

*Survey and Excavations on Cummings Mesa,
Arizona and Utah, 1960-1961*



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*Survey and Excavations on Cummings Mesa,
Arizona and Utah, 1960-1961*



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SURVEY AND EXCAVATIONS ON CUMMINGS MESA,
ARIZONA AND UTAH, 1960-1961

GLEN CANYON RESERVOIR
UPPER COLORADO RIVER BASIN

Written by J. Richard Ambler, Alexander J. Lindsay, Jr., and Mary Anne Stein as a part of the Upper Colorado River Basin Salvage Program in accordance with the Memoranda of Agreement 14-10-333-530 and 14-10-333-666 between the U. S. National Park Service and the Museum of Northern Arizona.

TO
WILLIAM C. MILLER

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EDITOR: *Diony H. Sutherland*

Foreword

IN 1957 the Northern Arizona Society of Science and Art, Inc., operator of the Museum of Northern Arizona, signed two contracts with the National Park Service for emergency archaeological work in the Glen Canyon section of the Colorado River, in the lower part of the San Juan River, and in the southern tributaries of both rivers. This work was necessary for, with the completion of Glen Canyon Dam, a lake will back up approximately 187 miles along the Colorado River and 70 miles along the San Juan. The lake is already forming behind the partially completed dam, many sites that man occupied at different periods over thousands of years are now destroyed, and soon many more will be gone for ever.

The work of the Museum has followed for the most part along the general lines outlined in an article I wrote for *Plateau*, Volume 30, January, 1958. In this I said that the first objective was to be a survey of the river bottoms themselves and of the tributaries, followed by the excavation of the important sites that would be destroyed by the lake. Finally, we would try to answer some of the problems resulting from these archaeological studies.

This report covers the surveys and excavations on Cummings Mesa in Arizona and Utah in the years 1960 and 1961, and is one of a series that will be published in the near future. Together with other reports published and to be published by the Museum of Northern Arizona on the Glen Canyon Project, and the reports stemming from the work done by the University of Utah on the Glen Canyon Project, it will combine to make one of the most complete archaeological pictures ever published about the prehistory of a large area, an area archaeologically barely known prior to the beginning of this project, and an area which has been found to be rich in prehistoric occupation.

Cummings Mesa, which overlooks the Colorado River today, in the near future will have water lapping along the base of the Mesa as Lake Powell backs up behind Glen Canyon Dam. Many of the sites excavated in previous years on the flanks of Cummings Mesa will be destroyed. These sites, and others that were excavated and reported on in the *Museum of Northern Arizona Bulletin* 36, *Glen Canyon Series No. 3*, raised a great many questions which cannot be answered by more work in the canyon bottom. This is because the vast majority of the sites tested and excavated along the river were either small, seasonally occupied Anasazi sites or lithic workshop and petroglyph sites. Large, permanently occupied pueblos in the canyons are extremely rare and, with a few exceptions, do not exist in the southern tributaries of the Colorado which cut far south along the flanks of Cummings Mesa. It was thought important to study these upland areas because this

type of site is rare in the impoundment area and because large sites do exist on the upland mesas and plateaus south of the salvage area. It was hoped that work on Cummings Mesa would produce the necessary material to test our hypotheses. Early reports from Cummings's and Bernheimer's work on this Mesa had told of many sites, including large pueblos. Prior to April, 1961, our anticipation ran high that excavation of some of these larger sites would show where the Kayenta Anasazi had had their permanent homes, homes from which they used to go down into the river bottoms to farm, to get material for their stone industry, or to go on trading trips that led across the river into the Virgin and Fremont culture areas.

There was another reason for digging sites on Cummings Mesa — to see if there was any difference in the culture of the western Kayenta from that of the far better known eastern Kayenta. Still another reason for excavating the sites on Cummings Mesa was that with the coming of the lake, tourists in their boats would be able to anchor near some of the trails leading up on to the top of the Mesa and it would not be too long before these virtually untouched pueblos could be pothunted by the Sunday tourist. If ever the information was to be obtained from the sites on Cummings Mesa, this was the time.

These reasons, I think, were valid, and the results of the excavations undertaken by Lindsay and Ambler and others, as reported in this monograph, give the student of southwestern prehistory the first clear picture of the architecture and the artifacts of the western Kayenta Anasazi. This information, together with the evidence that the people who were living on top of Cummings Mesa were of the same culture and probably the same people as those who occupied the seasonally used small sites along the river bottom, for the first time gives us some information of the life of the western Kayenta Anasazi.

Our first excavation program in the highlands answered only some of the major questions posed by work in the canyon lands. Many problems still remain, and fortunately other questions were the outgrowth of our archaeological work on Cummings Mesa. In order to pursue some of these questions the reconnaissance and excavation operations in 1962 were programmed within the boundaries of the Lake Powell Recreation Area, primarily the uplands south of the San Juan River. The results of these investigations will be the next number to be published in the Museum's *Glen Canyon Series*.

Edward B. Danson
Director,
Museum of Northern Arizona

Credits and Acknowledgements

DURING THE COURSE of the preparation, field work, and subsequent analysis that have culminated in this report, the authors have become indebted to many people for their interest and assistance. Without their help this report in its present form could not have been written, and, indeed, might never have been started. It is therefore a pleasant task for us to thank the following persons for their aid.

Our first thanks go to the National Park Service and its representatives, for their sponsorship which made possible archaeological research in the impoundment area of the Glen Canyon Dam under grants to the Museum of Northern Arizona. The continued interest and support of the National Park Service enabled the collection of comparative data from regions adjacent to the area to be flooded, resulting in this report. It is the first of several that will deal with the archaeology of the higher elevations in the Glen Canyon Basin. The Navajo Tribal Council and its district representatives freely granted permission to work in the Cummings Mesa region, all of which is within the Navajo Reservation.

The entire staff of the Museum of Northern Arizona has contributed to this report in all phases of its preparation. Dr. Edward B. Danson, as Administrative Director, acted as a liaison agent for securing research contracts and permits for field work. Dr. Harold S. Colton gave his time freely to assist with ceramic identifications and analysis of clay samples. Dr. Alan P. Olson also assisted in ceramic problems. Mr. William J. Breed assisted in the identification of lithic materials, and joined the 1961 field party for a week to conduct a geological reconnaissance of Cummings Mesa. Dr. Walter B. McDougall and Mr. Milton A. Wetherill, respectively, painstakingly studied and identified herbarium specimens and faunal remains. Miss Katharine Bartlett has willingly assisted in our library research.

With the 1960 field party working from the Colorado River were J. Frank Wright, Calvin R. Cummings, Michael E. Mosley, and Edward B. D. Perin, whose services are greatly appreciated.

The two trips to Cummings Mesa owe a large part of their success to Mr. and Mrs. Myles Headrick, operators of the Rainbow Lodge Trading Post, who assisted us in ways too numerous to mention.

Mr. Royce Knight of Page Aviation supplied air service for dropping supplies on Cummings Mesa and making an aerial reconnaissance of the area.

Mr. James Eden, Superintendent of Lake Powell National Recreation Area, supplied parachutes for the air drop and aided us in other ways, for which we extend our thanks.

Glen Canyon Project personnel on the first trip to the Mesa, in 1960, comprised Mr. Lindsay, Mr. Paul V. Long, Jr., and Mr. Christy G. Turner II. The 1961 trip was again led by Mr. Lindsay, with Mr. Ambler and Mr. Long assisting. Mr. Long supervised the excavations at several sites and took almost

all of the field photographs in 1961. We would like to extend special thanks to him for his conscientious field reporting and photography, often done under adverse conditions. He has also helped in the preparation of this report by reading the reports on the sites with which he is familiar.

The survey made during the 1961 trip was conducted by Mr. William C. Miller, assisted by Mr. Charles Kearns and Mr. Robert Sears, all of whom freely donated part or most of their vacation time from Mt. Wilson and Mt. Palomar Observatories to work on this project. Thanks to them, we have a much more complete sample of the prehistoric sites on Cummings Mesa than would have otherwise been possible.

Mr. Nicholas C. Hawkes joined the field party as a summer assistant, and our appreciation is extended to him for his contribution.

Without laborers, the excavation program could not have been carried out. These men, all residents of the Navajo Mountain area, were quick to learn and proved to be capable and efficient excavators, and we would like to take this opportunity to thank them for their contribution. They are:

John Bryant	Bahe Ketchum
Ephraim Crank	Kee Yazzi Clitso
Tom Dougi	Ivan Nelson
Kee Bahe Holiday	Delbert Smallcanyon

Floyd Laughter and Eugene Holgate, also from the Navajo Mountain area, served as wranglers for both the 1960 and 1961 trips, periodically negotiating the precipitous trails with supplies and equipment.

Once out of the field, many people have contributed to the final form of this report. Miss Elizabeth A. Galligan, as laboratory technician, performed the laborious task of washing and cataloguing artifacts and doing the paper work necessary for the laboratory operations. She was assisted by Miss Nancy Epler, Miss Angelita Hernandez and Mr. John Schreiber.

Our knowledge of the pottery of the Glen Canyon and adjoining areas has profited greatly by discussions and correspondence with Mr. Watson Smith, Dr. David A. Breternitz, Mrs. Florence C. Lister, and Mr. Arthur H. Rohn, and to these people we are indebted for their unselfish donation of their time and thoughts.

Dr. Hugh C. Cutler examined the archaeological plant remains found, and Mrs. Kate Peck Kent studied the cotton cloth fragment from NA7472. Their reports on these studies are appended.

Our gratitude is extended to Mr. Thomas Harlan and Dr. Bryant Bannister of the Laboratory of Tree-Ring Research, Tucson, who examined the wood specimens.

We are grateful to the many people who helped us in our search for historical data pertaining to Cummings Mesa, particularly Mrs. Sadie Schmidt

of the Arizona Pioneer's Historical Society, for her help in locating and doing research in pertinent papers of Byron Cummings in the Society's library.

Mrs. Ole Solberg has capably and patiently performed the laborious task of typing and re-typing the several drafts of the report.

Most of the field photographs were taken by Mr. Paul V. Long, Jr., with some by Mr. Lindsay and Mr. Christy G. Turner II. The task of printing these photographs for the report was undertaken by Mr. Philip M. Hobler, who also took all the pictures of artifacts and the photograph used in Figure 1. All the line drawings and graphs are by the senior author.

This is truly a report of joint authorship, each of us assisting the others in matters of style, terminology, and editing, but each primarily responsible for certain sections. Mr. Ambler prepared the reports on NA7455A, NA7456A, NA7485, NA7486, and NA7498; Mr. Lindsay wrote the Introduction and Environment Sections, and the reports on NA7472 and NA7961; Miss Stein and Mr. Lindsay collaborated on the survey report and those on NA7457, NA7902 and NA-

7940. Overall editing and proofreading has been the responsibility of Mr. Ambler, with the final editing by Miss Diony Sutherland.

Among the numerous individuals mentioned above, we would like to single out Mr. William C. Miller of Pasadena, California. He has unselfishly devoted almost his entire free time for many years toward a better understanding of Kayenta archaeology. In addition to his invaluable contribution to this report by the intensive survey of Cummings Mesa, he has conducted an archaeological survey of White Mesa and collaborated in a survey of the extensive Navajo Canyon, and his fully professional reports on these surveys have been prepared for publication. In appreciation for the contributions and good companionship of an amateur whose accomplishments in the field of archaeology are to be envied, we dedicate this report to Bill Miller.

J. Richard Ambler
Alexander J. Lindsay, Jr.
Mary Anne Stein

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Abstract

THIS BULLETIN is the fifth major report on the archaeology of the Glen Canyon area issued by the Museum of Northern Arizona in cooperation with the National Park Service. Cummings Mesa is a vertical sided, flat topped area rising 1600 to 3000 ft. above the Colorado River, which is adjacent to the north. Archaeological surveys of the mesa and adjoining region yielded 180 prehistoric sites, most of them assignable to a Pueblo II-III horizon. Some may have been occupied in Basketmaker II and III times, and a few show evidence of Pueblo IV-V occupation. The majority of sites are small, with no visible masonry or 1 to 5 rooms, although some larger sites of up to possibly 50 rooms were recorded. Listed in descending order of occurrence, sites were found in four different types of locations: in the open (80%), on talus slopes, in shallow rock shelters, and in cliffs.

Ten sites were excavated on the mesa in 1961. These ranged in size from one-room units to a pueblo with seven surface rooms and five pithouses. The temporal placement of most excavated sites lies between A.D. 1100 and 1225, but one was apparently occupied in the Basketmaker III and Pueblo IV-V

periods as well. Surface structures are generally built of masonry, but not carefully finished. Pithouses, sometimes an integral part of the same architectural unit as the surface rooms, are shallow and unlined. Kivas are deep and circular with a southern recess, and sometimes a bench and elaborate floor features. Trash, indicating a more permanent occupation than found in the adjoining Glen Canyon, is common, although not always deep, concentrated, or stratified.

Stone artifacts are similar to those of Glen Canyon, but with less emphasis on chipped stone tools and greater quantities of milling stones. The pottery is of indigenous Kayenta Anasazi types assignable to Tusayan White Ware, Tsegi Orange Ware, and Tusayan Gray Ware, and dating between A.D. 1050 and 1250. A minor number of intrusives indicate trade with other areas adjoining the Kayenta heartland. The prehistoric occupation of Cummings Mesa was obviously by people of the Kayenta Anasazi cultural tradition. The Pueblo IV-V pottery closely resembles pottery types from the Jeddito area. For at least the last three decades the mesa has been occupied intermittently (winter and spring) by Navajo and possibly Paiute Indians.

Introduction

CUMMING MESA has for 35 years been a part of the oral tradition of southwestern archaeology, primarily because of exploration there during the early 1900's by Byron Cummings, John Wetherill and Charles Bernheimer. Little information of the archaeological potential of the area has survived the early work except for the rumored wealth of large and small ruins on this isolated mesa. Generally speaking, the reports were true, although exaggerated, as the survey information indicates. Except for disturbance by livestock and weathering, all of the ruins are untouched, and some are in pristine condition. With a certain degree of anticipation the Museum of Northern Arizona conducted the first systematic archaeological program in the region since its exploration by early archaeological reconnaissance expeditions (Adams, 1960:6-7).

This report is concerned with the results of this archaeological research program conducted on and near Cummings Mesa during 1960 and 1961. The main focus is on the prehistoric occupation of Cummings Mesa and adjoining canyon systems, which occurred primarily during the late Pueblo II and early middle Pueblo III periods (A.D. 1050-1250). Secondly, we are concerned with the present day Navajo Indian manifestations as they apply to the prehistoric materials.

The program was divided into two operations: the surface reconnaissance for archaeological sites; and the excavation of sites selected from surveys. The first survey was conducted between April 18 and 25, 1960, as a separate operation, but during the period April 20 to May 13, 1961, the survey operation ran concurrently with the excavation activities. The few sites from the canyons adjoining Cummings Mesa that are included in the survey report were recorded in 1960. All of the work was sponsored by the National Park Service in connection with the Glen Canyon Dam salvage program. It should be noted that none of the ruins on the mesa or in the highland regions of the adjoining tributary canyons will be destroyed by Lake Powell. However, our previous excavations and survey in Glen Canyon led to the formulation of more problems than could be solved by further excavation and reconnaissance along the main stream. Furthermore, the survey made during 1960 indicated that many answers to river problems might be obtained by collecting comparative data from the upland regions above and away from the Colorado and San Juan Rivers and mouths of their tributary canyons. It was also learned through upland surveys that many sites were either being destroyed by erosion or livestock, or would soon be readily accessible to vandalism from the Lake Powell Recreation Area.

At the present time, travel throughout the Cummings Mesa area is a strenuous undertaking because of the deeply entrenched canyon systems and high cliffs of the mesa. Sites discussed in this report were

reached by foot or horseback from camps along the Colorado River or on Cummings Mesa proper.

The starting and returning point for the two mesa top survey and excavation expeditions was Rainbow Lodge. The mesa was reached over several stock trails built and used by the Navajo Indian inhabitants of the area to utilize the water and grazing resources in Forbidding Canyon and on Cummings Mesa. These hazardous stock trails lead west from Rainbow Lodge over a dune and sand-capped rock platform which terminates at the rim of Forbidding Canyon. Descent into the canyon is at the northern boundary of the "Kettle," so named by John Wetherill for its vast network of rugged canyons which coalesce in Forbidding Canyon to form the collecting basin for Aztec Creek. Proceeding westward, the trails join into one, then ascend a series of talus slopes and precipitous ledges to reach the summit of the mesa's eastern escarpment.

During the survey, site characteristics were recorded on 5 by 8 in. cards which are a facsimile of the larger notebook size site survey forms (Adams, Lindsay, and Turner, 1961:1). The data were later transferred to larger, 8 by 11 in. sheets in the laboratory. At the time of recording, the location of each site was plotted on the appropriate USGS topographic sheet: Cummings Mesa, Navajo Creek, or Navajo Mountain. Since not all of the area has been mapped, several sites were merely located as closely as possible by sketch maps. Other survey records included surface collections and photographs in black-and-white and color. Laboratory analyses of perishable, stone, and ceramic materials were recorded on prepared forms.

Excavations were conducted at a small number of sites, chosen primarily from the first survey on a priority basis developed from survey information. An attempt was made to select sites that would be within the limits of the Project's capabilities, would yield comparative data, and would provide a general sample of the antiquities on Cummings Mesa.

Much of the excavation was conducted by metric levels, usually 30 cm., until natural stratification was recognized when natural levels were employed. None of the cultural deposits or room fill were screened due to logistic restrictions. Room and burial information was recorded on mimeographed forms designed especially for this type of data. Field notations, mapping, photography and other supplementary data gathering processes were done concurrently with the excavations. All sites were backfilled at the completion of excavation.

In order to avoid confusion, we have chosen to supply a short description of the terms and names used in this report. As a result of the numerous surveys conducted along the San Juan and Colorado Rivers there arose a need to draw an arbitrary boundary between the regions adjacent to the main streams and tributaries, and those areas generally higher in

elevation and somewhat removed from the deep canyon environs. The distinction is based primarily on the characteristics of the geology, archaeology, flora, and modern land use of the canyon country. Considerable overlap and gradation of this twofold division is apparent and recognized. The areas along the rivers and barren slopes adjoining the river gorges are variously called *lowlands*, *canyon lands*, and *river environment*. This category also includes the lower portions of all the tributaries of the San Juan and Colorado Rivers. The archaeology in the canyon lands is characterized by small sites of scattered, small domestic structures; lithic workshops; petroglyph panels; and a network of trail systems. The Navajo occupation here is seasonal, consisting mainly of trails and sheep camps occupied for a short duration. The geologic formations most commonly encountered are the Navajo sandstone in the Lower Glen Canyon and the Chinle formation along the San Juan River. The flora, except at seeps, springs, and stream side, is xerophytic.

The second division is called the *uplands* or *highland* region. This area includes all of the mesas, platforms and higher benches south of the Colorado and San Juan Rivers and the upper portions of all major tributary canyons. The archaeology here includes both large and small pueblos; indications of a year-round occupation; and a few petroglyph sites and lithic workshops. The Navajo and Paiute Indian occupation in the highland is of a permanent nature. It is manifest in large hogans and hogan complexes, permanent corrals, stock watering tanks, and cornfields. The geology of this division generally includes

all the rock units above the Chinle formation along the San Juan River and those above the Navajo formation in Glen Canyon. The flora is characterized by an increase in juniper and pinyon.

Where possible, all names of canyons, streams, and topographic features have been preserved as assigned by the most recent editions of the United States Geological Survey topographic maps. However, many canyons and landmarks have not been officially titled by the U. S. Board of Geographic Names. In order to maintain consistency of the record, we have chosen to use the designation established by usage at the inception of the Glen Canyon salvage program. A table of concordance of other names and designations may be found in Adams (1960:4-5).

The reader will undoubtedly become aware of the omission of certain tabular data from this report, especially lengthy site characteristic tables and complex and multi-provenience tables. This elimination is intentional, disappointing but necessary, and those desiring to use or review any of the data upon which our thoughts and conclusions are founded should contact the Director of the Museum of Northern Arizona, Flagstaff, Arizona.

Although each site report in this volume has been designed to stand alone, repetition of detailed descriptions and photographs of similar artifacts has generally been avoided. The reader is therefore referred to the reports on the survey and NA7961 for description and illustrations of chipped stone tools, the report on NA7498 for description and illustrations of ground stone tools, and NA7498 for the most complete discussion and illustrations of pottery.

Environment

PHYSIOGRAPHY

CUMMINGS MESA is located in Land District 2 of the Navajo Indian Reservation at approximately 111° west longitude and 37° north latitude. The mesa is approximately 25 airline miles east of Page, Arizona, and is easily seen from this new town adjacent to the site of the Glen Canyon Dam.

Cummings Mesa, a dissected remnant of the Jurassic sediments which once covered all of the Glen Canyon region, is one of the prominent topographic landmarks in Lower Glen Canyon. It lies south of and adjacent to the Colorado River, and is approximately bisected by the Utah-Arizona state line. To the east is Navajo Mountain, a mountain sacred to the Navajo Indians, and the salient terrain feature of the area. Its summit, at 10,388 ft., towers approximately 4,000 ft. above the highest elevation (6,483 ft.) on Cummings Mesa. Like a three-fingered hand, the extremities of the mesa extend toward the Colorado River and rise above the river gorge in a series of vertical cliffs and ledges. Resistant sandstones of the Saltwash member of the Morrison formation cap the mesa and protect the underlying Cow Springs sandstone, and Summerville, Entrada, and

Carmel formations. These rock units overlie the Navajo sandstone, of Jurassic and Triassic ages, out of which the Colorado River and its many tributaries have carved a fantastic network of deep canyons and barren rock slopes on both sides of Cummings Mesa, as well as the steep-sided inner gorge of Lower Glen Canyon between Cummings Mesa and the Kaiparowits Plateau. The topographic expression and stratigraphic relationship of these strata are shown in Adams, Lindsay, and Turner (1961:3).

Cummings Mesa is highest (elevation 6,483 ft.) at its southern extremity and lowest (elevation 4,800 ft.) at the northwest, near the Colorado River. At the south end of the mesa a platform of one square mile rises 200 to 300 ft. above the main body of the mesa. Descent northward from this elevated terrain feature is over a series of negotiable rock terraces and rock aprons to a gradual slope terminating at the rim of the canyons and ultimately at the outer gorge.

All around the perimeter of the mesa is a series of rocky ledges and precipices, most of which are 1,000 ft. above the Carmel-capped platform (Fig. 1).

SURFICIAL DEPOSITS

Four types of surficial deposits occur on the mesa proper and around its extremities: they are represented by: (1) terrace deposits along the streams; (2) wind deposited sand; (3) talus; and (4) soil.

Due to the topographic weakness of the Carmel formation, rock falls from the higher members of the stratigraphic sequence build up as talus slopes, resting against Entrada cliffs on the Carmel bench. This type of deposit has been important both in prehistoric and historic times for two reasons. Some of the large talus slopes rise above the base of the Entrada formation, which is usually vertical or nearly so, and therefore are convenient locations for both human and domestic animal routes to the summit. Secondly, larger talus blocks are often used for slump boulder habitations (Adams and Adams, 1959:12) and animal shelters and pens.

Eolian deposits are widespread over the mesa top, but are shallow and distributed rather spottily on the Carmel-capped platform at its base. The canyon bottoms display blowsand deposits to varying degrees, mostly in the form of falling or climbing dunes. On Cummings Mesa, windblown sand has accumulated in both open and protected areas. These eolian deposits have been stabilized by dense stands of blackbrush and interspersed growths of sagebrush, and in some cases, by various cacti and ephedra plants. Although a deeper red color than the sandstone in the Saltwash member, these deposits appear to be locally derived and reddened through weathering. Dune sands are not spread evenly over the mesa. An abundance of this type of deposit is located in the extreme upper end of the Catfish drainage system. On the western extremity of the mesa, blowsand deposits form primarily on the eastern side of the promontory and extend only five to six miles northward from the south part of the mesa top. This northern limit of moving sand is marked by an east-west trending dune belt which coincides roughly with the northern limits of the prehistoric and Navajo occupation on the mesa top, and interestingly, the northern limit of juniper growth. North of the dune belt the soil is thin, sparsely covered with vegetation, and rocky. On both the central and eastern promontories of the mesa, eolian deposits are very shallow or non-existent except in pockets where they have settled out and collected over the years.

Terrace deposits on Cummings Mesa indicate at least three periods of degradation and two periods of aggradation. The periods of erosion and deposition would be due almost entirely to climatic fluctuations since the top of the mesa is completely isolated from any fluvial action in other areas of Glen Canyon. The lower terrace, about 10 ft. above the stream level in the vicinity of NA7498, can possibly be correlated with Cooley's terrace system (Adams, Lindsay, and Turner, 1960:3). Since neither system can be traced to the terrace along the Colorado River, it is not feasible to correlate them precisely. West Canyon and particularly Forbidding Canyon both show evidence of alluviation; however, the terraces in

these tributary systems were not studied. It is interesting to note that the periods of aggradation and degradation agree qualitatively with the study of Navajo Canyon. The general similarity is suggestive and it is perhaps likely that the same changes could account for the alluvial phenomenon in Navajo Canyon and on Cummings Mesa.

Most of the soil on the mesa, as might be expected, is sandy and shallow, with poorly developed soil horizons. The humic content is low, but proportionately higher on the wooded areas at the mesa's south end. Rapid runoff and low precipitation are undoubtedly the reason for poor structuring in the mesa top soils. The soil situation in the canyon lands below and on the Carmel terrace is comparable to the situation described above.

HYDROGRAPHY

An exotic stream such as the Colorado River is one that receives enough water at its source to carry it through a climatically dry area where its volume is diminished by transpiration and evaporation. In most areas, this type of stream is important to the occupation of the locale because it supplies abundant water and soil reserves. However, in Glen Canyon these resources could only be used by a few inhabitants since down-cutting of the Colorado River has entrenched a canyon 200 to 1,400 ft. deep leaving the water for the most part inaccessible. Thus, the former inhabitants, as well as the modern Indians choosing to live in the canyon and mesa country, were forced to seek other sources of water and soil. This is shown by the modern and prehistoric occupation in Forbidding, West and Navajo Canyons which flank Cummings Mesa, respectively on the east, west and south sides. Each of these major canyon systems has some alluvium and perennial streams. The prehistoric occupation in Navajo Canyon is particularly significant because of its intensity and time depth (Miller, Breternitz, and Euler, in preparation).

The modern, and presumably the prehistoric, inhabitants of Cummings Mesa have been faced with water shortages. Living on top of a mesa, the only available moisture for utilization in agriculture is that derived from seasonal precipitation. The three extremities of Cummings Mesa, which embrace Dungeon, Catfish, and False Entrance Canyons, have such a limited areal extent that most of the moisture falling to the ground is soon lost through runoff and evaporation. For this reason most of the mesa top has been sparsely occupied. Only at the southern end of the mesa, the palm of the three-fingered hand, could sufficient water be collected to support a sizeable prehistoric horticultural-based occupation. This is demonstrated amply by the distribution of the prehistoric sites (Fig. 2). It should be noted that two of the mesa's major canyons, Catfish and False Entrance, have perennial streams near their confluence with the Colorado River. All of the mesa top stream courses indicate aridity, shown by modern gullying and arroyo cutting.

Precipitation falling on the higher elevations of

Cummings Mesa generally flows toward the head of Catfish Canyon. Similarly, the dip of the strata in Cummings Mesa is such that all underground seepage would be toward the north—so the greatest likelihood of seeps and springs would likewise be at the head of Catfish Canyon and False Entrance Canyon. However, a spring was visited at the northern tip of the mesa's westernmost extremity. A seep found at the head of Catfish Canyon supplies minor amounts of water to the present-day Navajo inhabitants here.

Several springs have been found by archaeological reconnaissance expeditions, each of which might produce enough water to support a family of perhaps five individuals under more favorable conditions than those encountered in 1960 and 1961. The spring at NA7461 at the Carmel terrace was producing enough flow to keep two artificial tanks full—about 200 gallons, despite overflow and high evaporation.

Potholes and plunge pools located in the streambeds of the major drainages and just over the mesa rims would be fairly reliable year-round water sources. They are usually well shaded. Pecked steps leading into one plunge pool indicate its prehistoric use as a water source.

A third source of water is found at many locations along the rim of the mesa where bedrock has been exposed. Here, natural basins in the sandstone are formed by solution and wind erosion. These weather pits (the proper geological term) are from one to eight feet across and up to three feet deep and could hold several hundred gallons of water. This readily available source of water, given enough precipitation, was probably extensively utilized by the prehistoric population. They are used today by Navajo herders to water their horses and sheep. Weather pits were found holding water north of NA7498 along the east side of Catfish Canyon.

The possibility that the Anasazi could build and maintain artificial reservoirs for water reserves should not be discounted, even though none were found to demonstrate this resourcefulness.

Perhaps a word about the water requirements of the two expeditions would shed light on its preciousness. The 1960 survey party obtained its water from Forbidding Canyon. Stock fulfilled their water requirements in frequent, grueling descents from the mesa to Aztec Creek. The wrangler brought water for human consumption when he returned with the stock. Fortunately in 1961, a small pond, caused by a masonry dam, served to fulfill the requirements of both men and animals.

Certainly the water requirements of the 11th and 12th century Anasazi were not as demanding as ours, and therefore it seems quite plausible that a prehistoric population could satisfy its domestic needs from the various sources mentioned above. The main concern of these people would have been to obtain enough soil moisture to initiate planting and subsequent precipitation to bring the plants to maturity for harvesting.

FLORA AND FAUNA

The changes in vegetation on Cummings Mesa

are noticeable as one proceeds from one end of the mesa to the other. At the highest elevations, particularly the platform at the southern end, pinyon pine, *Pinus edulis*; and juniper, *Juniperus monosperma*, occur mixed with stands of blackbrush, *Coleogyne ramosissima*; and big sagebrush, *Artemisia tridentata*. Buffalo berry, *Shepherdia rotundifolia*; serviceberry, *Amelanchier utahensis*; hop-sage, *Graya spinosa*; cliff-rose, *Cowania mexicana*; and mountain mahogany, *Cercocarpus montanus*, are found scattered throughout the pinyon and juniper forest and associated with other shrubs, herbs, and grasses. Proceeding northward across the mesa and descending over the ledges of the platform and into the upper portions of the tributaries, one finds a distinct decrease in the number of trees and associated shrubs. A marked increase in isolated and densely mixed stands of sagebrush and blackbrush is apparent over most of the mesa wherever sandy soils, alluvium, and stabilized dunes are present. Still further to the north, at the canyon rims and margins of the deeper sandy soil, are found concentrations of the ubiquitous prickly pear, *Opuntia compressa* var. *macrorhiza*; and joint-fir or Mormon tea, *Ephedra viridis*. Beyond a radius of five miles north of the southern end of the mesa, the plant cover is very sparse and dominated by blackbrush, with grasses and narrow-leaved yucca, *Yucca angustissima*. Pale lycium, *Lycium pallidum*, was encountered on the trash deposits at several of the larger sites. The following is a list of plants collected from the mesa top by the Project's field parties during 1960 and 1961: *Allium macropetalum*, onion; *Amelanchier utahensis*, serviceberry; *Arabis lignifera*, rock cress; *Arabis pendulina*, rock cress; *Arabis pulchra*, rock cress; *Artemisia tridentata*, big sagebrush; *Aster arenosus*; *Astragalus tephrodes*, milk-vetch; *Phlox austromontana*; *Bromus rubens*, red brome; *Coleogyne ramosissima*, blackbrush; *Cymopterus fendleri*; *Calochortus* sp., sego lily bulb; *Cowania mexicana*, cliff-rose; *Cryptantha pterocarya*; *Cercocarpus montanus*, mountain mahogany; *Castilleja chromosa*, paintbrush; *Cryptantha flava*; *Descurainia pinnata*, tansy mustard; *Ephedra viridis*, joint-fir; *Festuca octoflora*, fescue; *Graya spinosa*, hop sage; *Gilia sinuata*; *Juniperus monosperma*, one-seed juniper; *Lupinus pusillus*, lupine; *Lesquerella intermedia*, bladderpod; *Lycium pallidum*, pale lycium; *Mentzelia albicaulis*, stickleaf; *Opuntia compressa* var. *macrorhiza*, prickly pear; *Oenothera caespitosa*, evening primrose; *Oryzopsis hymenoides*, Indian rice grass; *Phlox woodhousei*; *Poa fendleriana*, mutton grass; *Pinus edulis*, pinyon pine; *Phoradendron juniperinum* on one-seed juniper, mistletoe; *Penstemon utahensis*, beardtongue; *Rumex hymenoccephalus*, wild rhubarb or dock; *Shepherdia rotundifolia*, buffalo berry; *Streptanthus cordatus*, twistflower.

