity of the A.D. 900s occupation, which typically yields high densities of midden artifacts, in contrast to the earlier period. Thus, either sites were occupied longer than previously or there were relatively more material goods or both.

The stimulus for the in-migration into Chaco Canyon, a marginal area, is suggested by the Plog et al. (1988:254-261, Figures 8.2-8.3) models that explain rapid population increases due to "range expansion" and high mobility facilitated by rising water tables, aggradation, and high effective moisture that characterized the A.D. 900s in the San Juan Basin, a link also observed for periods of aggregation in the Mesa Verde area (Orcutt 1987; Orcutt et al. 1990). In other words, the wetter A.D. 900s that followed the drier A.D. 800s (Dean and Robinson 1977; Plog et al. 1988; Rose et al. 1982) allowed large-scale occupations in marginal areas that were not possible earlier.

These shifts accelerate experimentation, change, and adjustments (Cordell 1982:75). While population size alone is not a reliable indicator of complexity (Powell 1988:189), territoriality (e.g., Plog et al. 1988:272), created by population pressures on the best-watered lands, would have favored development of new decision-making strategies to lessen potential conflicts. The development of public and community structures (i.e., greathouses, great kivas, shrines, stone circles, isolated elevated kivas, etc.) to integrate community households followed previous Anasazi patterns. Also, the presumed intense use of land adjacent to the communities, where major side tributaries and watersheds drain into the Chaco Wash, was the focus of community development in the A.D. 900s (Judge et al. 1981). It spurred the creation and use of water control systems that would have been far more effective during the wetter A.D. 900s (Figure 2.4), when moisture was more reliable and available, than during the environmentally turbulent A.D. 1000s. A large labor pool may be needed near a water collection and distribution system for its efficient use and maintenance to justify the investment (Athens 1977:365; Geertz 1963:322), although it can be argued that such a water control system does not necessarily require many people (Lagasse et al. 1984:207). Nevertheless, the key to increased moisture is the potential for producing food surpluses to support large-scale community efforts--such as the construction of public structures.

Communities located in areas of maximum precipitation diversity in Chaco Canyon in the A.D. 900s may have been self-sufficient and not forced into bartering turquoise (Judge 1979; 1989:235-240), for example, to obtain food or to forge alliances to facilitate information exchange (Cordell 1982:80-81) and intermarriage (Plog 1980:136). Of course, the size of the resident population in greathouses is critical to invoking models of stress from over-population pressures, resource depletion, and food shortages, particularly if they were packed with residents. If the greathouses were staffed by small groups, however, then community sizes probably did not exceed more than a few hundred individuals each and societies could have operated on a less complex level.

Greathouses are an enigma if viewed as major centers of food production during bad times when canals supplied from runoff waters would have been inadequate. Instead, crop surpluses during the A.D. 900s and early A.D. 1000s (Burns 1983; Sebastian 1988:Figures 4 and 5a) could have been pooled in central storage facilities at the greathouses under resident caretakers (Judge et al. 1981), particularly if the population was mobile and seasonal or intermittent. This storage strategy may have had parallels in the earlier Basketmaker III period in Chaco Canyon (Wills and Windes 1989), another period of potentially high mobility (Plog et al. 1988).

Aggregation, as in the Fajada Gap Community settlement and the eastern end of the canyon, did not arise during times of environmental stress (e.g., Adler 1990; Altschul 1978) but during good times when imbalances between population and the carrying capacity of the land and other resources were minimal (Orcutt et al. 1990).

By the A.D. 1000s, all ecological niches may have been filled by people in the San Juan Basin, reducing the option of mobility (Cordell 1979:102; Judge et al. 1981) and thus, creating population stress and resource depletion. But, we cannot be sure that this was true, particularly if multiple residences were in use by a mobile people employing a mixture of subsistence strategies (e.g., Plog and Powell 1984; Powell 1983; Upham 1984:238). Reduced mobility, then, as a primary factor in the socio-political development of Chacoan communities, remains to be demonstrated.

Community development incorporating both small houses and greathouses is evidence against the rise of separate but coeval social systems within the same communities (Vivian 1989, 1990), as well as centralized power and control invested in groups inhabiting spatially distinct, architecturally contrasting houses in Chaco Canyon (Grebinger 1973; Judge et al. 1981; Sebastian 1988). Small-house communities and their attendant public buildings apparently began simultaneously, suggesting common origins. Communities that rose during the Early Bonito phase (A.D. 900s) were not restricted to Chaco Canyon, however, but were a widespread phenomenon throughout the southern half of the San Juan Basin, particularly along its peripheries (Windes and Ford 1992), as well as throughout the Colorado Plateau.

While the Fajada Gap excavations suggest a depopulation in the early A.D. 1000s in Chaco Canyon, this depopulation does not infer collapse of the Chacoan system. As Vivian (1989:248) suggests, evidence for technological and social adjustments was to be expected during major changes in the environment. It is during the A.D. 1000s that evidence for sociopolitical complexity is particularly evident (Sebastian 1988) when massive building projects, unusual and specialized structures, and large numbers of great kivas begin to appear.

More dramatic evidence provided by Burn's reconstructions suggest that surplus, early community development, and greathouse construction were linked. In the Four Corners area, the second largest surplus since A.D. 652 occurred between A.D. 1050 and 1065 (Burns 1983:271, 274; Sebastian 1988:Figure 5). At the time, it was an unprecedented period of potential surplus--and in Chaco Canyon, a period that yielded several massive greathouse construction projects (Lekson 1984) of storage rooms, mainly in "downtown" Chaco in the Pueblo Bonito area.

Events in the small sites do not mirror this increase in social energy, however, unless it was in the area of Pueblo Bonito where population seems to have coalesced. But for much of the small-house population, it seems that residential bases shifted out of the canyon, as they had done in prior centuries (see Schlanger 1988 for other examples). It is also during the mid-A.D. 1000s that great kivas became prolific in Chaco Canyon. These have been attributed as centers of distribution under some leadership models, but they appear absent during the A.D. 900s and early 1000s, with the exception of one at Kin Nahasbas. Clearly, the period around A.D. 1050 in Chaco Canyon saw important changes to the structuring of Chacoan society (e.g.,Toll 1985, Windes 1987a). The effects of famine and unprecedented food harvests--record events that occurred in the A.D. 1000s--could have stimulated the need for greater storage facilities in the public structures in the mid-A.D. 1000s. As suggested by the Plog et al. (1988:270) model, the increase in storage facilities were to alleviate periods of expected shortages experienced in the previous decades. The more food that could be stored, the greater ability to lessen or eliminate periods of famine (Burns 1983).

Continued study of small-house occupations and community development is necessary for an understanding of the Chacoan system. The pattern of land use, environmental studies, and the relationship between small and large houses must also be pursued to further unravel the complexities of the Chacoan story. Research at the Spadefoot Toad Site provides a new understanding of small sites in Chaco Canyon and adds to the growing literature of studies on Chacoan communities (e.g., Breternitz and Doyel 1987; Fowler et al. 1987; Irwin-Williams and Baker 1991; Marshall et al. 1979; Powers et al. 1983; Stein and McKenna 1988). Finally, studies need to continue to focus on horticultural methods in the canyon and the affects of famine and crop surpluses as critical variables in understanding Chacoan social and political dynamics.

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APPENDIX A

CARTRIDGES FROM 29SJ 629

Scott P. Berger[a]

The six cartridges recovered from 29SJ 629 in 1975 (Table A.1) were probably used after World War II by one or two parties of shooters. The .45s form two distinct batches by manufacturer and chamber marks, thus suggesting that at least two persons fired them on the site. Those made by the Western Cartridge Company ("45 WCF") were produced under contract to the U.S. Government in 1941, but large quantities were released to the general public in the 1950s until 1975. All appeared to have been fired in the same firearm, probably a Colt Model 1911, .45 Automatic pistol or its copy,

Table A.1. Cartridge cases from 29SJ 629.

Provenience	Type	Date of Manufacture	Manufacturer
Grid 15, surface	.45 Colt automatic	1941	Western Cartridge Company
Grid 16, surface	.45 Colt automatic	1941	Frankford Arsenal, Philadelphia
Grid 16, surface	.45 Colt automatic	1941	Frankford Arsenal, Philadelphia
Grid 19, surface	.45 Colt automatic	1941	Western Cartridge Company
Grid 22, surface	.45 Colt automatic	1941	Western Cartridge Company
Grid 8, surface	.410/12mm/high velocity	1877-present	Peters Cartridge Company, Cincinnati

since there is a shallow cannelure but no half-moon clip marks. A similar shell was recovered from nearby 29SJ 626 on the east midden and another came from Pueblo Alto's East Ruin (Room 4).

Those produced at the Frankford Arsenal were produced by the U.S Government in 1941 with copper-mercuric primers (nickel or brass colored) that leave a highly corrosive residue within the casing and sometimes a distinctive mark around the outer edge of the primer pockets. These cartridges were probably sold to the general public as surplus after World War II or the Korean War. Both types reveal similar firing-pin marks and were also fired in a .45 automatic pistol. The Frankford cartridges, however, reveal case-mouth creasing or denting from when the spent cartridge was caught in the firearm's action or twisted against the ejection slide.

The shotgun cartridge may represent a separate event. Many of these shells were stamped "12 mm" for European export or for use by Europeans in this country for trap and skeet shooting as well as hunting with European guns. Several American companies made shotguns in the 1930s and 1940s that used these shorter cartridges. Because this cartridge is stamped "High Velocity" (H.V.), it probably postdates the 1940s, although this type of cartridge was sold between 1934 and 1964. Its physical condition, however, suggests that it is more recent, perhaps from the 1950s or 1960s.

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[a]Senior Environmental Scientist, Public Service Company of New Mexico. Notes and identifications made in 1980 and 1988.

APPENDIX B

CORRELATION OF CHACO PROJECT AND LABORATORY OF ANTHROPOLOGY SITE NUMBERS

29SJ No.	LA. No.	Site Name	29SJ No.	LA. No.	Site Name
292	40292		1260	41260	
298	40298		1272	41272	
299	40299		1278	41278	
315	40315		1360	41360	
391	143	Una Vida	1361	41361	
392	152	Kin Nahasbas	1362	41362	
409	40409		1681	41681	
589	40589		1682	41682	
622	40622		2772	52772	
625	40625	3-C Site	2773	52773	
626	40626		2774	52774	
627	40627		2786	52786	
629	40629	Spadefoot Toad	2809	52809	
630	40630		3006	72233	
631	40631		3007	72234	
633	40633	Eleventh Hour	3008	72235	
634	40634		3009	72236	
638	40638		3010	72237	
721	40721		3011	72238	
724	40724		3013	72240	
1242	41242		3014	72241	
1247	41247		3015	72242	
1248	41248		3016	72243	
1250	41250		3017	72244	
1251	41251		3018	72245	
1253	41253		3019	72246	
1254	41254		3020	72247	
1258	41258		3021	72248	
1259	41259		29Mc 184	40081	

APPENDIX C

DENSITY SAMPLING

Density samples at the Spadefoot Toad Site (29SJ 629) evolved from a desire for better quantification of fill materials to control for differential processes and prehistoric behavior regrading trash disposition (Schiffer 1972, 1976). Initial experimentation at the site in 1976 became the impetus for some of the new approaches conducted at Pueblo Alto (Windes 1987). A dramatic increase in archeologists for the excavations at 29SJ 629 in 1976, as we readied the assault on Pueblo Alto, brewed experimentation and independent studies that in the past project excavations were not possible in the field. We explored several approaches to measure the density of the materials recovered in trash deposits, particularly materials of sand, stone, and charcoal, that are often discarded during southwestern excavations.

The size of bulk samples cut from the sides of profiles in trash deposits dominated problems of the initial sampling. Our original samples, 30 by 30 by 30 cm, were so large and heavy that we had great difficulty in removing and processing the samples. Wet and dry processing was tried with wet and dry screens through screen meshes of 1/2, 1/4, 1/8, and 1/16 in., again a formidable task (Tables C.1-C.2). The effort to retrieve and screen these large samples was too time consuming, so we switched to 1-liter samples using 1 pound coffee cans. This switch allowed comparability with the ethnobotanical samples being collected for pollen and flotation analyses (see Cully 1985; M. Toll, this report).

Because firepit deposits of ash and charcoal were primary constituents of household trash deposits, charcoal fleck density provided a quick, across-the-site numeric comparison of trash density. If nothing else, at least some gross idea of charcoal density can be obtained that is not possible for other, unexcavated cultural materials in profile. Frequencies of charcoal, stone, and calcium carbonate nodules within 10-by-10-cm squares (one or more) placed along the profile faces of natural units of unexcavated balks provided the numeric data. This method, begun at 29SJ 629, was widely used at Pueblo Alto (Windes 1987:Table 8.4) and adds to the descriptive base for depositional units.

Examination of the tables will reveal a disproportionate amount of stone and clay detritus in the dry samples that was much lower for the same units when wet screened (Table C.2). This discrepancy can be attributed to the dissolution of the harder materials during wet screening. Although dry screening was more practical over the long run for on-site screening, wet screening was more reliable in retrieving artifactual samples, as Peter McKenna demonstrated for the Trash Mound materials at Pueblo Alto (Windes 1987:567).

Our early efforts at 29SJ 629 to quantify cultural material densities seemed to support our empirical field observations (Table C.3). The fill in Room 6 was essentially sterile deposits, being composed primarily of wall and roof fall and postoccupational sands. The uppermost deposition in Pithouse 2, composed of alluvial sands, was also nearly devoid of cultural material. Notable differences were recorded for the trash units, however. Cultural materials, including charcoal, were noticeably present in the trash-filled Pithouse 3 deposits, but sparse compared

Table C.1. Density sample concentrations from 29SJ 629 (wet screened).[a]

		Frequency						Weight (g)		
Provenience	Screen Wet/Dry	Sherds	Chipped Stones	Bones	Eggshell	Turquoise	Snails	Charcoal	Stone	Cultural Material[b]
Room 6, Level 1	1/2 W	1	1	-	-	-	-	-	2,029.9	T
	1/4 W	-	-	1	-	-	-	-	249.7	T
	1/8 W	1	1	-	-	-	-	0.2	284.4	T
	1/16 W	1	1	1	-	-	-	0.5	247.0	T
Room 6, Level 2	1/2 W	-	-	-	-	-	-	-	3,798.2	T
	1/4 W	-	-	-	-	-	-	-	?	T
	1/8 W	-	-	-	-	-	-	0.8	210.0	T
	1/16 W	-	1	1	-	-	-	1.3	242.2	T
Pithouse 2, Layer 1	1/2 W	-	-	-	-	-	-	-	24.7	T
	1/4 W	-	-	-	-	-	-	-	38.7	T
	1/8 W	-	1	1	-	-	-	0.4	171.0	T
	1/16 W	1	4	15	-	1	-	0.8	174.1	T
Pithouse 3, Layer 1	1/2 W	-	-	-	-	-	-	-	1,324.9	T
	1/4 W	1	-	-	-	-	-	-	83.0	0.1
	1/8 W	-	-	2	1	-	-	2.1	109.0	0.2
	1/16 W	-	11	25	2	4	-	6.8	168.5	0.4
Pithouse 3, Layer 2	1/2 W	3	1	1	-	-	-	-	1,438.0	647.5[c]
	1/4 W	-	-	4	-	-	-	1.8	181.5	2.1
	1/8 W	-	1	23	-	-	-	5.3	204.0	0.9
	1/16 W	-	52	210	-	8	-	5.8	189.2	1.0
Trash Midden, Grid 82, Layer 1, Level 1	1/2 W	53	7	0	-	-	2	-	2,073.6	436.2
	1/4 W	23	4	3	-	-	-	1.0	338.5	21.3
	1/8 W	30	4	47	-	-	-	0.4	398.4	2.9
	1/16 W	0	32	184	-	1	-	0.1	218.3	0.7

Table C.1. (continued)

Provenience	Screen Wet/Dry	Frequency: Sherds	Chipped Stones	Bones	Eggshell	Turquoise	Snails	Weight (g): Charcoal	Stone	Cultural Material[b]
Trash Midden, Grid 82,										
Layer 1, Level 2	1/2 W	19	2	0	-	-	-	1.0	1,813.0	149.4
	1/4 W	0	6	7	-	-	-	0.4	315.6	8.2
	1/8 W	1	3	48	-	-	-	?	312.5	1.9
	1/16 W	3	20	230	-	3	-	6.7	193.2	1.0
Layer 2, Level 1	1/2 W	11	4	3	-	-	-	1.0	1,285.2	66.5
	1/4 W	9	7	18	-	-	-	8.5	611.0	39.9
	1/8 W	5	5	65	-	-	-	37.7	486.2	2.1
	1/16 W	4	24	396	-	-	1	11.1	387.0	1.9
Layer 2, Level 2	1/2 W	0	0	0	-	-	-	-	1,675.5	?
	1/4 W	1	3	3	-	-	-	0.1	737.8	3.5
	1/8 W	4	4	189	-	-	1	7.7	676.7	4.7
	1/16 W	2	9	93	-	-	2	5.0	217.0	0.6

[a] Samples retrieved in blocks 30 x 30 x 30 cm (0.027 m^3).
[b] T= Cultural material present in trace (less than 0.05 g) amounts.
[c] One piece of worked sandstone weighed 442.0 g.