Vegetation is quite sparse over most of the Carmel-capped terrace at the base of Cummings Mesa due to the very thin soil mantle and paucity of dune sand deposits. It consists mainly of xerophytic plants adapted to small amounts of precipitation. The permanently watered canyons, Navajo, West and Forbidding, which flank Cummings Mesa, support



FIGURE 1. Aerial view of Cummings Mesa. A portion of the Kaiparowits Plateau is in the foreground and the canyon of the Colorado River lies between the two highland forms.

a wide range of vegetation including both phreatophytic and xerophytic plants. A comprehensive treatment of the flora in Glen Canyon area may be found in Woodbury and others (1959:21-72).

The fauna of Cummings Mesa have not been studied; therefore, personal observation and surmise must suffice for this realm of the mesa environment. Undoubtedly the distribution of many animal forms has been disturbed because of the seasonal occupation by the Navajo Indians.

The most conspicuous animals sighted during 1960 and 1961 were lizards, cottontails, jackrabbits, wood rats, bats, mice, and birds. Insects and arachnids include ants, flies, spiders, scorpions, gnats, and mosquitoes. A young prairie rattlesnake was caught near the rim of Catfish Canyon. Large game animals are quite scarce. However, the skull and vertebra of an adult bobcat, *Lynx rufus baileyi*, was recovered from the south end of the mesa, and Bernheimer (Ms-2:12), reports seeing tracks of the bighorn sheep during his expedition's brief visit to the mesa in June,

1924. A discussion of the wild animal life in the Glen Canyon region is contained in Woodbury and others (1959:148).

CLIMATE

The climate of Cummings Mesa is treated only briefly and in general terms since no meteorological studies have been carried out on the mesa and its immediately surrounding area. The nearest weather station is at Navajo Mountain Trading Post on the eastern flank of Navajo Mountain in Utah. It should be noted that the data recorded at this station are in part affected by the conditions prevalent on Navajo Mountain, and that these same conditions do not necessarily prevail on Cummings Mesa.

The climatic zone on Cummings Mesa is semi-arid, transitional between the desert climate found in the canyons below and the cooler and moister climate found on Navajo Mountain (Adams, Lindsay, and Turner, 1961:7).

The evaporation rate is high due to the factors of low humidity, high temperatures, dry winds, and

a preponderance of sunny days. The months of maximum precipitation are July and August, while April, May, and June are the driest months. Snow falls at higher elevations, such as Cummings Mesa, during the winter and spring months. The average annual precipitation for the area is about 10 in. per year with a range of 6.5 to 13 or more. (Harshbarger, Repenning, and Callahan, 1953: 112). Cummings Mesa probably receives more than 10 in. of moisture during a normal year, much of this moisture falling in localized short thunder showers. Several intense rain showers and snow falls were encountered during both field seasons on the mesa. Both conditions were accompanied by low temperatures and high winds.

Wide temperature changes between day and night are common on the mesa top and to a lesser degree in the surrounding canyon lands. The average annual temperature at Navajo Mountain Trading Post, elevation 6,020 ft., is approximately 50° F.

Freezing temperatures generally occur between October and March. (Climatological Data, Utah 1960:200-8).

The frost free period at the Navajo Mountain station is approximately 200 days, providing ample growing time for garden-variety vegetal products.

Surface winds are usually dry and moderate throughout the canyon country; however, strong winds lightly laden with blowsand at or near ground level are not uncommon. Winds are westerly in the winter and southwesterly during the summer months.

SUMMARY

Cummings Mesa is a large remnant of Jurassic rocks at the flank of Navajo Mountain, towering over the canyon lands of the Colorado River and lower upland regions which lie at its base. From various

vantage points one can easily see the Kaiparowits Plateau and the Henry Mountains to the north, the upper end of Paiute Mesa to the east, White Mesa to the south, and the Kaibab Plateau area to the west. Surficial deposits on the mesa are primarily locally derived eolian sands, which are recognized in the form of alluvial terraces, stabilized dunes, and shifting beds of dune sand. Water resources are scarce, particularly during the summer months, but otherwise vary considerably by season. Permanent water is nearly non-existent on the mesa, and the only reliable perennial streams are in the canyon systems below. The flora and fauna of the area belong to the Upper Sonoran Life Zone. Trees, shrubs, herbs, and grasses are closely spaced on the higher portions of the mesa, but grade to xerophytic desert shrub vegetation at lower elevations north of the main body of the mesa, where climatic and soil conditions are less favorable. Large game animals are almost non-existent today, while smaller animals appear to be common. Climatically the region is semi-arid, being characterized by rapid evaporation, thunder-shower storms, rapid runoff, and variable temperature changes.

In contrast to the canyon lands the present environment of Cummings Mesa was judged to be the more hospitable. The modern occupation on Cummings Mesa is limited to Navajo Indians grazing sheep, goats, and horses, primarily during the winter and early months in spring. The Indians have built hogans, sweathouses, and corrals, mainly along the water courses. Despite the existence of several favorable farming locations, no sign or knowledge of agricultural pursuits was found or gathered from local informants. Perhaps the impingements of aridity account for this situation.

Cummings Mesa Region Survey

History

DURING THE SPRING of 1960 and 1961, members of the Museum of Northern Arizona's Glen Canyon Project recorded 163 prehistoric sites on the top of Cummings Mesa in Utah and Arizona. These surveys were supplemented with other survey data from the adjoining tributaries, collected on various occasions during the summer of 1960 at the time the Project's staff were concluding their investigation of sites along the Colorado River (Table 1). The total number of sites included in this report stands at 180, although only 168 site numbers were assigned. The discrepancy occurred because occasionally, when two sites were in close proximity to one another, they were given the same number, but distinguished by letters. The surface survey information from both excavated and unexcavated sites form the subject matter of this section.

Before the Glen Canyon Project's survey and excavations on Cummings Mesa, only two recorded scientific investigations of the mesa had been made.

Byron Cummings, led by John Wetherill, made the first recorded ascent of the mesa in 1919, but was only on top for a few hours (Cummings, 1934:14, Bernheimer, 1926:177-178). In 1924, Charles Bernheimer, again led by Wetherill, climbed the mesa on three consecutive days, and explored a considerable amount of the mesa proper. He mentions having seen 8 or 10 prehistoric sites and he took several photographs while on the mesa top. The mesa was unnamed at the time of Cummings's ascent, but was apparently named by the time of the 1924 Bernheimer expedition (Bernheimer, MS-2:14-40) (Gillmor and Wetherill, 1934:237).

The various canyon systems on the mesa were observed and named by Bernheimer. False Entrance Canyon was called Mountain Sheep Canyon, and Catfish Canyon was named Chocolate Drop by the expedition (Bernheimer, 1926:177-178). West Canyon Creek was referred to as Sirocco Pass by Morris and Bernheimer (Morris, 1922:504, MS-1; Bernheimer, 1926; Adams, 1960). Dungeon Canyon and Cathedral Canyon apparently never had other names

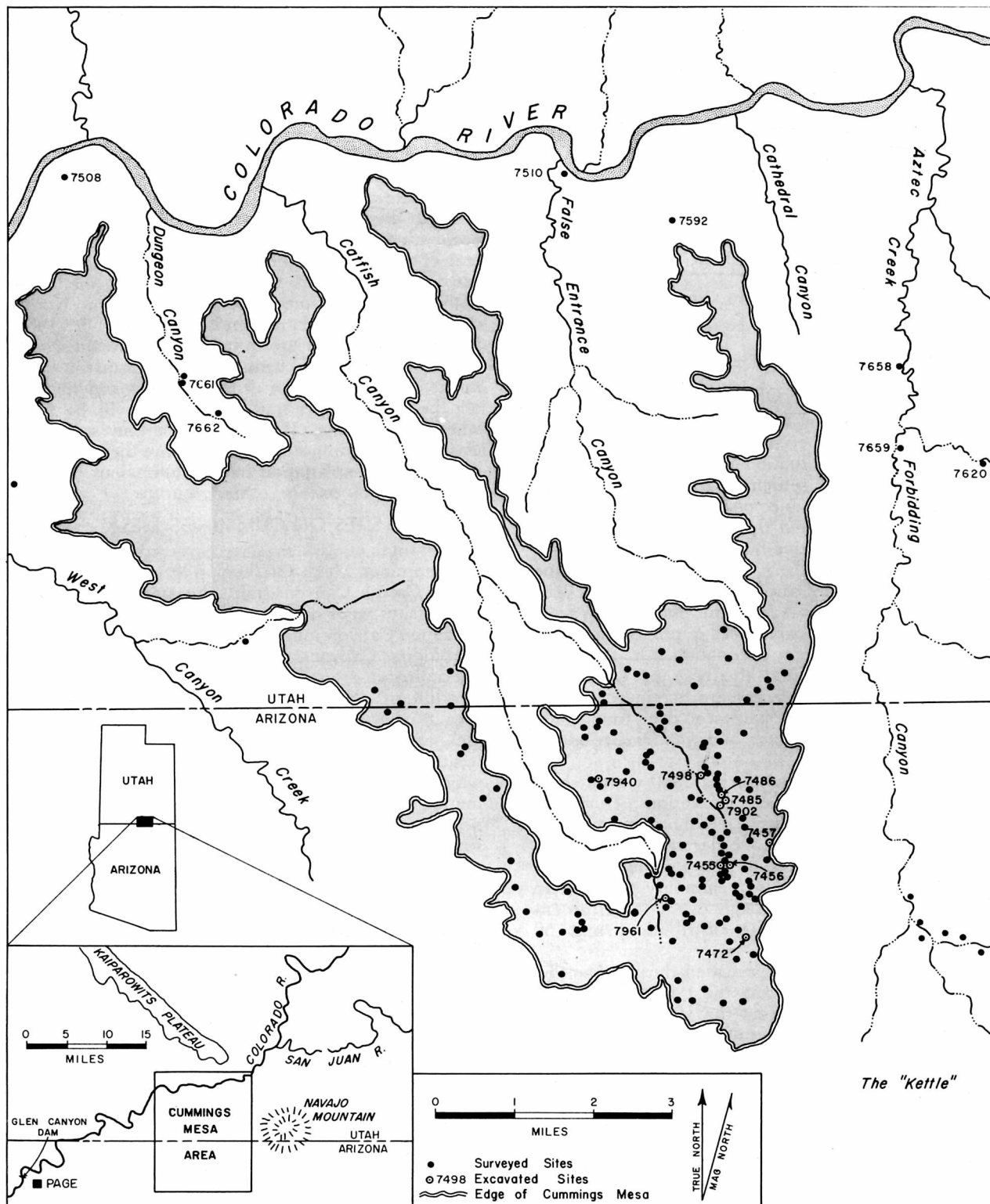


FIGURE 2. Map of Cummings Mesa showing site distribution.

or published regional designations assigned them (Adams, 1960), but both names are regional only, and not official U.S.G.S. names. No sites on the mesa were actually recorded in any known survey system until the Glen Canyon Project began work in the area in 1960.

Year	Area Surveyed	Sites Recorded
1960	Cummings Mesa	NA7451-7500
1960	Tributaries	NA7501-7506
1960	Tributaries and Glen Canyon	NA7508, 7510, 7592-94, 7620, 8658-62
1961	Cummings Mesa	NA7901-8001

TABLE 1. Chronology of the Glen Canyon Project surveys in the Cummings Mesa region.

Site Distribution

EVALUATION OF THE SURVEY

The base map of sites surveyed on Cummings Mesa shows a very uneven distribution of prehistoric sites (Fig. 2). This situation is a true reflection of the rather centralized settlement on top of the mesa. An intensive reconnaissance of the resources and prehistoric sites has revealed that the preponderance of arable land and attractive building sites on the mesa is centered at the southern end of the mesa at the head of the Catfish Canyon drainage system. Peripheral settlements radiate from this nucleus into areas that are today, and probably were in prehistoric times, less attractive for human occupation. On the other hand, the surveys around the base of Cummings Mesa were not exhaustive but are herein considered representative of what probably could be found elsewhere in these *canyon lands* and *highland* tributary canyon locations.

The survey conducted during 1960 was of short duration because of logistic limitations. During a seven-day period an extensive reconnaissance of the mesa top was conducted in order to assess the archaeological potential so as to plan for the 1961 field season. As a result of this preliminary work there was derived a general knowledge of the mesa top environment, a sensing of site distribution, and 50 recorded sites.

The majority of sites excavated during the 1961 field season were chosen from the 1960 survey. Only three sites were selected from the 1961 survey, since the time available for excavation was seriously limited.

The survey conducted during 1961 added 113 sites to the 50 already recorded, thus expanding the amount of information for laboratory analysis, but not altering greatly the findings of the first expedition. It is worthwhile to note that many of the sites reported in 1961 were found in the areas surveyed in 1960. These additional data are not an indication of haphazard work during the initial reconnaissance; rather they represent the difference between the amount of information that can be collected on an enforced extensive survey as opposed to a carefully planned intensive survey. Without a survey of Cummings Mesa of the intensive type, we would have

lacked several interesting pieces of information and certainly the large body of material upon which to conduct our analysis.

Concerning the surveys conducted during 1960 off the mesa proper, it should be noted that they were designed to collect information on settlement at the base of Cummings Mesa, and possible routes of access to and from Cummings Mesa, specifically from the Colorado River. As mentioned previously, the 17 sites found seem to be representative and do bring to these pages a greater insight into the human occupation on Cummings Mesa, and answers to several of the problems encountered in the survey and excavations in Glen Canyon proper. It should be noted that the off-mesa sites tie in quite nicely with those reported in Adams, Lindsay, and Turner (1961: Map 1), and some are quite close to sites discussed in that report. In discussing the sites from the Cummings Mesa region, the distinction between the sites off the mesa proper and those on it will be made whenever possible. However, in certain sections it was considered impractical to separate the two groups since textual explanation has made obvious the relative weight of one or other group.

SITES ON CUMMINGS MESA

A total of 163 sites were recorded on the top of Cummings Mesa. Of them, 139 sites were located in the Catfish Canyon drainage system. The remaining 24 sites were distributed over the mesa, in False Entrance Canyon and minor tributaries of West and Forbidding Canyons. Most of the sites on Cummings Mesa proper are open sites (see below). There are, in addition, a few talus and shelter sites, but no cliff sites as they are defined here. The reason for the lack of this type of site lies in the fact that the weathering characteristics of the uppermost rock unit which caps Cummings Mesa do not include the formation of caves and large alcoves. Furthermore, no extensive foot and hand trails exist on the mesa since nowhere is the relief great enough to warrant their construction.

Due to the nature of certain terrain features, it is difficult to place some sites in any specific site location category. Therefore, these sites were put into a separate class of sites called *combination* which implies that the sites occupy more than one location category. Most of the sites in the combination category are on buttes, but have certain associated elements secondarily placed in talus and shelter location.

The prehistoric occupants of sites along the Colorado River presumably had ample water and arable land—two of the factors which brought them to the various riverine locations. On the other hand, the occupants of Cummings Mesa were restricted to the amount of water that fell as precipitation, and were limited also to the several areas of the mesa where soil was deep enough for planting and moisture retention. Nevertheless, the mesa top was quite heavily populated during the 12th and early 13th centuries despite these limitations. It is of interest to note that the Navajo occupation on the mesa

today is limited to winter and early spring because of the scarcity of water. Undoubtedly some Indians would graze their sheep here year-round if sufficient water sources were available for both livestock and human consumption.

SITES IN TRIBUTARY CANYONS

Seventeen of the 180 sites dealt with in this report are located in Lower Glen Canyon proper or in the tributary canyons of Cummings Mesa and those adjacent to it. All of these sites were recorded as the result of an extensive survey of the base of Cummings Mesa shortly after the report for the Lower Glen Canyon was written, and thus, they are not previously noted (Adams, Lindsay, and Turner, 1961). These sites are considered important because they indicate contacts between the mesa and the Colorado River and the mesa and other highland areas. These connections with the mesa justify our inclusion of them with the Cummings Mesa highland sites. These sites are discussed below and elsewhere in order to indicate more fully the connections with the human occupation on Cummings Mesa.

The 17 sites included in this account of the extra-mesa survey are located in the following places: West Canyon, NA7593-7594; Dungeon Canyon, NA-7508, 7660-7662; False Entrance Canyon at the Colorado River, NA7510; Little Arch Canyon, NA7592; Forbidding Canyon, NA7658, Charcoal Cave, and NA7659, Sandal Cave; Tsebehotso Canyon, NA7501-7506; and Cliff Canyon, NA7620.

The site locations for this group of data are as follows: open sites, 4; talus sites, 1; shelter, 9; and cliff sites, 3. The four open sites are all campsites on or near the Carmel-capped platform. In each instance the site is marked by relatively few or no sherds and lithic material, and associated with various trail systems. In three of the four instances, the sites were first recognized because of recent Navajo occupation. Although NA7661 is purely a Navajo hogan-corral site, it is considered important because of the active spring located at the site. The one talus site (NA-7660) is a slump boulder room, with both ceramic material and lithic debris. This site is on a trail leading through Dungeon Canyon. The nine shelter sites are spread widely over the region. Two sites (NA7508 and 7662) are important because of their obvious affiliation with the Cummings Mesa occupation and the trail which each adjoins. NA7508 is the only one of the 17 off-mesa sites which has been excavated. This site is important because it is primarily a lithic workshop and is located on the Dungeon Canyon trail between Cummings Mesa and the Colorado River. It is reported by Long and Turner, (in preparation). Charles L. Bernheimer's account of the pictographs near "Painted Rock Camp" necessitates the mention of NA-7620 (Bernheimer, 1926:107). Even though the masonry rooms below the glyph have crumbled from the incessant "wall-walking" of visitors to Rainbow Bridge via Red Bud Pass, the pictograph panel is still one of the largest known and best preserved in the Lower Glen Canyon area. Six shelter sites (NA7501-

7506) in Tsebehotso Canyon were surveyed on the homeward journey from Cummings Mesa at the conclusion of the 1960 survey. None of these sites are well preserved or worthy of intensive excavation. It should be noted that additional shelter and cliff sites are known for other eastern tributaries of Forbidding Canyon (Morss, 1931:6). Two cliff sites were recorded, one of which (NA7510) is a foot and hand trail (see Footholds and Trails). The second is NA-7659 which was called Charcoal Cave by Morris and Bernheimer (Bernheimer, 1926:119-20). The deposits in Charcoal Cave have been tested, but the findings remain unreported. A similar situation exists for Sandal Cave, a small alcove type site.

All but one of the 17 sites are known or suspected to be Kayenta Anasazi, and occupied between A.D. 1050 and 1300. It is possible that Basketmaker remains exist at the cliff-cave sites, especially NA7658 and 7659. The exception is a recent and currently used Navajo site.

From this short summary it can readily be seen that these sites not only give us a better knowledge of prehistoric habitations and campsites below the mesa top, but also form the basis for a better understanding of the relationships between the highland and the canyon land sites.

Site Locations and Environments

Habitation and workshop sites recorded by the survey may be classified as: *open* sites located on sandy ridge lines or dunes, buttes, remnants, or terraces; *talus* sites situated on broken or slump material below cliffs; *shelter* sites located in ledges, small alcoves, or rock shelters; *cliff* sites consisting of caves, large alcoves, or prehistoric trails. These types of site locations are generally consistent with those defined by Adams, Lindsay, and Turner (1961:11).

In addition to these types, there are sites which fall into a combination of locations category, hereafter referred to as *combination* sites. The frequency of occurrence of each type of site is shown in Table 2.

Location Types	Cummings Mesa	Tributary Canyons	TOTALS
Open	139	2	141
Talus	2	2	4
Shelter	12	10	22
Cliff		2	2
Combination	10	1	11
TOTALS	163	17	180

TABLE 2. Distribution of sites by location and environment.

OPEN SITES

Open sites comprise 141 of the 180 recorded sites from the survey. This group includes a few Navajo camps on the mesa and in the adjoining canyon drainages, as well as prehistoric habitations and workshops. Sites occur on sandy ridge lines and sand dunes; on alluvial and rock terraces; and on buttes and remnants on the mesa proper. Room number estimates ranged from none to 30 or more, and sites

are in various states of collapse. Several of the larger pueblos may have been multi-storied, but one story structures are the most common.

TALUS SITES

Talus and slump boulder sites are uncommon in the area, perhaps due to the lack of suitable talus locations. Only four talus sites were reported by the various survey parties. This contrasts with the numerous talus sites recorded for the San Juan River region (Adams and Adams, 1959:37).

SHELTER SITES

Ledges, small alcoves, and rock shelters compose the shelter type of sites. Both structural habitations and workshop debris are found in these shelters. The majority of the canyon sites were of the shelter type, and 22 of the total surveyed sites fall into this category. None of the shelter sites visited, recorded, or excavated were in pristine condition, all suffering in varying degrees from livestock damage and collapsing cave roofs.

CLIFF SITES

As mentioned before, large alcoves and caves are not common in the Cummings Mesa area, and only two sites of this nature were reported, both located in Forbidding Canyon. The only prehistoric pecked trail which has been assigned a survey number (NA7510) is included in this category. Other unnumbered trail locations were found in the vicinities of Dungeon, West, Forbidding, Cathedral, and Little Arch Canyons. The best complex of trail sites in association with prehistoric sites is in Dungeon Canyon between NA7662-NA7508, and NA5252 at the Colorado River. NA7510 is a good example of a prehistoric hand and foothold trail site. This trail and others are significant to the archaeology of Cummings Mesa because they are usually associated with trail systems or riverside sites which were probably utilized by the prehistoric inhabitants of Cummings Mesa. A fuller discussion of this type of site may be found in the Foothold and Trails section.

COMBINATION SITES

Sites which fall into two or more of the above location designations are placed in the *combination* category. There were 11 of these sites, usually combining open elements with shelter or talus elements.

RESOURCES

At least 30 sites were located near good springs or seeps, and 39 more were located near potholes and weathering pits. Water sources for many sites were undetermined. Over 50 sites had stone for building purposes and wood nearby. Numerous other sites may have had the above resources, but were not recorded due to the type of site card used on the first survey. Arable land in the near vicinity is reported for 175 of the 180 sites. Usually this land consists of stabilized dunes or alluvial terraces. The various plant products which occur on Cummings Mesa have been previously mentioned. Clay that may have been used for ceramic manufacture and model-

ing occurs in pockets in the Saltwash member of the Morrison formation. This material has a high sand content. At several locations on the mesa top, especially at the weathered mesa rim, small siliceous cobbles can be found eroding from the conglomerate sandstone. Some of these cobbles are of ample size for use in tool making, and perhaps it may not have been necessary for the prehistoric people to go to the riverside gravel beds for all such material.

Cultural Elements

Cultural remains recorded by the survey parties for Cummings Mesa include structures, lithic and ceramic debris and artifacts, petroglyphs, perishable materials, and foothold trails. These elements, singly or in various combinations, compose the 180 sites recorded by the survey, from both the canyon land and highland areas.

STRUCTURES

Masonry structural remains were found at 158 of the total number of sites. Rooms, storage features, pithouses, kivas, and water and soil control features are the types of structures observed. Sites with masonry structures range in size from one room farmhouses to multiple room pueblos (Fig. 3). A comparison of ruin structure size and extent with the type of site location present is shown in Table 3. The storage units and pithouses could not always be defined on the surface evidence, and therefore were tabulated as rooms. NA7945 is one of the few examples of an obvious and uncontroversial storage unit. At this particular site, the door jambs are recessed to receive the door slab. Kivas are defined on the basis of structure character and form and were not included in the room counts. Kivas, pithouses, and hearths occurred in varying numbers, and granaries occurred in some ledge sites. Masonry units of the

	No masonry	1 Room	2-3 Rooms	4-10 Rooms	10 or more	TOTALS
<u>Open</u>						
Dune-ridge	13	63	33	11		120
Butte-remnant		3	3	1		7
Terrace	1	5	6	1	1	14
<u>Talus</u>						
Talus-slump Boulder	1	1	2			4
<u>Shelter</u>						
Ledge	1	4	4	4		13
Small Alcove	2		2			4
Rock Shelter	2	1	1	1		5
<u>Cliff</u>						
Large Alcove		1				1
Cave						
Trail	1					1
<u>Combination</u>						
	1	2	2	3	3	11
TOTALS	22	80	53	21	4	180

TABLE 3. Comparison of masonry size and extent with site location.

one-room type predominated, occurring in 80, or one-half of the masonry sites. Two and three room units were also common, numbering 53. Units of 4 to 10, or 10 or more rooms occurred at 25 sites. Twenty-two sites had no visible masonry, or consisted of scattered hearths or trash areas with no other structures. Walls made of upright slabs set in mortar occurred infrequently. Masonry of both the wet-laid and dry-laid types was observed. Generally, the masonry was crude, and most sites were in a poor state of preservation when recorded. Hearths occurred at 24 sites, pithouses were thought to be present at five sites, and kivas are reported from nine sites. Possible storage units in combination with rooms, or possible storage units by themselves occurred at 24 sites.

The orientation of masonry structures could not always be determined because of the poor preservation of many sites. Orientation was determined by the presence of doorways and trash deposits or exposure. Twenty-two sites had a generally eastern orientation. Twenty sites had a south or southwestern orientation, three were oriented towards the west, and two towards the north. Orientation of structure implies ex-

posure for ledge and cliff sites. Open and combination sites were perhaps purposefully oriented, generally south or southeast.

AGRICULTURAL STRUCTURES

Indications of soil and water control were reported from five sites. These structures consisted of linear borders and terraces located along intermittent drainages near the sites. No ditches, grid borders, or reservoirs were found. Terraces at one site, NA7940, were tested.

TRASH

Trash, defined as a concentration of charcoal or a large amount of ceramic and lithic debris, occurred at 85 sites. A small amount of ceramic and lithic debris scattered about a dwelling is not considered to be a trash deposit. Charcoal-stained soil and heat cracked rocks are considered herein as trash. The location of a trash deposit was often determined by wind direction or building orientation. Trash may be scattered all over a site, or it may be a function of the slope of the land as at NA7458. Trash may also be a function of erosional cutting as at NA7456B, or it may be buried, in which case, little or no surface evidence

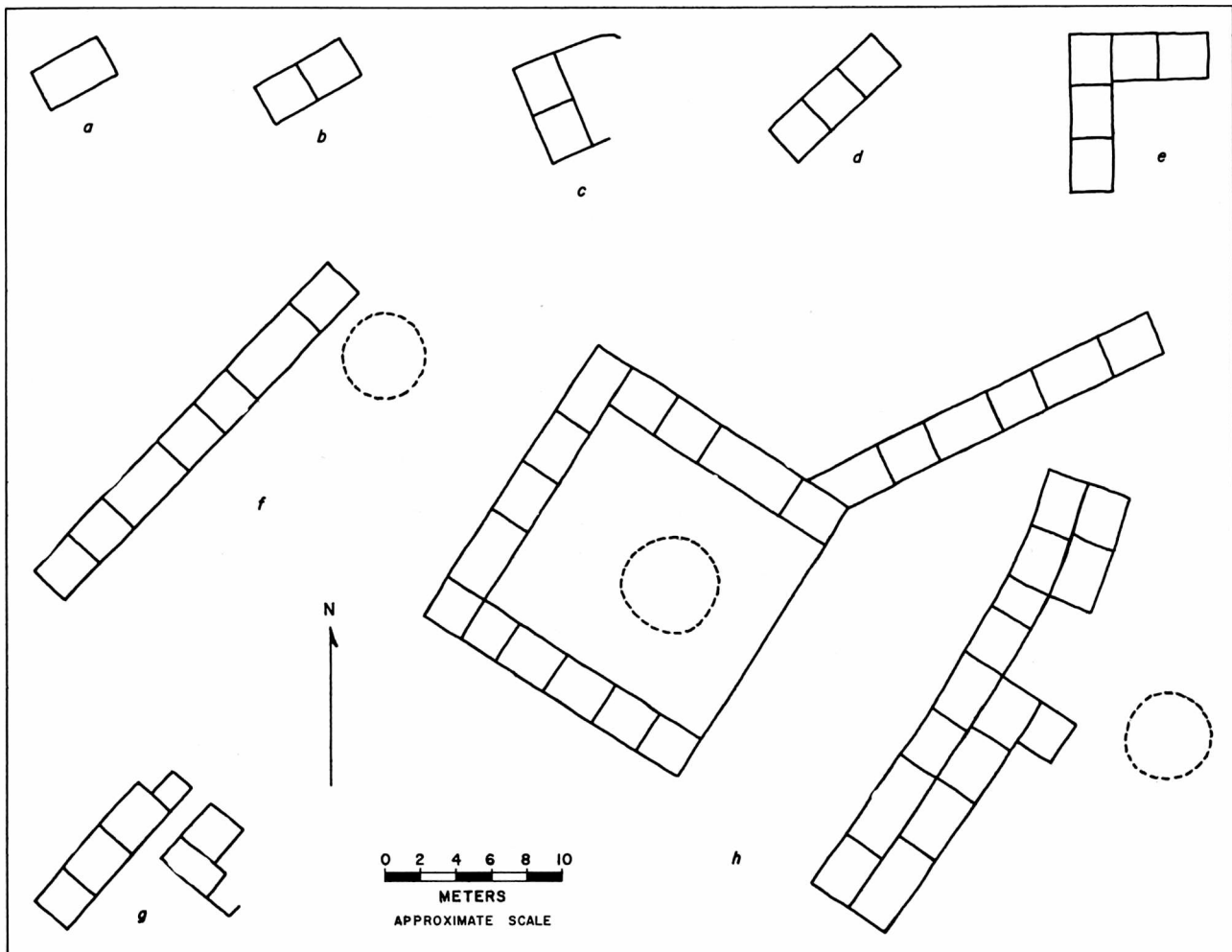


FIGURE 3. Simplified outlines of types of masonry structures found on Cummings Mesa.

will be present. Trash orientation, like that of masonry structures, could not always be determined because of scattering, erosion, or poorly defined refuse areas. Twenty-five sites had trash to the south of the masonry structures. Twelve sites had trash in the area east of the masonry, and a few sites had trash to the north or west, or so badly scattered that no pattern could be observed. Trash was generally not extensive, and erosion of dunes and slopes below sites accounts in part for the lack of refuse.

PETROGRAPHS

Petrograph is the generic name used for both painted and pecked designs on rock surfaces (Turner, 1963). Only 12 sites are reported as having petroglyphs.

Where Navajo glyphs occur, they are usually incised and depict horses, personal names, and the names of trading posts. Three sites in Tsebehotso Canyon have recent carving which is probably of Anglo origin. These inscriptions read *WTL 1933* and *WTL 7/11/33*. At Sandal Cave (NA7659) in Forbidding Canyon, an inscription was found which reads *Bernheimer Exp. 7-6-1922*. These glyphs are indicative of Turner's (1963) Style 1.

One site (NA7960) on Cummings Mesa proper and one (NA7620) in Cliff Canyon have both petroglyphs and pictographs, which are fairly well preserved. NA7620 has the largest known pictograph panel surveyed by the Museum in the Lower Glen Canyon area.

In every case, the petroglyphs occurred with lithic and ceramic material and six of the sites had masonry structures present as well. The sherds are Kayenta Anasazi types and date approximately between A.D. 1050 and 1250, which by association would place most of the rather non-diagnostic pictography in the Style 4 period. At three sites only one room exists, but at the other three sites with masonry the room numbers range between 2 and 10. Nine of the 12 petroglyph sites occur at tributary canyon sites, and four of them are in the Tsebehotso drainage. The others are dispersed in Forbidding, West, Cliff, and Dungeon Canyons. Eight of the nine canyon sites are shelter or cliff sites; the other is a talus site. On Cummings Mesa proper, two of the three pictograph sites are located in ledge sites and the third in an open dune site.

Several of the pictographs at Sandal Cave are anthropomorphic forms with square shoulders, up-raised arms, straight legs, and rectangular or triangular-shaped bodies. All are painted on a bare rock surface with white pigment. These figures are probably Style 5, and may be of Basketmaker origin.

The large panel of pictographs at NA7620 includes geometric, zoomorphic, and anthropomorphic forms painted primarily in one shade of red. Some glyphs are painted white and green.

The pictographs at NA7960 are either Style 2 (prehistoric Hopi) or Style 4 (Kayenta Anasazi). Both Hopi and Anasazi sherds were found at this site. Forms represented are a Kachina-like mask and several rows of dots, all painted with red pigments

and extremely weathered, because of their poorly protected location.

It is interesting to note that the known pictograph locations are in the highland areas or in the tributary canyons away from the Colorado River, whereas the most impressive petroglyph panels are near or alongside the Colorado River. There are exceptions. Undoubtedly weathering has obliterated some pictographs from the canyon lands region, and certainly the enticing surfaces of the Navajo sandstone, which contain the Colorado and its tributaries in Lower Glen Canyon, account for a portion of the noted dichotomy in the petrographic art. Further support of our impression exists in the fact that few other rock units in the Lower Glen Canyon region and particularly Cummings Mesa are adaptable to the pecking, incising, and retention against weathering of the petrographic expression.

FOOTHOLDS AND TRAILS

The importance of trail systems in the Lower Glen Canyon region has already been discussed (Adams, Lindsay, and Turner, 1961:22-23).

It is our intention here to mention what significance the trail systems on and below Cummings Mesa have with respect to the Cummings Mesa occupation and the occupation along the Colorado River and the tributary canyons adjacent to Cummings Mesa.

At least three trails are used today by the Navajo Indians to bring livestock to and from the mesa top. The trail to the Rainbow Lodge area, used at present, descends the mesa at the eastern escarpment. If a prehistoric trail exists here, evidence for it has not been found. This, however, does not preclude the former existence of a trail at this point, because the route may have been accessible before it was modified to make it passable for stock. The Navajo travel this trail swiftly over the ledges and rock slopes, using the prepared stock trail for convenience rather than necessity. The distance between the mesa top and Rainbow Lodge, approximately six air miles, was covered on foot in three hours, the return journey taking slightly longer. This time-distance relationship is particularly interesting because it indicates that Cummings Mesa is less than one-half day's walking time away from another population center, that south of Navajo Mountain, in Arizona.

Another stock trail ascends the mesa at the southwest escarpment. This trail, we are told, is used by Indians from another area—probably around Inscription House, as an incised petroglyph at NA-7594 indicates. Descent from the mesa into the bottom of West Canyon is strenuous, but not very difficult. We believe this trail is the one used by both the Cummings (1919) and Bernheimer (1924) Expeditions (Bernheimer, 1926:177-8).

The third trail onto Cummings Mesa is located in the upper portion of the east fork of Dungeon Canyon. The steep and strenuous climb over talus and along ledges from NA7662 can be negotiated in less than one hour and descended in nearly one-half an hour. Descent of this trail was often made easier by

disregarding the stock trail and walking the talus. The implications of this trail are manifold. Initially we considered it important because it formed a vital link in the known network of trail systems established by the Navajo for grazing and watering their livestock at the Colorado River. Beginning at NA5252 at streamside on the Colorado River, the modern Indians had re-carved a set of prehistoric pecked steps and set up a log ramp, to allow their livestock access to the river. Proceeding inland the trail is easily followed, mostly over scoured Navajo sandstone slopes and through bedrock drainages to the location of the ledge shelter at NA7508. The importance of this site to the archaeology of Cummings Mesa is two-fold. First, it is a lithic workshop which is adjoined by a one-room masonry habitation, both of which are assumed to be dated by a subfloor burial having associated ceramic grave furniture. Our reasons for an interest in dating lithic workshop materials are known (Adams, Lindsay, and Turner, 1961:54-5), and; secondly, to have a site of this nature on or near a trail which eventually leads to the top of Cummings Mesa is important indeed. The trek from NA7508 to NA7662 is merely a matter of following the Carmel-capped platform into and up Dungeon Canyon, and hence up the talus slope trail south-east of NA7662.

Two other trails, both prehistoric, were found which have implications for the Cummings Mesa area. The trail at NA7510 consists of a series of pecked footholds and handholds, separately cut, into six rock faces to include well over 250 individual steps on the precipitous inner canyon wall of the Navajo sandstone. This trail begins at the mouth of False Entrance Canyon and terminates at the Carmel-capped bench at the base of Cummings Mesa. It is unknown whether a modern stock trail or prehistoric trail ascends the northern escarpment of the mesa near this location. The second hand and foot trail is in the vicinity of NA6445, adjacent to the Colorado River. From this large lithic site (Adams, Lindsay and Turner, 1961: 41-3) one can ascend the Navajo sandstone cliff via the pecked step trail to the Carmel-capped platform and hence into the higher elevations along the canyon rim of Forbidding Canyon. That this location on the Carmel platform can be reached from other highland locations is attested by the fact that modern camp debris and sheep dung were found at NA7592.

Although we could not demonstrate it by actual ground reconnaissance, there is a definite possibility that there exists a prehistoric and perhaps historic trail from Cummings Mesa through Catfish Canyon to the Colorado River. Both ends of this possible trail location have been traced out for at least one mile.

From our extensive surveys, both aerial and ground, the data given above, and the routes of the 1921 Bernheimer Expedition (Morris, 1922:498), it has been demonstrated conclusively that the base of Cummings Mesa can be nearly, and probably completely, encircled on foot. Furthermore, we know of at least one descent location from the mesa to the

Colorado River and at least two pecked step trails from the base of the mesa to the river. Descent to the Colorado River through West and Forbidding Canyons is also possible and relatively simple. Access to Cummings Mesa from Jay-i Canyon, a tributary of Navajo Canyon, and highland regions to the east is less than a one-half day's walk.

ARTIFACTS
Lithic Material

Worked lithic material was quite abundant on Cummings Mesa, and collections were made at 152 of the 180 recorded sites. Artifacts and lithic debris were collected when transportation logistics permitted, and artifacts not collected were recorded on stone catalogue forms and left in the field.

In the analysis of stone material, two taxonomic schemes were followed: the taxonomic groups proposed by Adams, Lindsay, and Turner (1961:14-22) for Lower Glen Canyon material have been followed because of the similarities between the Cummings Mesa and Glen Canyon material; Woodbury's (1954) classifications were modified to fit this material in cases where the above taxonomy did not extend.

Lithic material collected on Cummings Mesa consists predominantly of chipped stone artifacts and fewer numbers of ground stone tools. Bifacially chipped implements comprise the majority of chipped stone, and consist of projectile points, knives, and chopping tools. Unifacial implements are represented by several scraper types, and the ground stone consists of manos, metates, and mauls. Utilized or unworked lithic debris was often collected and also subjected to analysis.

Chipped Stone

Projectile Points. Small triangular projectile points or knives without notches (Fig. 4a-e) were the predominant group found on the Cummings Mesa survey. Twenty-one points of this type were recovered in either complete form or as identifiable fragments (Table 4). These were from 17 to 37 mm. long, with

Point Types	Number of Specimens	
Small Triangular Points	21	
Not notched		12
Straight base		3
Convex base		6
Concave base		
Oval and Leaf-shaped Points	5	
Not notched		3
Side notched		2
Stemmed Points	12	
Shouldered	3	
Barbed	9	
Expanding stem		7
Straight stem		2
Unidentifiable Fragments	93	
TOTAL	130	

TABLE 4. Point type occurrence on Cummings Mesa.

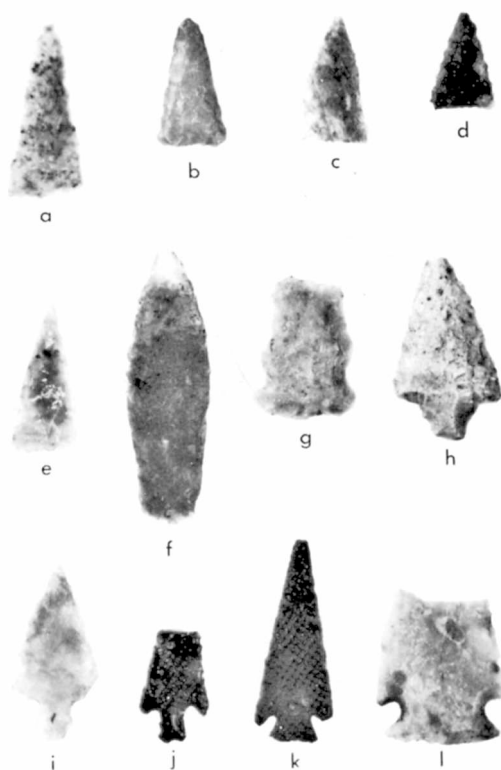


FIGURE 4. Points from Cummings Mesa. *a-c*, small triangular, straight base; *d, e*, small triangular concave base; *f*, oval or leaf-shaped, no notches; *g*, oval or leaf-shaped, side notched; *h, i*, stemmed, shouldered; *j-l*, stemmed, barbed, expanding base. Length of *f*, 52 mm.

the width ranging from two-fifths of the length to equal the length. On an average, length is about two times the width, and a typical triangular point is 25 mm. long. Twelve of the points have straight bases, and three have slightly convex bases. Six have slightly concave bases. None of the small triangular points are notched.

Oval and leaf-shaped points and small knives (Fig. 4 *f, g*) are represented by five specimens, most of which are fragmentary. These have rounded bases, resembling the larger round base knife type. Two are side notched. The width at the base ranges from 12 to 22 mm. This type of implement grades into the larger knife categories which are similar in shape and only slightly larger than the small oval knives and points. Workmanship on the oval points is less fine, and they tend to be thicker than the smaller triangular points. One of the oval points (Fig. 4 *f*) is thickest towards the middle and has a slightly rounded square base. It had been ground on the lateral edges near the base, and slightly resembles in form some of the archaic point types of the southwest. It is 52 mm. long and 17 mm. wide. The two side notched points have rather large bases below the notches. One of these has a concave base; the other a convex base.

Stemmed points fall into two groups: shouldered (square tanged), and barbed (sharp tang). Three of the twelve stemmed points recovered are shouldered with straight or tapering bases (Fig. 4 *h, i*). Seven of the stemmed points are barbed and have expanding stems (Fig. 4 *j-l*). These are a variety of sizes, but very similar in outline and all have consistently fine workmanship. The two remaining points have straight or only very slightly expanding stems. All of the stemmed points are finely made, like the triangular points. Widths range from 12 to 28 mm. The longest complete specimen is 38 mm. long, but probably some of the larger based fragmentary points had greater original lengths than this.

In addition to the above identifiable points, there are 93 fragments of small points and knives, usually tip portions, which have no identifiable bases. Points and small knives are made of chert, jasper, chalcedony, agate, and in a few cases, quartzite. Obsidian artifacts were found on the surface in two locations, one NA7961, the other at a spot near the south end of the mesa (unnumbered), where a group of 20 obsidian tools was found. This obsidian material may be assignable to the Pueblo IV-V horizon.

Large Knives. Numerous large knives and knife fragments were collected. Many of these were probably never completed, and others cannot be identified as to type or original size due to their broken condition. Following the typology of Adams, Lindsay, and Turner (1961:16), the identifiable fragments fall into several groups: square base, round base, and crude knives. The knives are predominantly made of chert, jasper, chalcedony and quartzite.

Nineteen knives are of the square base type, and 15 of these have straight bases and sides with distinct basal corners (Table 5). The maximum width of these specimens is attained at or near the base, and most of the knives are well made with edges retouched to provide a sharp cutting edge. In addition to the well finished square based knives, four knives exhibit definite corners, but have more rounded bases and sides. Two of these are complete, and all are fairly well made but somewhat more crude than the more square based knives. Sizes range from 45 to 55 mm. long, and 20 to 33 mm. wide. Original length of some of the broken specimens was probably as great as 75 mm.

Knife Types	Number of Specimens	
Squared Base	19	
Straight base and sides		15
Slightly rounded base and sides		4
Round Base (leaf-shaped)	23	
Elongate		2
Intermediate		16
Broad		5
Crude Knives	6	
Unidentifiable Fragments	39	
TOTAL	87	

TABLE 5. Knife type occurrence on Cummings Mesa.

Twenty-three complete or fragmentary round based or leaf-shaped knives were recovered and these can be classed as elongate, intermediate, or broad in type. Only four of the specimens are complete. Two knives are elongate in type, from 55 to 60 mm. long, and 20 to 23 mm. wide. Both are finely made and have secondary retouching. Five fragmentary knives fall within the width range for broad knives of 35 to 40 mm. (Adams, Lindsay, Turner, 1961:17), but lengths could not be determined. Two of these are finely made and the others are crude and lack retouching on the working edge, resulting in an almost zigzag appearance. The 16 remaining round based knives are probably intermediate in type, although some are too fragmentary to identify with certainty. Over half of these are quite unfinished in appearance but some are finely shaped and carefully retouched. The elongate, intermediate, and broad categories intergrade to a considerable extent, the only difference being slight variations in size. Because of the small number of complete specimens, it was not possible to determine if the knife categories set up previously for the Glen Canyon and used herein are valid when applied to Cummings Mesa material.

In addition to the knives discussed above, six crude knives or knife choppers (Adams, Lindsay, Turner, 1961:18) were identified. These show some evidence of percussive use on the edges, and are crudely leaf-shaped. They possibly represent rejects or unfinished tools, or more likely, they are a composite knife and chopper type of tool. They are thick, and on several specimens the original cortex is present. Working edges are zigzag, but are usually sharp. The six specimens are uniform in size, and range from 55 to 65 mm. long and from 35 to 40 mm. wide.

An additional 39 knife fragments are tip portions or unidentifiable parts.

Choppers. Ovoids and nodular choppers comprise the two distinctive chopper groups on Cummings Mesa. Twenty-four chopping tools were recovered from almost as many sites (Table 6). Eleven of the tools are nodular choppers made from quartzite river cobbles. These have a crude bifacially chipped and sharpened edge extending from one-quarter to two-thirds the way around the circumference. This edge is usually irregular, and it is sometimes blunted from use. The cutting edge is formed by the removal of large flakes in most cases, and the stone's original patina is usually present on the surface away from the cutting edge. The nodular choppers are all made of quartzite with the exception of one crypto-crystalline specimen, and one made of a dense, hematite bearing stone. Maximum diameters of nodular choppers range from 6 to 14 cm.

Ovoids tend to be smaller than nodular choppers, are oval to round in outline, and have a rough working edge extending all the way around the circumference. The edges often show percussive use. Four large ovoids and nine small ones were identified. On some, a portion of the original stone surfaces is present. The smaller ovoids resemble crude knives

Implement Type	Number of Specimens	
Choppers	24	
Nodular		11
Ovoids		13
Large		4
Small		9
Scrapers	22	
Working edge all around		3
Large hemispherical		3
Limited working edge	19	
Nodular		3
Rough flake		15
Cobble		1
Manos	32	
One-hand		21
Two-hand		11
Metates, slab	3	
Mauls	7	
Hammerstones	20	
Unmodified cobbles		6
Shaped nodules		14
TOTAL	108	

TABLE 6. Implement type occurrence on Cummings Mesa.

except they are more rounded and have no recognizable point. Large ovoids are from 75 to 80 mm. in maximum diameter, and small ovoids range from 30 to 65 mm. in diameter. Ovoids are made of quartzite and chert.

Scrapers. Scrapers may be divided into two basic categories; those with a working edge all the way around the circumference, and those with a limited working edge. Three encircling working edge scrapers were found, all of which are fairly large and fall into a small plane category (Table 6). These are from 7 to 11 cm. long and 50 to 95 mm. in maximum width. Two are round in outline and one is rectangular. In all three cases, large irregular flakes had been removed unifacially. These planes are of quartzite and cherty-limestone.

Limited edge scrapers are more numerous than the encircling edge scrapers, and include nodular, rough flake, and cobble specimens. Fifteen flake scrapers with varying amounts of worked area were recovered. Some are thin and elongated with chipping along one or two edges, and others are irregular in outline with some amount of dressing on one or more edges. Maximum lengths ranged from 30 to 65 mm., maximum widths from 15 to 40 mm., and thickness from 2.5 to 20 mm. Twelve scrapers are of chert and three are of quartzite.

Three nodular scrapers were found. These are characterized by a flat under surface and a high back. The worked edge extends about one-half way around the circumference. The surface opposite the cutting edge is thick and roughly broken in a vertical plane in all three specimens. These scrapers are 60 to 70 mm. in length, 35 to 55 mm. in width, and 15 to 30 mm. thick. All are irregular in outline. Two

are of quartzite and one is of impure chert.

One cobble scraper is present in the collection (Fig. 5 c). It is made of a large quartzite cobble, flat on one surface, with several large flakes removed from one end to form a sharp angle from the back to the nether surface. The scraper shows little evidence of use, no battering, and is otherwise unmodified. It is 95 mm. long, 70 mm. wide, and 70 mm. thick.

Notched Flake. One flake of red jasper was recovered which has six notches, all carefully chipped, along one edge. Chipping is unifacial, and the flake was perhaps used as a small saw. Use chipping occurs on another edge of this flake.

Unknown Object. A piece of pink agate had been carefully chipped to an eccentric form. It is not whole, so the original shape is not definite, but was probably rectangular with a large triangular notch removed from one of the longer sides.

Utilized Flakes. Numerous flakes of chert, jasper, chalcedony and agate were recovered which exhibit fine chipping along one or more edges indicating use as knives or scrapers. These utilized flakes occurred with great frequency and were represented at nearly every site where lithic collections were made. Almost one-half of the chips and flakes collected showed evidence of being used and then perhaps discarded. The near absence of chipping tool stone for tool manufacture on the mesa proper necessitated many trips to the Colorado River gravel terraces to acquire raw materials (Adams, Lindsay, and Turner, 1961:54). Secondary usage of chips and flakes, usually the debris of tool manufacture, indicates that stone was somewhat precious and utilized in as many ways as possible. It seems likely also, that finished stone tools such as projectile points were re-used for cutting, after they were broken, in much the same way that flakes were utilized. The presence of flakes at many sites indicates that tools were made on the mesa itself, as well as at workshops along the Colorado River. Undoubtedly many tools were made near the river and transported to the mesa, but indications are that some stone was also taken onto the mesa and processed there into the finished products.

Ground Stone

Metates. Three slab metates are reported from the Cummings Mesa survey. All were well shaped rectangular slabs with flat grinding surfaces. Lengths were from 35 to 45 cm. and widths ranged from 20 to 30 cm. All of the metates were stone catalogued and left in the field due to logistic problems.

Manos. The thirty-three manos recorded by the survey can be divided into one-hand and two-hand groups on the basis of size and appearance characteristics (Table 6). The small, one-hand manos are characterized by being round to sub-rectangular in outline and cross section. All but two are bifacial, and most show signs of sharpening by pecking. Most specimens have distinct shoulders. The 22 one-hand manos are from 8 to 12.5 cm. long, 7.2 to 9.5 cm. wide and 3.5 to 5.5 cm. thick. They may be divided

into the following groups on the basis of the nature of the grinding surface:

one flat surface, one convex surface	8
two convex surfaces	8
one convex surface, one rounded surface	1
two rounded surfaces	1
two flat surfaces	2
one convex surface	2

Some of the one-hand manos may have had rotational use in addition to reciprocal grinding resulting in rounded surfaces. Most are made of buff to red medium or coarse-grained sandstone. Two are made of a coarse-grained angular conglomerate, and one was made from an unmodified quartzite river cobble. The one-hand manos are similar in many respects, and the above form groupings are somewhat arbitrary, so no further analysis of the grinding surface groups is attempted.

Two-hand manos are represented by 11 complete or fragmentary specimens. They fall into the following categories based on the number and shape of the grinding surfaces:

(1). One convex surface. One fragmentary mano has a slightly convex face, and is unworked on the other face. The length was not determinable and the width is 10 cm.

(2). One flat surface. These three manos are all fragmentary. Two have been pecked to sharpen them. One is made of rough conglomerate and is well shaped, and the others are smoothed sandstone slabs. Widths range from 9.8 to 11.3 cm., and thickness from 25 to 45 mm. Lengths could not be determined.

(3). One faceted surface. Two manos have one grinding surface which is faceted into two adjoining grinding planes. These manos tend to be thick on one edge and taper to a very thin edge on the opposite edge. Both specimens are rough and unworked on the face opposite the grinding surface. They are 26 to 28 cm. long, 11 to 12.5 cm. wide, and 22 to 30 mm. thick.

(4). Two flat surfaces. One mano, made of a flat sandstone slab, is smoothed on both faces to very flat surfaces. This bifacial mano is irregular in shape and shows signs of having been sharpened by pecking. It is 18.5 cm. long, 11.5 cm. wide, and 20 mm. thick.

(5). One flat, one faceted surface. This fragment has a sharply faceted grinding surface with a very flat surface opposite it. The mano is "airfoil" shaped in cross section, thick on one edge, and thin on the opposite edge. It is 95 mm. in width, but the original length cannot be determined.

(6). One flat and one convex surface. This mano is 28 cm. long and 12 cm. wide.

(7). Large, loaf-shaped. Two large loaf-shaped manos, one with finger grooves, were recovered. On the grinding surface of the grooved specimen are shallow transverse sharpening grooves. The smaller mano, without finger grooves, has one grinding surface and another possible one. Maximum dimensions of the two manos are 19.5 to 28 cm. long, 7 to 12 cm. wide and both are 70 mm. thick. Both have flat

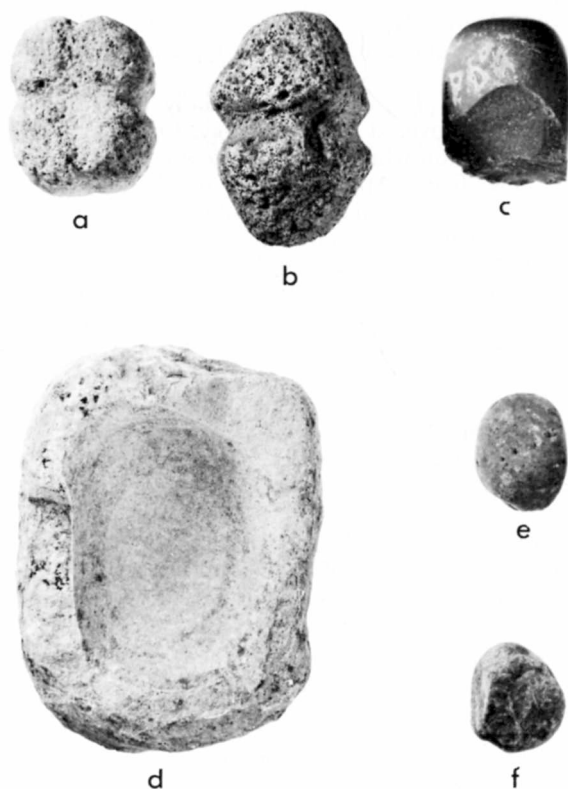


FIGURE 5. Miscellaneous stone artifacts from Cummings Mesa. *a*, grooved stone; *b*, maul; *c*, cobble scraper; *d*, mortar (?); *e*, *f*, hammerstones. Length of *d*, 21 cm.

grinding surfaces.

Mauls. Seven mauls were recorded on the survey, all from different sites (Table 6). All are fully grooved with the groove around the area of maximum circumference (Fig. 5 *b*). Five of the mauls are made of coarse buff sandstone and one is made of conglomeritic sandstone. The other was made from a reddish medium-grained sandstone mano, and three of the mano's grinding surfaces are evident on the maul. On all of the mauls, the grooves tend to be deep, and are bordered by slight ridges on either side which extend around the circumference. Three of the mauls have one flat side, and the rest tend to be round in cross section. The smallest maul is almost spherical except where grooved. All of the mauls show signs of battering on the ends, and spalls have been knocked off in some cases. Lengths range from 9 to 15 cm. and widths from 7 to 10 cm.

Grooved Stone. One unusual grooved stone was recovered (Fig. 5 *a*). It is coarse buff sandstone, and rectangular in outline with rounded corners. It is fully grooved around its width, like a maul, and is also fully grooved around its length, the grooves crossing at right angles on each face of the stone. Some evidences of battering and spalling off are evident on the corners of the stone. The lengthwise groove is less well defined than the other groove.

The artifact is 100 mm. long, 80 mm. wide, and 65 mm. thick.

Mortar (?). A roughly shaped block of sandstone 21 cm. long, 16 cm. wide, and 8 cm. thick has a smooth oval depression in one side (Fig. 5 *d*). This depression is 15 cm. long, 8 cm. wide, and 4 cm. deep. Most of the rim of the depression has partially weathered away.

Other Lithic Material

Hammerstones. Eighteen of the 20 hammerstones (Fig. 5 *e*, *f*) recovered are made of gray, white, or reddish quartzite. One is made of chert, and one is of petrified wood. Six of these are river cobbles which have been used without other modification (Table 6). The other 14 appear to be deliberately shaped nodules, similar to nodular choppers in some cases, except that their edges were battered away until they were no longer suitable for chopping. Numerous spalls and chips have been removed from the edges and ends of the hammerstones where they received the most intensive use in pounding and pecking. The hammerstones are irregular in shape and range in maximum diameter from 55 to 85 mm. Average diameter is 65 mm.

Smooth Pebbles. Several small, very smooth quartzite pebbles were found which are unmodified and have no abrasion striations. The functional significance of these, if any, is unknown.

Hematite. Several pieces of hematite were recovered, some showing striations or rubbing marks where the stones had been abraded to remove the pigment.

Chipping Residue. Numerous chips of all kinds of stone material were collected. These are of a variety of materials, mostly cherts and quartzite. This material is unworked, and is probably the result of tool manufacture on the mesa.

Pottery

Potsherds were found at 160 of the 180 sites recorded by the survey. 5,117 sherds were collected for the Cummings Mesa area, and of these, 4,843 were from Cummings Mesa proper. Individual site sherd collections ranged from fewer than 10 sherds to around 150 sherds in a few instances. Collections generally consisted of 20 to 30 sherds.

Tusayan White Ware is the dominant white ware for the area. Sosi, Dogoszhi, Flagstaff, and Tusayan Black-on-white types occurred with great frequency, with 129, 113, 269, and 636 sherds respectively. Kayenta and Black Mesa Black-on-whites (16 and 11 sherds) occurred in much lesser frequency.

Tusayan Gray Ware was found at nearly all sites where sherd collections were made. Tusayan Corrugated, Moenkopi Corrugated and Kiet Siel Gray were the principal types collected, and Kiet Siel Gray was the dominant gray type, with 911 sherds compared to 250 and 450 for the other two types. Small amounts of North Creek Gray, North Creek Black-on-gray, and Tusayan Gray Ware of the Lino Tradition (see NA7498) were also collected.

Tsegi Orange Ware is widely distributed in the



FIGURE 6. Partial pottery vessels from Cummings Mesa. *a*, McElmo Black-on-white; *b*, Flagstaff Black-on-white; *c*, Moenkopi Corrugated. Length of *a*, 26 cm.

Cummings Mesa area, and was recovered in consistently substantial quantities. Tusayan Black-on-red (153 sherds) Tusayan Polychrome (482 sherds) and Tsegi Orange (302 sherds) occurred most frequently. Smaller amounts (one to 20 sherds) of Medicine Black-on-red, Cameron Polychrome, Citadel Polychrome, Tsegi Red-on-orange, Tsegi Black-on-orange, and Tsegi Polychrome were found. No Kayenta Polychrome, Kiet Siel Polychrome, or Kiet Siel Black-on-red were identified. Very small amounts of San Juan Red Ware occurred in the Middleton Black-on-red and Middle Polychrome types.

Some trade wares were obtained in small quantities. Both McElmo and Mesa Verde Black-on-whites occurred. Ten Walnut Black-on-white sherds were recovered. St. George Black-on-gray, Mancos Black-on-white, Puerco Black-on-white, Gallup Black-on-white, Holbrook Black-on-white, and Johnson Shinarump Corrugated occurred in very minor amounts, and usually the above types were present at only one site.

Pueblo IV-V pottery was found on the surface at seven sites. Thirty-five sherds of Jeddito Plain were recovered, 8 sherds of Jeddito Corrugated, and 3 of Jeddito Black-on-yellow. In addition, 13 sherds of Homolovi Plain were found at one tributary site.

Numerous sherds were unclassifiable Tusayan

White Ware, and smaller numbers were unidentifiable, or of unknown types. In many instances, a sherd was too small to be assigned to a type group with accuracy.

Restored Vessels. Four partially restorable vessels were recovered on the survey. One partial McElmo Black-on-white bowl is present in the collection (Fig. 6 *a*). Approximately one-half of the rim is present, with a diameter of 25 cm. The depth of the bowl was undeterminable.

A fragmentary Flagstaff Black-on-white bowl (Fig. 6 *b*) was collected. Its diameter is estimated at 16 cm. and it is 80 mm. deep. One handle is present just below the rim, and is formed of a clay strap bent into a double loop and pressed into the body of the vessel.

A miniature Moenkopi Corrugated jar (Fig. 6 *c*) was found which was nearly full of a carbonized substance. This vessel is 55 mm. in diameter and 65 mm. deep.

One large globular vessel has been partially restored. It resembles Lino Gray to some extent being undecorated and smooth, but it is tan to reddish in color. None of the rim is present, and the original form cannot be determined. The bottom portion of the vessel is nearly complete, and extends past the point of maximum body diameter which is 27 cm. No coils are evident except where the vessel was cracked, and it is smooth inside and out.

Perishables

Perishable materials were reported from only 16 sites, nine of which are shelter or cliff sites. The material consisted of plants and bone fragments for the most part, although some artifactual materials were collected. Collections were not made from all the sites where perishables are reported as being present. Vegetal materials consisted of corncobs, seeds, acorns, reed fragments, yucca, and cucurbit fragments.

Digging Stick. This artifact (Fig. 7) is 99.5 cm. long and 4.7 cm. in maximum diameter. The distal end, about one-third of the total length, had been flattened to a blade 9 to 14 mm. thick, and slightly pointed. The proximal end is rounded.

Worked Sticks. Several sticks showing signs of having been cut or shaped were found, but only one appears to be a finished artifact. This is what may be a dart foreshaft (Fig. 8 *c*). Made of a hard wood, this artifact is presently 15.1 cm. long, but both ends are broken. It is 9 mm. in diameter at the butt end, and tapers to 6 mm. in diameter at the other end.

Basketry. One small basket fragment (Fig. 8 *b*) was found. The foundation is apparently one rod



FIGURE 7. Digging stick from Forbidding Canyon. Length, 99.5 cm.

and a bundle, but since only one surface is preserved, precise identification of the technique is impossible.

Tumpline. A fragment of leather that may have been used as a tumpline (Fig. 8 a) was found. It is 55 cm. long and 3.2 to 3.9 cm. wide. One end is knotted as if it had been looped around something and tied with a half-hitch.

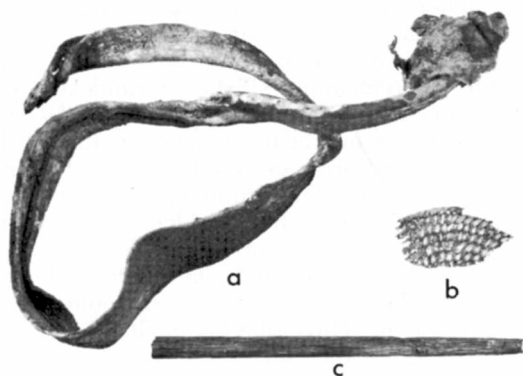


FIGURE 8. Perishable artifacts from NA7658, Forbidding Canyon. Length of c, 15.1 cm.

Cultural Components

ANASAZI SITES

In order to understand and describe the prehistoric occupation of the Cummings Mesa region better, the recorded site information and ceramic collections were analyzed further into ceramic and architectural categories.

Of the total 180 sites available for analytical purposes only 133 sites could be used for ceramic studies; however, for the study of settlement and architecture the total survey was employed. The ceramic study of "off mesa" sites revealed that only 7 of the 17 sites had sherd collections and these collections constituted only 274 sherds. The collections were similar in content to those from Cummings Mesa proper. Tusayan Black-on-white was the predominant and most diagnostic pottery type. However, earlier material was represented in several instances, which is also the case on Cummings Mesa. Because of the similarity with the mesa top ceramic material, and as the tributary sites comprise only 5.3 per cent of the total sherd count, the seven tributary sites are included in the following tabulations and discussion. We do not feel that the inclusion of these data causes any significant bias in the preponderance of mesa proper survey data, nor has it caused us to misinterpret the results of the ceramic-site characteristic analyses.