Table C.2. Density samples from the Trash Midden Grid 82 from multiple processing techniques.[a]

	Screen:	Frequency					Weight (g)		
Provenience	Wet/Dry/ Pinch	Sherds	Chipped Stones	Bones	Turquoise	Other	Charcoal	Stone	Cultural Material
Layer 1, Level 1	1/2 W	53	7	0	-	2 tools	-	2,073.6	436.2
	D	36	2	0	-	-	-	2,546.7	-
	P	2	2	0	-	-	-	97.1	-
	1/4 W	23	4	3	-	-	1.0	338.5	21.3
	D	9	9	4	-	-	0.2	537.5	0.2
	P lost	-	-	-	-	-	-	-	-
	1/8 W	30	4	47	-	-	0.4	398.4	2.9
	D	30	6	37	-	-	2.9	527.3	-
	P	2	2	10	-	-	1.8	120.2	1.8
	1/16 W	0	32	184	1	-	0.1	218.3	0.7
	D	0	29	201	-	4 snails	8.4	451.4	-
	P	1	4	28	1	-	1.9	44.0	0.3
Layer 1, Level 2	1/2 W	19	2	0	-	-	1.0	1,813.0	149.4
	D	17	3	1	-	-	-	2,416.5	-
	P	7	0	2	-	-	-	488.4	-
	1/4 W	0	6	7	-	-	0.4	315.6	8.2
	D	6	6	6	-	-	2.7	790.4	-
	P	1	-	6	-	1 corncob	1.4	93.3	-
	1/8 W	1	3	48	-	-	?	312.5	1.9
	D	19	7	92	1	-	37.2	335.8	3.3
	P	7	-	23	-	-	7.8	93.6	0.9
	1/16 W	3	20	230	3	-	6.7	193.2	1.0
	D	0	8	94	1	6 snails	19.6	188.7	-
	P	0	0	0	-	-	3.9	48.1	0.0

Table C.2. (continued)

Provenience	Screen: Wet/Dry/ Pinch	Frequency					Weight (g)		
		Sherds	Chipped Stones	Bones	Turquoise	Other	Charcoal	Stone	Cultural Material
Layer 2, Level 1	1/2 W	11	4	3	-	-	1.0	1,285.2	66.5
	D	19	2	0	-	-	0.0	2,000.0	-
	P	1	0	0	-	-	0.0	84.3	-
	1/4 W	9	7	18	-	-	8.5	611.0	39.9
	D	7	1	20	-	-	18.0	1,545.2	-
	P	2	0	1	-	-	2.8	80.2	-
	1/8 W	5	5	65	-	-	37.7	486.2	2.1
	D	0	3	86	3?	3 eggshell	42.0	834.4	1.0
	P	4	1	12	-	-	6.0	104.8	-
	1/16 W	4	24	396	-	1 azurite	11.1	387.0	1.9
	D	9	29	265	1	-	33.5	419.6	-
	P	3	4	25	-	-	5.2	75.6	-
Layer 2, Level 2	1/2 W	0	0	0	-	-	-	1,675.5	?
	D	0	0	0	-	-	-	2,372.5	-
	P	0	0	0	-	-	-	117.7	-
	1/4 W	1	3	3	-	-	0.1	737.8	3.5
	D	1	4	2	-	-	2.3	1.669.5	?
	P	0	0	1	-	-	0.2	27.6	?
	1/8 W	4	4	189	-	-	7.7	676.7	4.7
	D	0	26	40	-	1 azurite	10.6	810.2	?
	P	0	0	3	-	-	0.8	?	?
	1/16 W	2	9	93	-	2 shell	5.0	217.0	0.6
	D	0	55	140	1	2 azurite	10.5	440.9	?
	P	0	0	1	-	1 eggshell	0.1	?	?

[a] Samples retrieved in blocks 30 x 30 x 30 cm (0.027 m^3).

Table C.3. Relative densitites of cultural material in trash deposits at 29SJ 629.[a]

Sample Location	Layer[b]	No. of sherds to kg/sand	No. of bone to kg/sand	No. of chipped stone to kg/sand	No. of hs to kg/sand	No. of cob frags to kg/sand	No. of flecks 5 x 5 m	Gm/char to kg/sand	Kg/rock to kg/sand	% of rock to total	Weight of sand in kg
Grid 82	Layer 1, Level 1	1.39 (45)	0.12 (4)	0.34 (11)	0.00	0.00	4	0.35 (11.5)	0.09 (3.08)	8.7	32.55
Grid 82	Layer 1, Level 1*	2.30 (76)	0.09 (3)	0.33 (11)	0.00	0.00	4	0.04 (01.5)	0.07 (2.41)	6.8	33.05
Grid 82	Layer 1, Level 2	0.68 (23)	0.20 (7)	0.26 (9)	0.00	0.00	12	1.76 (59.9)	0.02 (0.79)	2.3	33.73
Grid 82	Layer 2, Level 2*	0.57 (19)	0.21 (7)	0.30 (10)	0.00	0.00	12	0.72 (23.9)	0.06 (2.13)	6.0	33.36
Grid 82	Layer 2, Level 1	0.80 (26)	0.61 (20)	0.10 (3)	0.00	0.00	3	2.89 (93.5)	0.11 (3.55)	10.0	32.38
Grid 82	Layer 2, Level 1*	0.60 (20)	0.63 (21)	0.33 (11)	0.00	0.00	3	1.74 (58.3)	0.06 (1.90)	5.4	33.54
Grid 82	Layer 2, Level 2	0.03 (1)	0.06 (2)	0.12 (4)	0.00	0.00	3	0.74 (23.4)	0.12 (4.04)	11.2	32.06
Grid 82	Layer 2, Level 2*	0.03 (1)	0.10 (3)	0.10 (3)	0.00	0.00	3	0.38 (12.8)	0.07 (2.41)	6.8	33.27
Pithouse 3	Layer 1	0.03 (1)	0.00	0.00	0.00	0.00	0	0.26 (08.9)	0.04 (1.41)	4.0	34.01
Pithouse 3	Layer 2	0.10 (3)	0.15 (5)	0.03 (1)	0.00	0.00	3	0.39 (12.9)	0.06 (2.06)	5.8	33.38
Pithouse 3	Layer 3	0.05 (2)	0.05 (2)	0.08 (3)	0.00	0.00	3	0.10 (03.3)	0.02 (1.12)	3.2	34.19
Pithouse 2	Layer 1	0.00	0.00	0.00	0.00	0.00	-	0.00	0.002 (0.063)	0.18	34.99
Room 6	Level 1	0.03 (1)	0.03 (1)	0.03 (1)	0.00	0.00	-	0.00	0.07 (2.28)	6.5	32.77
Room 6	Level 2	0.00	0.00	0.00	0.00	0.00	-	0.00	0.12 (3.80)	10.8	31.25

[a] Compare with densities from Pueblo Alto (Windes 1987:Table 8.4).
[b] All samples processed wet except for starred (*) levels, which were processed dry.

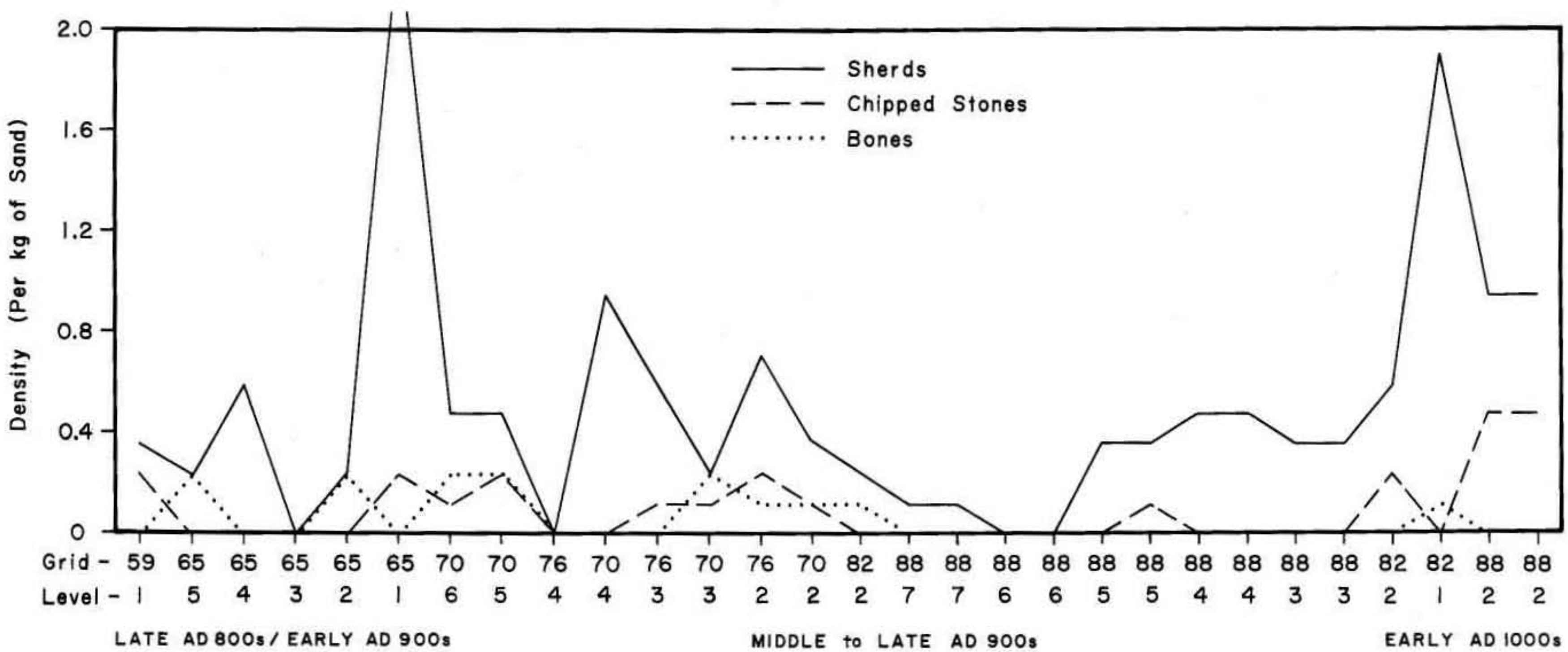

Figure C.1. *Densities of cultural material in the Trash Midden by grid level through approximate stratigraphic time (some duplicate levels from different tests included). Compare with Windes (1987: Figure 8.4).*

to the Grid 82 densities in the Trash Midden.

Of particular interest is the greatly increased recovery of small items in the 1/16 in. screens, especially of small rodent remains, turquoise, and micro-flakes from lithic reduction. The number and species diversity of bone is enhanced, even at the 1/8 in. level. Selective fine-screening, of course, can greatly quantify the presence and diversity of cultural materials that are mostly missed by rote 1/4 in. screening. These lessons were relevant to our work at Pueblo Alto, especially in the Trash Midden, which allowed quantifiable inter- and intra-site comparisons.

The number of 1-liter samples recovered from the Trash Midden at 29SJ 629 also allowed density calculations for sherds, chipped stones, and bones to be graphed through approximate stratigraphic and ceramic time (Figure C.1). The double samples listed for Grid 88 resulted from wet and dry processing. While the densities are not as controlled as the comparative samples from the Pueblo Alto Trash Mound, they allow some idea of changing material densities through time. Bones were nearly absent in the latest midden deposits, probably because of wet conditions and alluvial action within the channel in which the trash was deposited. The closer to the bottom of the channel bones were discarded, the more effect dampness had on bone preservation (including the burials recovered). The peaks of sherd and chipped stone densities suggest increased deposition of these materials between periods of little disposition. Given the lack of fine stratigraphic layering and the problems of alluvial action within the channel (Chapter 6), however, these differences should be treated with caution.

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APPENDIX D

ANTS AND THEIR EFFECTS ON THE CULTURAL RECORD

It has long been common knowledge by the students of Chacoan archeology that ant nests are places to find turquoise and beads in Chaco Canyon (e.g., Hibben 1937b:93). Since the days of the University of New Mexico field schools, stories have been passed down among the generations of students about spending one's spare time picking the ant nests for turquoise. These practices are detrimental to research. In the Cisco Desert, Utah, for instance, some ant nests have been accorded site status because of the prolific number of glass beads (715) found on them (Bradley et al. 1986:50). Despite a consensus of knowledge that ant nests can be informative about cultural materials (Wood and Johnson 1978:321), even to identify site locations (Frisbie 1967:10), little is known about their co-association. The problem became particularly important for the author when it was found that ants possessed the entire assemblage of turquoise found on some Chacoan shrines, even after excavation (e.g., McKenna and Windes 1975). Although it is assumed that the ants moved the turquoise from its original location, for shrines, at least, there is always the possibility that the turquoise had been placed on the ant nests as offerings by historic groups, notably the Zuni. It is known that the Zuni and Acoma, among other groups, make pilgrimages to place offerings on ancestral sites and shrines in the Chaco and Mesa Verde regions (e.g., Ferguson and Hart 1985:20-21, 126), and that the Zuni Red Ant Society still places turquoise and other semi-precious stones on ant nests.

On Chacoan house sites, however, there is little question that turquoise and other cultural material has been mined and collected by ants because similar cultural material has been found scattered throughout and deep within the prehistoric sites in primary contexts. Ant nests, then, can be informative about some kinds of cultural materials found at a site. But can we tell where the material has been obtained by the ants? Two activities of ants cover the possibilities: surface harvesting of materials and subsurface mining of the earth during nest construction. Because of the abundance of turquoise at the Spadefoot Toad Site (29SJ 629), the initial concern regarding ants was their effect on the turquoise distribution and other cultural materials at the site. Although a number of types of cultural material can be found on ant nests, it is the tiny, rare artifacts that remain the most informative for interpreting activity loci. Burned bone elements, micro-flakes and tools, beads, and items of turquoise found on ant nests offer the most potential for assessing site activities. In this case, it is the turquoise distribution at 29SJ 629 and in the A.D. 900s small-house communities that provokes the discussion.

Not all species of ants exhibit similar behavior, but two kinds are responsible for disturbing archeological sites in Chaco Canyon. In Chaco and northern New Mexico, large tracts of land are infested by the harvester ant, specifically Pogonomerymx sp., which, as many of us could guess from their stings, have the most toxic venom of any insect (Schmidt and Blum 1978). Two species of these, P. rugosus (or P. barbatus) and P. occidentalis, exist in Chaco Canyon (Mehlhop and

Scott 1980:1), although only P. rugosus are found in the nests immediately around 29SJ 629. Both species are found on other ridges in Fajada Gap, however, but the flats appear solely inhabited by P. occidentalis, the reddish-orange Western Harvester ant. The latter are known for construction of symmetrical, conical-shaped mounds, while P. rugosus (dark brown or black ants) build irregular or flat mounds that are often densely covered by small gravels. It is P. rugosus that generally retrieves so much cultural material from across and within the sites on which they are located.