Our first attempt at defining ceramic complexes was to divide the total inventory of pottery types into small groups which were representative of both time and site location-settlement characteristics. This initial endeavor was not rewarding because the sherd collections were too small and the architectural distinctions were not clear-cut. Our next step was more

subjective. As the various types of Tusayan White Ware were represented at most sites and in sufficient numbers, they were selected for analysis and comparison. Each black-on-white type was given relative temporal placement on the basis of the dendrochronologically derived dates and Colton's (1946:20) ceramic groups. Perusal of the ceramic table indicated that several ceramic complexes existed, and a tally was made of these complexes. This tabulation of black-on-white types was then checked against the other local and intrusive types for concurrence or disparity. Corroboration was found which allowed certain categories to be combined, the result being four ceramic complexes with temporal significance. Each period is represented by one or more dominant black-on-white type and considerable overlap is evident.

The four ceramic complexes are temporally designated *early*, *middle*, *middle-late*, and *late*, generally corresponding to Colton's (1946:20) Ceramic Groups 6, 7, 8, and 9 (Table 7). Black Mesa, Sosi, and Dogoszhi Black-on-white make up the first category with emphasis on a predominance of Sosi and Dogoszhi Black-on-whites (Table 7). Sosi, Dogoszhi, and Flagstaff Black-on-white compose the second, or middle time period category, with an abundance of Flagstaff being the deciding factor. When Sosi, Dogoszhi, Flagstaff, and Tusayan Black-on-white occur in fairly equal amounts at a site, the site is placed in the middle-late, or third category. A predominance of Tusayan or Tusayan and Kayenta Black-on-white places a site in the fourth, or late grouping.

It should be pointed out that the assignment of any particular site to a certain ceramic complex is based solely on the predominant black-on-white type or types, and does not mean that a site assigned to the "late" category was not also occupied in earlier times, or that a site assigned to the "early" category does not have any "late" sherds.

Ceramic Groups	Time	Black-on-white types
6	Early	Black Mesa, <u>Sosi</u> , <u>Dogoszhi</u>
7	Middle	Sosi, Dogoszhi, <u>Flagstaff</u>
8	Middle-late	<u>Sosi</u> , <u>Dogoszhi</u> , <u>Flagstaff</u> , <u>Tusayan</u>
9	Late	<u>Tusayan</u> , <u>Kayenta</u>

TABLE 7. Ceramic analysis groupings with dominant types in each grouping underlined. Ceramic Groups are those of Colton (1946:20).

Period	Number of Sites
Black Mesa, Sosi, Dogoszhi (early)	16
Sosi, Dogoszhi, Flagstaff (middle)	23
Sosi, Dogoszhi, Flagstaff, Tusayan (middle-late)	13
Tusayan, Kayenta (late)	81
TOTAL Assignable Sites	133

TABLE 8. Number of sites in each ceramic grouping.

A breakdown of the number of sites in each of the four complexes is shown in Table 8. Tusayan White Ware sherds occurred at 133 sites, and these sites were therefore assignable to one of the four groupings. Twenty-four sites had no sherd collections and 23 others had no black-on-white sherds and could not be accurately assigned to a grouping on the basis of other sherds in the collection.

The late group tends to predominate in all locations except in the ledge sites where one is early, four are middle, three are late, and five have no collection or no black-on-white sherds (Table 9). The predominance of Tusayan Black-on-white is especially seen in the open site category. At a few sites, sherds were present from Black Mesa to Kayenta, or early to late in the ceramic sequence, and nearly all sites had sherds from more than one grouping present. The predominant number of sherds at each site shows a late tendency but strong evidences of early, or continuous early to late occupations are indicated at many sites as well.

Environmental Location	Early	Middle	Middle-Late	Late	Not Assignable	TOTALS
Open	14	18	13	62	34	141
Talus				2	2	4
Shelter	1	4		9	8	22
Cliff					2	2
Combination	1	1		8	1	11
TOTALS	16	23	13	81	47	180

TABLE 9. Breakdown of 180 sites by location and ceramic grouping based on predominant sherd types at each site.

For further analysis and comparisons, all sites were divided into four categories on the basis of complexity of architecture. A line drawing of the plan of each site was made, and when these cards were compared, the sites fell into four rather distinct groups (Fig. 3). The ceramic complex at a site (which has already been shown in four ceramic-time association groupings) was then compared with architectural complexity to show sherd type frequency with the type of architectural pattern at the site. Thirty-three sites showed no architectural form, and were not included in the tabulations. One third of these 33 had no sherd collections, so 22 sherd sites were left out of the ceramic-architectural tabulation (Table 10).

The first architectural category, containing 77

Ceramic Group	Complex No. (%)	Large No. (%)	2-3 Rooms No. (%)	1 Room No. (%)	TOTALS
Early		1 (9)	4 (10)	10 (19)	15
Middle		1 (9)	3 (7)	9 (17)	13
Middle-Late		1 (9)	9 (22)	2 (4)	12
Late	7 (100)	8 (73)	25 (61)	31 (60)	71
TOTALS	7	11	41	52	111

TABLE 10. A comparison of architectural complexity with predominant ceramic associations. Only those sites assignable in both time and complexity are used in this tabulation.

sites, consists of one room masonry units or very simple structures such as hearths or cists. Twenty-five of these sites had no sherd collections or no black-on-white sherds. Of the 52 remaining simple sites, ceramically ten were early, nine were middle, two were middle-late, and 31 were late sites (Table 10).

Fairly simple two to three room units make up the second architectural group and 48 sites are represented. The masonry units are in scattered room arrangements or in linear patterns. Seven of these sites had no sherd collections or no black-on-white sherds. Of the remaining 41 sites, ceramically four are early, three are middle, and nine are middle-late. The late ceramic group again predominated, with 25 sites having a majority of Tusayan and Kayenta Black-on-white sherds. The middle-late ceramic group shows up quite strongly here, which is interesting since it was the smallest group in the first category.

Fourteen sites composed the third category. These sites are large, with three to ten rooms and a kiva usually present. Three sites had no datable sherds. Eight of the remaining sites were late in ceramic type and one site each were early, middle, and middle-late.

The fourth architectural group was designated as complex. These seven sites have ten or more rooms combined with other complex features such as kivas and separate storage units. All seven of the complex sites were ceramically dated as late, having predominantly Tusayan Black-on-white with some Kayenta Black-on-white sherds.

Each of the four architectural groups was predominantly late in ceramic content, with a scattering of earlier elements. It is noticeable that the more complex a site, the more probable that it is late, and a higher proportion of the less complex sites are early, middle, or middle-late.

NAVAJO SITES

Evidence of a present day Navajo occupation of the area was observed at 15 sites, all but three of which are on Cummings Mesa proper. Most of these consist of Navajo culture elements in super-position or close association with prehistoric Anasazi elements, as the many Navajo sites not in close proximity to prehistoric sites ordinarily were not assigned site numbers. Utilization of water resources and trails by the Navajo often seems to follow closely the precedent established by the prehistoric inhabitants. This same pattern was also found in Lower Glen Canyon proper (Adams, Lindsay, and Turner, 1961:9). Navajo elements recorded by the survey include stone and log hogans, brush and pole and stone corrals and lambing pens, earth and log sweat lodges, rock cairns (often built on Anasazi sites), sheep droppings, modern trash, and recent petroglyphs. No Navajo ceramics were found.

Sites including more than one habitation are rare. The fact that the sites are little more than outlying and seasonally used sheep camps is attested by the absence of agricultural plots, poor water sources, meager trash deposits, and crudeness of the structures, particularly the hogans. Stock trails link many

of the hogan complexes together.

The usual place of settlement is at the head of a small ravine or in an embayment within the canyon system. None form a salient feature on the terrain.

Just how much time depth can be attributed to the Navajo, and perhaps Paiute, occupation of the region is unknown.

PUEBLO IV-V SITES

Seven of the 180 sites dealt with in this survey report had identifiable Pueblo IV-V pottery associated with them. In most cases these sites only had one to four sherds, but at some (NA7660, 7960, 7961) the Pueblo IV-V material forms a significant portion of the pottery assemblage. NA7660 and NA7594 are slump boulder sites located at the base of Cummings Mesa in Dungeon and West Canyons respectively. The remaining five sites are on top of Cummings Mesa. Three are partially under protecting ledges, one is a slump boulder site, and one is in the open with no definable masonry. Deserving of special mention is NA7961, which was excavated. The implications of the Pueblo IV-V material are discussed in the report for that site. A group of 20 obsidian tools, largely scrapers and utilized flakes, suspected to be of Pueblo IV or V origin, was found on the south end of Cummings Mesa. Since no other cultural remains were associated with this material, a site number was not assigned.

SITES OF UNKNOWN HORIZON

Sixteen sites from the Cummings Mesa survey are unassignable as to cultural affiliation. Most of these are lacking any lithic or ceramic material, or they have lithic material only. A few prehistoric trail

sites are also of unknown origin. The five sites with lithic material only are probably Anasazi, since analysis has indicated that tool types are very similar to the mesa ceramic sites. The lithic material from workshops and ceramic sites bears a strong resemblance to the river workshop material (Adams, Lindsay, and Turner, 1961). It is quite possible that the specialized workshop sites belong to the same culture horizon as the numerous ceramic sites. Petroglyph sites probably relate to the same Anasazi sites, and often petroglyphs are found in association with masonry structures. The Anasazi occupants of the mesa probably made trips to the tributary canyons and rivers for stone and prepared some of the finished tools at the "lithic workshops," after which they carried the finished tools and unworked stone onto the mesa. Stone types are the same as those that occur on the alluvial gravel terraces of the river on the mesa top in the pueblos.

The possibility that there is a pre-ceramic horizon on Cummings Mesa cannot be ignored, but no stone tools were found that could be unhesitatingly assigned to a Basketmaker II or earlier period.

Prehistoric trails, when unassociated with other culture items, cannot be specifically designated as to origin. The proximity of the trails to Anasazi sites would seem to indicate that they are affiliated with the Anasazi culture horizon. Since, however, the trails would be necessary for anyone trying to gain access to some parts of the area, any group of people in the canyons could have been responsible for them.

The 10 sites which lack any sherds or stone material cannot be said definitely to belong to any culture horizon. In several of these cases, however, masonry is present which seems to be of the same type as is present in the Kayenta-Anasazi masonry sites.

Excavations

EXCAVATIONS AT selected sites on Cummings Mesa took place between April 20 and May 12, 1961. Seven of these 10 sites were chosen from the initial survey conducted in 1960. The remaining three were recorded while the excavation program was in progress. Each of the sites selected for excavation appeared, from surface indications, to offer a contribution toward the better understanding of our research problem, which was to determine the temporal and spatial limits of the occupation on Cummings Mesa and the relationships of this occupation to those found along the Colorado River in Lower Glen Canyon. The following criteria were used in assigning priority to sites for the excavation program: site size and location, temporal and cultural affinities, and potential for artifact recovery. Unfortunately, sufficient time was not available to excavate thoroughly all of the sites considered necessary to gain a full cross section of the prehistory contained on Cummings Mesa. However, it is felt that the material sampled and data gained are representative, and that our knowledge of the area in particular, and the

Kayenta Anasazi in general, has been substantially increased.

The excavated sites described and discussed in this bulletin are on top of Cummings Mesa. The sites excavated in Lower Glen Canyon and its tributaries, some adjoining Cummings Mesa, are reported in two complementary bulletins (Adams, Lindsay, and Turner, 1961; Long and Turner, in preparation).

Excavations were conducted by Navajo Indians working with hand tools. No heavy equipment was employed. Screening of cultural bearing deposits was seldom practiced except at NA7961.

NA7455A

INTRODUCTION

History, Location, and Physical Description

NA7455A was recorded in 1960 by the Glen Canyon Project staff. It is located on a northwest-southeast trending small ridge between the drainages of the east and west forks of Catfish Canyon, at an

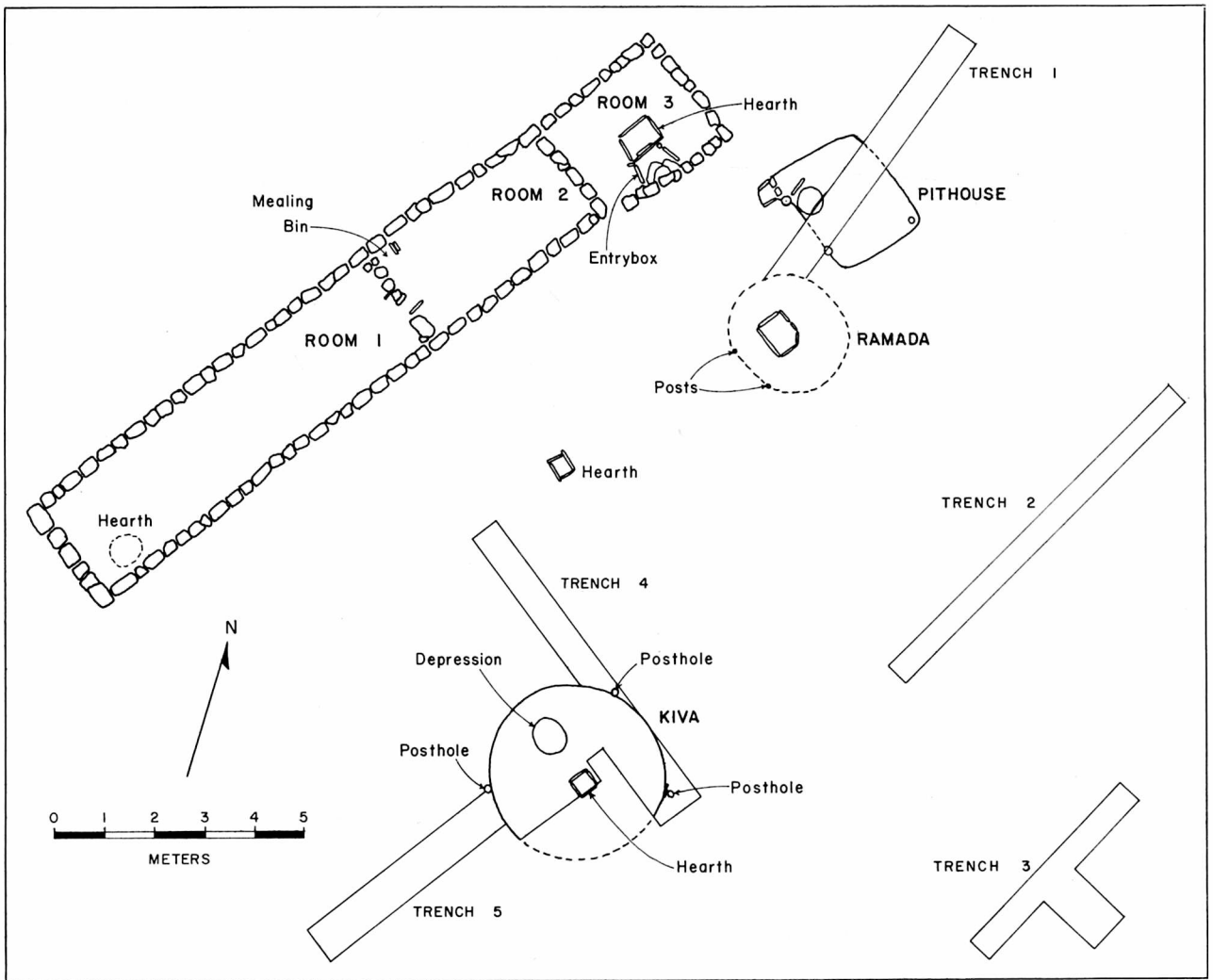


FIGURE 9. Plan of NA7455A.

approximate elevation of 5,950 ft. The sandy ridge supports a growth of blackbrush, ephedra, grasses, some sage and prickly pear, and a few scattered pinyon and juniper trees, with some *Lycium pallidum* indicating disturbed areas. The nearest known water supply today is about one mile to the south, near NA7961. Although the water supply there is a modern development, it is probable that it was also used prehistorically. Arable land nearly surrounds the site, especially on the small drainage to the southwest. Outcrops of stone suitable for construction occur at the southeast end of the site.

Surface Indications

Four areas of cultural remains, 40 to 75 yd. apart, were noticeable along the low ridge. They are all included under the number NA7455, but distinguished by capital letters. NA7455A, at the northwest end of the ridge, was the only portion excavated. The general outline of the room block could be traced at NA7455A, although most of the walls stood only one or two courses above the ground surface.

A large depression indicated the presence of a kiva. Between the kiva and the room block a hearth was partially exposed. Sherds and stone artifacts could be found on the surface, but no major trash deposit was evident.

NA7455B is being destroyed by erosion. Trash and masonry are apparent, but the limits of neither can be defined. Three to five rooms are probably present.

NA7455C appears to be a one-room unit. No trash concentration is apparent.

NA7455D, at the southeast end of the ridge, where the Project's 1961 field party located its base camp, appears to have been a camp site. Evidence of several hearths was noted, but no definite masonry was seen. The trash that occurs is scattered.

Problem

NA7455A was selected for excavation in order to sample a medium sized open site and because of its proximity to, but different type of location from, that of NA7456.

EXCAVATIONS

Excavations at NA7455A were carried out on a room block consisting of three rooms, approximately three-fourths of a kiva, and one pithouse (Fig. 9). Several test trenches were dug in various parts of the site to determine the depth and nature of the trash and to locate any other architectural features.

The long axis of the room block is aligned almost exactly northeast-southwest. For convenience in the following room descriptions, however, reference will be made to the cardinal points. For example, what is actually the southeast wall of a room will be referred to as the east wall.

Domestic Structures

Room 1. Rooms 1 and 2 were constructed at the same time, and only a nebulous dividing wall separates them.

The east, south, and west walls of this long room (Figs. 9, 10) are formed of unmodified sandstone slabs averaging 46 cm. long, 25 cm. wide, and 4 cm. thick, set in reddish-brown sandy mortar. Gaps and holes were chinked with many small slabs and spalls to form a wall averaging 30 cm. thick. The straightest edge of the large stones was generally placed to the outside of the wall. Rooms 1 and 2 at one time formed one long room. The dividing wall between them is a later addition, as it was built over an abandoned hearth or bin and abutted against the east and west walls. This dividing wall was crudely constructed and is poorly preserved due to the fact that the east wall had fallen directly upon it. This north wall had been built directly on the floor, but the others had been placed in a trench 10 to 20 cm. deep, with the basal course of somewhat larger rocks. No openings are apparent in any of the walls. The southwest and southeast corners were bonded.

The floor was hard to define, and in many places could be distinguished from the fill above it only by the presence of artifacts lying upon it. It was unplastered, formed of the leveled off ground surface. This leveling operation apparently cut slightly into the sand along the west side of the room, making the floor at that side up to 20 cm. below the original ground surface.



FIGURE 10. Rooms 1 and 2, NA7455A.

A poorly defined hearth is in the southeast corner of Room 1. It is a shallow depression 3 cm. deep and 60 to 80 cm. in diameter. It was filled with ash.

The remnants of a hearth or bin were found under the north wall. Only the east and west sides of this feature were found. These were formed of upright slabs 44 cm. apart. Some charcoal-darkened sand was between the slabs, and extended to the south. The slabs had been broken off at floor level.

A spotty layer of charcoal-stained sand 2 to 15 mm. thick rested on some areas of the floor. Elsewhere the floor was covered by red sand that was indistinguishable from the mortar between the fallen wall stones. Much of the east wall had fallen as a unit into the room, and this formed the majority of the fill. The top 5 to 10 cm. was recent windblown sand.

The artifacts found within Room 1, in addition to sherds, were a chopper, a scraper, six hammerstones, one utilized flake, one metate, and two manos, most of which were found on or near the floor.

Room 2. The east, north, and west walls of Room 2 (Figs. 9, 10) are an extension of, and were constructed in the same manner as the east, south, and west walls of Room 1. The south wall is formed by the north wall of Room 1. The northwest and northeast corners are bonded. No openings were found.

The floor is similar to that in Room 1, the leveled-off ground surface definable largely on the basis of the artifacts upon it. The west side of the room had been cut into a slight rise, so the floor at that point was 20 to 25 cm. below the old ground surface.

In the southwest corner are two upright slabs that may have been the sides of a mealing bin. These two slabs are 40 cm. apart. The catch basin was presumably at the east end of the bin.

The fill was similar to that found in Room 1 except that no charcoal-stained sand was found on the floor. The artifacts recovered included sherds from the fill and from the floor, and one hammerstone, three utilized flakes, three manos, and one small grinding slab were found on the floor.

Room 3. This room (Figs. 9, 11) was added on to the north end of Room 2 after it had been constructed.



FIGURE 11. Room 3, NA7455A.

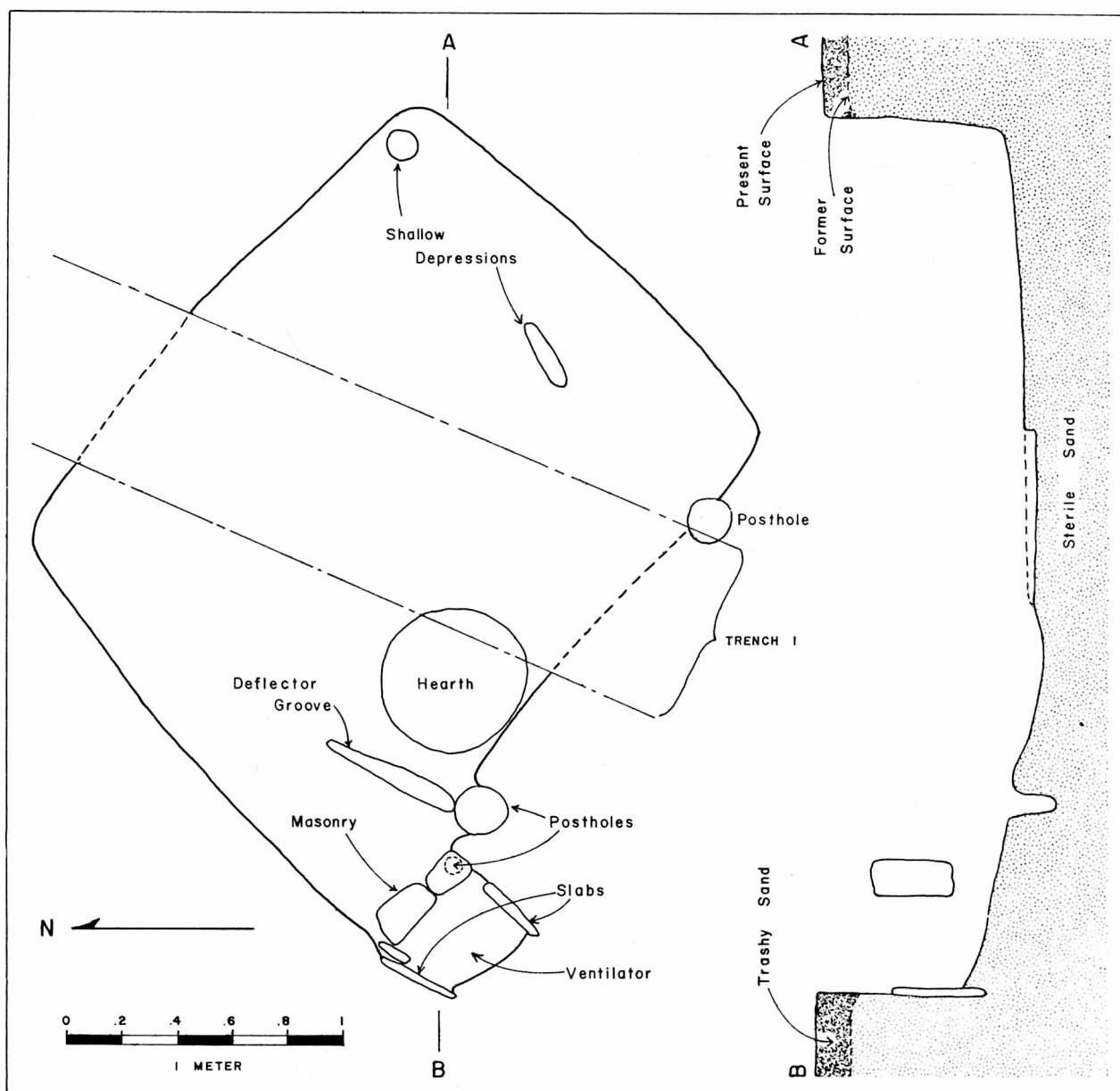


FIGURE 12. Plan and section of Pithouse 1, NA7455A.

The *walls* of Room 3 had been constructed in the same manner as those of Rooms 1 and 2, but with slightly larger and less well chosen slabs, and with less attention to careful fitting. A trench 2 to 10 cm. deep had been dug to receive the slightly larger basal course. None of the corners were bonded. A gap is present at the south end of the east wall, but this is apparently the result of poor preservation rather than an opening. No direct evidence of a doorway was found, but it was probably in the center of the east wall, above the entrybox.

The somewhat uneven *floor* was formed by the leveled-off ground surface, compacted and darkened by use. It may have been a few centimeters below the original ground surface at the southwest corner.

A rectangular, slab-lined hearth is slightly east of the center of the room. The slabs rise 5 to 13 cm. above the floor.

Between the firepit and the east wall is a feature interpreted as an entrybox. Direct evidence that this type of feature was used as an entry was not found until later in the 1961 season in the area on the northeast side of Navajo Mountain. This feature consists of an upright slab extending from each corner of the hearth to the wall. The present height of the north slab above the floor is 49 cm., and the south slab rises 11 cm. above the floor. Both appear to be broken off. The east side of the hearth is formed of two slabs side by side. The exterior of one also appears to have been higher once, forming a deflector. Built

into the wall, between the two slabs, are several stones that protrude well into the room. These and some others not built into the wall (removed in Fig. 11), probably formed a stepping platform and show that the entrybox was designed at the time the east wall was constructed and was not an afterthought. No direct evidence of a doorway was found, so its height could not be determined, although it must have been at least 50 cm. above the floor. An entry system such as this could not have been a simple means of ingress and egress, and may have been designed as a method of controlling drafts.

The lowermost portion of *fill* was formed of a layer of nearly sterile red sand 15 to 25 cm. thick resting on the floor. This sand had accumulated before the collapse of the walls, but it could not be determined whether it represented roofing material or was eolian. A few fallen wall rocks had pushed down into this sand. Upon this rested a poorly defined layer of tumbled wall rocks, mortar, and windblown sand 10 to 25 cm. thick, which was in turn covered by 10 to 20 cm. of fallen wall rocks and recent wind-blown sand.

In addition to sherds, the only artifacts found in the fill were one small point and three utilized flakes. No stone artifacts were on the floor.

Pithouse 1. A semi-subterranean structure, sub-rectangular in form, lies a short distance northeast of Room 3 (Figs. 12, 13). It appears to have been constructed at about the same time as the rest of the site, but was abandoned somewhat earlier.

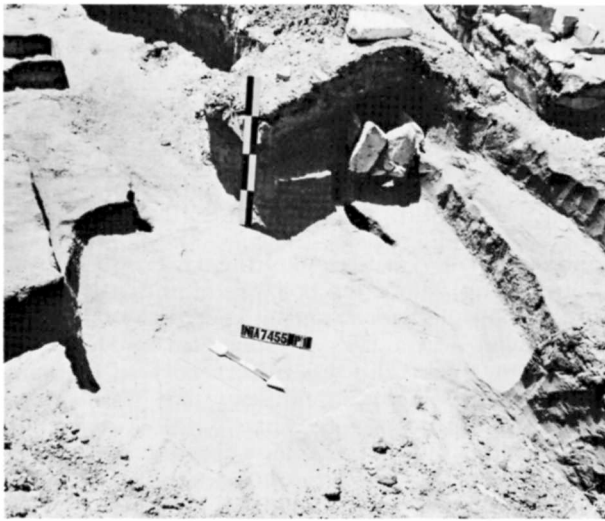


FIGURE 13. Pithouse 1, NA7455A.

The nearly vertical *walls* were formed by the sides of the pit. These walls had been somewhat smoothed, but not plastered. Since the original depth of the structure was about 65 cm., the walls must have continued on up above the ground by means of some form of superstructure. No evidence was found, however, to indicate the nature of this wall. Two posts, probably roof supports, had been partially recessed into the south wall.

The ventilator opened at floor level through the west end of the south wall. The vertical shaft is just outside the room, separated from it only by vertical slabs and small stones. The sides of the shaft were lined with upright slabs, but the back was unlined. The opening probably had a wooden lintel, which rotted away after the room filled in. On the east side of the opening was found a posthole 5 cm. in diameter, indicating that this lintel was supported at that side by a small post.

The somewhat saucer-shaped *floor* was formed by plastering 5 to 20 mm. of sandy red clay over the bottom of the pit. It is 68 to 75 cm. below the present ground surface. The original depth of the floor was about 60 to 65 cm.

The hearth is located next to the south wall. It is a shallow basin, unlined and unrimmed, 8 cm. deep and 50 to 55 cm. in diameter.

Between the hearth and ventilator opening is a slot in the floor that probably held an upright slab deflector. Within this slot was found a loose piece of pinyon which unfortunately could not be dated.

Partially recessed into the south wall are two postholes, 20 and 22 cm. deep below the floor. In the northeast corner is a shallow depression 2 cm. deep that may have supported another post.

On the east side of the room is an elongated depression 3 to 4 cm. deep. Its purpose is unknown.

The *fill* was trashy sand. After the abandonment of the pithouse it was apparently used as a dump, for it contained the heaviest trash concentration found at NA7455. Many of the artifacts listed as coming from Trench 1 came from this fill. A generally brown to gray surface layer 20 to 30 cm. thick found throughout Trench 1 extended across the trash fill of the pithouse.

In addition to sherds, one notched flake, three utilized flakes, and one mano were found in the fill.

Ramada or Brush Shelter. A short distance south of the pithouse, a hearth was encountered (Fig. 14). This hearth had been enclosed or surrounded by a ramada or brush shelter, the form and dimensions of which could not be determined, probably due to the proximity of its floor with the present ground sur-



FIGURE 14. Ramada, NA7455A. Pins mark the location of posts.

face. Approximately 65 cm. south of the hearth two charred posts, 4 to 5 cm. in diameter and 95 cm. apart, were found that probably represent the southern side of the structure. In a roughly circular area extending 90 to 140 cm. away from the hearth was a charcoal layer averaging 10 cm. in thickness, indicating that the structure had burned. The floor is fairly smooth but was not plastered. It is 10 to 15 cm. below the present ground surface.

The rectangular hearth, 51 by 71 cm., has walls of vertical slabs that stand 4 to 10 cm. above the floor of the structure. Two floors were found within the hearth. The upper, 8 cm. below floor level, was formed of a large slab and a mano. The lower floor, 3 to 6 cm. below the upper, was formed by sterile sand. A layer of ash separated the two floors, but no ash was found above the upper hearth floor.

Two manos and a portion of a large Tusayan Black-on-white jar were found on the floor of this structure.

Ceremonial Structure

Kiva 1. The kiva at NA7455A (Fig. 9) was not completely excavated because of the time necessary to remove the consolidated overburden.

The vertical *walls* were formed by plastering the smoothed sides of the pit with 0.2 to 3 cm. of sandy clay. These unlined walls could be traced to within 1.3 m. of the surface, or only 90 cm. above the floor. Although no direct evidence remained concerning the construction of the upper part of the walls, they may have been partially masonry lined, judging from the many rocks in parts of the fill.

Three postholes were located and a fourth is presumably in the unexcavated portion. The postholes on the north and west sides were not completely recessed into the wall. The one on the east side was completely recessed, and the hole faced over with masonry. The postholes extend 20 to 30 cm. below the floor.

The small portion of wall excavated to the south of the posthole on the east side has slumped so badly it could not be determined if a recess was present. If the kiva has a recess, the greater part of it would be in the unexcavated portion. A ventilator is probably in the unexcavated area.

The bottom of the kiva was covered with 5 to 25 mm. of sandy clay to form the *floor*. It is slightly saucer-shaped, 2.15 to 2.2 m. below the present surface. The original surface in this area was probably the same distance above the floor.

A rectangular hearth 18 cm. deep is just south-east of the center of the floor. It is slab-lined, with the slabs rising 4 to 8 cm. above the floor.

Northwest of the firepit is a straight-sided depression 64 to 78 cm. in diameter and 7 cm. deep. This type of feature was found consistently in the kivas on Cummings Mesa, and may have some relationship with the sipapu feature.

The lowest deposit of the *fill* was a mound of windblown sand and fine charcoal up to 20 cm. thick, resting on the center of the floor, directly over the firepit and extending almost to the walls. This

Point, leaf-shaped, not notched	1
Chopper, nodular	1
Scraper, circumphural edge, small	1
Notched flake	1
Manos, two-hand	
One convex surface	1
One flat surface	6
One faceted surface	5
Two flat surfaces	1
One flat, one faceted surface	4
Manos, one-hand	9
Metates	4
Cylindrical rubbing stone	1
Small grinding slab	1
Mortar (?)	1
Hammerstones	12
Utilized flakes	17
Cores	2
Chips	5
Unmodified pebbles	3
Hematite	3

TABLE 11. Stone artifacts from NA7455A.

sand apparently drifted into the kiva through the roof opening before the collapse of the roof. Over this, and on the floor areas not covered by the wind-blown sand, was a layer of gray sand and charcoal 2 to 3 cm. thick. This was in turn covered by many thin laminations of silt and sand that washed and blew into the depression. These layers extended to the surface, but became less distinct toward the surface. The top 1 to 1.2 m. was moist, but below that the fill was dry, consolidated, and hard.

Three hammerstones, three utilized flakes, ten manos, and a rubbing stone came from within the kiva fill.

Other Architectural Features

Hearth 1. Southeast of Room 2 a slab-lined hearth was visible before excavation. It is rectangular, 27.5 by 40 cm. The sides are formed by four upright slabs standing 19 to 29 cm. above the bottom, which was a well shaped slab. No floor or living surface could be defined around this hearth. It was filled with windblown sand.

Other Excavations

Trenching around exposed structures and testing for other possible structures revealed that the surface on which NA7455A was constructed was represented by hard red sand averaging 25 cm. below the present surface. This sand was very deep, at least as deep as the kiva floor, but less oxidized at those depths. Thin sheet trash and charcoal-stained sand 5 to 30 cm. thick rested on this old surface. This was in turn covered in spots by more recent windblown sand. No major trash deposit was evident, although some trash concentrations were found, as in Pithouse 1, in Trench 3, and outside the west wall of Room 1. The general paucity of trash indicates that the pueblo was occupied for only a very short period.

ARTIFACTS

Lithic Material

With few exceptions, the stone tools found at NA7455A (Table 11) fall within the range of those described and illustrated for the Lower Glen Canyon (Adams, Lindsay, and Turner, 1961:14-19) and for NA7498 (this volume), so descriptions here will be brief.

Chipped Stone

The only well-chipped artifact recovered is an unnotched projectile point or small knife (Fig. 15 *c*), 21 mm. wide and 34 mm. long. It had originally been longer, but the tip had been broken and re-flaked. Other chipped artifacts were also rare, and most of the cutting and scraping needs were apparently met by the use of fortuitously shaped flakes.

Ground Stone

Two metates were the trough type, with one end closed. The measurable one is 55 cm. long. The other two are basin metates, similar to those recovered from NA7498.

A small grinding slab was found. It is irregular in outline and is 27.5 cm. long, 10.4 cm. wide, and 2.5 cm. thick. One side is smooth and slightly concave.

A much higher proportion of manos was found at NA7455A than at NA7498, although the different types occurred in approximately the same relative frequency.

One of the small manos differs from the others in being longer, somewhat loaf-shaped, with one flat grinding surface. Each side of this mano has been

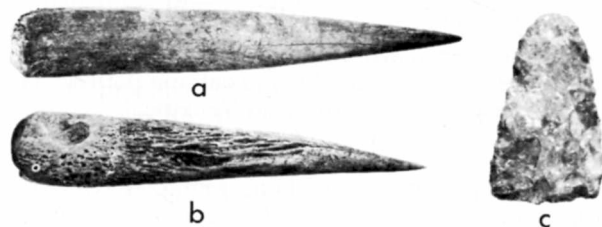


FIGURE 15. Bone and stone artifacts from NA7455A. *a*, *b*, awls; *c*, point or knife. Length of *a*, 78 mm.



FIGURE 16. Partial Kiet Siel Black-on-red dipper from NA7455A. Half of photograph is retouched to bring out design. Diameter of bowl, 14.5 cm.

roughened by pecking to form finger grips. One of the large manos with one flat side had been secondarily used on the obverse surface for grinding hematite, traces of which still remain.

A cylindrical rubbing stone similar to, although slightly smaller than, that found at NA7498 was recovered. The differences, aside from size, are that the grinding surface on the end of this specimen is not at a right angle to the long axis of the tool, and that the grinding surface parallel to the long axis shows only a minor amount of use.

A rectangular slab 34 by 56 by 5 cm. may have been used as a mortar. Near one end is a somewhat conical depression 6 cm. in diameter and 3.5 cm. deep that could have been used in conjunction with a pestle for grinding and pounding.

Other Lithic Material

Utilized flakes and hammerstones were common, as at NA7498. Cores, chips, and unmodified pebbles were also found. Several pieces of hematite that had been abraded to remove the pigment were recovered.

Pottery

Almost all of the small collection of pottery from NA7455A can be classified as types of Tusayan White Ware, Tsegi Orange Ware, and Tusayan Gray Ware manufactured in the first half of the 13th century (Table 12). The only sherd that can be assigned to an earlier horizon is a Sosi Black-on-white worked sherd found in close association with Tusayan Black-on-white on the kiva floor.

The types of pottery recovered from NA7455A differ in no significant respects from the same types found at Surprise Pueblo (NA7498), and so will not be discussed in detail here.

All structures appear to have been in use at the same time, but this cannot be verified statistically because of the small numbers of sherds recovered. Judging from the pottery, NA7455A was occupied

	Room 1	Room 2	Room 3	Pithouse 1	Ramada	Kiva, Fill	Kiva, Floor	Trench 1	Trench 2	Trench 3	Surface	TOTALS
Tusayan White Ware												
Sosi B/W							1					1
Flagstaff B/W	2		1			1						4
Tusayan B/W	4	6	4	7	3	3	10	2	1	12	8	60
Unclassified	27	3	8	20		12	29	4	4	29	11	147
Mesa Verde White Ware												
McElmo B/W	1									1		2
Unclassified			1	2								3
Unidentified B/W	5	3	3				3	3	1	4	6	28
Tsegi Orange Ware												
Tusayan B/R	1			3								4
Tusayan Poly.	3			1			1		4	11	7	27
Tsegi Orange	11	1	7			1			2	2	1	25
Tsegi R/O									1			1
Kiet Siel B/R	1		1		4							6
Unclassified	5	2	3	4	4	4	4		7	9	3	45
Tusayan Gray Ware												
Tusayan Corr.	1			2			1		1		2	7
Moenkopi Corr.	28	8	3	7			7	3	1	5	4	66
Kiet Siel Gray	53	12	19	35	1	52	64	17	11	46	15	325
Lino Tradition			1			3	1	3	4	4		16
Unclassified	2		2	4			5	3	2	4		22
Unidentified Corr.						1						1
Unidentified Gray	5										1	6
TOTALS	149	35	53	85	12	77	126	35	39	127	58	796

TABLE 12. Pottery from NA7455A.

for a relatively short period, probably less than 25 years, shortly before A.D. 1225.

Intrusive and unidentified sherds indicate trade with the Mesa Verde area to the northeast and with Kayenta regions on the west side of the Colorado River, in much the same degree as at NA7498.

One partial Kiet Siel Black-on-red dipper (Fig. 16) and a large fragment of a Tusayan Black-on-white jar were the only partially complete vessels recovered. Most of the dipper was found in Trench 3, but two fragments of it were found in the fill of Room 3. The dipper bowl is 14.5 cm. in diameter and 6.7 cm. in height. Most of the tubular handle is missing. The edges of the bowl are well worn. The jar fragment, from the floor of the ramada, is from a jar estimated to be 50 cm. in diameter.

Seven worked sherds were recovered from NA-

7455A. Six of these were made of black-on-white sherds, mostly Tusayan Black-on-white, while the other is of Tsegi Orange. It is noteworthy that the only Sosi Black-on-white sherd found is one of these worked sherds. Three are roughly circular, 19 to 54 mm. in diameter. One is elliptical, with estimated dimensions of 9 by 12 cm. Three are too fragmentary to determine the original shape. The large elliptical sherd appears to have been used for smoothing pottery. The use of the circular sherds is problematical.

Bone

The only artifacts of bone found at NA7455A are two awls (Fig. 15), made from deer or mountain sheep metapodials. Both have relatively long and tapering points, and include a portion of the end of the bone, well smoothed off. At present they

are 73 and 78 mm. long. The longer one, however, originally was slightly longer, as the epiphysis had fallen off after the awl was manufactured.

NON-ARTIFACTUAL MATERIAL

Bone. Faunal remains were scarce at NA7455A, only four identifiable bones having been found. Two of these were identified as deer (*Odocoileus hemionus*) and the other two as cottontail (*Sylvilagus* sp.).

Wood. One specimen, from Pithouse 1, was saved for possible dendrochronological analysis. Although it was pinyon, it could not be dated.

SUMMARY AND DISCUSSION

NA7455A, located on a sandy ridge, consists of three masonry surface rooms, a pithouse, a kiva, and a ramada or brush shelter. All structures were probably contemporaneous, although the pithouse was probably the first structure to be abandoned. The pottery recovered and the general lack of accumulated refuse indicates that the site was only occupied for a short period, probably less than 25 years, and possibly as few as four or five years. This occupation took place in the early part of the 13th century, ending probably before A.D. 1225. The surface rooms are similar to others on Cummings Mesa from this period. Although differences of detail are noted, subterranean structures dating from this time were also found at NA7498. The kiva at NA7455A is remarkable for this period in view of the fact that it was not masonry lined. The ramada is unique for sites excavated on Cumming Mesa.

NA7456A

INTRODUCTION

History, Location, and Physical Description

NA7456A was recorded by the Glen Canyon Project staff in 1960. It is located about 300 yd. northeast of NA7455 on an erosional remnant of the Saltwash member of the Morrison formation, rising an average of 100 ft. above the surrounding area (Fig. 17). It is in the drainage of the east fork of Catfish Canyon, at an elevation of slightly over 6000 ft. The flora includes ephedra, blackbrush, grasses, juniper, and cacti. The nearest known water supply is about one mile to the southwest, near NA7961. Most of the surrounding land to the north, west, and south could have been used for agricultural purposes, if enough moisture was available. Building stone is plentiful, as is timber at a slightly higher elevation.

Surface Indications

Approximately 15 rooms could be discerned on the top of the butte, with about the same number below on the sloping sides of the butte. A wall-like structure on top of the butte and south of the main room block may have served as a defensive wall. Two isolated units to the west and south of the main portion of the site were also included as part of NA7456, but separated by the designations B and C. They were not excavated. All rooms seen on the

surface were of masonry, but the walls had tumbled, leaving only a few courses visible. Most of the trash is to the east, south, and southwest of the top of the butte, on the sloping sides, but some pockets of trash were also noted on the surfaces adjacent to the rooms. No disturbance was apparent other than minor burrowing by small animals.

Problem

NA7456A was excavated in order to sample a site in an environmental setting different from others excavated on Cummings Mesa, to determine the relationships with nearby NA7455A, and because sherds found on the surface indicated that it might represent the latest segment of the prehistoric occupation on Cummings Mesa.

EXCAVATIONS

Only what is thought to be the main room block, consisting of seven rooms, two courtyards, and a kiva, was excavated at NA7456A (Fig. 18). Several of the trash areas were stratigraphically tested. The fill within most of the structures was excavated as a unit from the surface to the floor, but in some the fill was excavated and artifacts separated by natural or artificial levels.

Domestic Structures

Room 1. Located at the north end of the excavated room block, this room (Fig. 19) was apparently used as a domicile.

The walls range from 30 to 40 cm. thick, formed of generally large sandstone slabs set in brown sandy mortar. Small rocks and spalls were used for chinking. No true coursing is evident. The basal course, forming the foundation, tends to be of larger rocks than the remaining portions of the walls. This foundation rests directly on bedrock. The interior surfaces of the walls are rough, whereas the stones were laid so that the exterior surfaces are relatively smooth. None of the corners are bonded.

The doorway is in the east wall, somewhat north of center. It is 40 cm. wide, with the sill formed of a large flat slab flush with the floor, but 10 cm.



FIGURE 17. NA7456A, looking northeast from NA7455A, showing the location of the site on the sloping-sided butte.

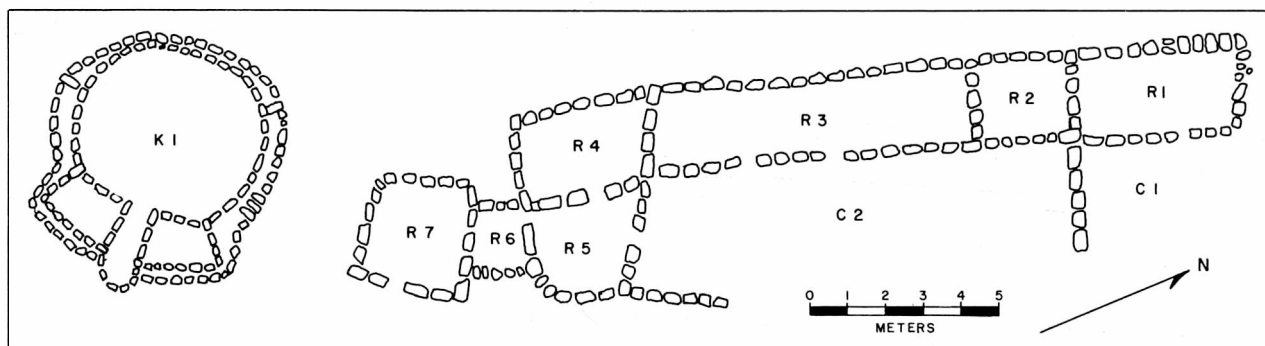


FIGURE 18. Plan of excavated portion of NA7456A.

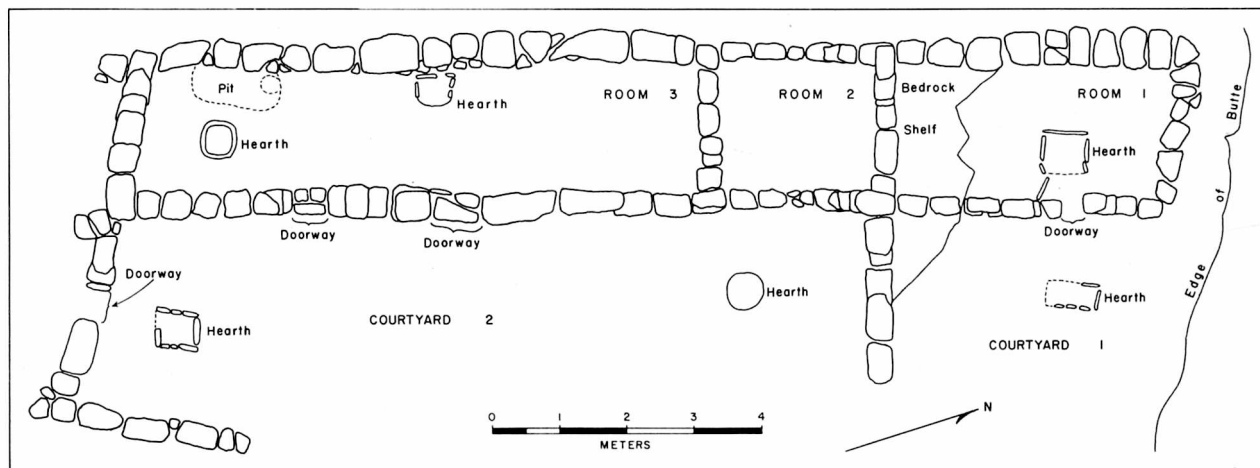


FIGURE 19. Plan of Rooms 1, 2, and 3, NA7456A.

above the adjoining surface of Courtyard 1.

The *floor* is formed of an average of 6 cm. of orange sand placed directly on bedrock to level it off. Spots of this were covered by 1 to 3 mm. of gray-green clay. The floor in the southern third of the room is bedrock, 35 cm. above the rest of the floor, thus forming an irregular shelf or bench.

A rectangular hearth is 40 cm. inside the room, opposite the doorway. All sides of the hearth except the east are lined with upright slabs rising 5 to 10 cm. above the floor. It is 11 cm. deep. An upright slab extends from the southeast corner of the hearth to the wall. It rises 42 cm. above the floor, forming a one-sided entrybox.

The fill was formed of 40 to 70 cm. of fallen wall rubble and windblown sand containing some trash. Fallen wall stones were concentrated in the upper 45 cm. of the fill. In addition to the sherds listed in Table 13, one hammerstone and a utilized flake were recovered from this room, and a bone awl and a circular bone object were in the hearth.

Room 2. The *walls* of this room (Fig. 19) had been constructed like those of Room 1. Generally irregular sandstone slabs and blocks had been set in brown sandy mortar, with small rocks used for chinking. The lowermost rocks are larger than most of the upper ones. With the exception of the south wall,

which was apparently first built as part of Room 3, the walls are noticeably rougher on the inside than on the outside. There is some indication that these rough interiors may have been covered with a thick coat of plaster to help smooth them off. The northeast corner is bonded, and the east and west walls about to the south wall, as does the north wall to the west wall. No evidence of a doorway was found, probably because the east wall, the most likely location for one, was badly tumbled.

The *floor* in Room 2 was composed largely of bedrock, with up to 6 cm. of hard packed orange sand filling the depressions. No floor features were present.

The uppermost 40 cm. of *fill* was formed of fallen wall debris and windblown sand. Below this was an irregular layer of green clay 5 to 10 cm. thick which may represent roofing material. This in turn rested on up to 12 cm. of reddish-brown windblown sand that covered the floor. Nine sherds (Table 13) were the only artifacts recovered from this room.

Room 3. The *walls* of Room 3 (Figs. 19, 20) were constructed of sandstone slabs and blocks laid haphazardly. The basal course, resting on bedrock, was formed of larger rocks than the upper portions. The interior faces of the walls were rough, and had been finished off by facing them with clay, small irreg-



FIGURE 20. Room 3, NA7456A.

ular stones, slabs, and spalls, forming walls 35 to 40 cm. thick. All corners were slightly bonded.

Two doorways were found in the east wall. The northern one is 75 cm. wide, with a slab and clay sill 17 cm. above the floor. The other is 48 cm. wide, with the slab sill 28 cm. above the floor.

The floor was formed of 1 to 3 cm. of orange to brown sand. Below this in spots was 1 to 5 cm. of trashy sand used for leveling the uneven surface of bedrock. The bedrock protrudes through the floor in a few places.

Two nearly rectangular hearths are in the room. One is near the center of the room, against the west wall. It is partially slab-lined. The other, in the center of the south part of the room, had been lined with gray clay that rises 1 to 3 cm. above the floor level.

Against the west wall at the south end of the room was a shallow pit in the floor. At the north end of this pit was a circular depression 29 cm. in diameter and 4 cm. deep, filled with charcoal. The main portion of the pit is roughly rectangular, 5 cm. deep on the east and 10 cm. deep on the west. Found

in the pit were pieces of clay with slab impressions on them, suggesting that the pit may be the remains of a destroyed series of mealing bins.

Near the southeast corner of the room, a post 11 cm. in diameter had been partially recessed into the wall.

Five more or less distinct stratigraphic layers could be discerned in the fill. The topmost 30 cm. was composed of fallen wall rubble and windblown sand. Below this was an irregular layer of clay averaging 10 cm. thick. This clay, probably derived from the fallen roof, was mostly gray, but contained pieces of green clay and small sandstone fragments. Below this was a layer 2 to 3 cm. thick of burned twigs, reeds, and juniper bark, which was probably from the roof as well. This in turn rested on an irregular layer of trashy sand averaging 10 cm. thick. Below this, resting on the floor, was a layer of burned sand 8 to 10 cm thick.

A relatively large number of artifacts were found in this room, mostly in the fill. These include sherds (Table 13), three point or knife fragments, a small drill, a small chopper, four flake scrapers, a graver, two hammerstones, 30 utilized flakes, three pieces of hematite, and a bone awl. A partial small Kiet Siel Gray jar was found in the pit near the southwest corner of the room.

Room 4. The foundations for the walls of Room 4 (Fig. 21) were of large boulders resting on bedrock. The upper portions of the walls were constructed similarly to those of the other rooms, being composed of different sized slabs and blocks set in sandy mortar. Small stones and spalls were used for chinking and to some extent facing on the interior. Except for the north wall, which was first built as part of Room 3, the interior faces of the walls are rougher than the exterior. The southeast and southwest corners are bonded, whereas the east and west walls abut to the north wall. Wall thickness ranges from 34 to 42 cm. A few pieces of plaster up to 2 cm. thick re-

	Tusayan White Ware					Mesa Verde White Ware					Tsegi Orange Ware					Tusayan Gray Ware					Mesa Verde Gray Ware					TOTALS
	Sosi B/W	Dogozshi B/W	Flagstaff B/W	Tusayan B/W	Unclassified	Mesa Verde B/W	Unclassified	Unidentified B/W	Tusayan B/R	Citadel Poly.	Tusayan Poly.	Tsegi Orange	Tsegi R/O	Kiet Siel Poly.	Unclassified	Tusayan Gray Ware	Noenkopi Corr.	Kiet Siel Gray	Lino Tradition	Unclassified	Mancos Corr.	Unidentified Gray				
Room 1				4	2										3		1	5	17				34			
Room 2					1	1	4																9			
Room 3			29	12	39		1	1	2		13	1	3	9	43	1	142	252	1	9		1	559			
Room 4				2	12						1	1			3	2	1	119					142			
Room 5		6			2						1				12	4	8	60					93			
Room 6				4	3										4		7	14					33			
Room 7		1	1	2	6			4			7	1			12	1		95					130			
Rm. 7, Fl. 2				1	7						1	3					2	16					30			
Courtyard 1					1						1				1	2	1	28				1	35			
Courtyard 2			2	22	35				2		11				4	14	2	23	7				120			
Kiva 1, Fill			4	21	24		1	7		3	18	1	1		25	8	38	179	2				334			
Kiva 1, Floor		1		3	7	2		3		1	3				2		6	26					54			
Outside Kiva				4	11	1			1		3				9	1	7	136	2	3		2	180			
Strat. Test 1			1	3	11			1			4				10		24	69	2	11		1	137			
Strat. Test 2				4	8			3			1			1	7	1	6	21	1	2			55			
Strat. Test 3				3	14						1				4	1	9	33					65			
Strat. Test 4				2	11				1	2	1				1		4	52				1	75			
Surface	2	1	5	36	11	2		9	12	1	26				6	1	7	7					126			
TOTALS	2	9	42	123	205	6	6	28	19	7	92	7	5	9	146	37	270	1149	17	26	1	5	2211			

TABLE 13. Pottery from NA7456A.

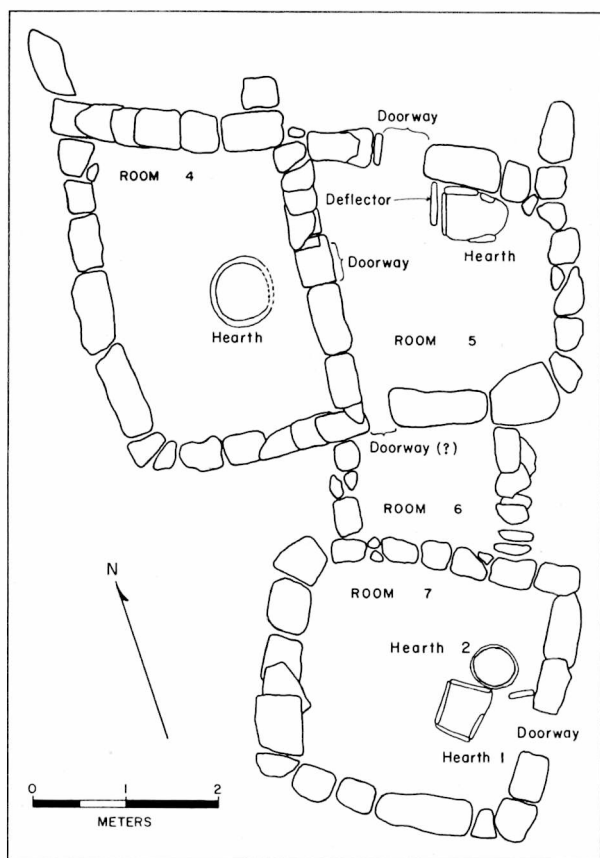


FIGURE 21. Plan of Rooms 4, 5, 6, and 7, NA7456A.

main on portions of the walls.

The doorway is in the east wall, opening into Room 5. It is 38 cm. wide. The sill, 25 cm. above the floor, is formed of a single sandstone slab.

A spottily preserved layer of red plaster averaging 10 mm. thick forms the *floor* of Room 4. It had been placed on a layer of orange sand 2 to 6 cm. thick, which in turn rested either on bedrock or on up to 15 cm. of trashy sand placed in the irregularities in the bedrock.

A circular clay-rimmed hearth is somewhat east of the center of the room. It is 11 cm. deep. The clay rim rises 2 to 3 cm. above the floor. No other floor features were found.

The uppermost 65 cm. of *fill* was composed of fallen wall rubble and windblown sand. Underlying this was a red compacted clay containing small sandstone fragments, 7 to 15 cm. thick. This probably was roofing material. Covered by this and resting on the floor was 3 to 5 cm. of sterile windblown sand.

In addition to the pottery listed in Table 13, one flake scraper, two hammerstones, one utilized flake, and two manos were found within Room 4.

Room 5. The *walls* of this room (Fig. 21), although poorly preserved, are similar to others at the site, having a foundation of large, sometimes upright boulders resting on bedrock, topped by slabs and blocks of varying sizes and chinked with small stones.

With the exception of the west wall, which was built as part of Room 4, the walls are more irregular on the inside of the room than on the outside. The northeast and southeast corners are bonded, and the north and south walls abut to the west wall.

Three doorways lead into Room 5. The principal one is near the center of the north wall, opening into Courtyard 2. It is 48 cm. wide, with a sill formed of bedrock 33 cm. above floor level. The west jamb of this doorway is formed of an upright slab. A second doorway, already described, leads into Room 4. The third doorway, 34 cm. wide, is at the west end of the south wall, and leads into Room 6. The sill of this doorway is bedrock, at the floor level of Room 5.

A layer of orange-brown sand up to 3 cm. thick was placed on the bedrock to form the *floor* of this room, except in some areas where the unmodified bedrock served as the floor.

A slab-lined sub-rectangular hearth is against the north wall, just east of the doorway. On the west side of the hearth is an upright slab serving as a deflector. It rises 64 cm. above the floor. No other floor features were found.

The topmost 40 to 50 cm. of *fill* was composed of windblown sand and fallen wall debris. This rested on a 7 to 12 cm. thick layer of compacted red sand mixed with small sandstone fragments and charcoal flecks. This layer covered the floor, and probably represents roofing material.

The artifact yield from Room 5 was low; only one flake scraper, three utilized flakes and a bone awl being found in addition to the pottery shown in Table 13.

Room 6. The north, east, and south *walls* of this room (Fig. 21) are of large blocks used for a foundation and topped by irregular slabs and blocks set in brown sandy mortar. Small stones and spalls were used for chinking. Both the interior and exterior faces are rough. The lower 53 to 58 cm. of the west wall is formed by bedrock, which apparently was topped by masonry, most of which has fallen. No bonding is present at the corners.

The doorway is at the west end of the north wall, leading into Room 5. The bedrock sill is flush with the Room 5 floor, 13 cm. above the floor of Room 6.

The uneven bedrock surface was covered with up to 12 cm. of rubble, clay, and sand to form the *floor*. No floor features were present.

The *fill* averaged 50 cm. deep. It was composed of a nearly homogeneous mass of fallen wall debris, windblown sand, and trash.

Thirty-three sherds (Table 13), two points, one scraper, one hammerstone, and seven utilized flakes were recovered from within this room.

Room 7. Parts of the *walls* of this room (Figs. 21, 22) have a definite foundation of large stones. The upper portions, and in some cases extending to the base, are of varying sizes of slabs and a few irregular blocks set in brown sandy mortar. Some chinking was done with small stones. As in the other rooms, the slabs were laid up so the exterior of the

walls are relatively smooth, but the interiors uneven. The walls of Room 7 are 37 to 50 cm. thick. The southeast and southwest corners are the only ones well preserved. They are bonded.

Near the center of the east wall is the doorway. It is 43 cm. wide, with a slab sill 29 cm. above floor level.

Two floors were present in this room. The uppermost, Floor 1, was formed of 7 to 20 mm. of hard packed orange sand resting on 8 to 15 cm. of trashy sand on top of Floor 2. Part of Floor 2 was of bedrock, and elsewhere it was formed of 2 to 5 cm. of gray-green clay laid on bedrock and up to 10 cm. of trashy sand.

Both of the floors had a hearth associated with them. Hearth 1, associated with Floor 1, is rectangular and slab-lined, 15 cm. deep. Hearth 2 was circular, with a clay rim 4 to 5 cm. thick. This rim probably rose above the level of Floor 2, but was apparently leveled when Floor 1 was added. It is 13 to 16 cm. deep.

The only other floor feature found is the stub of an upright slab extending from the wall on the north side of the doorway toward Hearth 1. It apparently was a portion of an entrybox, associated with Floor 1.

The fill within Room 7 was nearly uniform wall debris, windblown sand, and trash.

From the surface to the topmost floor were found one drill, two scrapers, one hammerstone, eight utilized flakes, one core, and 130 sherds. Between Floor 1 and Floor 2 were found only 30 sherds and one utilized flake.

Courtyard 1. Directly east of Room 1 is a poorly preserved area thought to have been used as an outdoor living area (Fig. 19). It was only partially excavated. The area is bounded on the west by Room 1, on the north by the edge of the butte, and on the south by a short wall. The east side was unexcavated. No prepared surface was found, the surface which apparently was used being composed partly of bedrock and partly of unconsolidated trash and sand. A

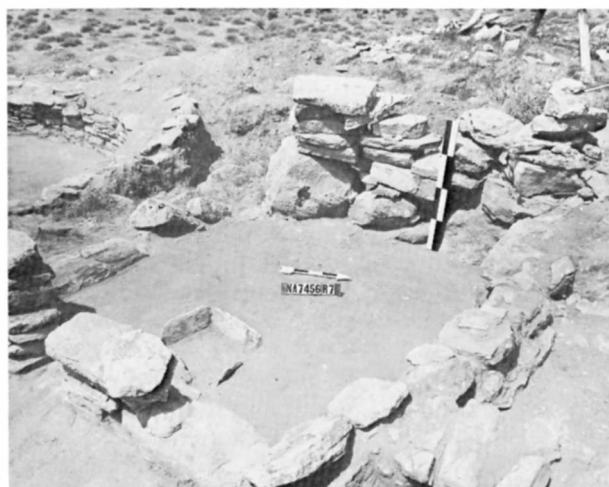


FIGURE 22. Room 7, NA7456A.



FIGURE 23. Kiva 1, NA7456A.

rectangular slab-lined firepit 10 cm. deep was found near the presumed center of the courtyard. The fill, 10 to 25 cm. deep, was sand, wall debris, and trash. A few sherds and a mano were recovered from this area.

Courtyard 2. Adjoining the east side of Rooms 2 and 3 is a larger courtyard area (Fig. 19). It is bounded on the north by Courtyard 1, on the west by Rooms 2 and 3, and on the south by Room 5. Most of the east side has no definite boundary, but a one-course high wall extending north from the northeast corner of Room 5 serves to delimit part of it. At least three doorways from these rooms open into Courtyard 2. Two lead out of Room 3, another out of Room 5, and there may have been one out of Room 2. The floor or occupation surface in this courtyard was partially formed of bedrock, in places chipped and pecked to make it smoother, and elsewhere a thin layer of reddish-brown sandy clay had been placed over trash fill up to 7 cm. In the center of the south end of the courtyard is a rectangular slab-lined hearth 14 cm. deep. A basin-shaped hearth 11 cm. deep is near the north end of the courtyard. It is unlined. The fill was 10 to 23 cm. deep, composed largely of windblown sand, with some fallen wall rubble and trash. This fill became darker and more compacted toward the bottom. In addition to the pottery listed in Table 13, one point, two large knife fragments, one scraper, eight utilized flakes, and two pieces of hematite were found within Courtyard 2.