At nearby 29SJ 634, we found P. rugosus ants as far as 43 m from their nest, but other studies have found a shorter range (e.g., Clements 1954:Table V, 22). Probably the foraging distance varies, in part, with the density of the nests and the foraging competition. In some areas, these ants nests may exceed 200 per hectare, with a formidable peak of 180,000 foragers (Whitford and Ettershank 1975), but in others they may drop as low as 32 nests per hectare (Sneva 1979:46). In the settlement study area in Fajada Gap (Section 29), however, a density of 37 nests per hectare was calculated from an aerial photo taken south of 29SJ 1260, a density that is typical of many areas in Chaco Canyon. Individual nests may contain several thousand adult ants (Hölldobler and Wilson 1990:Table 3-2).

Although ant foraging effects on seed plants is not of direct interest here, their harvest of certain seed crops every year can be substantial and places them in competition with other gatherers of economic wildplant seeds, including the Anasazi. Harvester ants are particularly exploitative of "clumped resources" or those plants that shed large numbers of seeds in a short time (Davidson 1977), and in Chaco Canyon these have been observed for Indian ricegrass, sagebrush, saltbrush, and greasewood that were also exploited by the Anasazi (Cully 1985; M. Toll, this report). A flotation sample from an ant nest at 29SJ 724 revealed a preference for Indian ricegrass (Oryzopsis hymenoides) and Hiddenflower (Cryptantha) seeds, 44 percent and 56 percent, respectively, of the 218 seeds recovered (Mollie Toll, personal communication 1976). Harvester ants may remove only about 2 percent of the available seeds (Rodgers 1974), but as much as 50 percent of the preferred annual forbs.

Furthermore, ants primarily tend to collect one species of seeds at a time in a day (Tevis 1958). Their effect on the viability of particular plant communities, therefore, is certain. Although an interesting problem, the competition between ants and humans is not explored further here because of a lack of additional data.

Nineteen ant colonies inhabited 29SJ 629 and the surrounding terrain in 1976. These were mapped (Figure D.1) and sampled to determine the horizontal displacement of cultural material at the site (Table D.1). As expected, the ant nests (AN) within the site yielded the turquoise, although not necessarily those in the closest proximity to primary contexts of the mineral. By 1989, only two of these nests were still active, but staffed by small numbers of non-aggressive ants. Near several of these old nests, however, were 12 new small nests, probably budding daughter communities, filled with hostile foragers that swarmed to the surface when disturbed. Another three nests were found in 1992. New turquoise was located on AN 11 (2 chips), which was far removed from any sites and cultural refuse in a run-off area south of 29SJ 629. Turquoise was also observed on AN 17 (1 fleck) and on new nests near AN 8 (ground turquoise fragment and a whole white bead) and AN 14 (a finished turquoise bead fragment).

The location of turquoise and other cultural material on ant nests clearly indicates its placement as part of ant nest construction. Although some material is brought to the surface after removal from the nest galleries, much is also gathered to thicken and maintain the shield of gravel that covers the nest and acts as a solar energy trap (Hölldobler and Wilson 1990:373). Both species limit their galleries directly below the surface mound, reaching 3 m in depth (Lavigne 1969:1166, Table 2) or more (Dumpert 1981:207; Wheeler 1926:284). An average depth for 33 P. occidentalis nests in Wyoming was 191 cm (Lavigne 1969:Table 2). In Room 5 at 29SJ 629, vertical P. rugosus galleries extended into the hard room floor, 93 cm below the surface. Thus, we can conclude that cultural material found on ant nests is probably a mixture of both subsurface and surface materials. Because ants can distinguish between colors (Dumpert 1981:40-42), the turquoise might have been an attractive material. More likely, however, turquoise and other small stones and bones

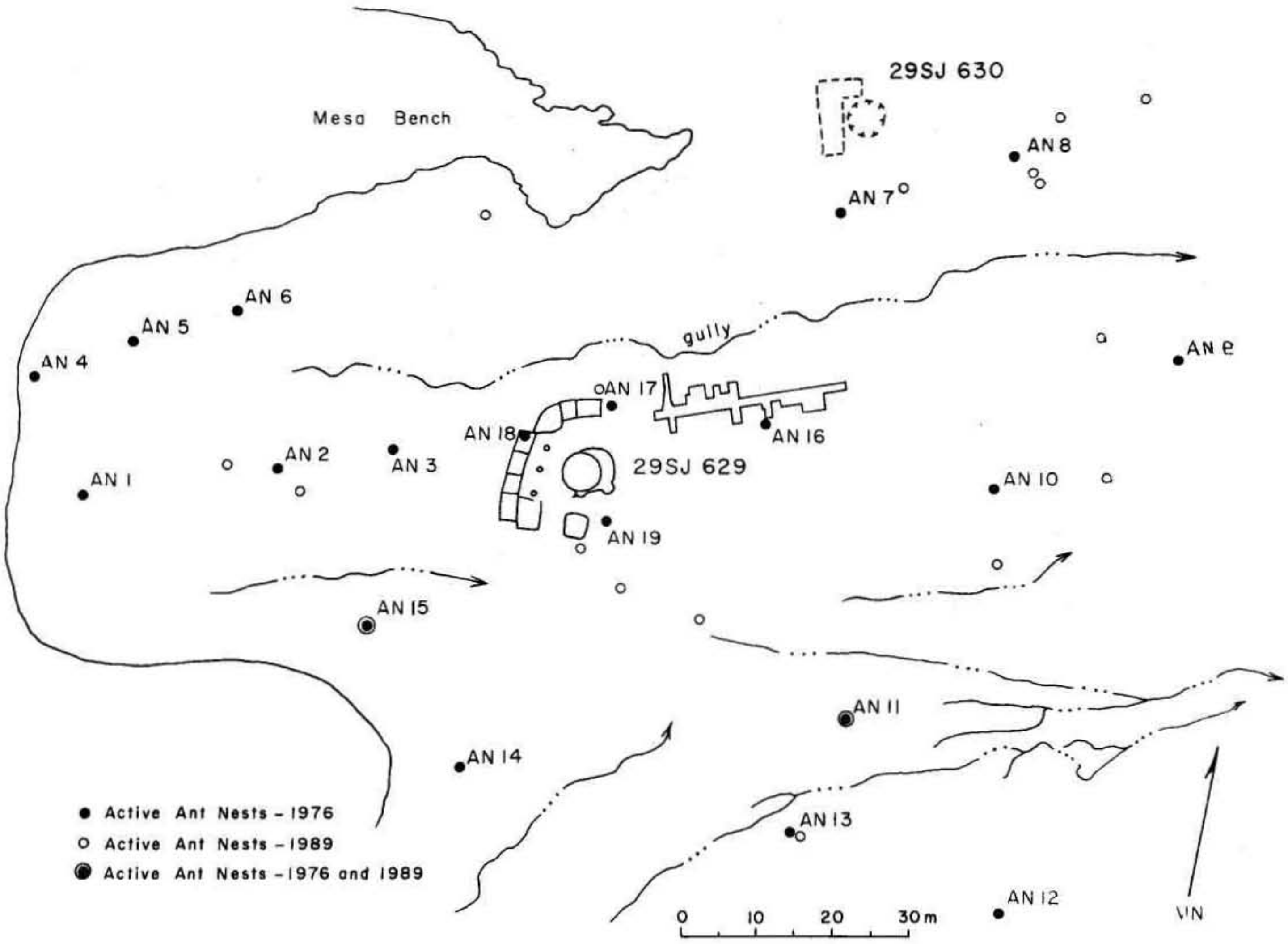

Figure D.1. Distribution of ant nests in the vicinity of 29SJ 629 in June 1976 and in June 1989.

Table D.1. Densities of cultural materials collected from ant nests around 29SJ 629 in 1976 and Kin Nahasbas in 1983[a].

	Frequency								
Ant Nest No.	Sherds	Chipped Stones	Bones/ Burned Bones	Turquoise	Non-Turq. Beads	Eggshells/ Other	Total	Distance from 29SJ 629[b]	Nest Size (cm)
1	-	-	1 / 0	-	-	-	1	57m	138x110
2	-	-	-	-	-	-	0	31m	132x53
3	3	3	1 / 1	2	-	-	9	15m	251x200
4	-	1	3 / 0	-	-	-	4	63m	131x131
5	-	-	2 / 0	-	-	-	2	53m	90x99
6	-	-	-	-	1	-	1	41m	155x132
7	73	31	35 / 9	2	2	-	143	40m	30x51
8	276	71	184 / 35	11	1	10/	543	62m	170x175
9	11	3	9 / 1	-	-	-	23	75m	114x95
10	28	12	4 / 2	-	-	-	44	49m	157x116
11	9	3	4 / 0	1	-	-	17	45m	185x183
12	2	6	3 / 0	-	-	-	11	78m	200x184
13 (inactive)	1	-	6 / 0	1	-	-	8	53m	200x195
14	-	-	1 / 0	-	-	-	1	35m	107x100
15	-	3	4 / 0	-	-	-	7	24m	183x173
16[c]	6	3	5 / 0	3	-	-	17	TM Grid 75	excavated
17	-	-	-	41	1	-	-	Grid 41	excavated
18	19	6	1 / ?	2	-	?	28	Room 5	excavated
19	7	-	3 / ?	25	1	-	36	Grid 31	excavated
Kin Nahasbas 1[d]	5	176	353 /120	31	17	16/7	608	-	tested
Kin Nahasbas 2[d]	12	66	60 / 23	8	7	9/-	162	-	tested

[a] Two liter samples were collected except in Nests 17-19, which were surface collected. See Figure D.1.
[b] Distance of nest to nearest room or to Pithouse 2. Nest 9 is close to 29SJ 628 and Nests 7 and 8 were on 29SJ 630.
[c] Only one liter collected.
[d] Nests at Kin Nahasbas were shoveled and 1/16 in. screened: 23 liters from Nest 1 and 10 liters from Nest 2.

have properties that ants sense are useful for the mound shield. These articles may be easier to handle because of their relative softness, but most likely the material is suitable primarily because of composition and size (2-4 mm). Probably, like the Australian meat ant nests built in similar ecological settings as Chaco, the shield serves as a behavioral boundary in which intruders are attacked, provides protection from nest erosion, dissipates heat through turbulent cooling, and increases the heat advantage in the winter (Ettershank 1971:150).

At Kin Nahasbas, the highest frequencies of turquoise were found on nests located on the flats where, presumably, deep subsurface nest construction intruded into cultural deposits containing turquoise. The surrounding flats were devoid of cultural material, indicating that the turquoise was brought to the surface and discarded on the dome. While it has been poorly studied, it appears that turquoise generally is located on the exposed surface of the dome rather than throughout its construction, suggesting that the turquoise is kept at the surface for its thermal properties. Fears of contamination by ant foraging prevented flotation and pollen analyses for part of Room 5 at 29SJ 629. Because of potential contamination by ant activities, soil samples were collected from inside many of the nests around 29SJ 629 to examine the seed harvests. Unfortunately, these have not been analyzed; however, studies during the Dolores Archaeological Project provided valuable clues to ant contamination of flotation samples (Nelson 1980a, 1980b).

Horizontal movement of turquoise is more difficult to demonstrate from ant activity. At Chacoan shrines, which are located high on the mesas with minimal soils underneath (i.e., they generally rest on bedrock), the ant turquoise must have been collected from across the site if it was not placed on the nest there historically. At one Kin Nahasbas ant nest, a piece of turquoise removed from the dome and placed about 50 cm away was quickly retrieved (within two hours) and placed back on the dome. The author has observed three P. rugosus ants remove a turquoise pendant fragment on 29SJ 630 from the nest entry tunnel and stagger beyond the nest with it for more than 75 cm.

A test plot of different materials (wire insulation, turquoise, plastic, and glass) of various colors (black, red, green, sky blue, silver, yellow, and white) were set at intervals up to 3 m away from a P. rugosus ant nest near the 29SJ 1253 weather station in June 1989 to test ant foraging preferences. After a month, many of the 57 materials had been taken by the ants to their nests, but the remainder had disappeared. Materials were often gathered specifically after severe rainstorms to repair the shield. The tiny yellow and red glass beads (two) entered the nest quickly, as did the black splinters of glass, and some plastics of different colors. By the end of the month, 20 percent of the red (two of eight), green (one of five), and silver (one of five) plastic, 50 percent of the eight pieces of sky blue plastic, 25 percent (one of four pieces) of the turquoise, both glass beads, and 75 percent (three of four) of the black glass had been gathered to the nest. The amount of blue plastic and black glass retrieved was intriguing, as if to suggest some preference for materials, but, overall, any small solid materials might have been suitable for the nest repair.

A second test series was implemented between 1990-1993 using a variety of colored glass beads, 2.0 and 3.0 mm in diameter. These samples reduced the sample attributes to color and size. Both sizes were readily retrieved by the ants from test plots set 3 to 9.4 m from four nests. The 3.0 mm-size beads, all blue, were favored by ants (51 of 87 were retrieved) over the smaller beads (34 of 374). Among the 2.0 mm-size beads, blue and green (n=159) were preferred over the colors of red, orange, pink, yellow, clear, and black (n=215). A Chi-square analysis tested the null hypothesis for the small beads that color and selection were independent of one another. Based on the variables for color (blue/green versus other) and selection (those collected versus those not collected), the test suggests that preference was not random ($\chi_c^2=5.83$, df=1, $\rho=.016$, n=364 beads; Fischer's Exact Test=0.008). Part of the sample of black beads was eliminated from the test due to the difficulty of visually relocating them on one of the sample nests covered with black stones. Because ants were disinterested in the beads when they were shaded, it may be that the thermal properties determined by the color ultimately affect ant preference for blue materials.

In conclusion, ant nests can be informative of certain cultural materials found within sites without recourse to excavation. In this study, it is the extent and type of jewelry manufacturing that can be reliably predicted from the collections on ant nests. Because of their small size, beads and debris from pendant and bead manufacture are unlikely to be found consistently on the surface of sites, even those in Chaco Canyon that reveal huge quantities of trash, if it were not for the foraging abilities of harvester ants. On the other hand, these ants disturb the cultural record within sites, biasing the location of some types of materials and, particularly, making pollen and flotation results more tenuous when nests are found in close proximity to sample areas. Finally, the competition by ants and man for the same wild economic seed crops, as well as cultivated crops (Cole 1968:4), particularly given the density of nests and sites in the Fajada Gap area, needs to be explored as a potential stress factor during periods of Anasazi crop failure and famine.

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APPENDIX E

CERAMIC MATCHES AND RESTORABLE VESSELS

Analysis of the Spadefoot Toad (29SJ 629) ceramics (Toll and McKenna, this report) included an attempt to match ceramics from the same vessels across the site to reduce the redundancy of the sherd analysis, to create whole or partially restorable vessels (Table E.1) for independent analysis, to identify coeval trash deposits, and to identify the extent of the problem of using sherds as representatives of whole vessels (the ultimate and ideal unit of analysis). The magnitude of the site collection of approximately 33,000 sherds, however, provided formidable obstacles in time and numbers to visually inspect all sherds for attempted matching. Thus, certain visual characteristics of the sherds that suggested a high rate of success were employed to help cull the collection to manageable size. The primary effort was done by the author with considerable assistance from Peter McKenna.

Generally, the first cut involving culling those sherds that were clearly limited in number: all redwares, smudged wares, carbon-decorated whitewares, rims, oddities (e.g., smeared with hematite paint or repair holes), and bottoms. For some, these selections enhanced the matching process, while others, for instance, jar bottoms, provided a rough estimate of the total number of whole vessels after matching eliminated duplicates from the same bottom. These sherds were spread over several tables by selected characteristic and then matched. A curatorial problem manifested itself from the onset of this analysis on whether matches were to be kept together or separated by their respective provenience units. Once enough pieces formed a "restorable vessel" (approximately one-third or larger of the original form) it was logical to keep the pieces together even if they could not be attached to one another. But at this cut-off, there were still many matched pieces that were returned to their provenience bags depending on our idiosyncratic behavior.