Ceremonial Structure

Kiva 1. Approximately 3 m. south of Room 7, in a partially natural depression, is a kiva (Figs. 23, 24). It is nearly circular, 4 to 4.7 m. in diameter, with a recess on the southeast side.

The kiva walls are double, the masonry facing the kiva interior being a separate wall from that facing the exterior. The total thickness of the two ranged from 48 to 93 cm. The space between was filled with trash, sand, and rocks. The two walls were apparently constructed at the same time, for in a few places a long slab extends from one to the other, helping tie them together. The face on the inside of the kiva is fairly smooth and even due to careful alignment of

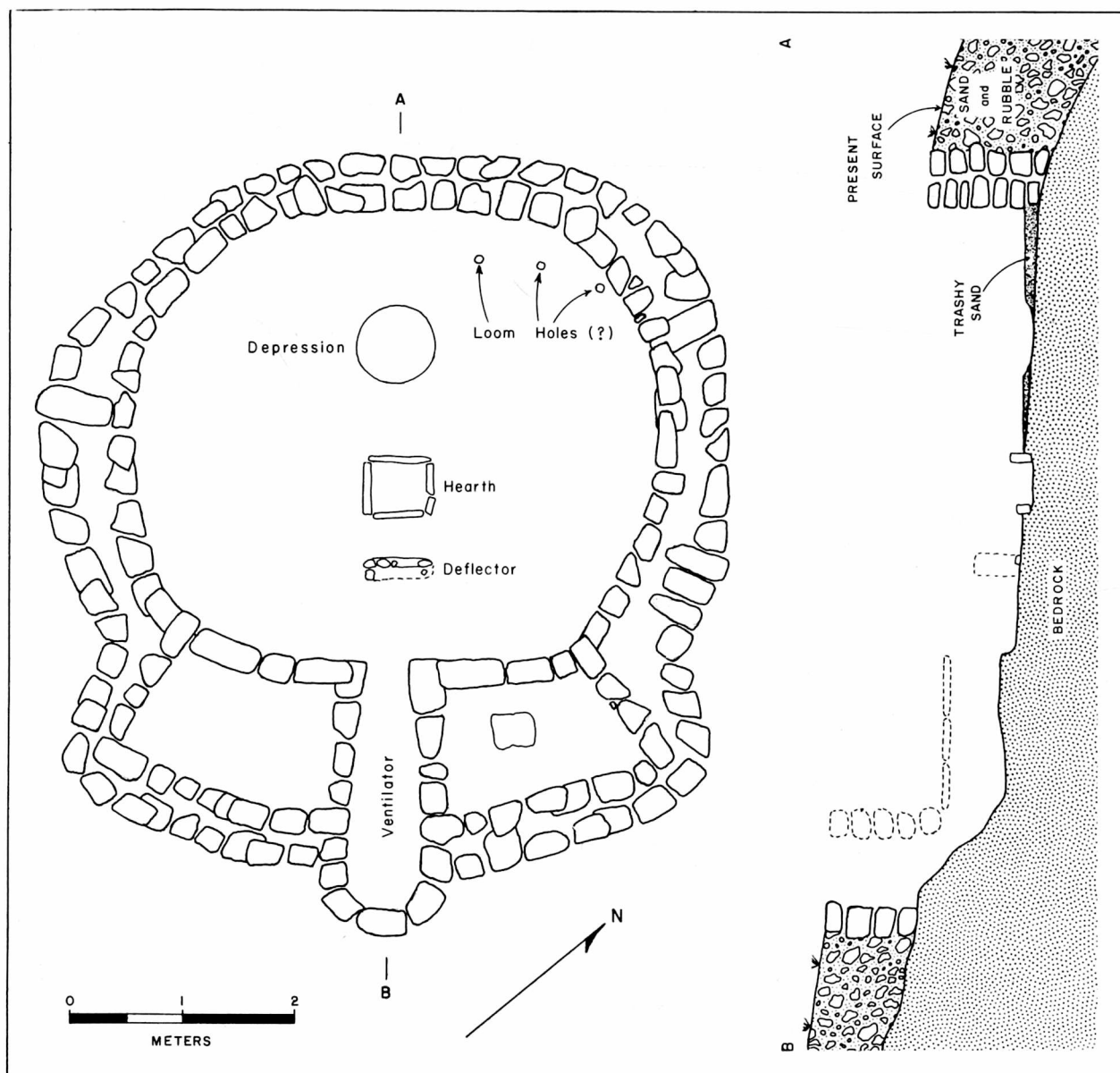


FIGURE 24. Plan and section of Kiva 1, NA7456A.

the stones. Small spalls were used in a few places for chinking. The side facing the exterior was fairly smooth, but not as carefully constructed as that on the interior. The lower part of the northeasterly section of wall was formed of bedrock, by cutting the rock away to level the floor.

The recess was also partly cut into bedrock. The platform of the recess was partially paved with slabs, but largely formed of red clay 2 to 7 mm. thick. The recess walls were constructed in the same manner as the other walls.

The ventilator enters the chamber below the recess. It was partially cut through bedrock as well. The horizontal tunnel, 43 cm. wide, enters the kiva 17 cm. above the floor. The tunnel roofing and the northwest side of the vertical shaft were not preserved. The

portion of the shaft preserved was of masonry on a bedrock foundation.

The floor was formed by pecking out up to 37 cm. of bedrock on the northeast side. On the southwest side, filling was necessary, and up to 11 cm. of trashy sand were used for this purpose. The bedrock and sand were then covered with 1 to 4 cm. of sterile sand, which was then plastered with a sandy red clay.

The hearth is near the center of the floor. It is nearly square, and lined with thick upright slabs. It is 11 cm. deep. Between the hearth and the ventilator are the remains of a masonry deflector. It was probably about 20 cm. wide and 33 cm. long, but had almost entirely collapsed.

A large, circular, basin-shaped shallow depres-

sion 7 cm. deep is northwest of the hearth, in the usual location for a sipapu. It had been lined with 2 to 7 mm. of red clay. Similar depressions were found in the kivas at NA7455A and NA7498.

A short distance south of this depression is a small hole 6 cm. in diameter and 4 cm. deep.

On the north side of the floor, near the wall, are three holes 5 to 6 cm. in diameter and 4 to 7 cm. deep. Although not in the usual position for loom anchors, these holes may have served that purpose.

The fill ranged from 78 to 105 cm. deep. Most of this was composed of windblown sand, fallen wall rubble, and minor amounts of trash. On the floor were scattered patches of charcoal, possibly from the roof. These were covered by an irregular layer of brown sandy clay 5 to 13 cm. thick.

Within the fill were found one drill, two scrapers, one hammerstone, ten utilized flakes, three cores, two manos, a metate fragment, and the sherds listed in Table 13. The floor and floor fill produced a smaller number of sherds, one point fragment, one scraper and seven utilized flakes.

Other Excavations

Stratigraphic Tests. Two tests, each 1 m. square, were excavated in 10 cm. levels to determine if the trash deposits revealed any temporal character. Stratigraphic Test 1, on the southwest slope of the butte, was excavated to a depth of 40 cm. before sterile sand and rock were encountered. Stratigraphic Test 2, on the eastern slope, revealed only slightly over 10 cm. of trash, so only two levels were excavated.

Two more tests, also 1 m. square, dug between the kiva and the room block, were excavated in 30 cm. levels. Stratigraphic Test 3, north of the kiva, was 50 cm. deep to bedrock, only giving two levels, and Stratigraphic Test 4, slightly more to the east, was 90 cm. deep.

None of these tests produced sherds in enough quantity to yield any significant results, so the different levels are combined in Table 13. Also found in these tests were one point, three scrapers, and three utilized flakes.

ARTIFACTS

Lithic Material

The stone tools recovered from NA7456A are arranged in the taxonomic system employed for the Glen Canyon lithic artifacts (Adams, Lindsay, and Turner, 1961:14-22), as expanded and modified in this report for the survey material and that from NA7498. Since those artifacts from NA7456A differ in only minor respects from those recovered from the survey and NA7498, no detailed descriptions will be presented here, although minor differences will be pointed out.

Chipped Stone

Only three classifiable points or small knives were found. These are: one side-notched oval point with a straight base; and two stemmed points, one shouldered and the other barbed with an expanding base. The shouldered point (Fig. 25 *d*) is small, only 22

mm. long and 10 mm. wide. Three unclassifiable fragments were also recovered.

One crude knife and three fragments of large knives were found.

Three drills were recovered. One had been reworked from a small, triangular, concave base point, another carefully chipped with a long point and flared base, and the third, of obsidian, is a fortuitously shaped flake with only a minor amount of retouching.

Two choppers, one nodular and the other a small ovoid, were excavated.

Scrapers were fairly common, eighteen having been found. Three of these are small, with a working edge nearly all the way around the perimeter. The others have a limited working edge. Two of them are nodular, twelve are flakes, and one is made from a small cobble.

One graver, a slightly chipped fortuitously shaped flake was found.

Ground Stone

Five manos were excavated. Two of these are two-handed, one with a single flat grinding surface, the other with two flat grinding surfaces. The other three are one-handed manos, with flat to slightly convex grinding surfaces.

A small fragment of a trough metate and a nearly complete metate with a flat grinding surface were the only other grinding tools recovered.

Other Lithic Material

Eight hammerstones were recovered, most with many large flakes removed.

Flakes with small use chips removed along one or more edges were common, showing that many cutting and scraping operations were performed with unshaped tools. Eighty-five of these were found. Unmodified chips and pebbles were recovered in minor quantities.

Six pieces of somewhat siliceous hematite were found. All exhibit one or more facets where some of the pigment had been ground off.

Pottery

Most of the small amount of pottery recovered from NA7456A can be classified as Tusayan Gray Ware, with some Tusayan White Ware and Tsegi Orange Ware, and minor amounts of Mesa Verde White Ware and unidentified, presumably intrusive, white and gray wares (Table 13). The sherds indicate that the majority of the occupation was in middle Pueblo III times, possibly between A.D. 1200 and



FIGURE 25. Bone and stone artifacts from NA7456A. *a*, *b*, awls; *c*, circular bone object; *d*, stemmed, shouldered point; *e*, stemmed, barbed point. Length of *a*, 10.7 cm.

1225, but that the site may have had its beginnings in late Pueblo II. The minor presence of Kiet Siel Polychrome indicates that the occupation may have lasted slightly later than A.D. 1225.

One partial Kiet Siel Gray jar was found. It has a rim diameter of 11.9 cm., and an estimated maximum diameter of 17 cm. Height was not measurable. It has a horizontal handle not far below the rim.

Nine worked sherds were recovered. Two are of Tsegi Orange Ware, six of Tusayan White Ware, and one Moenkopi Corrugated. Seven are circular, ranging in diameter from 22 to 75 mm. One of these has a hole in the center. The other two, possibly used as pottery making tools, are sub-rectangular with rounded sides and corners, 49 and 91 mm. across.

Bone

Awls. Three bone awls were found. Two were made from splinters of mammal long bones, and have fairly short points. The unbroken one (Fig. 25 *b*) is 55 mm. long. The third awl, made from a bone with a part of the head intact, is long and slender, 10.7 cm. long (Fig. 25 *a*).

Circular Object. A fragment of a large mammal bone had been shaped into a nearly circular object 22 to 26 mm. in diameter, with a hole in the center 12 to 18 mm. in diameter (Fig. 25 *c*). It may have been carved in imitation of a shell, for one side is appreciably thicker and has the appearance of an umbo. The opposite side is thin, and has a piece missing.

NON-ARTIFACTUAL MATERIAL

Bones recovered during the excavations are 15 mountain sheep (*Ovis canadensis*) from eight proveniences and one cottontail (*Sylvilagus* sp.). One wood specimen, of juniper, was collected for possible dendrochronological analysis. It could not be dated.

SUMMARY AND DISCUSSION

Seven rooms, two courtyards, and a kiva were excavated at NA7456A. Architectural evidence indicated that the rooms were probably not all built at the same time, Room 3 apparently being one of the first, with other rooms appended at each end. Sherds, especially those in contact with room floors, are too few to draw any definite conclusions. All the rooms except 2 and 6 contained firepits, indicating that they served at least part of the time as living quarters. Rooms 2 and 6 were probably used for storage. Pottery recovered indicates that NA7456A was occupied during middle Pueblo III times, the occupation possibly lasting slightly later than most of the other sites on Cummings Mesa. The site may have been first occupied as early as the last part of Pueblo II or early Pueblo III, but no structures definitely assignable to this earlier period were found. The almost complete lack of artifacts on the room floors indicates that the site was not abandoned in haste. It appears unlikely that the seemingly defensive location of NA7456A was actually chosen for such a purpose, as many of the other sites on Cummings Mesa, including the nearby ones of NA7455, NA7456B, and NA7456C,

were occupied at the same time, but are not located in defensible positions, and other similar locations often were not utilized.

NA7457

INTRODUCTION

History, Location, and Physical Description

NA7457 was first recorded in 1960 and was excavated in April, 1961. The site is located on the eastern escarpment of Cummings Mesa on a ledge 50 ft. below the top of the mesa and 1500 ft. above the floor of Forbidding Canyon. This under-cut ledge is formed at the contact of the harder Saltwash member of the Morrison formation and a narrow layer of soft, dark reddish-brown siltstone, which has eroded while the more resistant sandstone has remained.

This site is located in Forbidding Canyon through which Aztec Creek flows to the Colorado River 10 miles to the north. It is not possible to gain access into the canyon bottom from NA7457. On the mesa proper in this eastern section, the many tertiary drainages flow into Catfish Canyon which has its beginning on the mesa. Evidence for seeps were observed under the ledge at the contact zone mentioned above. Weathering pits in which water will collect are also numerous in the Saltwash member. The nearest spring known is about two miles west. Saltbush, sage and ephedra form the dominant vegetation at the site.

The location of this site, beneath the hollowed-out ledge, provides protection from inclement weather, but the sheltered orientation to the southeast is chilly following the noon hours.

Building stone, clay and arable land were the only nearby natural resources. The Saltwash member provides excellent building stone and can be quarried at almost any place on the mesa. Seams of green clay



FIGURE 26. Rooms 1 and 2, NA7457.

are abundant in practically every remnant of the Saltwash member. In its native state, this material is not suitable for pottery manufacture because it contains coarse inclusions. However, this does not rule out its use for this purpose, if the craftsman could extract the coarser granules from the sediment. Arable land abounds on the mesa in this particular area. Numerous sand dunes and sandy depressions across small drainages may have provided the prehistoric people with ample land for the cultivation of food products.

Surface Indications

The site consists of two granaries (Fig. 26), the walls of which are full height and abut to the overhanging ledge. The rear walls are formed by the bedrock at the back of the overhang. A small amount of trash was present downslope and east of the two rooms. Fine powdery sand mixed with rat dung, seeds and pinyon shells was present inside the rooms. Some wall slabs and roof spalls also littered the surface. There was some evidence of pack rat disturbance and a slight amount of wall tumbling, but otherwise the two rooms were in excellent condition and undisturbed. On the cliff face between the two storage rooms are the initials "WTL 1933," with the figures "100 ft.," "100 k feet" and a second date, "1945," following the first. Whose initials these are and what the numbers mean is undetermined, as investigations 100 ft. in both directions from the rooms turned up nothing new. The initials "WTL" also appear at NA7501-3, in Tsebehots Canyon, a tributary of Forbidding Canyon.

Problem

Investigation of the two granaries was undertaken because the fine state of preservation of the rooms indicated that perishable materials might be recovered, and it was hoped that some artifacts might be found to make it possible to assign the site more closely temporally and discover its relationships with other nearby sites. Neither of these objectives were fully realized.

EXCAVATIONS

Excavation of the two rooms consisted of the removal of 5 to 10 cm. of sandy fill inside the rooms.

Room 1. Room 1 is a semi-circular masonry structure 2.20 by 4.80 m. in maximum dimensions. The walls were constructed of sandstone slabs laid one on top of the other, on a foundation of bedrock and large sandstone boulders. The walls reach a maximum height of 1.50 m. and a maximum width of 30 cm. The blocks used in the wall construction were irregular in shape and were slightly finished on the exterior faces only. The interior wall face was rough and unfinished. A reddish-brown mortar was used to join the slabs. Numerous spalls, small pebbles, and sandstone fragments had been pushed into the mortar for chinking. Some plaster adheres to the doorway and walls. Where the walls abut to the back of the ledge, plaster is used to seal off the cracks and holes, and fingerprints are noticeable in these and other spots.

The doorway faces northeast. It is elevated above

the ground surface and the floor by three courses of masonry 40 cm. high. The doorway measures 40 by 60 cm. in maximum dimensions. The lintel, a large sandstone slab, had fallen in front of the room. Directly below this slab two sticks 9 to 16 mm. in diameter had extended across the top of the doorway, probably forming a rest for a door slab.

The floor was formed of somewhat uneven bedrock, partially decomposed. No floor features were present. The overhanging ledge provides a roof for the granary.

The fill was formed of 5 to 10 cm. of sand containing scattered pack rat dung and pinyon seed shells. No artifacts were recovered from the room; however, a few corncocks were collected at the time the room was surveyed.

Room 2. Room 2 was a semi-circular masonry structure much like Room 1. It is 3.60 by 1.20 m. in maximum dimension. The walls were constructed from flat, rectangular sandstone slabs placed one on top of the other. A brown mud mortar was used to cement the blocks in place, and the walls were chinked with numerous sandstone spalls and fragments. The walls are footed on large boulders which in turn are placed on the bedrock ledge. The walls reached a height of 1.10 m. and a thickness of 20 cm. Some plaster, reddish-brown in color, is peeling off the exterior walls.

The doorway of Room 2 opens to the northeast. The opening is rectangular and measures 40 by 60 cm. The sill, of bedrock, is flush with the floor. A large sandstone slab lintel is in place across the top of the doorway. This lintel rests on a small stick also extending across the top of the doorway.

The floor is partially decomposed bedrock. Some plaster adheres to the wall-floor juncture. No floor features were present. The natural overhanging ledge forms the roof of the room.

The fill, only partially excavated, was composed of 5 to 10 cm. of sand containing small amounts of pack rat debris. No artifacts were found in Room 2.

SUMMARY AND DISCUSSION

NA7457 consists of two small masonry rooms, too small to be living quarters, which were probably used as storage granaries. Both rooms were in a state of excellent preservation when excavated. The lack of artifacts, except corncocks, in or around the ledge rooms also indicates that they were storage and not habitation structures. The proximity of the granaries to NA7458, a large pueblo of 30 or more rooms, allows for the possibility that the pueblo inhabitants built and used the structures for storage. Because of the lack of artifactual material, however, the cultural horizon to which these structures belong cannot be ascertained definitely. The ceramics of neighboring ruins date between A.D. 1100 and 1250.

NA7472

INTRODUCTION

History, Location, and Physical Description

NA7472 was surveyed in 1960, and was excava-

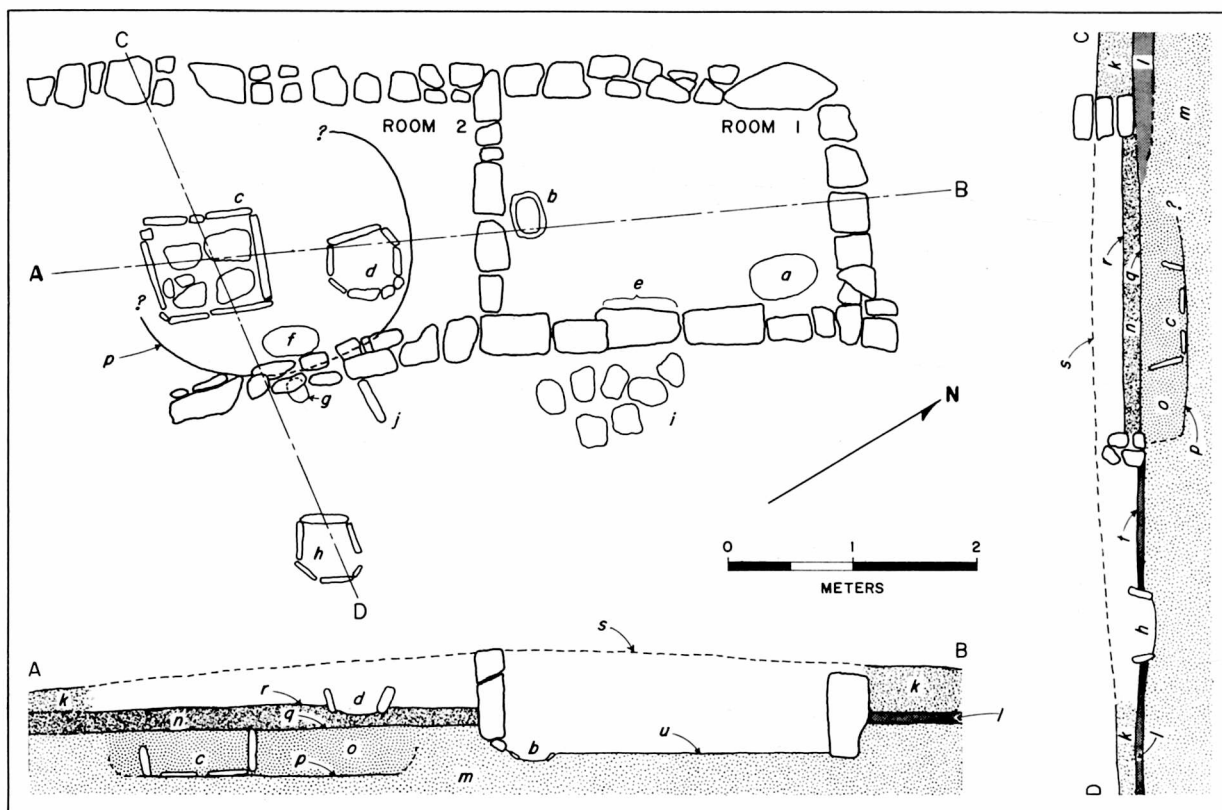


FIGURE 27. Plan and sections of NA7472. *a*, ashpit; *b*, clay-rimmed basin; *c*, cist associated with Surface 2; *d*, hearth associated with floor, Room 2; *e*, entry; *f*, hearth (?) associated with pithouse; *g*, posthole associated with pithouse; *h*, hearth; *i*, slabs; *j*, upright slab; *k*, tan sand; *l*, red sand; *m*, sterile orange sand; *n*, red and orange sand; *o*, orange sand; *p*, pithouse floor; *q*, Surface 2; *r*, floor, Room 2; *s*, present surface; *t*, occupation surface; *u*, floor, Room 1.

ted by the Glen Canyon Project in May, 1961. The site is located in the east Catfish drainage system on the southern end of a densely vegetated park surrounded by pinyon and juniper. The park is relatively flat except for a slight dip near its center, and it is approximately 200 yd. long and 100 yd. wide. The park surface is sandy, except where the bedrock is exposed at several locations. The sandy deposits which cover bedrock range between several inches and six ft., and are partially stabilized by blackbrush, prickly pear, ephedra, and grasses. About the flanks of the park are outcroppings of Morrison formation Saltwash, and within a mile to the south is the summit of Cummings Mesa. To the east is the eastern escarpment of Cummings Mesa and Forbidding Canyon. West and north of the site are portions of the various canyon systems which dissect Cummings Mesa. The elevation at the site is approximately 6250 ft. above sea level. No nearby sources of water were noted, but water probably occurs at wet seasons in the canyons to the west of the site, and perennially flowing Aztec Creek is an hour's walk from the site. The site is open to the elements and affords an excellent view of the surrounding terrain. The entire southwest side of Navajo Mountain is visible from the site, as well as the summit of Cummings Mesa, the eastern and northern escarpments, and portions of the

northern extensions of the mesa. This site is very near several other sites, but none of any greater proportions. A faint stock trail passes over the site, and present day use of the area by the Navajo is evidenced by grazed vegetation and the presence of a holding pen at the head of the main trail from Rainbow Lodge.

Surface Indications

The sandy location of NA7472 is almost featureless due to the expanse of blackbrush in the pinyon and juniper bordered park. The dune sand which contains the site is eroding in all directions, except to the south because here the terrain is level. Masonry was visible about 50 cm. above the top of the vegetation. The presence of a room was evident in the masonry rubble, but distinguishable wall outlines were not visible. Trash was weathering out of the sheep trail and the slopes to the north and west. Several burned trees are possible evidence of lightning strikes on the exposed summit area of Cummings Mesa.

Problem

This site was investigated because it is situated on the mesa top bordering the park, and because the survey indicated that the pottery here was similar to other sites in the area, but the masonry seemed slightly different, being of the large block type. All of the

site which seemed relative to the field house occupation was sampled.

EXCAVATIONS

Excavation began with the removal of fill from around the walls of Room 1. This excavation continued along the walls into Room 2. All the material from outside the walls consisting of sherds, worked hematite, and three hammerstones, was kept together as one provenience. In addition to the excavations in Room 1, and the Room 2 structure, three tests were made; one outside of Room 1 against the west wall, one outside the northeast corner of Room 1, and one located 6 m. northeast of Room 1.

Domestic Structures

Room 1. The fallen masonry of Room 1 formed no pattern, and much of the masonry was sanded over. The room was found to be rectangular in outline, being 2.56 m. long and 1.80 m. wide. The method of wall construction and the height of the outside occupation surface indicate that Room 1 is a semi-subterranean house in a pit (Figs. 27, 28).

The *walls* were formed of large blocks of sandstone, apparently quarried nearby, as many sources exist. The stones were not shaped or dressed, but were usually oriented with the most regular face towards the room interior. The walls were laid on naturally compacted orange sand. The wall corners were bonded occasionally by overlapping stones. The mortar used in wall construction was a reddish sandy material, and the spaces between building stones were chinked with irregularly shaped spalls and small stones. The height of the walls above the floor was from 52 to 94 cm. and wall thickness ranged from 22 to 30 cm. No plaster was noted, but the mortar was smoothed out to form an even surface with the faces of the blocks. Three corners of the room were profusely chinked. The upper courses of the walls tend to be built of thinner, unshaped slabs, whereas the lower courses are of large, long blocks, usually set on end or edge.

The doorway was probably in the east wall. The possible threshold was 40 cm. wide and 45 cm. above the occupation surface, and 75 cm. above the room floor.



FIGURE 28. Room 1, NA7472.

The *floor* was about 80 cm. below the present surface at the east wall. It was formed of a layer of reddish sand mixed with charcoal, and was laid over sterile orange sand. It was poorly defined, especially near the edges.

A basin filled with ash was located in the northeast corner of the room, with no slabs or other features to indicate its function as a definite hearth. A small rectangular bin was located 50 mm. from the south wall. The bin had a clay rim but was floored with sand. A concentration of charcoal was noted in the center of the room nearest the east wall.

The top 70 cm. of *fill* consisted of tan and orange windblown sand mixed with fallen wall stones, mortar, and chinking stones. From 70 cm. to the floor the fill consisted of orange sand mixed with burned roofing material and rock. In each corner of the room was a pile of windblown sand resting on the floor and abutting against the walls, indicating that the room sanded in after abandonment. A layer of burned and highly fragmented roofing material 2 to 3 cm. thick rested on this sand.

Three hammerstones, two choppers, one one-hand mano, one graver, one knife fragment and sherds were recovered from the room (Tables 14, 15). A fragment of cotton cloth was found clinging to the east wall of the room just above the floor.

Room 2. Room 2 is located adjacent to and south of Room 1 (Fig. 27). The room form is that of a walled open-end courtyard, approximately 2.8 m. long and 2.0 m. wide.

The *walls* of Room 2 are formed by irregular blocks and slabs of locally derived sandstone, and are bonded with large amounts of red sandy mortar and chinking stones of all shapes. Both east and west walls were independently built, abutting at the north to the south wall of Room 1. The sides of both walls lack evidence of purposeful facing and are crudely built. The walls diverge toward the south and become untraceable beyond a distance of 3.6 m. The wall stones were laid on a red colored layer of sand which overlies the basal sterile orange sand. The red sand layer is mixed with orange sand in its lower limit, and occasionally the orange sand foots the walls. Wall height ranged from 16 to 65 cm. and in width from 22 to 45 cm. Since very little masonry debris occurred inside or outside of the room, it is doubtful if the masonry walls ever rose over 1 m. high. It is likely that these walls, possibly topped by brush, served to deflect surface winds and sand, rather than making a formalized room. No evidence of a south wall was found.

The *floor* was poorly defined and composed of trashy debris scattered through red and orange sand. A slab-lined hearth, 30 cm. in diameter, was located in the northeast side of the room. It contained 20 cm. of gray ash.

The room *fill* consisted of windblown sand and fallen rocks. No evidence of roofing material was found.

Artifacts recovered from the floor of Room 2 include a mano, a bone awl, 14 hammerstones, one

nodular chopper, one nodular scraper, and sherds and lithic chips (Table 14).

Surface 2. Subfloor tests were made in Room 2, recovering seven hammerstones scattered along a second recognizable occupation surface, consisting of a layer of red sand mixed with trash which lies 30 to 50 cm. below the present ground surface.

Several stones projecting through Surface 2 led to further subfloor testing. A slab-lined cist was uncovered and cleaned out. It apparently was associated with Surface 2. The cist was filled with orange sand and contained one mano, five hammerstones, and two choppers. The bin or cist was mortared with green clay, and two mano blanks were used in the bin construction. It is possible that Surface 2 was associated with Room 1 before the construction of the walls of Room 2, and after the occupation of Pithouse 1.

Pithouse 1. Immediately below the cist floor slabs is a third surface, slightly charcoal-stained. Numer-

Knife, fragmentary	1
Choppers, nodular	5
Scrapers	
Nodular	1
Flake	2
Hammerstones	46
Graver	1
Cores	3
Manos	
One-hand	4
Two-hand	1
Metate, flat and bifacial	1
	—
TOTAL	65

TABLE 14. Stone artifacts from NA7472.

ous artifacts were located on this surface, which materialized as the floor of a pithouse 1.19 m. wide by 2.20 m. long (Fig. 27). Neither Surface 2 nor the pithouse floor were definable outside the walls of Room 2 or in any test. The pithouse had been excavated into compacted orange sand, from an undetermined level.

The *walls* were very difficult to find, and were not definable higher than 15 cm. above the floor. Wall surfaces, formed of sand, may have been plastered with a red sand similar to the floor. No evidence for a doorway was located.

The *floor* is a compacted surface of reddish sandy materials veneered with a small amount of trash. A possible hearth is located against the east wall of the pit. There is no formalized structure here, simply a depression 2 cm. deep and 30 to 40 cm. in diameter which is marked by intense burning. A possible post-hole is located just outside the east wall.

The floor was overlain by sterile orange sand, and no evidence of roofing was found.

No sherds, stone, or bone material came from the sandy fill. Floor artifacts include 11 hammerstones, one scraper, two cores, and numerous sherds (Tables 14, 15).

Other Excavations

Test 1. Test 1 was placed outside the west wall of Room 1 and excavated to a depth of 135 cm. in order to sample the deposit adjacent to Room 1 and define the occupation surface at Room 1. From 0 to 35 cm. trash and orange sand were encountered. The occupation surface was located at a depth of 35 cm. Sterile orange sand was found at a depth of 35 to 90 cm., and from 90 to 135 cm., compacted, weakly cemented orange sand was found.

Test 2. Test 2 was excavated outside the northeast corner of Room 1 for the same purposes as Test 1. Orange sand and trash occurred from 0 to 30 cm., and the occupation surface was located at a depth of 30 cm. below the surface. From 30 to 65 cm. sterile orange sand was encountered.

Test 3. Test 3 was in the trash 6 m. northeast of Room 1, excavated in order to sample the refuse deposit. It was dug to a depth of 61 cm. Trash mixed with orange sand was encountered from the surface to a depth of 20 cm. From 20 to 40 cm., less trash was found, mixed with slightly charcoal-stained orange sand. Sterile orange sand composed the level from 40 to 61 cm. below the surface. Besides sherds, one chert core and a few lithic chips were recovered.