Once patterns of matching suggested coeval deposition, all ceramics from the associated proveniences were pulled for matching to find missing pieces and to strengthen ties between separate units by increasing the number of vessels matched. Clusters of ceramics retrieved during excavation as identifiable vessels were also matched, as well as the surrounding units that might have provided more matching pieces. Often matched pieces were retrieved based solely on memory of the sherds observed during earlier sorting processes. Painted vessels, of course, provided greater possibilities of matches than culinary jars because of the greater variation in surface treatment, slip, color, paint, and forms. More restorable culinary jars were reconstructed, however, because they were most often the vessels left smashed in situ at abandonment. The overwhelming preference for neck-modified culinary vessels at the site made it difficult, otherwise, to find matches for the numerous plain gray pieces comprising the jar bottoms. On the other hand, the few overall indented culinary jars used at the site were easier to match because of fewer sherds of this type.

Of the 32,724 sherds recovered from 29SJ 629, 2,674 (8.2 percent) were matched or fitted. If we subtract those categories--plain gray and white body

Table E.1. Distribution of restorable vessel fragments at 29SJ 629.[a]

RV 1. Tohatchi Banded jar (Plate 8.7a)
- (34) Room 2, Level 1
- (3) Room 2, Layer 1
- (32) Room 2, Layer 2

RV 2. Red Mesa B/w pitcher (Plate 8.5a)
- (2) Room 9, Floor 1

RV 3. Late Gallup B/w olla (Plate 8.11b)
- (9) Room 9, top of Firepit 1

RV 4. Red Mesa B/w bowl (Plate 8.4b)
- (1) Grid 7, surface
- (8) Room 9, Level 1
- (7) Room 9, Level 3
- (2) Room 9, Bin 3 (Level 1)
- (2) Room 9, Bin 3 (Levels 1-2)
- (6) Room 9, Bin 3 (Level 2)
- (1) Room 9, Floor 1
- (1) Room 9, top of Posthole 1

RV 5. Red Mesa B/w bowl (Plate 8.4a)
- (7) Room 2, Level 1

RV 6. Red Mesa B/w cup/vase (Plate 8.5f)
- (2) Pithouse 3, floor fill
- (5) Pithouse 3, Floor 1

RV 7. Red [illegible]esa B/w bowl (Plate 8.4c)
- ([illegible] [illegible]laza, OP 14 (Layer 6)
- (5) [illegible]aza, OP 14 (Floor)

RV 8. Red Mesa B/w seed jar (Plate 8.6a)
- (1) Pithouse 2, Layer 4
- (14) Pithouse 2, Layer 5
- (2) Pithouse 2, Vent Tunnel (Layer 1)

RV 9. Red Mesa B/w bowl
- (3) Pithouse 2, general fill
- (21) Pithouse 2, Floor 1

RV 10. Red Mesa B/w pitcher (Plate 8.5b)
- (1) Pithouse 3, Level 9
- (10) Pithouse 3, Layer 3

RV 11. Early Gallup B/w olla (Plate 8.10e)
- (1) Pithouse 2, Layer 4
- (4) Pithouse 2, Layer 5
- (45) Pithouse 2, Floor 1

RV 12. Chaco Corrugated jar (Plate 8.11a)
- (1) Grids 27/33, Levels 2-3
- (1) Room 8, Level 3
- (16) Pithouse 2, general fill
- (1) Pithouse 2, Layer 1
- (3) Pithouse 2, Layer 4
- (51) Pithouse 2, Layer 5
- (2) Pithouse 2, Layer 6
- (29) Pithouse 2, Layer 7
- (14) Pithouse 2, Floor 1
- (1) Pithouse 2, Mealing Bin 1, basin bottom
- (4) Pithouse 2, Vent Tunnel (Layer 1)
- (1) Pithouse 2, Vent Tunnel (Layers 1-2)
- (1) Pithouse 2, Vent Tunnel (Layer 2)
- (13) Pithouse 2, Vent Tunnel/Shaft (Layer 1)

RV 13. Early Red Mesa B/w canteen (Plate 8.5c)
- (25) Pithouse 3, Level 9

RV 14. Red Mesa B/w pitcher (Plate 8.5d)
- (2) Pithouse 3, Level 7
- (1) Pithouse 3, Level 8
- (6) Pithouse 3, Layer 2
- (1) Pithouse 3, Layers 2 and 3
- (1) Pithouse 3, Layer 3

RV 15. Coolidge Corrugated jar (Plate 8.8a)
- (58) Pithouse 2, general fill
- (1) Pithouse 2, Layer 4
- (16) Pithouse 2, Layer 5
- (5) Pithouse 2, Layer 7
- (11) Pithouse 2, Floor 1
- (1) Pithouse 2, Mealing Bin 2 basin (Layer 2)

RV 16. Early Gallup B/w bowl (Plate 8.10a)
- (8) Plaza Grid 16, Level 1
- (15) Pithouse 2, Layer 7

RV 17. Tohatchi Banded jar (Plate 8.7d)
- (25) Pithouse 2, Layer 5
- (21) Pithouse 2, Floor 1

RV 18. Kana'a Banded jar (Plate 8.3f)
- (18) Room 5, Level 3

RV 19. Kana'a Banded jar (Plate 8.3d)
- (17) Pithouse 2, Layer 4
- (probably also includes 13 plain gray)

Table E.1. (continued)

RV 20. Early Red Mesa B/w jar
(1) Grid 7, surface
(3) Grid 21, Level 1
(1) Grid 21, Level 2
(1) Grid 25, surface
(1) Kiva, Level 6
(2) Plaza OP 1 (Level 1)
(1) Plaza OP 1 (Level 6)
(1) Plaza OP 1 (Level 7)
(7) Plaza OP 1 (Level 9)
(4) Plaza OP 1 (Level 10)
(6) Plaza OP 1 (Level 11)
(4) Plaza OP 1 (Level 12)
(1) Plaza OP 1 (Posthole 1, fill)

RV 21. Coolidge Corrugated jar (Plate 8.8b)
(9) Room 2, Level 1
(62) Room 2, Layer 2

RV 22. Kana'a Banded jar (Plate 8.3e)
(2) Plaza OP 1 (Level 10)
(8) Plaza OP 1 (Level 11)
(17) Plaza OP 1 (Level 12)
(3) Plaza OP 1 (Posthole 1, fill)

RV 23. Tohatchi Banded jar (Plate 8.7b)
(23) Pithouse 3, Levels 3-6

RV 24. Newcomb Corrugated jar (Plate 8.9b)
(4) Plaza Grid 16, Level 3
(74) Plaza Grid 22, Level 3

RV 25. Capt. Tom Corrugated jar (Plate 8.9a)
(21) Pithouse 3, Level 7

RV 26. None assigned.

RV 27. Blue Shale Corrugated jar (Plate 8.9c)
(54) Pithouse 2, Vent Tunnel/Shaft
(Layer 1)

RV 28. Blue Shale Corrugated jar
(6) Room 2, Layer 2

RV 29. Hunter Corrugated jar (Plate 8.9d)
(44) Kiva, Floor 1

RV 30. Tohatchi Banded jar (Plate 8.7c)
(2) Pithouse 2, general fill
(1) Pithouse 2, Layer 4
(7) Pithouse 2, Layer 5
(49) Pithouse 2, Layer 7
(2) Pithouse 2, Floor 1

RV 31. Kana'a Banded jar (Plate 8.3c)
(50) Pithouse 2, Layer 5

RV 32. Unclassified culinary jar
(incised between very narrow coils)
(1) Grid 17, surface
(1) Grid 21, Level 1
(1) Grid 22, surface
(3) Grid 26, surface
(1) Grid 33, surface
(1) Grid 34, Level 1
(1) Grid 49, surface
(1) Grid 203, Level 2
(1) Kiva, Level 10
(1) Kiva, Level 11
(1) Kiva, Vent Shaft, fill (top)
(3) Pithouse 2, general fill
(2) Pithouse 2, Layer 1
(1) Pithouse 2, Vent Tunnel/Shaft
(Layer 1)
(3) Pithouse 2, Vent Tunnel (Layers 1-2)
(45) Pithouse 3, Level 3
(1) Pithouse 3, Levels 3-6
(16) Pithouse 3, Level 4
(6) Pithouse 3, Level 5
(4) Pithouse 3, Layer 1
(1) Pithouse 3, Layer 2

RV 33. Red Mesa B/w pitcher (Plate 8.5e)
(10) Pithouse 3, Levels 3-6

RV 34. Early Gallup B/w olla top (Plate 8.10c)
(2) Pithouse 3, Level 5
(3) Pithouse 3, Level 7
(1) Pithouse 3, Layer 2

RV 35. Red Mesa B/w unique form (Plate 8.6d)
(3) Pithouse 3, Level 7

RV 36. Early Puerco B/w olla top (Plate 8.10f)
(1) Grid 22, Level 2
(1) Grid 28, surface
(1) Room 2, Level 1
(6) Room 2, Layer 2
(1) Room 3, Layer 2
(1) Pithouse 2, Vent Tunnel (Layers 1-2)
(1) Pithouse 2, Vent Tunnel (Layer 2)

Table E.1. (continued)

RV 37. Early Red Mesa B/w bowl
(5) Pithouse 2, Layer 6

RV 38. Red Mesa B/w bowl (Plate 8.4d)
(7) Plaza Grid 14, Level 1

RV 39. Kana'a Banded jar
(16) Trash Midden Grid 65, Level 6

RV 40. Coolidge Corrugated jar (Plate 8.8c)
(1) Plaza Grid 22, Level 3
(3) Room 2, Layer 1
(1) Room 2, Layer 2
(27) Room 3, Level 1
(1) Room 3, Levels 1-2
(19) Room 3, Level 2
(6) Room 3, Level 3
(1) Room 3, Level 4
(1) Room 3, Floor 1
(8) Room 3, Floor 1, Firepit 1 (Layer 1)
(1) Room 3, Floor 1, Firepit 2 (Layer 2)

RV 41. Coolidge Corrugated jar (Plate 8.8d)
(1) Grid 19, surface
(1) Grid 27, surface
(1) Room 5, Levels 1-2
(6) Pithouse 2, Layer 1
(1) Pithouse 2, Layer 4
(2) Pithouse 2, Layer 5
(8) Pithouse 2, Floor 1

RV 42. Kana'a Banded jar
(3) Pithouse 2, Layer 5
(11) Pithouse 2, Floor 1

RV 43. Kiatuthlanna B/w bowl (Plate 8.2c)
(1) Grid 26, Levels 1-2 (above Kiva vent)
(2) Pithouse 2, general fill

RV 44. Red Mesa B/w jar
(1) Grid 34, surface
(1) Room 2, Layer 1
(3) Pithouse 2, Layer 5
(6) Pithouse 2, Layer 6
(4) Pithouse 2, Layer 7
(9) Pithouse 2, Floor 1
(3) Pithouse 2, Mealing Bin 2 basin (Layer 2)

RV 45. Red Mesa B/w jar
(1) Pithouse 2, Layer 5
(1) Pithouse 2, Vent Tun. (Layers 1-2)
(1) Pithouse 2, Vent Tun. (Layer 2)
(1) Pithouse 2, Vent Tun. (Floor)

RV 46a. Red Mesa B/w jar
(1) Kiva, Recess area, Vent Trench
(9) Pithouse 2, Layer 5
(1) Pithouse 2, Layer 7
(1) Pithouse 2, Vent Tun. (Layer 1)
(3) Pithouse 2, Vent Tun. (Layers 1-2)
(1) Pithouse 2, Vent Tun. (Layer 2)
(1) Pithouse 2, Vent Tun. (Floor)

RV 46b. Kana'a Banded jar (Plate 8.3b)
(6) Trash Midden Grid 65, Level 4

RV 47. Coolidge Corrugated jar (Plate 8.8e)
(2) Grid 29, surface
(65) Room 2, Level 1

RV 48. Early Gallup B/w canteen (Plate 8.10b)
(4) Room 2, Level 1
(1) Room 9, Bin 2 (Level 1)

RV 49. Kana'a Banded jar (Plate 8.3a)
(5) Trash Midden Grid 65, Level 4

RV 50. Red Mesa B/w ladle (Plate 8.6c_4)
(1) Plaza Grid 14, Level 1
(1) Plaza OP 14 (Layer 4)
(3) Plaza OP 14 (Layer 5)
(1) Plaza OP 14 (Layer 6)

RV 51. Red Mesa B/w ladle (Plate 8.6b left)
(1) Room 7, tub fill

RV 52. Early Gallup B/w ladle (Plate 8.6b right)
(2) Room 7, tub fill

RV 53. Red Mesa B/w ladle (Plate 8.6c_1)
(2) Plaza OP 6 (Level 3)

RV 54. Red Mesa B/w ladle (Plate 8.6c_3)
(1) Pithouse 3, Levels 3-6

RV 55. Red Mesa B/w ladle (Plate 8.6c_2)
(1) Grid 7, surface
(2) Room 9, Level 3
(3) Room 9, Bin 2 (Level 1)
(1) Room 9, Floor 1, OP 1 (Level 3)

Table E.1. (continued)

RV 56a. Red Mesa B/w ladle (Plate 8.6c_5)
- (1) Pithouse 3, Layer 3

RV 56b. Early Gallup B/w canteen (Plate 8.10d)
- (5) Pithouse 3, Layer 3

RV 57. Chaco Corrugated jar (sooted)
- (8) Room 9, room fill between metate and Bin 3 entry
- (12) Room 9, Bin 1 (Level 3)
- (2) Room 9, Bin 1 (Floor)
- (7) Room 9, Bin 1, S. wall construction/fill
- (3) Room 9, Bin 3 (Level 2)
- (1) Room 9, OP 1 fill

[a] ( ) = Number of sherds.

sherds, and unclassified PII-III sherds with mineral paint (a total of 18,333 sherds)--where little matching was attempted, a much higher success rate (18.9 percent) was evident. By either count, there was considerable redundancy within the ceramic assemblage that could be demonstrated, which was undoubtedly far higher than shown.

As might be expected, matches occurred throughout the Trash Midden, indicating the scattered nature of the deposits from rodent disturbance, alluvial action, and human discard behavior. Several pieces from the very early deposits behind Rooms 1 and 2, in Test Trench 99, came from five vessels also represented in Grids 64, 65, and 70, linking these spatially distinct early deposit areas. On the other hand, the numerous matches found in small, distinct areas such as the Plaza Other Pits or Pithouse 3 suggest primary, undisturbed deposits.

Sometimes these small proveniences can be linked with others because of matches, indicating that refuse was being deposited at a coeval time. Particularly noteworthy were the numerous internal matches within Plaza Other Pit 1, Other Pits 6/12, and Other Pit 14, as well as the lower deposits in Pithouse 3, that indicate rapid filling. The proximity of Pithouse 3 to Other Pits 6/12 and 14 and the numerous matches among them (four vessels between Pithouse 3 and OP 6, and nine vessels between Pithouse 3 and OP 14), mark coeval deposition of refuse that is supported by other lines of evidence (ground stone and pollen). Pithouse 3 also yielded matches of four vessels with the latest components of the Trash Midden, in Grids 82 and 88, that correspond closely to the interpreted chronology based on ceramic time. Because we know that Pithouse 2 was abandoned after Pithouse 3, it is without surprise that there were no matches between their refuse deposits, except for material recovered from the Pithouse 2 ventilator. The ventilator also contained matches from Rooms 2 and 3, suggesting that it was used as a separate trash pit after the structure was abandoned. Finally, five pieces from five vessels suggest some coeval deposition in the upper levels of Pithouse 3 and Room 3.

Few rooms yielded high frequencies of ceramics, except for Rooms 2, 3, and 9. Despite the inferred suite function of Rooms 2 and 3 (Chapter 4) and the appearance that trash was thrown from Room 3 into Room 2, only pieces from two vessels support the postoccupation links. Possibly, Room 2 was abandoned before Room 3. Room 3 reveals closer abandonment links with Pithouse 3 (see above) while both Rooms 2 and 3 yielded but a single match, each, with the deposits in Room 9. Room 9 revealed matches to ceramics recovered from the surrounding grids that mark broadly scattered refuse deposited throughout the area after room abandonment.

The majority of ceramic matches and restorable vessels came from Pithouse 2 (Table E.1). Fifteen restorable vessels came from the floor fill and floor (Plates 8.3, 8.6-8.9) that yielded 633 sherds (136 painted and 497 culinary). These vessels seem to have been smashed at abandonment (Toll and McKenna, this report).

Ceramic matches strengthen the internal site chronology based on ceramic time and depositional patterns. Several matches in the Kiva revealed ties to Grids 201 and 203, where late ceramics were recovered. Some vessels, however, show the extent to which deposits can be distributed within a site. An unusual gray jar (RV 32) incised between its very narrow coils had the greatest site distribution. It was found in all three pitstructures and numerous surface grids, but not in the plaza. While it occurred near the floor of the Kiva, it only came from the upper levels of both Pithouse 3 and the ventilator shaft fill in Pithouse 2, indicating that the latter structures were filled with postoccupational deposits, but the Kiva was not.

Finally, the latest typological culinary ceramics at the site were from overall indented corrugated jars that made their appearance at about A.D. 1030 or 1040. The beginning bottom coils from eleven of these jars indicate that at least eleven were broken on site, although only four restorable ones were found. The latest occurred on the floor of the Kiva (RV 29: Plate 8.9d) followed by a Chaco Corrugated jar (RV 12: Plate 8.11a) scattered throughout Pithouse 2, in Room 8, and in Grid 27/33. All these areas have been considered the latest used at the site based on other lines of evidence. Only one piece came from the typologically earlier Trash Midden, and it was in the uppermost fill in Grid 82. It is also significant that none of these sherds were found in the plaza pits or Pithouse 3, which were believed to have been abandoned close to A.D. 1000 before these late culinary jars were introduced.

APPENDIX F

THE EAST CHACO COMMUNITY

In October 1988, a reconnaissance survey discovered an early Bonitian greathouse and attendant small-house community in eastern Chaco Canyon between Wijiji and Pueblo Pintado (Figure F.1). Although the greathouse was known in the early 1950s by the Park Superintendent, Homer F. Hastings, it had long been forgotten and the area left unexplored during the search for Chacoan greathouses in the A.D. 1970s and 1980s. Its 1950s greathouse name, Kin Bulldozer, referred to the trenches cut through the trash mound and the back side of the housemound that revealed a single-story structure, minimally 3.2 m high, of classic, chipped-slab, Type I masonry without wall cores. House surface rubble suggests that the entire structure was built of the dark brown, hard, sandstone slabs that characterize all of the park's early greathouses. There is no surface evidence of the soft, blocky and spall sandstone that marks A.D. 1000s and early A.D. 1100s construction so prominent in other Chacoan greathouses. Trash mound ceramics (Table F.1) revealed the classic assemblage that comprises the majority of the park's greathouse trash mounds deposited between about A.D. 1050 and 1100 (Windes 1987:561-667). A refuse-filled berm, possibly part of the intended landscaping around the house (i.e., Stein 1987, Stein and Lekson 1992), near the southwestern corner of the house, yielded an earlier ceramic assemblage that temporally matches the house masonry style in the late A.D. 900s. The latest ceramics came from the top of the house, primarily from rodent burrows in trash-filled rooms in the eastern center, indicating early A.D. 1100s use and reuse in the A.D. 1200s (Table F.1). Ceramic forms, dominated by jars during the A.D. 900s and 1000s, are consistent with those from other contemporary sites in the main part of the canyon.

Numerous small contemporary houses are situated adjacent to the greathouse on the same ridges on the south side of Chaco Canyon. An inventory of these has not been completed; however, preliminary findings indicate a substantial A.D. 900s settlement that continued, to a lesser degree, into the A.D. 1000s and early A.D. 1100s, mirroring the Fajada Gap Community (Chapter 9). However, there seems to be few houses occupied between about A.D. 1050 and A.D. 1150. A major reoccupation of the vicinity seems to have occurred in the A.D. 1200s that often utilized the earlier housemounds as loci for new buildings. A.D. 900s houses border the prehistoric roads entering the eastern end of Chaco Canyon, near Pueblo Pintado, suggesting that the roads linked this community before continuing down canyon to other communities in Fajada and South Gaps. A number of swales around the greathouse revealed roads that entered the site from the canyon bottom. Rare community structures, including a shrine and an isolated elevated kiva, were found within or near the community. No great kiva was found. Thus far, 32 small houses occupied in the A.D. 900s have been inventoried. There is no indication of earlier occupations from which this community might have locally derived. Therefore, it appears that it formed quickly in the A.D. 900s by people from outside the area.

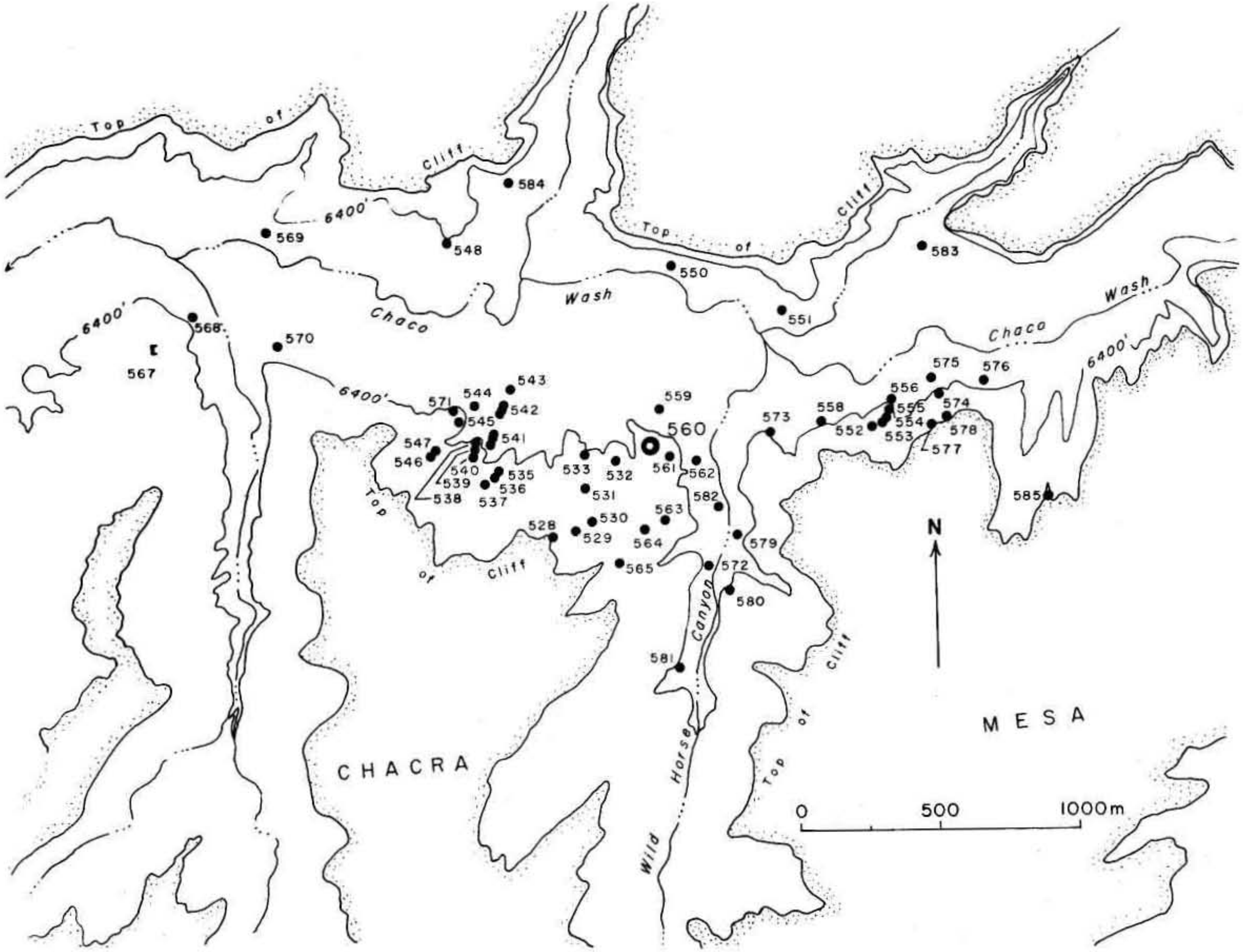

Figure F.1. *Distribution of A.D. 900s-1200s houses in the East Chaco Community. The greathouse (Kin dóó wóláchíí' yóó' íína') is 29Mc 560.*

Table F.1. Ceramic samples from the East Chaco greathouse.[a]

Ceramic Type	Berm No.	Berm %	Midden No.	Midden %	House No.	House %
CIBOLA CULINARY		[37]		[30]		[39]
Lino Gray	-	-	-	-	-	-
Plain gray	37	15	9	2	4	3
Wide neckbanded	15	6	4	1	-	-
Narrow neckbanded	14	6	7	2	3	2
Neck indented corrugated	3	1	-	-	1	1
Unclassified indented corrugated	17	7	92	23	43	29
Indented corrugated rims[b]						
PII	-	-	2	1	-	-
PII-III	-	-	1	1	2	1
PIII	-	-	-	-	2	1
Unclassified rim fillet	2	1	4	1	3	2
CHUSKA CULINARY		[9]		[13]		[5]
Bennett Gray	-	-	-	-	-	-
Plain gray	5	2	3	1	-	-
Sheep Springs/Tocito Gray	-	-	-	-	-	-
Capt. Tom Corrugated	4	2	4	1	-	-
Neck indented corrugated	-	-	-	-	-	-
Unclassified indented corrugated	12	5	39	10	7	5
Blue Shale Corrugated rim	-	-	3	1	-	-
Hunter Corrugated rim	-	-	-	-	1	1
Unclassified rim fillet	1	T	4	1	-	-
MISCELLANEOUS CULINARY[c]		[1]		[1]		[8]
Plain gray	-	-	-	-	-	-
Narrow neckbanded	1	T	-	-	-	-
Unclassified indented corrugated	1	T	3	1	12	8
Subtotals	112	46	175	45	78	52

[a] T = trace (less than 0.5%). Samples do not necessarily reflect the entire site occupation. Ware percentage = [ ]; combined ware and type percentages = ( ).
[b] Based on rim flare.
[c] Sherd or San Juan rock tempered.

Table F.1. (continued)

Ceramic Type	Berm No.	Berm %	Midden No.	Midden %	House No.	House %
CIBOLA WHITEWARE		[32]		[39]		[26]
La Plata B/w	-	-	-	-	1	1
Kiatuthlanna B/w	-	-	3	1	1	1
Red Mesa B/w	34	14	21	5	3	2
Escavada B/w	-	-	1	T	-	-
Puerco B/w	4	2	18	5	3	2
Gallup B/w	13	5	68	17	9	6
Chaco B/w	4	2	3	1	3	2
Chaco-McElmo B/w	2	1	1	T	12	8
Unclassified PII-PIII B/w	21	9	39	10	7	5
UNCLASSIFIED WHITEWARE	44	(18)	49	(12)	15	(10)
CHUSKA WHITEWARE		[T]		[1]		[1]
Newcomb B/w	-	-	1	T	-	-
Chuska B/w	1	T	1	T	-	-
Nava B/w	-	-	-	-	1	1
Unclassified carbon B/w	-	-	2	1	-	-
TUSAYAN WHITEWARE		[T]		[1]		[1]
Kana'a B/w	1	T	-	-	-	-
Dogoszhi B/w	-	-	1	T	-	-
Sosi/Black Mesa B/w	-	-	1	T	1	1
LITTLE COLORADO WHITEWARE				[T]		
Unclassified whiteware	-	-	1	T	-	-
MESA VERDE WHITEWARE				[T]		[5]
Unclassified whiteware	-	-	-	-	1	1
Mancos B/w	-	-	-	-	1	1
McElmo B/w	-	-	1	T	3	2
Mesa Verde B/w	-	-	-	-	2	1
SMUDGED WARE	-	-	3	(1)	1	(1)
TSEGI ORANGEWARE				[1]		[1]
Unclassified orangeware	-	-	2	1	2	1
WHITE MOUNTAIN REDWARE		[2]		[1]		[3]
Unclassified redware	4	2	2	1	2	2
Puerco B/r	-	-	-	-	3	2
Wingate B/r	1	T	-	-	-	-
Totals	241	98	393	101	149	104
Ware %		97		100		100
Temporal Period	A.D. 950[b] -1050		A.D. 1050-1100		A.D. 950-1250	
Sherd Density (per m²)	8.0		28.1		1.9	
Forms: (decorated only):						
Bowls	34		75		31	
Jars	91		141		75	
Ladles	4		2		5	

[a] T = trace (less than 0.5%). Ware percentages = [ ]; combined ware and type percentages = ( ).
[b] Ceramics from the late A.D. 1000s and 1100s are intrusive, probably from the nearby house.

The community occupies the classic community location in a widened area of the canyon where major adjacent tributaries enter Chaco Wash. The largest tributary, Wild Horse Canyon, extends 2.5 km south into Chacra Mesa, although it is nearly devoid of small-house occupation. A large stock tank at its mouth, constructed in the late A.D. 1940s for Edward Sargent (Mrs. Homer Hastings, personal communication 1990) when the greathouse was vandalized, attests to the probability of significant runoff. It is one of the few major side canyons in Chaco Canyon that has not been incised by erosion, possibly because it has little gradient. We expect that this confluence was particularly amenable to community water-control efforts and that Wild Horse Canyon, in particular, was excellent for horticulture.

The clustering of the Bonito phase houses on the ridges close to Chacra Mesa limits practical utility of southern solar radiation advantages. Many early houses were oriented east (Figure 9.11) but were built over in the A.D. 1000s, early A.D. 1100s, and A.D. 1200s by houses facing a different direction. At least three large Mesa Verde-era houses built in the A.D. 1200s were located on benches on the north side of the canyon where there were few Bonito-phase houses. House locations and orientations, therefore, may be indicative of shifting occupation durations. The A.D. 900s community suggests a large, intermittent use of the area.

Despite the complete abandonment of all ant nests except in the flood plain, turquoise manufacturing debris, in the form of micro-debris and beads and pendants broken during production, are present on the community sites. The greathouse trash mound contains much of this material, however, small A.D. 900s and 1000s houses also contain it. The absence of ant activity severely limits the ability to find clustered deposits of ornament manufacture debris, nevertheless, enough was found to warrant interpretation that it mirrors, in time and space, the same widespread activity noted in the Fajada Gap Community. Well-weathered, abandoned ant nests are common on the sites, giving rise to our Navajo name for the East Chaco greathouse as Kin dóó wóláchíí' yóó' íína' (Kin doe wo-la-chee yo e-nah) or house next to place where red ants have gone.

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APPENDIX G

HYDRATION ANALYSIS OF OBSIDIAN ARTIFACTS FROM CHACO CANYON, NEW MEXICO

Christopher M. Stevenson[a]

Nine obsidian artifacts were submitted to the Diffusion Laboratory for chemical analysis and age determination using the obsidian hydration dating method. The samples were obtained from multiple subsurface contexts at the Spadefoot Toad Site (29SJ 629) in Chaco Canyon, New Mexico.

To calculate an absolute date for an obsidian artifact, four analytical procedures need to be completed. First, the amount of surface hydration, or the thickness of the hydration rim, must be measured. Second, the geological origin of the artifact needs to be ascertained in order that the appropriate set of rate constants, particular to each glass type, may be applied. Third, the hydration rate constants for each chemically distinct natural glass are estimated from their compositions. Finally, the soil temperature and relative humidity at the archeological site is estimated so that the rate of hydration estimated at high temperature may be adjusted to reflect the hydration temperature at the prehistoric site. Each of the analytical steps is discussed below.

Hydration Rim Measurement

A thin section was prepared for each sample under the guidelines presented by Michels and Bebrich (1971). Hydration rim width measurements were made at 800 power using a Watson image-splitting measurement instrument (Scheetz and Stevenson 1988). Seven independent measurements were made and a mean value and standard deviation were calculated (Table G.1). The standard deviations represent the precision errors associated with the measurement process. A $0.1\mu m$ error factor was used to calculate the uncertainty factor for each age determination. Hydration rims were observed on all specimens.