Walking Surface and Hearth 1. Beyond the east walls of Rooms 1 and 2 and eastward for a distance of 2 m. or more lies an occupation surface associated primarily with Room 1. This surface varies slightly in depth, is marked by a trash-stained deposit of reddish sand and overlain by the surficial ground cover, tan blowsand. Beneath the walking surface deposit lies the ubiquitous sterile orange sand. Adjacent to and east of Room 1, for approximately a 1 m. radius from the east wall, is a pavement of thin slabs laid over the occupation surface. These slabs probably served the purposes of a firm footing during wet weather and to hold down sand during windy conditions. Associated with the occupation surface, south of the slab paving and east of Room 2, is a rectangular hearth built of upright slabs. The hearth slabs have an overall depth of 22 cm. with equal portions buried and exposed. They penetrated the walking surface and were set in orange sand. Ten cm. of gray ash filled the lower one-half of the hearth and rested on an unlined base of orange sand.

The walking surface defined around the hearth and east of the rooms was traceable into Room 2 at

the level of Surface 2. Generally it underlay the walls of Room 2. The floor of Room 2 is slightly higher than the walking surface.

Two manos, three hammerstones, and one scraper were found near the wall between Hearth 1 and the east wall of Room 2. A miniature jar lay against the east or outside wall surface of Room 2. Sherds were common in the walking surface deposits.

ARTIFACTS

Lithic Material

The stone tools found at NA7472 (Table 14), generally fall within the range of those described by Adams, Lindsay, and Turner (1961) and the Cummings Mesa Survey (this volume).

Chipped Stone

Chipped artifacts were rare and no projectile points were recovered. One fragmentary chert knife was found, but it could not be typed. There are 46 hammerstones, primarily from the habitation surfaces. Six of the hammerstones are unmodified river cobbles, and the remaining 40 are battered nodules or river cobbles fragments modified by use. All show evidence of pounding. Five nodular choppers made of chert and quartzite were found. These show evidence of use along the sharpened edges, two of them being excessively battered as though by secondary use as hammerstones. Cores are represented by three irregularly shaped specimens. There are three scrapers, two of which are flake scrapers, and one which is similar to a nodular scraper, but exhibits use flaking and percussion marks around the entire circumference. Two scrapers are quartzite, and one is a dense hematite bearing stone.

A possible graver made from a chert flake was recovered. The flake bears a sharp projection which has been unifacially chipped to form a working point.

Ground Stone

Four one-hand manos and one two-hand mano were recovered. The one-hand manos are oval to rectangular in outline, and all except one are bifacial with nearly flat grinding surfaces. The two-hand mano has a single flat grinding surface, and shows wear only on raised portions of the working face. It is oval in outline, with rough edges, and apparently was not extensively used.

Surface finds included a flat metate from west of Room 1. The specimen is bifacial, with slightly convex surfaces. It is well formed from local sandstone and measures 44 cm. long, 27 cm. wide, and 7 cm. thick.

Other Lithic Material

Two pieces of hematite were found outside the walls of Rooms 1 and 2. Both stones display grinding facets indicating that the stones were rubbed to remove the pigment.

Numerous unmodified chips and spalls were recovered in the excavations, in addition to the above-mentioned artifacts. Represented are quartzite, chert,

jasper, and sandstone of which quartzite and sandstone were in the majority.

Pottery

The pottery from NA7472 is predominantly of Kayenta Anasazi wares and manufacture (Table 15). The exceptions to this are one sherd each of Mesa Verde Black-on-white and Walnut Black-on-white.

The presence of Tusayan Black-on-white, Tusayan Polychrome, Moenkopi Corrugated and Kiet Siel Gray in relatively large numbers of sherds at nearly all proveniences adequately date the excavated masonry and adjacent features at approximately a period between A.D. 1150 and 1225, at the latest 1250. The early date might be questioned by those familiar with Kayenta ceramics. However, recent analysis of tree-ring dates and pottery types (D. A. Breternitz: personal communication) has extended the range of dates for the above-mentioned types considerably to include the earlier date cited above. The terminal date of A.D. 1225 is used here because of absence of post-1225 black-on-white and polychromes.

The presence or absence of certain pottery types at various proveniences does not adequately solve the problem of dating these features. This is true in the instance of the cist and pithouse below Room 2. Stratigraphically, it was learned that these structures were built earlier than Room 2, but how much earlier is an unknown factor. Since the areas beyond the three major excavation units, Room 1, Room 2, and the walking surface, were not tested, we are hard pressed to explain the presence of Black Mesa and Sosi-Dogoszhi Black-on-whites and perhaps Tusayan Black-on-red. However, these alternatives are available. There may have been an undisclosed earlier component at the site; or potsherds were picked up from neighboring sites and used in wall construction; or these earlier types may still have been in vogue when the site was occupied. At the present time, the second and third alternatives are preferred for reasons stated in the report for NA7498 (see Discussion, Pottery Chronology).

The two intrusive sherds found at this site affirm the temporal placement given for the site, since both types cross-date with the four types mentioned in the second paragraph of this discussion.



FIGURE 29. Bone and clay artifacts from NA7472. a, awl; b, miniature jar. Length of a, 83 mm.

Only one whole vessel was recovered from the excavations (Fig. 29 b). This is a miniature jar from the walking surface adjacent to Room 2. The jar is globular in shape with the rim being formed by a single coil which is attached to the body of the vessel and nearly obliterated by molding clay over it on the

	Room 1, Floor-fill	Room 2, Floor-fill	Surface 2	Pithouse 1	Walking surface	Test 3, Level 1	Test 3, Level 2	Surface	TOTALS
Tusayan White Ware									
Black Mesa B/W					1				1
Sosi B/W								2	2
Dogoszhi B/W	2								2
Flagstaff B/W		1	1	1				1	4
Tusayan B/W		9	2	1	3			5	20
Unclassified	1	17	1	1	20	5	1	2	48
Little Colorado White Ware									
Walnut B/W								1	1
Mesa Verde White Ware									
Mesa Verde B/W						1			1
Tsegi Orange Ware									
Tusayan B/R					7			2	9
Tusayan Poly.	4	7			5	1		3	20
Unclassified	2	5	8	13	10	2		4	44
Tusayan Gray Ware									
Tusayan Corr.					3				3
Moenkopi Corr.	2	17	10	1	17	2		17	66
Kiet Siet Gray	14	33	14	7	44	10	1	12	135
Lino Tradition	5	7							12
Unclassified	1	15			12		1	3	32
TOTALS	31	111	36	24	122	21	3	52	400

TABLE 15. Pottery from NA7472.

exterior only. The jar is uniformly gray, with an exterior smoothly finished, but unpolished or slipped. The rim diameter is 20 mm., body diameter 30 mm., and overall height 30 mm.

Bone

One bone awl (Fig. 29 a), well made and highly smoothed and polished by use, was found in Room 2 on the floor. It is 83 mm. long, 13 mm. wide, and 7 mm. thick at the base.

Perishables

The plain weave cotton textile fragment found at this site (Fig. 30) is worth noting because it is unique in the southwest. The item is different from other textiles found in the Glen Canyon Basin because the weft selvage is similar to treatment used commercially in the manufacture of cotton textiles. Be-

cause of its similarity to modern products a note should be added concerning the recovery of the fragment. The artifact was found pressed against and clinging to the wall of Room 1, 20 cm. above the floor. It appears to the authors that the textile fragment is prehistoric despite its similarity to modern textiles. A detailed report on this specimen appears in Appendix II.

NON-ARTIFACTUAL MATERIAL

Three pieces of unworked bone, mule deer, *Odocoileus hemionus*, were found in various proveniences. These items are: first phalange, pithouse floor; sternum, walking surface; and third phalange, Surface 2—cist.

SUMMARY AND DISCUSSION

NA7472, a habitation complex, was excavated in

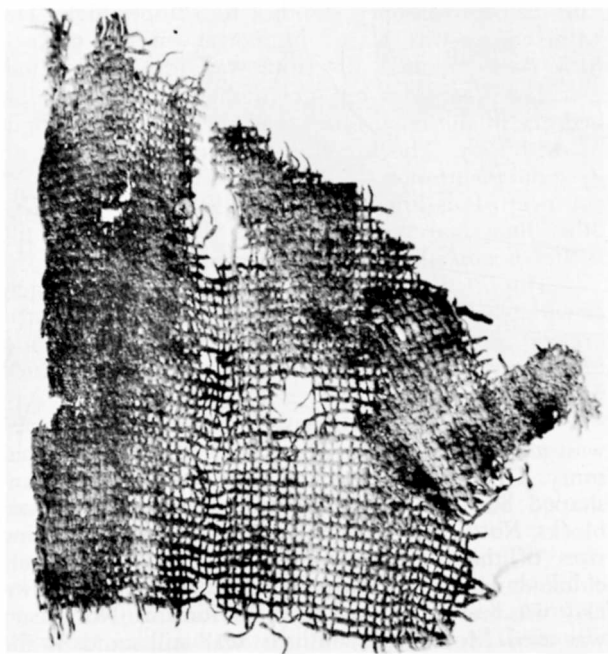


FIGURE 30. Cotton cloth from NA7472, selvage at right. Length along selvage, 5.0 cm.

order to study a site which is similar in many respects to sites thought to be field houses elsewhere on Cummings Mesa, yet in a different environmental setting. Two rooms were excavated as well as an occupation surface and a pithouse. Stratification was found, but did not represent great time depth. NA7472 is of Kayenta Anasazi affiliation, probably occupied during the period A.D. 1150 and 1225.

The stratigraphy at NA7472 is both natural and cultural and its interpretation rests heavily on the stratification of the tan, red and orange sand layers.

From the excavation evidence it is impossible to determine the initial event of construction at the site, because the deposits in Room 2 were so badly disturbed by human activity and fallen masonry. However, it is definitely established that the pithouse predates the masonry wall construction at Room 2. Therefore, it is possible that the pithouse was excavated from Surface 2, and was associated with the walking surface east of the rooms. That the pithouse construction represented an independent event not associated with later events should be considered, but this is not necessarily borne out by the ceramics.

Room 1 was built either before, during or after the pithouse, and associated with it were the walking surface and Surface 2 in Room 2. It is probable that the cist resting on the pithouse floor was also a part of this complex. On the basis of information from other sites, specifically NA7498 on Cummings Mesa, it would be more realistic to assign the pithouse to the Room 1 complex than to make no interpretation at all.

During the occupation of Room 1 further modifications were made to the south of this domicile. The changes included joining Room 2 onto Room 1,

abandonment of Surface 2 by adding fill between the walls of Room 2, and the construction of a hearth in Room 2. Presumably the walking surface east of the rooms remained in use, since neither damage to the surface nor structures appeared in this area.

The abandonment of the site seems to have been orderly and at a time commensurate with the general exodus from Cummings Mesa.

The ceramic sample from NA7472 hints of an earlier occupation than that reflected by Flagstaff and Tusayan Black-on-whites. The distribution of types does not provide a clear picture of this problem. The ceramic evidence argues against an early occupation of the pithouse, and it is difficult to conceive of Room 1 having been utilized for 50 years or more. Therefore, two alternatives are possible: that Sosi, Dogoszhi, and Black Mesa Black-on-whites were used, not necessarily made at this site in association with Flagstaff and Tusayan Black-on-white; or that an earlier occupation exists at the site which was not revealed by excavation. Unfortunately, the situation cannot be resolved as both alternatives are possible.

NA7485

INTRODUCTION

History, Location, and Physical Description

This site was recorded by Glen Canyon Project staff in 1960. It is located in the east fork of the Catfish Canyon drainage, about 2.2 mi. upstream from the point where the stream channel terminates at an abrupt drop-off at the mesa edge. It is on the east side of the streambed, approximately 50 ft. higher than the dry channel, at an elevation of about 5800 ft. No water supply is known in the vicinity today, although the streambed a short distance upstream was noted to have some moist pockets in 1961.

The site is a series of contiguous rooms built under a small ledge overhang (Fig. 31). The overhang was formed by the erosion of soft mudstone layers within the Saltwash sandstone. Exposure is to the southwest, allowing the afternoon sun to play on the interior, but also exposing the rooms to the direct force of the majority of storms. Scattered pinyons and



FIGURE 31. General view of NA7485, looking north.

junipers are the largest vegetational features, but blackbrush, ephedra and sage are more common. Arable land is nearby in the slight amount of alluvium in the bottom of the valley.

Surface Indications

Many of the rear portions of the walls remained standing to their original height because of the protection afforded by the overhang. The more exposed portions were badly tumbled and difficult to trace. At least five rooms appeared to be present. A few sherds were noted on the talus slope in front of the rooms, but there was no concentrated or deep trash deposit. Relatively little disturbance other than that by wind and rain could be seen. All rooms showed at least minor evidence of pack rat activity, and Room 3 was filled completely with a pack rat nest. The front portions of the walls of Room 2 appeared to have been rebuilt in historic times, probably by Navajo for use as a temporary shelter or lambing pen.

Problem

NA7485 was excavated in order to sample a site in a sheltered setting, with prospects of recovering perishable artifacts and therefore gaining a fuller picture of prehistoric life on Cummings Mesa, and in order to salvage as much information as possible before nature and man caused further deterioration of the structures. Unfortunately, no perishable artifacts were recovered.

EXCAVATIONS

The deposits within most of the rooms were shallow, generally ranging from 10 to 40 cm. deep, so the entire fill of each room was cleared out as a unit. No excavations were undertaken other than in the rooms, as deposits appeared too shallow to warrant it. The shallowness of the fill is indicated by the fact that only slightly more than half a day with five men was required to completely clear out the rooms.

Domestic Structures

Room 1. This feature (Fig. 32) may have been a courtyard or open work area, as no evidence of a front wall was found. The rear wall was formed by the back of the shelter. A crack in the bedrock had been filled in with masonry, probably to keep rodents from entering the area. The northwest wall was formed of unshaped stones crudely piled on dirt, with no mortar evident. It was apparently constructed to keep dirt and wind out of the room. The southwest

wall, of poor masonry, stands 1 to 3 stones high. The basal course was placed in mortar on top of bedrock. As mentioned, the front wall was not located.

The floor was cut down slightly into the soft bedrock at the rear, whereas in the front it was built up with clay. The firepit, near the rear wall, is an irregular depression 37 to 40 cm. in diameter and 8 cm. deep. It is lined with 20 to 40 mm. of clay. No other floor features were found. The ceiling of the shelter is partially smoke blackened.

The fill, 20 to 50 cm. deep, was composed largely of windblown sand and fallen wall stones, with a little organic debris scattered through it by pack rats. Sherds recovered from this and other rooms are listed in Table 16.

Room 2. The southeast, southwest, and northwest walls of this room (Fig. 32), were formed of masonry. This masonry was one stone thick, made of unshaped but fairly closely fitted sandstone slabs and blocks. No true coursing is evident, due to the varying sizes of the stones. The interstices were profusely chinked with small slabs and spalls. Reddish-brown clay was used only sparingly for mortar. No plaster was used. Most of the southeast wall still stands to the ceiling of the shelter, 1.2 m. above the floor. Most of the other walls have fallen. The northeast wall is formed by the rear wall of the shelter. This rear wall is not vertical, but forms a shelf 70 cm. above the floor. This natural shelf extends further back into the rock, but was blocked off by masonry, prior to the time the southwest wall was constructed, probably to keep rodents from entering the room. No doorway was apparent, due to the collapsed condition of the front wall.

Most of the floor was formed of bedrock, but a slight amount of loose dirt and rubble had been placed on the south side in an attempt to make a more level surface. No plaster was found. Near the south corner is a poorly defined hearth 30 to 35 cm. in diameter and 1 to 3 cm. deep. It may have been at least partially clay lined. No other floor features were present. The roof, formed by the ceiling of the shelter, is slightly blackened by soot.

The fill was formed of 20 to 30 cm. of windblown sand and a few fallen rocks. Two sherds were the only artifacts recovered from this room.

Room 3. The walls of Room 3 (Figs. 32, 33) are similar to those of Room 2, having been formed of irregular pieces of sandstone, many small chinking

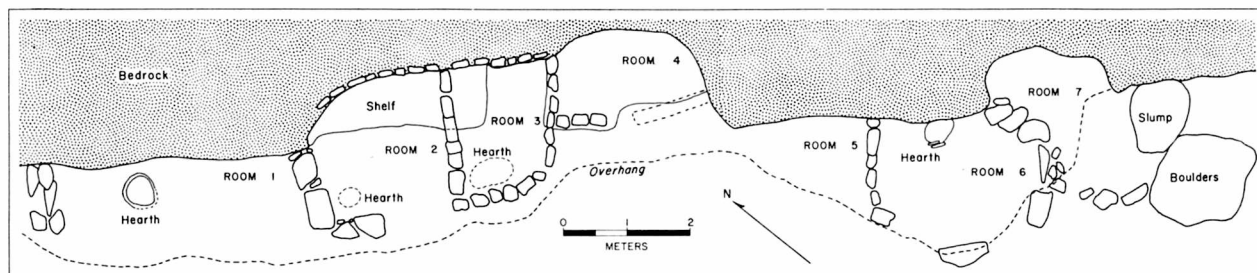


FIGURE 32. Plan of NA7485.



FIGURE 33. Room 3, NA7485.

stones, and mud mortar. About two-thirds of the rear wall was formed by bedrock, but the same crack as found in Rooms 1 and 2 had been walled off by masonry. The ledge or shelf found in Room 2 extended part way into Room 3. No plaster was used. Most of the front wall and the adjoining portion of the southeast wall had fallen, and were partially rebuilt by crudely laid dry masonry. This rebuilding was probably done by the Navajo to form a lambing pen or temporary shelter. No doorway was found.

Most of the *floor* was formed of bedrock, with an irregular depression in the south corner filled in with dirt and sand to make it level. Although the roof and upper 10 to 30 cm. of the walls are smoke blackened, no evidence of a hearth was found.

The *fill* was 15 to 40 cm. deep, composed of fallen wall debris, windblown sand, and some organic material brought in by pack rats. Twenty-two sherds and a scraper were found within the confines of Room 3.

Room 4. The northeast and southeast *walls* of this room (Fig. 32) were formed by the rear wall of the shelter. The northwest and southwest walls are of crude masonry, similar to that described for Rooms 1, 2, and 3. A rectangular doorway is near the center of the front wall. Half of this wall had fallen, so the width of the doorway could not be determined. The height was 56 cm. The stones forming the jamb were not shaped, but were carefully aligned. The lintel was apparently formed of a single stick 16 mm. in diameter, the socket for which remains between the top-most two courses in the wall.

The *floor*, averaging 55 cm. above that of Room 3, is mostly of bedrock, partially covered with red clay to smooth it off. No floor features are present.

From floor to ceiling the room was completely filled by a large pack rat nest, parts of which had burned. A maul was found near the floor.

Room 5. The area labeled Room 5 (Fig. 32) was apparently not a room, but simply a use area or courtyard. It is bounded on the northeast by the rear wall of the shelter, and on the southeast by Room 6. No boundaries were apparent to the west. No prepared floor was evident, but a fairly level surface 0 to 40

cm. below the present surface could be traced. A small amount of charcoal was scattered over this surface, and the remainder of the fill was windblown sand. No artifacts were found.

Room 6. The *walls* of Room 6 (Fig. 32) are of masonry, but of somewhat cruder construction than those of Rooms 1 to 4. The northwest wall was formed of unshaped sandstone blocks, clay mortar, and a few chinking stones. It was poorly preserved. The southeast wall is of large slabs and pieces of sandstone, one large slab having been set upright. The back wall was formed by the rear wall of the shelter. The front wall was apparently of masonry, but only one stone remained in place.

Most of the *floor* is of 3 to 25 mm. of clay laid over bedrock. The bedrock protrudes through this clay in a few areas. The firepit, against the rear wall, is 40 to 50 cm. in diameter and 12 cm. deep. It is an irregular basin, partially lined with small slabs.

The *fill*, 10 to 70 cm. deep, was formed of fallen wall stones, windblown sand, and a little pack rat debris.

Artifacts found within Room 6 include 29 sherds (Table 16), two hammerstones, and two manos. The sherds tend to be earlier than those in the remainder of the site, suggesting that Room 6 was the first to be constructed or the first to be abandoned.

Room 7. This room (Fig. 32) was formed in a small area between Room 6 and some large boulders. The northwest wall is formed by Room 6, the rear wall by bedrock, and the southeast wall by the large boulders, which had probably been topped by masonry. The front wall is of masonry, only standing one course high at present.

The *floor* was poorly defined, being formed of bedrock, dirt and sand, and clay. No floor features are present.

The *fill* was 20 to 70 cm. deep, being composed largely of sand and fallen rocks, with some organic material brought in by pack rats near the surface. Only one sherd was found.

ARTIFACTS

Lithic Material

Very few artifacts of stone were recovered from NA7485. All fit into the range of artifacts described for the survey and NA7498, so no detailed discussion will be given here. Chipped stone artifacts are: one crude knife fragment; one flake scraper with a limited working edge; one hammerstone; one core; and one utilized flake. Three manos were found. All are two-hand; two with a single faceted grinding surface, the other with one flat grinding surface. One fragmentary trough metate was found on the surface. One maul was recovered. It was crudely chipped from a quartzite cobble, with pecked notches on either side. It is 92 mm. long, 73 mm. wide, and 40 mm. thick.

Pottery

Few sherds and no whole or partial vessels were recovered from NA7485. Almost two-thirds of the sherds were picked up on the surface (Table 16). The

	Room 1	Room 2	Room 3	Room 6	Room 7	Surface	TOTALS
Tusayan White Ware							
Dogoszhi B/W						1	1
Flagstaff B/W				2		1	3
Tusayan B/W			12			5	17
Unclassified		1	1			17	19
Unidentified B/W						3	3
Tsegi Orange Ware							
Tusayan B/R	1					4	5
Tusayan Poly.	5		1	3	1	1	11
Unclassified			2			5	7
Tusayan Gray Ware							
Tusayan Corr.				3		3	6
Moenkopi Corr.				21		13	34
Kiet Siet Gray	2	1	7			37	47
Unclassified						5	5
TOTALS	8	2	23	29	1	95	158

TABLE 16. Pottery from NA7485.

ceramic evidence indicates that this site was occupied during Pueblo III times, mainly between 1200 and 1225. Because of the low number of sherds the evidence is not conclusive, but does indicate that Room 6 may have been the first room occupied, in early Pueblo III, whereas, most of the remainder of the sherds can be assigned to the middle portion of Pueblo III.

No bone or perishable artifacts were found.

NON-ARTIFACTUAL MATERIAL

The only non-artifactual material recovered were two corncobs, one from Room 2 and the other from Room 4.

SUMMARY AND DISCUSSION

NA7485 was constructed in a shallow rock shelter in a ledge of Saltwash sandstone. The architectural remains consist of five rooms and two partially enclosed courtyards or use areas. All construction was of masonry, with the stones exhibiting no evidence of having been deliberately shaped. Chinking stones are numerous, but clay mortar was generally used sparingly. None of the walls were plastered. The walls originally extended to the ceiling of the shelter, utilizing it as a roof. Rooms 2 and 6 were apparently used as living quarters, whereas Rooms 4 and 7 were utilized for storage. The size of Room 3 indicates storage, but the smoke blackening indicates its use as a domicile. Rooms 1 and 5 were probably not completely enclosed, and served as open living areas.

The site was apparently occupied at the same time as many of the other sites on Cummings Mesa. The paucity of artifactual material and the lack of ceremonial structures indicate that the site was not occupied for a long length of time, perhaps only seasonally.

NA7486

INTRODUCTION

History, Location, and Physical Description

NA7486 was recorded by Glen Canyon Project personnel in 1960. It is located approximately .2 mi. downstream from NA7485, on the same side of the usually dry streambed, but in the next higher series of ledges. It is approximately 150 ft. above the stream channel, at an elevation of about 5860 ft. The environment is the same as that noted for NA7485.

Like NA7485, this site consists of a series of rooms built in a shallow shelter (Fig. 34), formed by the erosion of soft mudstone layers from an exposed face of the Saltwash sandstone. Exposure is to the southwest. The front walls of many of the rooms are poorly preserved, because the force of many storms comes from this direction.

Surface Indications

Prior to excavation, at least six rooms were easily visible, having been partially protected by the shelter in which they were built. A few sherds were scattered over the slope in front, but there appeared to be no definite trash area. Pack rats had occupied parts of the ruin, especially Room 1, and left organic debris and droppings. Other evidences of disturbance were the presence of sheep and goat droppings on the surface of the more accessible rooms, and the rebuilding of the walls of Room 4 with crude dry-laid masonry, probably by Navajos.

Problem

Although very similar to NA7485, this site was excavated because the hopes of finding perishable artifacts at NA7485 were not realized, and it was thought that another ruin of the same type might provide this sort of material, as well as more decorated pottery that would be useful in dating this type of site. Although more perishable material and pottery were recovered from this site, neither of the objectives was fully realized.

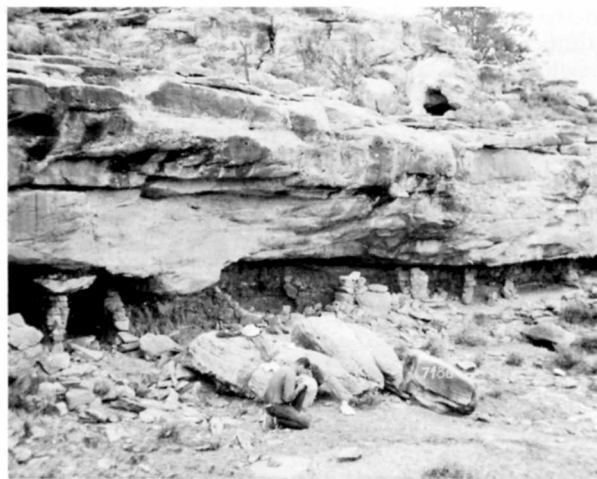


FIGURE 34. General view of NA7486, looking southeast.

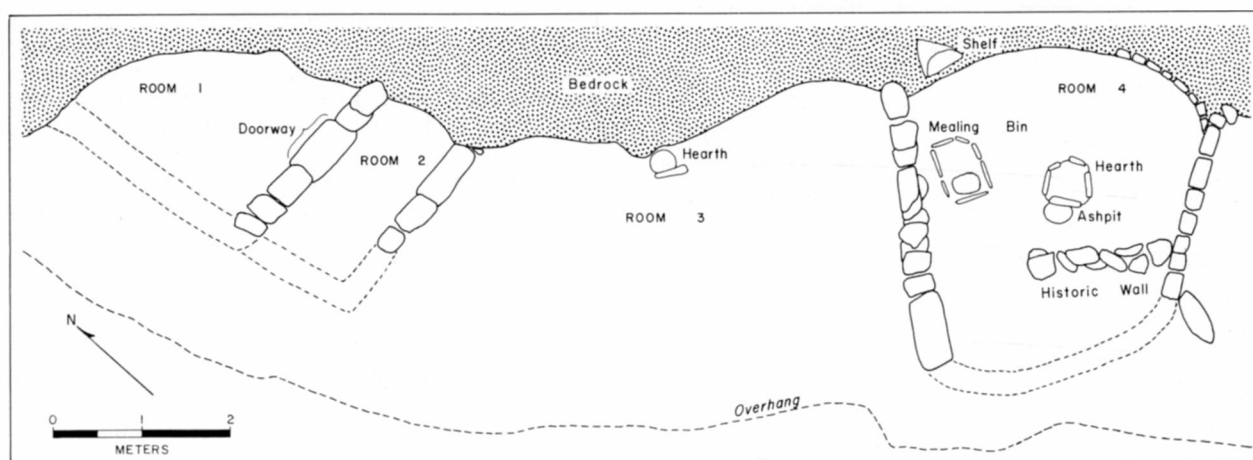


FIGURE 35. Plan of Rooms 1-4, NA7486.

EXCAVATIONS

The fill within each room was removed as a unit. The paucity of artifacts and general shallowness of deposits obviated the need for removing the fill by levels. No excavation was undertaken outside of the rooms, except for minor wall clearing, because of the obvious shallowness of the deposits.

Domestic Structures

Room 1. The north and east walls of this room (Fig. 35) were formed by the rear wall of the shelter. The west, or front wall had been destroyed almost completely by a rock fall, with only a little mortar remaining at the north end. The south wall, however, was very well preserved. It was constructed of irregular blocks and slabs of sandstone, set in copious amounts of reddish clay mortar, and chinked with a few small spalls. It was noticeably smoother on the outside (toward Room 2) than on the inside. Many of the irregular slabs used in the construction of the wall protruded into Room 1, forming small irregular shelves. The walls were not plastered.

In the center of this south wall is a doorway 30 cm. wide and 59 cm. high. The top of the sill is 23 cm. above the floor of Room 1. Both the sill and lintel are formed by large slabs extending across the full width of the opening. Directly beneath the lintel stone were two parallel sticks 15 to 21 mm. in diameter, also spanning the opening. Only the impressions of these remain in the mortar on either side of the doorway. The width of the doorway from the stones on one side to the stones on the other is 47 cm., but this was reduced to an average of 30 cm. by the addition of a vertical ridge of clay on either side. The clay ridge on the east side was reinforced by a stick 15 mm. in diameter. These ridges form a jamb, obviously meant to receive a rectangular door slab, which could have been fitted into place from the outside.

The roof was formed by the ceiling of the shelter, and the walls abutted against it. It was smoke blackened, probably as a result of the burning of a pack rat nest.

The floor was formed of natural clay, mudstone,

and sandstone, slightly smoothed off to make it more level. It still has a decided slope from rear to front, however. No floor features are present.

The fill of Room 1 was 35 to 80 cm. deep, composed of large and small rocks fallen from the ceiling of the shelter and burned and unburned pack rat nests. Sometime after abandonment a large part of the ceiling fell into the room, providing an ideal location for pack rats to live. After a considerable quantity of leaves, twigs, and other organic debris had accumulated through the efforts of these rodents, it caught fire, or possibly was set afire by Navajos. Later, more pack rats re-occupied the room and were living in the nest at the time of excavation.

In addition to the sherds listed in Table 17, a trough metate was recovered from this room.

Room 2. The north and south walls of this room (Figs. 35, 36) differ considerably in detail, indicating that they may have been constructed at different times. The north wall, previously described under Room 1, was constructed of sandstone slabs and blocks



FIGURE 36. Room 2, NA7486.

	Room 1	Room 2	Room 3	Room 4	Room 5	Room 6	Room 8	Room 9	Surface	TOTALS
Tusayan White Ware										
Sosi B/W				1					1	2
Dogoszhi B/W									1	1
Tusayan B/W	4			2					1	7
Unclassified	5			1			1	1	9	17
Mesa Verde White Ware										
Unclassified								24		24
Tsegi Orange Ware										
Medicine B/R									1	1
Tusayan B/R									2	2
Tusayan Poly.	4	2							3	9
Tsegi B/O				1	1		2			2
Kiet Siet Poly.										2
Unclassified	13			2					3	18
Tusayan Gray Ware										
Tusayan Corr.	2	1	3	2	1		1	2	9	21
Moenkopi Corr.							1	13	2	16
Kiet Siet Gray	10	7		81	15	5	25	67	19	229
Unknown Gray	3	1		2	2				1	9
TOTALS	41	11	3	92	19	5	30	107	52	360

TABLE 17. Pottery from NA7486.

all of nearly the same size and thickness, resulting in masonry that approaches true coursing. No attempt at coursing is apparent in the south wall, as it had been constructed of pieces of sandstone of widely varying sizes and often irregular shapes. The clay used for mortar and chinking in the south wall was less carefully applied, giving a more ragged appearance to that wall. The north wall rested directly on sandstone bedrock, whereas the south wall was constructed on green mudstone, which had subsequently been cut away on either side of the wall to form the floors of Rooms 2 and 3, leaving the wall on a ridge. The front wall had entirely collapsed. A doorway, previously described, is in the north wall, serving as an entrance to Room 1. It is possible that Room 2 never had a front wall, and simply served as access passage to Room 1.

The *floor* was formed of smoothed bedrock, leveled somewhat at the front by 3 to 25 mm. of clay. No floor features are present.

The walls extended to the ceiling of the shelter, which then formed the roof of the room. It was somewhat smoke blackened, probably by the burning of the pack rat nest in Room 1.

The *fill* was composed of 15 to 25 cm. of wind-blown sand, fallen rock, burned material spilled through the doorway from Room 1, and some organic debris brought in by pack rats.