Compositional Analysis

Chaco Canyon is located to the northwest of several large obsidian flows. The extrusion points for the glasses are located in the Jemez Mountain region or at East Grants Ridge. The erosion of the high silica rhyolite flows resulted in the deposition and transport of obsidian within the Rio Puerco and Rio Grande rivers to locations as far south as El Paso, Texas (Stevenson and McCurry 1990). Additionally, obsidian from these sources was acquired directly from the flow and exchanged or traded. As a consequence, chemically distinct obsidians with different rates of hydration may be present at a prehistoric site. The situation requires that each of the artifacts be chemically analyzed to

Table G.1. Obsidian hydration rim measurements and dates for 29SJ 629.[a]

Lab No.	Depth in cm	Temp in °C	%RH	Source	Rim Width (μm)	S.D.	Rate	Date	S.D.
89-145	195	15.2	100	?	1.93	0.07	-	-	-
									-
89-146	190	15.2	100	EGR	1.60	0.05	4.81	A.D. 1418	69
89-147	12	17.08	40	EGR	2.30	0.05	4.90	A.D. 871	97
89-148	100	15.2	95	EGR	1.97	0.07	4.32	A.D. 1052	94
89-149	12	17.08	40	CdM	4.56	0.08	7.71	747 B.C.	119
					3.19	0.08	7.71	A.D. 630	84
89-150	175	15.2	100	CdM	3.21	0.05	7.61	A.D. 596	86
					2.62	0.08	7.61	A.D. 1048	70
89-151	12	17.08	40	CdM	2.90	0.05	7.71	A.D. 860	77
					2.87	0.05	7.71	A.D. 882	76
89-152	70	15.8	87	PP	3.18	0.05	10.34	A.D. 972	62
					3.01	0.07	10.34	A.D. 1074	59
89-153	70	15.8	87	OR	3.68	0.05	8.25	A.D. 309	90

[a] Rim measurements for Specimens 89-151 and 89-152 represent two separate cuts. Other double entries represent two rims on the same thin section.

determine the geological source. Once completed, the appropriate rate constants may then be applied.

Nine samples were chemically characterized by X-ray fluorescence analysis to determine their geological origin. This resulted in the identification of four obsidian types: Obsidian Ridge, East Grants Ridge, Polvadera Peak, and Cerro del Medio (Table G.1). A single sample, 89-145, could not be linked to a geological flow. As a result, no additional analysis was conducted on this specimen.

Hydration Rate Development

Hydration rates for each of the obsidian sources has been developed in the laboratory using equations that estimate the rate constants from the composition of the glass. Under conditions of high temperature and pressure (Stevenson et al. 1989), freshly polished monoliths from 14 different obsidian sources were hydrated in a vapor environment between temperatures of 110°C and 230°C for periods of up to 50 days. At the end of the reaction periods, each sample was thin-sectioned and the hydration rim measured. The induced rims were used to calculate the activation energy and the preexponential. The values were then correlated with the intrinsic water content of the glass to establish the rate constant prediction equations. These relationships are presented in Figure G.1. The predicted hydration rate constants are listed on Table G.2.

Soil Temperature Relative Humidity Estimations

Soil temperature and soil relative humidity significantly affect the rate of hydration (Mazer et al. 1991). These data were obtained for the project area using temperature\relative humidity monitoring cells developed by Ambrose (1980). Cells were placed at Shabik'eshchee Village at depths between 5 cm and 100 cm for a period of one year. At the end of this

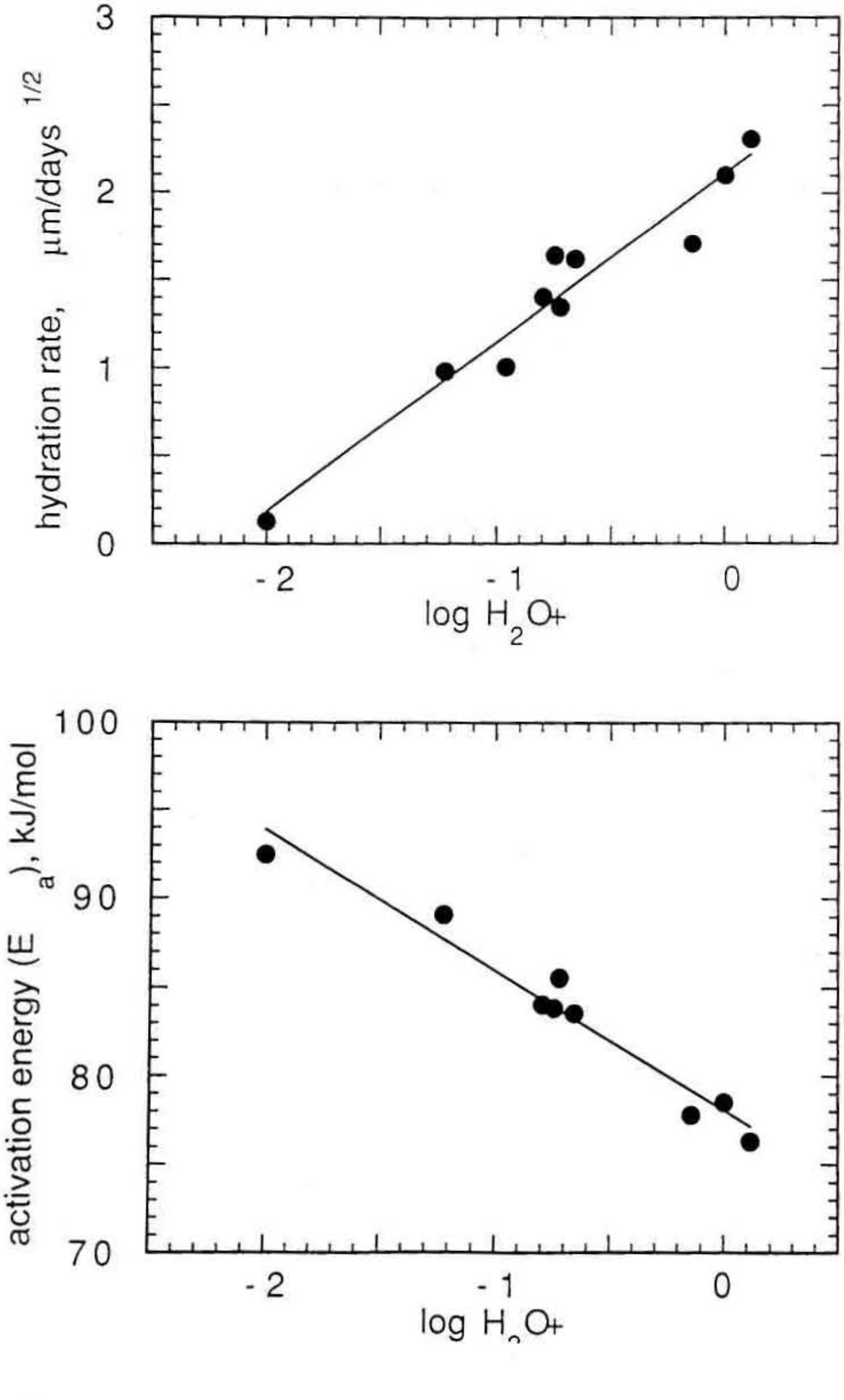

Figure G.1. *Relationships of induced high temperature and pressure to glass to calculate the activation energy and preexponential equations for hydration rates (NPS 310/82809 A).*

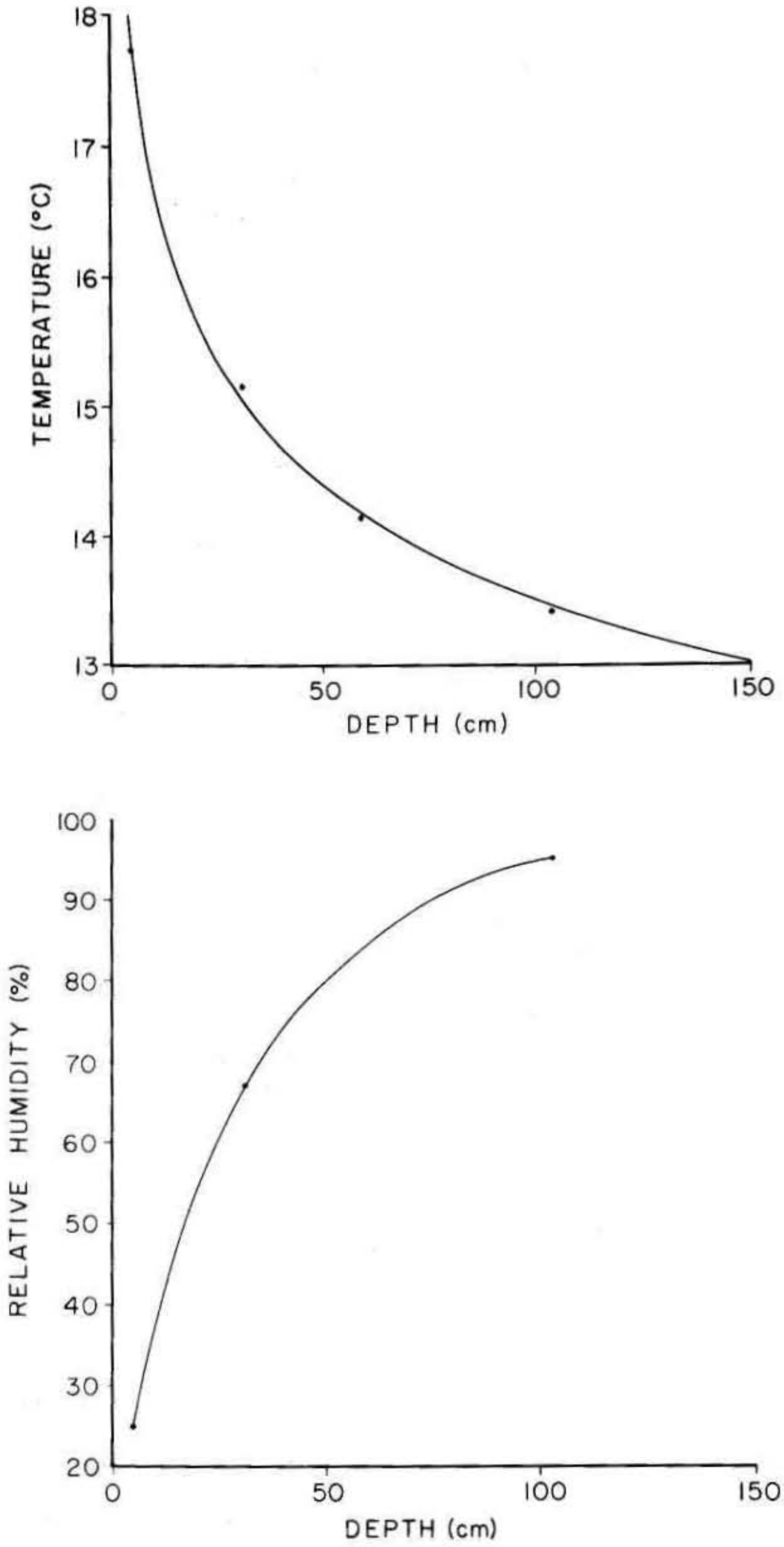

Figure G.2. *Temperature and relative humidity curves calculated for the soil profile at Shabik'eshchee Village, Pithouse Y, in Chaco Canyon (NPS 310/82810 B).*

Table G.2. Hydration constants and rates for New Mexico obsidians.

Obsidian Source	Wt. % H²O+	A(μm^2/day)	E(J/mol)
Cerro del Medio	0.23	2.24	83116
Polvadera Peak[a]	---	6.17	81324
Obsidian Ridge[b]	---	2.16	81785
East Grants Ridge	0.15	1.74	84589

[a] The Polvadera Peak preexponential (A) was developed at 180°C while all other obsidians were developed at 160°C.

[b] Obsidian Ridge rate constants were empirically determined at elevated temperature and pressure. All other rate constants were estimated from the H_2O+ values.

period the cells were retrieved and analyzed. Temperature and relative humidity curves were calculated for the soil profile (Figure G.2). The result from the cell planted at 59 cm (71 percent RH) was eliminated from the calculation of the curve since it was inconsistent with the overall trend of this and other data sets. Temperature and RH values for individual artifacts were estimated from the curves.

Age Estimation

Using the estimated effective hydration temperature and relative humidity, a hydration rate for each obsidian may now be calculated. The estimated high temperature hydration rate (160°C) is extrapolated to the hydration rate at the estimated EHT and RH for the project area using the Arrhenius equation: $K = (RH)k' \text{ EXP } E/RT$

where K = archeological hydration rate (μm^2/day)

RH = relative humidity adjustment (%)

k' = preexponential (μm^2/day at 160°C)

E = activation energy (J/mol)

R = universal gas constant

T = effective hydration temperature in degrees Kelvin.

The hydration rate, temperature, relative humidity, and date for each artifact is presented on Table G.2. It should be noted, however, that laboratory hydration rate constants are experimental and subject to evaluation and revision.

[a] Diffusion Laboratory, Archaeological Services Consultants, Columbus, OH 43202. Report prepared in October 1991.

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APPENDIX H

ARCHITECTURE ON FAJADA BUTTE

Dabney Ford

Introduction

In August, 1989, the Chaco Culture NHP preservation crew conducted scheduled stabilization work on the masonry cliff structures along the upper part of Fajada Butte. The work consisted of mapping and documenting the architectural details of the structures, testing mortar mixes to arrive at an appropriate match, repointing eroded mortar joints, and adding a capping course to exposed wall cores. During the mapping and documentation phase, it became evident that the structures on Fajada Butte, particularly a masonry ramp on the west face, were quite unique and deserved more extensive study.

The structures on Fajada Butte were originally recorded in 1971 and 1972 during the Chaco Center inventory survey of the park. The complex on the west side of the butte was designated 29SJ 296 and was described in the survey as a masonry pueblo, a hearth, and petroglyphs. The materials on the east side and top of the butte were recorded as 29SJ 297, consisting of cliff rooms, hearth, and associated rock art. Several years after the survey, the New Mexico Archaeological Society Rock Art Field School thoroughly recorded the rock art on the butte. Anna Sofaer, a participant in the field school, recognized the significance of one particular panel, and established the Solstice Project to research what became known as the Sun Dagger as well as other solar and lunar markers on the butte (Sofaer et al. 1979). Although the study of calendrical markers on the butte has contributed greatly to our understanding of the complexity of Anasazi culture, it overshadowed examination of the architectural remains on the butte. The recent preservation work provided the justification to research the architecture in greater detail.

For purposes of this report, the two sites, 29SJ 296 and 29SJ 297, are considered one architectural unit (Figures H.1-H.2). Documentation of the architecture is divided into the cliff structures, east and west faces, and the prehistoric ramp. Reference will be made to the presence of rock art elements associated with the structures, but no detailed descriptions are presented (see Sofaer et al. 1979, 1982, and 1987, for discussion of calendrical markings).

Cliff Structures

The cliff structures are built along the first terrace beneath the top of Fajada Butte. Evidence of structures are visible primarily on the eastern and western sides of the butte (Figure H.2). The structures are more eroded on the extreme ends of the two sides, particularly the far southern section. No construction remains were found on the south face of the butte, but it is believed that there may have been contiguous architecture; perhaps a catwalk, scaffolding, or other type of structure connecting the

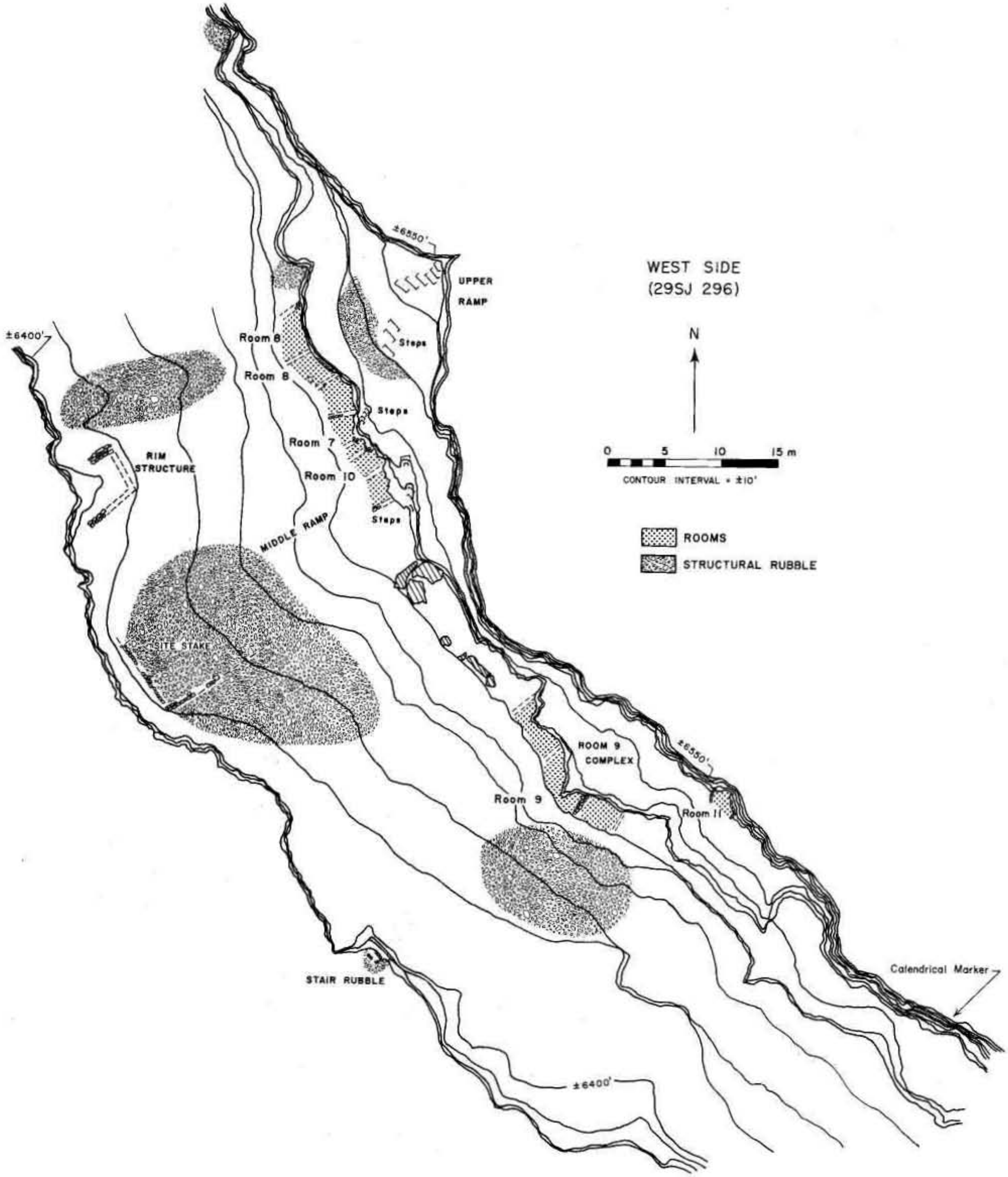

Figure H.1. Brunton compass map of architectural features on the west side of Fajada Butte (NPS 310/82836 B).

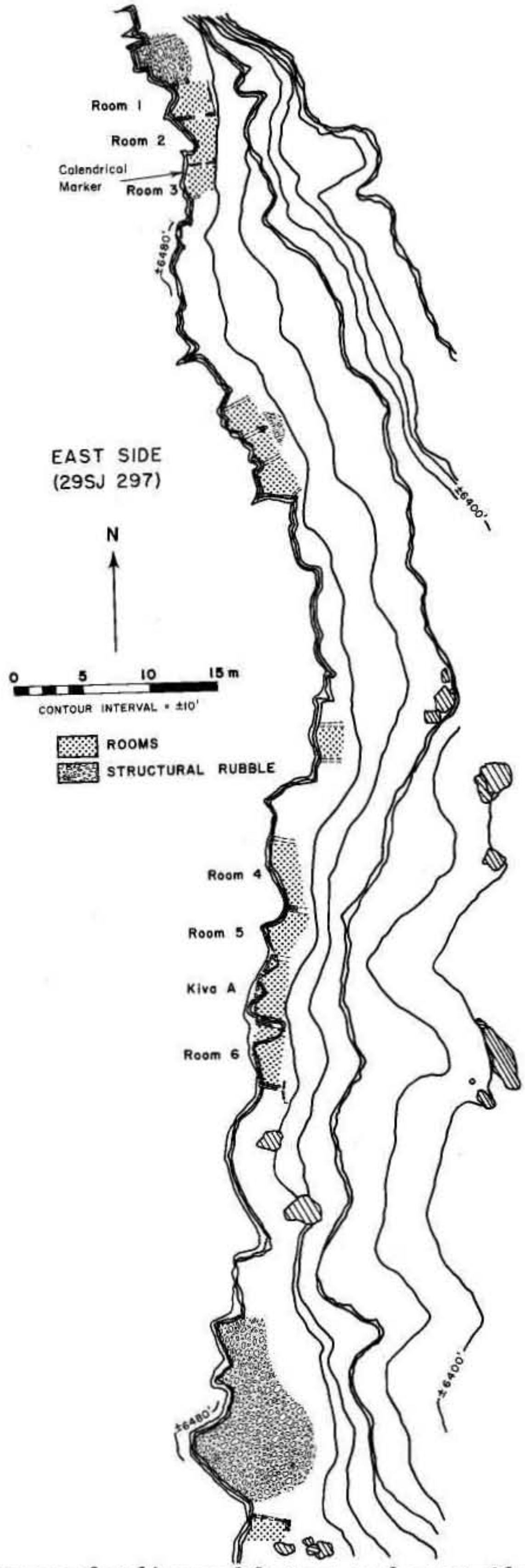

Figure H.2. *Brunton compass map of architectural features on the west side of Fajada Butte (NPS 310/82835 B).*

two sides of the butte. A total of ten rooms and one circular kiva are clearly visible, and an additional six areas containing rubble and small wall fragments were defined during the mapping. Based on the extent of the rubble, number of wall fragments, and presence of beam seats carved in the cliff, it is estimated that there may have been as many as thirty to thirty-five rooms on the butte.

All of the structures use the cliff face to form the back wall of the individual rooms. Roof supports, or beam seats, are carved into this face, and plaster and/or masonry facing is visible on part of the cliff wall where shale and coal deposits are exposed. Much of the rock art is found above the roof levels of the rooms, but there is little evidence to suggest that there were complete second stories on any of the structures.

Wall construction was of compound and simple/double masonry, with locally available soils used for mortar. Mortar joints contain both chinking and leveling stones, but do not appear to have been placed in a decorative pattern. None of the walls in the cliff structures are core-veneer construction, primarily because they are single story and had to support only a part of the roof weight. Several of the more completely preserved rooms retain fill, evidence of floor features, and remains of the outside wall.

Ceramic samples associated with the cliff structures suggest that while the assemblages date primarily from the A.D. 1200s, there is a constant percentage of wares dating to the late A.D. 900s, A.D. 1000s, and early A.D. 1100s (Table H.1). The late ceramics include Mesa Verde Black-on-white, McElmo Black-on-white, the late Chuskan whiteware types, and San Juan utility sherds containing crushed sherd and rock temper. The earlier components are composed of small percentages of Red Mesa Black-on-white, Puerco and Gallup Black-on-white, and sand and trachyte-tempered utility wares, suggesting some activities on the butte as early as the late A.D. 900s through the early A.D. 1100s (Chapter 8; Toll and McKenna, this report).

East Face

Remains of structures, rubble concentrations, and artifacts are scattered along the entire eastern face of the cliff, for a total of approximately 120 m. All of the structures are located on a single topographic contour, the slope being extremely steep beneath the cliff. Above the cliff ledge, there are several small terraces which contain rock art, but no evidence of structures. Judging from the average size of the visible rooms and the quantity of rubble, there may be as many as twenty rooms along this face.

Six definable rooms were recorded on the east face of the butte. A group of three are located on the far north end on this east side, with rubble concentrations and possible wall alignments suggesting at least three additional rooms. Three solstice, equinox, and/or noon markers are associated with this group of rooms (Sofaer and Sinclair 1987) that are pecked into the cliff face above the roof levels of the rooms. Remnants of the outer walls are visible in Rooms 1 and 2, which may also contain intact room fill. In the section of the cliff between Room 3 and Room 4 there are no definable wall alignments but several concentrations of rubble and fill. Two intact deposits of charred corn are eroding out of the slope, indicating some type of structure or feature is present at each deposit.

Rubble and fill deposits on either side of Rooms 4 through 6 and Kiva A indicate several additional structures. Although no outside wall remnants can be seen, it appears that room fill is still intact. A number of shaped slabs, perhaps door/hatch covers are in the fill, along with manos and ceramics. Two niches are visible in masonry facing that was applied to the cliff face and forms the back wall of the kiva. At the southernmost point on the east side of the butte there is a large rubble concentration with at least one wall alignment. This area may contain from three to five rooms, and artifacts in the rubble suggest intact fill.

West Face

Wall remnants and masonry rubble were found along the west face of the butte for a distance of approximately 90 meters. While most of the structural remains are concentrated at the base of the cliff ledge, the slope beneath the ledge may contain additional features (in addition to the ramp) and at least one masonry room was constructed in the terrace above the cliff ledge. An estimate of 15 rooms was made based on the rubble, beam seats, and wall alignments.

Table H.1. Ceramic samples from the top west side of Fajada Butte.[a]

CERAMIC TYPE	Masonry Ramp No.	Masonry Ramp %	Cliff Structures No.	Cliff Structures %	Totals No.	Totals %
CIBOLA CULINARY						
Plain gray	7	2	13	3	20	3
Wide neckbanded			1	T	1	T
Narrow neckbanded	2	1	5	1	7	1
Neck indent. corrug.	1	T	3	1	4	1
Uncl. indent. corrug.	33	10	38	8	71	9
Indent. corrug. rims[b]						
PII	1	T	1	T	2	T
PIII	2	1	2	T	4	1
Uncl. rim fillet	2	1	1	T	3	T
CHUSKA CULINARY						
Plain gray			1	T	1	T
Capt. Tom Corrug.	1	T	1	T	2	T
Neck indent. corrug.			1	T	1	T
Unclass. indent. corrug.	15	4	44	10	59	7
Blue Shale Corrug. rim			1	T	1	T
Hunter Corrugated rim			2	T	2	T
Unclass. rim fillet	2	1	1	T	3	T
MISC. CULINARY[c]						
Plain gray			2	T	2	T
Narrow neckbanded	2	1	1	T	3	T
Neck indent. corrug.	1	T			1	T
Uncl. indent. corrug.	115	34	169	37	284	35
Indent corrug. rims[b]						
PII			1	T	1	T
PII-PIII	1	T			1	T
PIII	7	2	8	2	15	2
Unclass. rim fillet	1	T			1	T
MOGOLLON INDENT. CORRUG.	3	1			3	T

Table H.1. (continued)

CERAMIC TYPE	Masonry Ramp No.	Masonry Ramp %	Cliff Structures No.	Cliff Structures %	Totals No.	Totals %
CIBOLA WHITEWARE						
Red Mesa B/w	3	1	7	2	10	1
Escavada B/w			1	T	1	T
Puerco B/w	2	1	4	1	6	1
Gallup B/w	4	1	4	1	8	1
Chaco B/w			1	T	1	T
Chaco-McElmo B/w	2	1	3	1	5	1
Unclass. PII-PIII B/w	8	2	6	1	14	2
Socorro B/w	1	T	2	T	3	T
Reserve/Tularosa B/w			3	1	3	T
Klageto B/w	1	T			1	T
UNCLASS. WHITEWARE	11	3	16	3	27	3
CHUSKA WHITEWARE						
Nava B/w			1	T	1	T
Crumbled House B/w			5	1	5	1
Unclass. carbon whiteware	2	1	6	1	8	1
LITTLE COLORADO WHITEWARE	1	T			1	T
MESA VERDE WHITEWARE						
Mancos B/w	2	1	4	1	6	1
McElmo B/w	5	1	7	2	12	1
McElmo/Mesa Verde B/w	8	2	2	T	10	1
Mesa Verde B/w	38	11	40	9	78	10
Unclass. whiteware	35	10	32	7	67	8
SMUDGED WARE	1	T			1	T
MOGOLLON BROWNWARE	3	1			3	T

Table H.1. (continued)

CERAMIC TYPE	Masonry Ramp No.	Masonry Ramp %	Cliff Structures No.	Cliff Structures %	Totals No.	Totals %
TSEGI ORANGEWARE						
Unclass. orangeware			1	T	1	T
WHITE MT. REDWARE						
Wingate B/r			2	T	2	T
St. Johns B/r	10	3	7	2	17	2
St. Johns Polychrome	1	T	4	1	5	1
Unclass. redware	8	2	7	2	15	2
Totals	342	99	461	98	803	96
Sherd Density (per m^2)	0.69	--	0.84	--	0.77	--

[a] T= trace (less than 0.5%). Samples do not necessarily reflect entire site.
[b] Based on rim flare.
[c] Sherd or San Juan rock tempered.

Beginning on the south end of the western side of the butte, in the area immediately beneath the double spiral and rectangular noon/equinox marker (Sofaer and Sinclair 1987), shaped slabs, artifacts, and rubble indicate possible structures but no definite alignments. An estimated four to five rooms on either side of Room 9 are evidenced by intact, room-fill deposits, large door slabs, roof beam seats, etc.

The masonry ramp, described below, is visible in the next section of the cliff, but alignments in the rubble of the ramp suggest that there may be rooms articulated with the ramp. Rooms 10, 7, and 8 are the most visible structures on the west side of the butte. Some masonry facing can be seen on the cliff that forms the back walls of the rooms. Hearths, shaped slabs, and other intact fill defines the floors and floor-fill of the rooms. On the slope beneath these rooms is an extensive artifact scatter. To the north of this series of rooms are rubble concentrations, evidence of wall alignments, and roof beam seats, suggesting up to four additional structures.

Prehistoric Ramp

This structure was built on the west-southwestern flank of Fajada Butte and extends from the toe of the lowermost talus to the uppermost sandstone stratum that forms the top of the butte (Plate H.1). The ramp is divided into three distinctive sections (Figure H.3). The lower section follows an erosional spine with a vertical slope angle which aligns with the upper construction. The middle section is masonry, at least a portion of which is core-veneer construction with a Type IV veneer style. In the upper section of the ramp, traversing the slickrock, there are hand and toe holds, scaffolding holes, cut stairs, and possibly masonry stairs. From base to top, the ramp is approximately 230 m (700 feet) in length and ascends 95 vertical meters (280 vertical feet). The ramp probably articulates with a segment of the Chacra Face road associated with the isolated great kiva (29SJ 1253) near Marcia's Rincon (Chapter 9). The ramp appears to be a formal access to the top of Fajada Butte, which houses numerous calendrical markings.

The lower section of the ramp, from the Fajada Wash floodplain to the first vertical sandstone cliff, follows an erosional ridge spine. The alignment appears to begin at the base of the talus on the Fajada Wash floodplain, at the site of a large concentration of burned rubble and fire-reddened upright slabs (recorded as 29SJ 294). This burned rubble is near or on the Chacra Face Road alignment. On initial inspection, the erosional ridge spine appears to be an unmodified surface. However, the extreme uniformity of the slope, breaks in the bedrock outcroppings, and light artifact scatter suggest that the surface has been culturally modified (landscaped; e.g., Stein 1987; Stein and Lekson 1992). Additionally, this lower ramp forms a clear alignment from the burned slab feature on the canyon floor and the masonry construction of the middle section of the ramp, both horizontally, in plan view, and vertically in the slope angle (Plate H.1).

The lower ramp is separated from the middle section by a 15-m-high cliff face. Ten meters south of this lower ramp alignment is a natural vertical crack or "chimney" up the cliff, in which hand and toe holds were carved. Immediately above this crack is a mass of eroded masonry, probably the remnants of masonry stairs which would have completed the ascent up this section of the cliff. This offset in the ramp alignment clearly takes advantage of a natural route up the cliff, however it is suspected that there also may have been a continuous, on-line connection between the lower and middle sections of the ramp. While there is a "landing" or platform (described below) at the top of the cliff, there are no features in the cliff surface, such as carved holes (beam or pole seats), hand and toe holds, etc.

The massive masonry ramp in the middle section begins at the upper lip of the sandstone cliff and continues upslope approximately 26 m to the ledge under which the cliff rooms were constructed. This section of the ramp is composed primarily of a masonry rubble core and fill. Definable alignments are visible along the southern and western edges of the ramp and appear to be the exterior retaining walls of the ramp. On the north perimeter of the ramp, a core-veneer wall encloses a natural break in the cliff edge. This enclosure may be a landing or shelf support for a rope and/or timber ladder which could have connected the lower and middle ramp segments. While the chimney, offset slightly from the ramp, provides a means for scaling the cliff (service stairs), the elaborate masonry and possible ladder connection would have preserved the continuous alignment of the

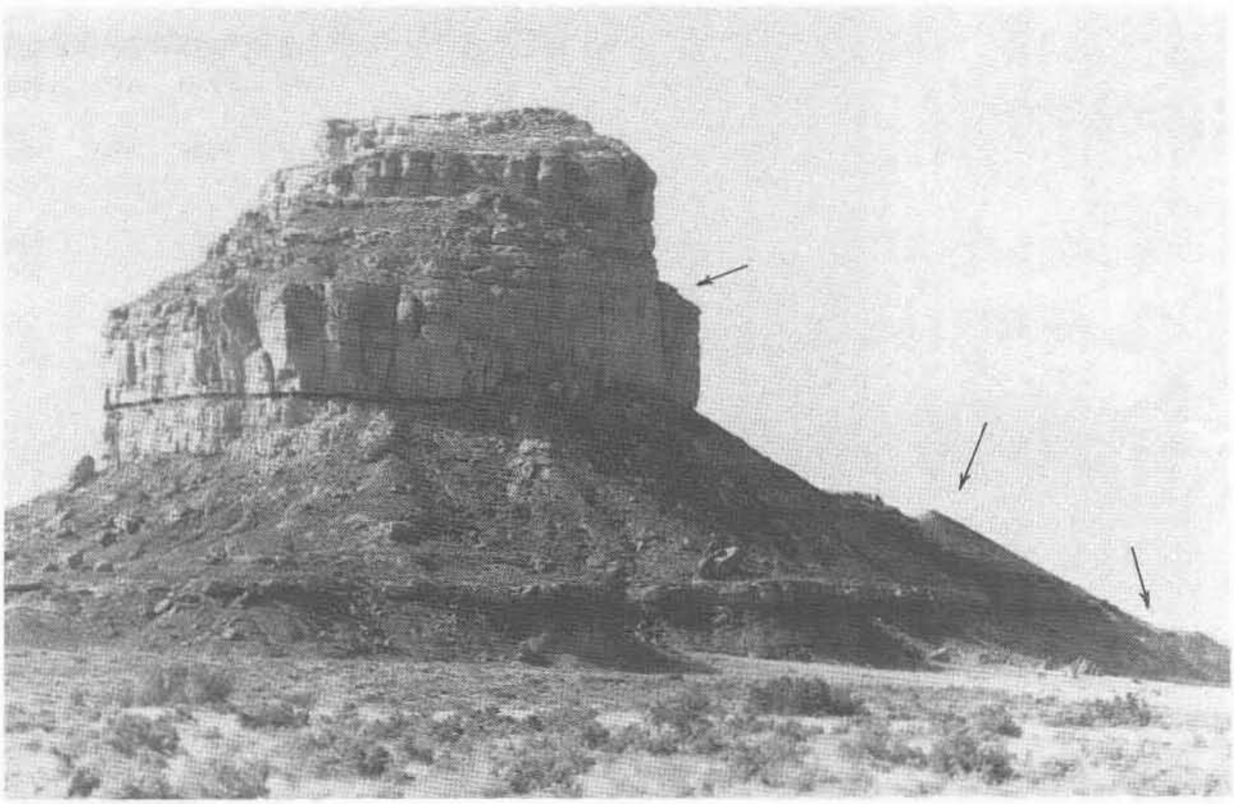

Plate H.1. *View of Fajada Butte looking south. Note ramp profile on the right hand side of the butte talus slope. Arrows mark the masonry structure at the cliff edge and the ramp.*

ramp ascent. Similar situations exist at the the Escalon pinnacle structure in the Indian Creek drainage just west of Chaco Canyon and at the Chimney Rock greathouse near Pagosa Springs, Colorado. At Escalon, a massive masonry staircase ascends from a clay ridge to a small landing platform, which is attached to the structure on the pinnacle (Marshall 1993; Marshall and Sofaer 1988). At Chimney Rock, an erosional ridge and shelf or landing in the cliff edge are incorporated into a possible alignment access to the mesa top (John Stein, personal communication 1992).

At the upper extent of this middle section of the ramp, where the ramp is closest to the cliff structures, it appears that the ramp is superimposed over the cliff structures. Without wall testing and more detailed investigation, however, it is not possible to determine for certain whether the rooms and ramp are contemporaneous or if one preceded the other.

At the upper end of the masonry ramp, a series of 2-to-4-m-high sandstone ledges step up to the final vertical cliff on the top of the butte. It is at the base of these ledges that the cliff structures were built. On these ledges are remains of carved steps, although in most places it is difficult to distinguish the steps from natural horizontal planes of the sandstone. These steps are not in strict alignment, but seem to be placed to accentuate the existing ledge contours. At the top of these ledges are two distinctive breaks or notches in the cliff, through which the ramp is aligned. There are several beam sockets in the lower of the two notches, suggesting a scaffold structure. No sockets or masonry are visible in the upper notch which opens onto the top of Fajada Butte. At the top, aligned with the three segments of the ramp is a meter square, fire-reddened slab box.

Ceramic transects associated with the middle section of the ramp are quite similar to those associated with the cliff structures (Table H.1). Late

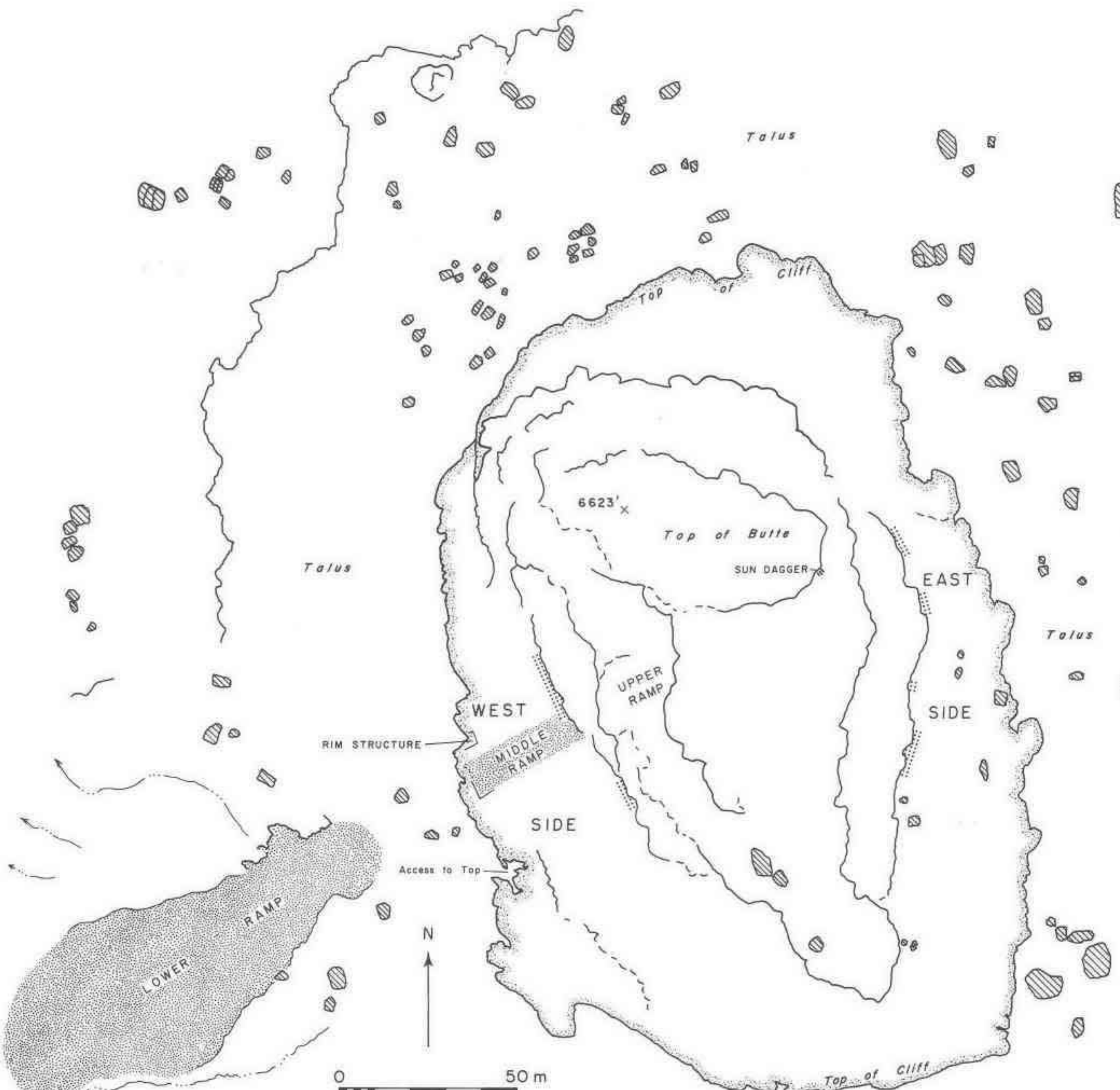

Figure H.3. *Plan view of Fajada Butte showing the ramp and the locations of features on top. Drawn from an unrectified aerial photograph (NPS 310/82837 A).*

wares dating from the A.D. 1200s predominate on the ramp, but there are earlier wares. Mesa Verde Black-on-white and the White Mountain redwares are the dominant decorated wares, followed by the Cibola whitewares of Red Mesa, Puerco, Gallup, and Chaco-McElmo Black-on-whites.

Summary

There are two distinctive construction components on Fajada Butte. The ramp is a massive, formal piece of architecture which addresses the top of the butte and presumably the calendrical devices as well. The cliff rooms feature the scale and characteristics of habitation structures, and are also directly associated with the calendrical markers.

During the initial mapping, it appeared that the ramp may have been the original structure on the butte. The massive, formal, core-veneer style architecture and association with road features suggested the late Bonito phase of the late A.D. 1000s and early A.D. 1100s. The cliff structures lack the mass and masonry style of this period, and their construction is more characteristic of the A.D. 1200s occupation in the canyon. But, after completing the mapping, tabulating ceramic counts, and studying the association between these two architectural components, it seems evident that they are contemporary. The ceramic assemblages from both the ramp and the cliff structures are dominated by late wares dating from the A.D. 1200s, but also contain significant amounts of earlier pottery. It is suggested that both the ramp and the cliff structures were initially constructed during the late A.D. 900s or A.D. 1000s, later modified, and then expanded or otherwise reused during the A.D. 1200s.

There is little doubt that Fajada Butte retained a sacred, shrinelike quality throughout the Anasazi occupations of the canyon. Topographically, the butte is a unique and imposing landmark. The lunar and solar calendrical markers signify long-term, ritual use of the butte, and the cliff structures help understand the nature of that use. The ramp is an elaborate architectural embellishment that connected the valley floor and the Fajada Gap Community (Chapter 9) to the top of the butte.

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APPENDIX I

COLOR PLATES OF EXCAVATIONS AT THE SPADEFOOT TOAD SITE[a]

MICROFICHE

1. Aerial view of 29SJ 629 after walls were defined (C-1304).
2. Overview of 29SJ 629 excavations looking southeast toward the Fajada Gap area (C-1067).
3. Room 3, Floor 1, Heating Pit 3 stratigraphy. 15-cm north arrow (C-652).
4. Room 3, Floor 1, plan view from overhead bipod camera (C-975).
5. Room 5, Floor 1, plan view from the overhead bipod camera (C-655).
6. Overview of Rooms 6-9, looking south. Mike Windham in Room 6, Tom Windes typing in Room 9 (C-1060).
7. Room 9, Floor 1, overview. 30-cm north arrow (C-566).
8. Kiva, north-south view of fill stratigraphy. Looking west. Nancy Akins on right. Yellow board is in 10-cm increments (C-633).
9. Kiva, Floor 1 with excavators at work: Wolky Toll, Bill Gillespie, Bob Powers, and one unidentified person (C-1101).
10. Kiva, Floor 1, Firepit 1 (half excavated). 30-cm north arrow (C-1290).
11. Kiva and Pithouse 2 floors in common. Looking south. 50-cm north arrow (C-933).
12. Kiva and Pithouse 2, showing the mass of lignite and adobe chunks below Floor 2. Looking south. 50-cm north arrow (C-909).
13. Excavations in Pithouse 2, Floor 1: left-right: Wolky Toll, Nancy Akins, Tom Windes, Vicky Atkins, and Bob Powers (C-890).
14. Pithouse 2, Floor 2, Heating Pit 4, showing charred brush in clean sand fill. 15-cm scale (C-906).
15. Pithouse 3, east-west profile of stratigraphy (C-1112).
16. Pithouse 3, Floor 1, plan view from overhead bipod camera (C-969).
17. Plaza Grids 8, 9, and 14, plan view from overhead bipod camera (C-1073).
18. Trash Midden trenches through Grids 64, 71, and 77. Looking north. 30-cm north arrow (C-998).
19. Alden Hayes and Tom Windes look over the 29SJ 629 excavations (C-896).
20. Peter McKenna types notes in Room 9 (C-1098).
21. Steve Lekson maps the plaza excavations (C-1074).
22. Earl Neller and Bob Powers excavate the Pithouse 2 ventilator shaft (C-0899).
23. Bill Gillespie excavates Burial 1 in the Trash Midden, Grid 76 (C-1062).
24. Plaza Firepits 2 and 6 (half excavated). 30-cm north arrow in FP 6 (C-947).
25. Chip Wills and Wolky Toll sample an ant nest (C-883).

26. W. James Judge maps the site with an alidade. Photograph by Rich Meleski, University of New Mexico, Photo Services. (C-1226).
27. Laboratory director Jean Hooten washing a metate fragment (C-1353).
28. Peter McKenna works on the ceramic type collection (C-1336).
29. Catherine Cameron washing flakes in the field (C-1329).
30. Robert Powers working on a report (C-1365).
31. Marcia Truell works on nearby 29SJ 627 (C-1228). Photograph by Rich Meleski, University of New Mexico, Photo Services.
32. Helene Warren examines sherd temper through the microscope (C-1339).
33. Jimmy Lopez excavates at the site (C-1124).
34. Trachyte temper revealed in a fresh break of a sherd (C-1334).
35. Non-local lithic material: Material Type 1040, Morrison formation chert (C-3645).
36. Lithic material found locally: Material Type 1053, High Surface Chert with black inclusions (C-3626).
37. Lithic material found locally: Material Type 1109, light Splintery Silicified Wood (C-3653).
38. Lithic material found locally: Material Type 1112, dark Cherty Silicified Wood (C-3628).
39. Lithic material found locally: Material Type 1113, light Cherty Silicified Wood (C-3629).
40. Lithic material found locally: Material Type 1140, Chalcedonic Silicified Wood (C-3632). This material was favored for the production of micro-drills.

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[a] C-numbers refer to the number of the original color slide in the National Park Service, Chaco Collections, housed at the University of New Mexico, Albuquerque, NM.

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