Sherds (Table 17), one hammerstone, and 11 small pieces of hematite were recovered from Room 2.

Room 3. The north and south walls of Room 3 (Fig. 35) are similar in construction. Both are masonry, of unshaped sandstone blocks, slabs, and irregular pieces, held together by a liberal amount of clay mortar. They were constructed on green mudstone, which was later cut away to form the floor, leaving the masonry on pedestals 5 to 38 cm. high. Both walls were tumbled at the front, but extended to the ceiling of the shelter in the back. The front wall was probably also of masonry, but is very poorly preserved. No doorway is evident. The rear wall is of bedrock,

mostly the red and green mudstones. This rear wall had been somewhat smoothed off, and two shelves or niches had been cut into it. These shelves are almost the same size, averaging 122 cm. wide, 40 cm. deep, and 35 cm. high. They are at the top of the wall, directly below the ceiling.

The *floor* was constructed by removing the stratum of green mudstone, and then filling it in with 2 to 7 cm. of clay and dirt. It slopes toward the front. The hearth is against the back wall. It is a shallow basin, with one upright slab lining the front side.

The ceiling, where not exfoliated, is smoke blackened.

The room was filled with 10 to 35 cm. of wind-blown sand containing a little rock, sheep manure, organic debris, a few sherds, three knives and a metate fragment.

Room 4. The *walls* of this room (Fig. 35) evidence much more care in construction than was found in other rooms at this site. The room was partially circular, suggesting that it may have served as a kiva. The north wall was formed by the south wall of Room 3, already described, and is cruder than the others. The south wall was constructed of varying sizes of sandstone slabs, which although not exhibiting signs of having been pecked or spalled, were probably broken to desired shape and certainly carefully chosen. A moderate amount of red clay was used for mortar, and the spaces between stones were liberally but carefully chinked with small pieces of sandstone. The east end of this wall was missing. Most of the back wall is formed of crumbling mudstones at present, but the south portion is still lined with masonry like that in the south wall. This lining appears originally to have extended the full length of the back wall. No trace of the front wall was found. A more recent front wall, presumably of Navajo origin, had been built on top of the room fill and abutted to the original south wall within the limits of the room. This recent wall was dry-laid, of large sandstone blocks, with a few daubs of green clay used for chinking. It was probably used to seal off the room for use as a lambing pen or temporary shelter.

At the north end of the rear wall is a shelf 70 cm. above the floor. It is 63 cm. wide and 47 cm. deep, constructed of a triangular slab supported by clay.

The *floor* is composed of 1 to 8 cm. of clay plastered over bedrock. It is fairly smooth and regular.

The hearth is lined with small slabs. Adjacent to the east side of the hearth is a small pit 16 cm. deep and 20 to 32 cm. in diameter. It was filled with ash.

On the north side of the room are the remains of a mealing bin that was destroyed before or at the time of abandonment. All the slabs had been pulled out except one that was broken off at floor level. The bottom of the catch basin was formed by a small slab. The metate, which was not found, had been supported by a sloping platform of green clay.

Where not exfoliated, the ceiling is smoke blackened.

The structure was *filled* with 10 to 40 cm. of fallen wall stones, slumped mudstones from the rear wall, windblown sand, and a little organic material carried in by rodents.

Most of the 92 sherds recovered from Room 4 are from the same Kiet Siel Gray jar. Not enough were present, however, to enable its restoration. Two knives, a chopper, three scrapers, six hammerstones, five utilized flakes, and nine chips and unmodified pebbles were also found in this room.

Room 5. The north wall of this room (Fig. 37) is formed by the south wall of Room 4. However, this wall is not as well finished on the side facing Room 5. The south wall is of much cruder construction, of rough sandstone blocks, red and gray mortar and only a few chinking stones. The rear wall was constructed similarly to the rear wall of Room 4, but in a much cruder fashion. It probably extended across the entire rear wall, reducing slumpage from the mudstone beds, although only a portion remains. The top of this portion is 47 cm. above the floor, and is topped by larger slabs, forming a shelf. The front wall had almost entirely collapsed except for a large boulder at its north end.

The *floor* is composed of 10 to 30 mm. of red clay resting on bedrock. A large depression 80 to 95 cm. in diameter and 7 to 12 cm. deep is in the center of the room, and two others 43 and 63 cm. in diameter and 11 and 5 cm. deep are on the west side of the room. None of these depressions exhibit any definite evidence of having been used as firepits.

The ceiling is blackened by soot.

The *fill* was 10 to 25 cm. deep, composed of sand, rocks and some organic material. Only sherds were found.

Room 6. This room (Fig. 37) is quite small, both in floor space and headroom, and probably was utilized for storage. The north wall is formed by the south wall of Room 5. The south wall is curved, formed of rough sandstone blocks, red mortar, and

carelessly placed chinking stones. Most of the front wall had collapsed completely. Enough of the north end remained to show that it was pierced by a doorway at least 61 cm. high. The width could not be determined. The sill, formed by a single large slab, is 12 cm. above the floor. Most of the rear wall was formed of bedrock, but a crack near the top had been filled in with a single course of masonry. The remainder of that wall had been plastered with 3 to 11 mm. of sandy clay, still being present in many places.

Most of the *floor* was formed of bedrock, but the front portion had been partially filled in with dirt and clay to make it more level. The ceiling of this room, formed by the roof of the shelter, was not smoke blackened, in contrast to most of the other rooms.

The room was *filled* with 10 to 30 cm. of wind-blown sand containing a little rock and pack rat debris. A few sherds and one mano were recovered.

Room 7. Evidence for the existence of a room in this location is scanty, and consists mostly of extremely tumbled masonry in the front and a shelf that had been carved into the bedrock of the rear (Fig. 37). This shelf is as wide as the width of the postulated room, approximately 80 cm. above what was presumed to be the floor. This *floor* was poorly defined, apparently formed of sand partially covered by clay. No definite limit to the floor was found. The room was *filled* with 5 to 30 cm. of windblown sand and fallen wall stones. No artifacts were found.

Room 8. The north wall of Room 8 (Figs. 37, 38) is formed of varying sizes of sandstone blocks, the largest of which, now fallen, is 1.45 m. long. Clay mortar and chinking stones were used sparingly. The south wall is of generally large unshaped blocks, one of which stands on edge. Various sizes of stones form the front wall, but none are as large as some in the side walls.

A doorway is apparent in the center of the front wall. It is 53 cm. wide. The sill, 15 cm. above the floor, comprises two slabs laid side by side.

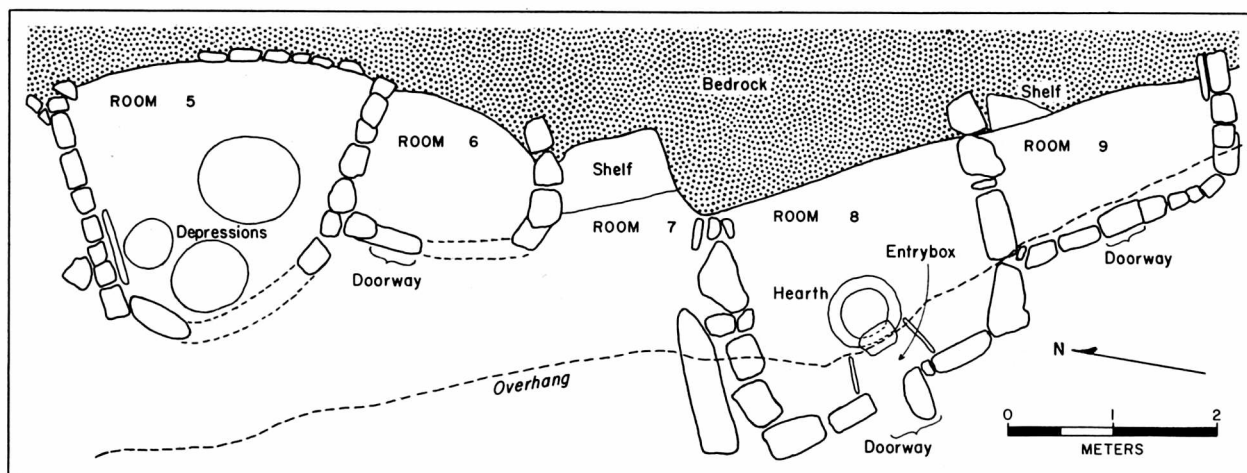


FIGURE 37. Plan of Rooms 5-9, NA7486.



FIGURE 38. Room 8. NA7486.

In the mortar at the east of the south wall, 87 cm. above the floor, is a horizontal hole 34 mm. in diameter and 19 cm. deep that apparently held a stick.

The *floor* is partially bedrock, leveled at the front with 1 to 7 cm. of clay. The firepit, 46 cm. in diameter, and 4 to 5 cm. deep, was encircled by a poorly preserved clay rim 10 to 15 cm. wide and 1 to 3 cm. high. Between the firepit and the doorway in the front wall is an entrybox similar to that found at NA7455. It is formed of upright slabs extending from near each side of the doorway to the firepit. These slabs rise 21 and 34 cm. above the floor at present, probably standing about 40 cm. originally. A third slab adjacent to the firepit formed a deflector. It had fragmented and fallen into the firepit. The floor of this entrybox is 7 cm. above the adjacent room floor.

The structure was *filled* with 20 to 35 cm. of windblown sand and fallen wall debris. Sherds were the only artifacts recovered.

Room 9. The north *wall* of this room (Fig. 37) is formed by a portion of the south wall of Room 8. The front wall is of smaller stones, fairly closely fitted together. The south wall has a base that appears to be a large, thick, upright slab. However, the other side of this wall was not excavated and what appears to be a slab could be the end of a large boulder. This was topped by masonry of irregular slabs and blocks. The rear wall is the natural mudstone forming the rear of the shelter. A doorway is in the center of the front wall. Its width could not be determined exactly due to wall slumpage, but it was probably about 40 cm. wide. It could be traced to a height of 32 cm. The sill, formed by a single slab, is 29 cm. above the floor. In the northeast corner, cut into the rear wall, is a small triangular shelf, 42 cm. above the floor.

The *floor* is red mudstone bedrock, well smoothed and leveled. No floor features were found. The ceiling, however, is partially smoke blackened.

Runoff from the south and above the room had helped *fill* the rear portion with water-washed clays and sands, and hastened the disintegration of

the mudstones at the rear, causing them to slump in also. The remainder of the room was filled with wind-blown sand, fallen wall debris, organic material brought in by pack rats, and artifacts accompanying the burials on the floor. The fill ranged from 40 to 75 cm. in depth.

On the floor were two skeletons, accompanied by a large number of artifacts. These burials are discussed more fully in the following section. All of the restorable vessels and stone, bone, and perishable artifacts found in Room 9 were associated with Burials 1 and 2. At least some of the sherds listed in Table 17 from Room 9 are probably parts of the larger restorable vessels.

Burials

Two burials (Fig. 39) were found at NA7486, both within Room 9. Burial 1 is the skeleton of an adult female, and Burial 2 is that of a 2 to 3 year old child. Both had been placed on the floor, with the heads adjacent to the north wall of the room. The bodies are aligned nearly east and west, with the heads slightly south of west. Both are on their left side. The legs of Burial 1 are fully flexed while Burial 2 is not quite fully flexed. The hands of Burial 1 are near the face, and those of Burial 2 are near the pelvis. Numerous irregular stones were found in the room fill above the burials, but it could not be determined whether they had been placed there, or are the remains of the room walls that collapsed or were deliberately pushed in. Some post-interment disturbance was evident, apparently by pack rats, whose burrows extended to the room floor. Sherds of some of the pottery vessels were scattered throughout the fill, and many of the smaller bones had been displaced. Some or most of this disturbance took place before the bodies had completely decomposed, for higher in the fill, preserved in a drier zone, a hank of human hair, assumed to be from one of the burials, was found. Although the upper deposits of the room were dry, at the depth of the burials, runoff and seepage



FIGURE 39. Burials 1 and 2, on the floor of Room 9, NA7486.

had destroyed almost all organic material except the bones.

Surviving artifacts accompanying the burials were 13 restorable pottery vessels (Table 18), five manos, a metate, a river cobble, a bone awl, and a fragment of a ring basket. Most of these items were in the immediate vicinity of the burials, but several of the larger jars were near the center of the room.

Type	Form	Maximum Diameter	Rim Diameter	Height	Illustration
Tusayan Poly.	Bowl	24.7	23.6	12.5	Fig. 40 <u>a</u>
Kiet Siel Poly.	Jar	20.0	11.8	19.0	Fig. 40 <u>b</u>
Taegi Orange	Bowl	22.3	22.0	11.6	Fig. 40 <u>c</u>
Taegi Orange	Dipper	8.5	8.3	5.1	Fig. 40 <u>d</u>
Kiet Siel Gray	Dipper	10.9	10.9	5.8	Fig. 40 <u>e</u>
Kiet Siel Gray	Dipper	7.8	7.7	4.7	-
Kiet Siel Gray	Jar	32.8	34.0	22.6	Fig. 40 <u>i</u>
Kiet Siel Gray	Jar	26.5	?	25 ?	-
Kiet Siel Gray	Jar	36 ?	?	31 ?	-
Moenkopi Corr.	Jar	12.3	9.8	11.7	Fig. 40 <u>g</u>
Moenkopi Corr.	Jar	21.5	14 ?	18.5 ?	Fig. 40 <u>h</u>
Moenkopi Corr.	Jar	31.0	22.7	26.5	Fig. 40 <u>j</u>
Tusayan Corr.	Jar	34.0	22.4	30.1	Fig. 40 <u>k</u>

TABLE 18. Restorable pottery vessels from NA7486, Burials 1 and 2. Measurements in cm. Question marks indicate estimated or unmeasurable dimensions. All measurements are exterior, dipper measurements for bowl only.

ARTIFACTS

Lithic Material

Artifacts of stone were not plentiful at NA7486. All of these fall within the range described for the survey and NA7498, so no detailed description is given. The chipped stone tools are: three large knives, one with a straight base and sides, one with a rounded base and intermediate in width, and one with a broad rounded base; one crude knife, one nodular chopper; two limited edge flake scrapers; one limited edge nodular scraper, seven hammerstones; seven utilized flakes, and four chips. Ground stone artifacts include three metates, one troughed and two flat, and six two-hand manos, two with a single faceted grinding surface, and one with two flat grinding surfaces. Several small pieces of hematite were also found.

Pottery

Thirteen restorable vessels (Table 18, Fig 40), and 360 sherds (Table 17) were recovered from NA 7486. Decorated pottery useful for temporal assignment was scarce in both sherds and whole vessels, but it indicates that the site was occupied about A.D. 1225.

The jar shown in Fig. 40 *b*, although classified as Kiet Siel Polychrome, does not fit the description exactly, as the black and white design is placed directly on the well-polished orange surface, without the use of a red slip. All other whole vessels fit the type descriptions.

Bone

Only one bone artifact was recovered from NA 7486. This is a bone awl which was associated with Burials 1 and 2. It is formed from a splinter of a large mammal bone, well sharpened and polished on one end, but almost totally unworked on the other. It is 81 mm. long.

Perishables

Over Burial 2 were fragments of what was probably a ring basket. Only portions of the rim were preserved. The curvature of this rim indicates that the basket was about 30 to 35 cm. in diameter. The ring was formed by a stick, with the bark left on, averaging 6 mm. in diameter. Enough is preserved to determine that the yucca strips forming the basket were bent around the ring and lashed down on the outside with more strips of yucca. There was no evidence of a braided rim.

NON-ARTIFACTUAL MATERIAL

Eighteen corncobs, one squash seed, and several reed and yucca fragments were found at NA7486 (Appendix I). Faunal remains include mountain sheep, *Ovis canadensis*, 32 bones; deer, *Odocoileus hemionus*, two; jackrabbit, *Lepus californicus texianus* three; and cottontail, *Sylvilagus* sp., one. The high number of mountain sheep bones is misleading, as they all were recovered from within the pack rat nest in Room 1, and are probably from the same individual.

SUMMARY AND DISCUSSION

NA7486 is a nine-room structure built under a small overhang in the side of a sandstone ledge. The rear wall of the shelter formed the rear wall of the rooms, although a few rooms had an additional masonry or plaster lining on the back. The walls of the rooms extended to the ceiling of the shelter, utilizing that as a roof. Rooms 3, 5, and 8 were apparently used as living quarters, while Rooms 1, 6, 7, and 9 were used for storage. Room 4 may have served as either a kiva or a domicile, or perhaps as a combination of both. Room 2 may have been little more than a passageway into Room 1, or it may have also served as a storage area. The structure was apparently not built all at the same time, judging from the varying masonry and wall abutments. The growth was largely from north to south. Room 1 was probably built before Room 3, and Room 3 was definitely constructed before Room 4, which was in turn followed by the construction of Room 5. Room 6 also may have been built before Room 5. Room 9 was constructed after Room 8. The masonry is generally crude, formed of various sizes of unshaped sandstone blocks, slabs, and spalls, liberal amounts of clay mortar, and haphazardly placed chinking stones, with true coursing usually absent. The outstanding exception to this is Room 4, which has carefully constructed walls.

Like NA7485, this site probably was not occupied for a long period of time, perhaps only seasonally. However, the slightly larger amount of trash and



FIGURE 40. Pottery vessels associated with Burials 1 and 2, NA7486. *a*, Tusayan Polychrome; *b*, Kiet Siel Polychrome; *c*, *d*, Tsegi Orange; *e-g*, Moenkopi Corrugated; *h*, *i*, Kiet Siel Gray; *j*, Tusayan Corrugated. Maximum diameter of *i*, 32.8 cm.

the suggestion that Room 4 was possibly used as a kiva implies a more permanent occupancy than that postulated for NA7485.

NA7498 — Surprise Pueblo

INTRODUCTION

History, Location, and Physical Description

This site was first recorded by the Glen Canyon Project staff in 1960. It is located in the east fork of the Catfish drainage system, 1.75 mi. above the point where the streambed abruptly drops off the edge of Cummings Mesa. The elevation at the site is 5740 ft. The site is on a ridge-like terrace remnant approximately 30 ft. above the valley floor and 100 yd. east of the present stream channel. This stream is intermittent, only running in response to thunder showers and snow melt. The nearest known water supply today is a small spring approximately .4 mi. north, near NA7929 and NA7930. The area surrounding the site supports a sparse growth of ephedra, blackbrush, prickly pear, sage, grasses, and annuals, with a few widely scattered junipers nearby. The valley floor adjacent to the site would have provided ample arable land for the prehistoric occupants. This valley has been recently bisected by arroyo cutting. The nearest good source of building stone is at the Saltwash sandstone ledges about .2 mi. to the east.

Surface Indications

Many walls could be traced on the surface, but with the exception of Room 6, none stood more than a few courses above the surface. It could be seen that the structure was a large rectangle with a room block forming the northwest side and enclosing walls forming the others. A large depression within the rectangle thus formed suggested the presence of a kiva. On the slope to the south and southeast of this rectangular structure was the trash area, indicated by the presence of numerous sherds and charcoal-stained soil. The only disturbances noted were a slight amount of erosion on the west edge of the trash area and a pack rat nest in Room 6.

Problem

NA7498 was chosen for excavation because surface sherds indicated a fairly long occupation at the site; the trash appeared concentrated and it was hoped that stratification would be found; and the site appeared to represent a previously unknown segment in the architectural development sequence on Cummings Mesa from small to large ruins.

EXCAVATIONS

Excavation at NA7498 was carried out during the first two weeks of May, 1961, with a crew of three to nine workers. Seven surface rooms, two pithouses, and a kiva were completely excavated; three other pithouses were tested; and the enclosing wall was completely outlined (Fig. 41). The site was named Surprise Pueblo because of the totally unexpected discovery of the pithouses. Several trenches were dug in the enclosed area to locate other archi-

tectural features. The trash was tested extensively by means of trenches and test blocks. In order to simplify the following room descriptions, directions will be given as the cardinal points, even though the ruin is oriented almost exactly northwest-southeast. Thus, the northwest walls of the rooms will be referred to as the west wall, and the north corner as the northwest corner. Sherds and other artifacts are not discussed in detail for any feature, but only as an aggregate from the entire site.

Domestic Structures

Room 1. This room, 1.8 m. square (Figs. 42, 43), is located at the southwest end of the room block, and was an addition to it.

The east, south, and west *walls* range from 27 to 35 cm. in thickness. They were formed of small closely fitted sandstone slabs and spalls, most of which do not extend from one side of the wall to the other. Although most of the stones were unshaped except for minor spalling, both sides of the walls are smooth and even due to careful placement of the stones. Because the stones vary greatly in thickness, true coursing was not present. Red sandy mortar and small chinking stones fill the gaps between the larger stones.

These walls had been built in a trench 10 to 15 cm. deep. The foundation stones tend to be larger and more irregular than the rest of the wall stones. The north wall is formed by the south wall of Room 2, and was originally built as part of that room. It differs from the other walls of Room 1 in the respect that almost all the stones are more regular and extend from one side of the wall to the other. The southwest and southeast corners are bonded. The east and west walls are abutted against the north wall. No direct evidence of a doorway was found. However, near the center of the east wall and 8 cm. away from that wall was an upright stone set 15 cm. into the floor and rising 21 cm. above the floor. The top of this stone was flat and somewhat worn, and could have served very well as a step to a doorway high in the wall. The present height of the wall at this point is 58 cm. Similar steps have been reported from RB551 (Beals, Brainerd, and Smith, 1945:45).

The *floor* was of sand, apparently constructed by leveling and smoothing the ground surface. Other than a few slabs on the floor and the possible step mentioned above, no floor features were present. Sub-floor tests revealed that this room had been constructed on 15 cm. of sand containing a little trash.

Two levels of *fill* were encountered. Resting directly on the floor was a layer of clean sand 2 to 5 cm. thick. Above this, and extending to the surface, the fill included fallen wall stones, mortar, and wind-blown sand.

Few artifacts were recovered from Room 1. Thirty-two sherds, mostly Tusayan Polychrome and gray ware, one mano, one metate, and one utilized flake were found. No concentration of artifacts on or near the floor was noted, most of them, including the metate, having been in the fill.

Room 2. This room is rectangular, inside dimen-

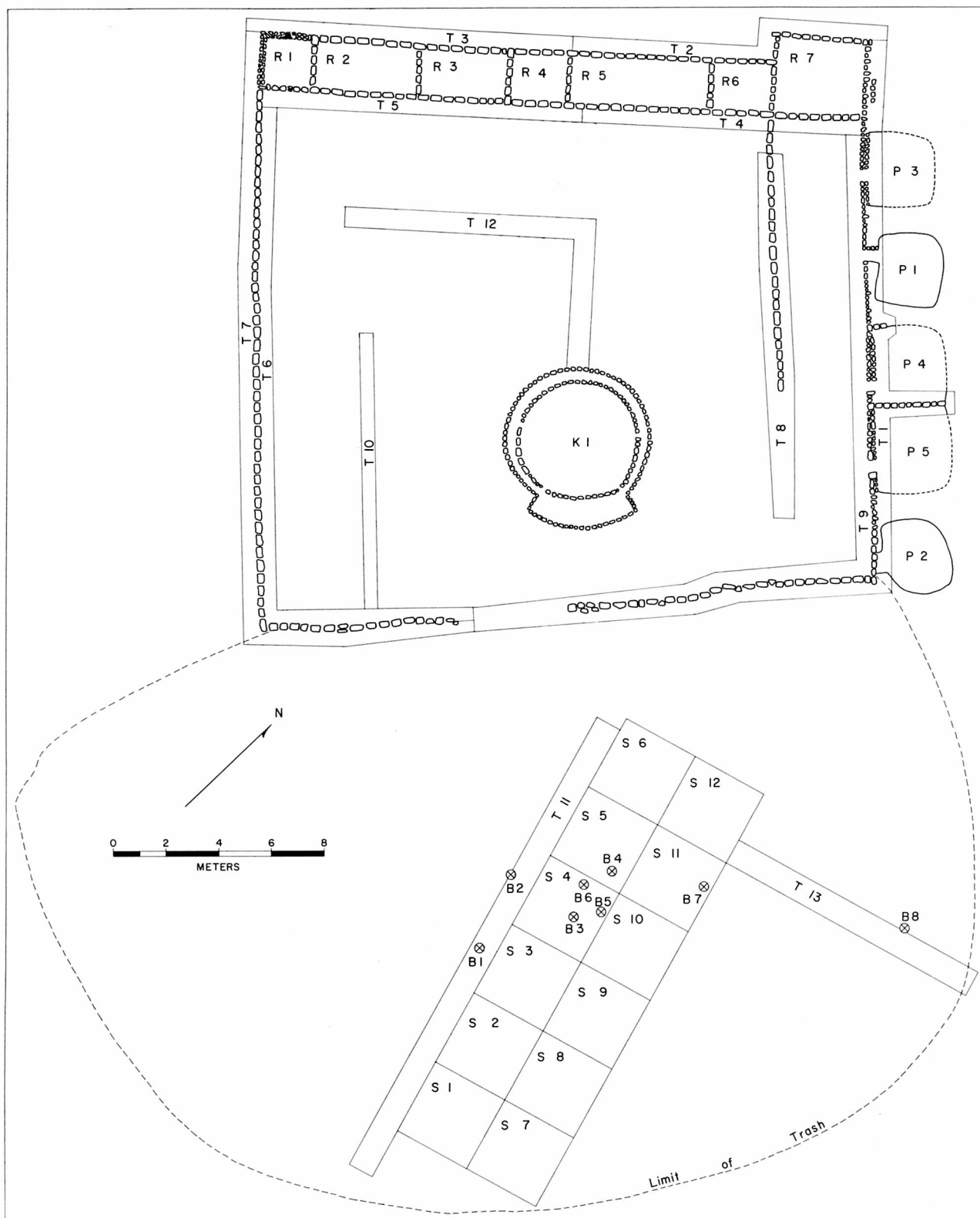


FIGURE 41. Plan of NA7498. R, room; P, pithouse, K, kiva; B, burial; T, trench; S, square.

sions measuring 1.7 by 3.7 m. (Fig. 43). Rooms 2 to 6 were all built at the same time and the wall construction is similar throughout these rooms, except for minor variations, thus the construction details given for Room 2 can be applied to Rooms 3 to 6 as well.

The *walls* are composed of sub-rectangular sandstone slabs set in red clay mortar. Most of the slabs extend from one side of the wall to the other. The straightest edges of the slabs were placed to the outside of the room, resulting in a wall that is quite smooth on the exterior and rough on the interior. An attempt was made to make the inside of the wall smoother by filling the larger gaps with spalls, chinking stones, and mortar. The exteriors had been chinked with small, thin pieces of sandstone. Width of the walls ranges from 20 to 35 cm. Most of the slabs are 5 to 6 cm. thick. This uniform thickness results in true coursing in most places. The foundation stones are generally larger and more irregular than the courses above, and were laid in a trench averaging 10 cm. deep. The southeast and southwest corners of Room 2 were carefully bonded. The north wall abuts against the east and west walls, showing that it was built after the construction of the main unit. No doorway was present in any of the walls.

The *floor* is composed of 1 to 2 cm. of red sandy clay. This was laid on charcoal-flecked red sand.

The hearth is located near the southeast corner of the room. It is a shallow basin, 36 to 38 cm. in diameter and 6.5 cm. deep, unlined and unrimmed except for one small slab on the south side. The remains of two mealing bins were found in the northeast corner. Both had been deliberately destroyed, but it could not be determined whether this destruction took place at the time of abandonment or before. All that remained were the slab and clay-bottomed catch basins. These catch basins are 20 cm. below floor level. The mealing bins are associated with the level of the floor of Room 2, as the catch basins were placed in a pit dug below floor level. Similar mealing bins with the catch basins below floor level occur in Rooms 4, 5, and 7. Subfloor tests showed that the



FIGURE 42. Room 1, NA7498.

room had been constructed on charcoal-flecked orange sand.

The lower part of the *fill* was formed by a layer of slightly clayey sand averaging 10 cm. thick resting on the floor. This material originally may have been roof covering. Above that, to the surface, the fill was a mass of jumbled wall stones and mortar and wind-blown sand. About 80 sherds, one scraper, three utilized flakes, three hammerstones, one metate, and one lump of hematite were recovered from this room. These artifacts were distributed throughout the fill, with a slight concentration near the floor. The metate rested on the floor.

Room 3. The *walls* of this room (Fig. 43) are in all respects similar to those of Room 2 with the exception that the south wall has the smooth face on the inside of Room 3. No doorway is apparent. The northwest and northeast corners are bonded, but the south wall abuts against the east and west walls.

The portion of the *floor* adjacent to the west wall was paved with sandstone slabs. The remainder of the floor was constructed of 1 to 3 cm. of sandy clay. The floor was laid on slightly trashy sand 5 to 10 cm. thick. No floor features are present.

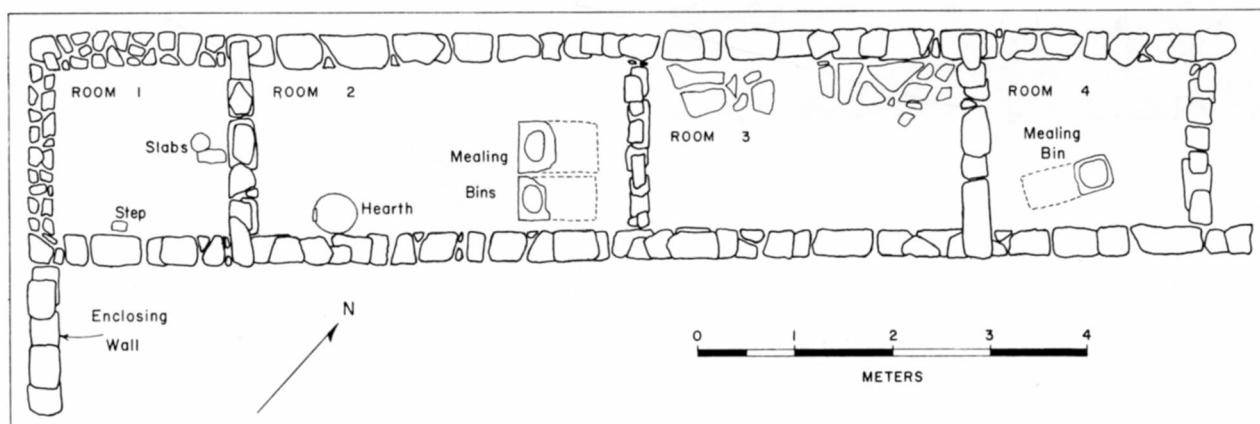


FIGURE 43. Plan of Rooms 1-4, NA7498.

The *fill* included a layer of sand averaging 10 cm. thick, which may have been derived from roofing material, resting on the floor. Above this level and extending to the surface were many fallen slabs from the walls, pieces of mortar, and minor amounts of windblown sand. Found within this room, in addition to sherds, were one scraper, two hammerstones, three utilized flakes, one mano, and one piece of hematite. Artifacts were concentrated on and near the floor.

Room 4. The *wall* construction used for Room 4 (Figs. 43, 44) is the same as that employed in Rooms 2 and 3. All walls except the south have the smooth face to the exterior. Plaster 1 to 4 cm. thick remains on the wall in the northwest corner. This plaster served to fill some of the uneven portions in the wall, but was not thick enough to smooth out all the irregularities. The southwest and southeast corners are bonded, whereas the north wall abuts against the east and west walls. No doorway is apparent, even though the present height of the walls is 45 to 128 cm. above the floor.

The *floor* is represented by a somewhat irregular layer of red sand 1 to 3 cm. thick, laid on charcoal-flecked sand. The only floor feature is a destroyed mealing bin. The base of the slab-bottomed catch basin is 21 cm. below the floor. The metate apparently rested on the south of the basin, on a surface that slopes up to the floor. The slab bottom of the catch basin is rimmed with clay, and many loose clay frag-



FIGURE 44. Room 4, NA7498.

ments rested on the slope west of the slab. The sides of the bin had probably been formed of upright slabs.

The lowest part of the *fill* was formed by a layer of red sandy clay 5 to 15 cm. thick resting on the floor. Although this clay was unburned, several fragments still retained impressions of sticks 9 to 12 mm. in diameter and set about 10 mm. apart. Although no evidence of larger members was found, it is probable that the roof was constructed of beams or poles, upon which a layer of small sticks was placed, and the clay placed directly on these small sticks. Tumbled

wall debris and windblown sand rested on the fallen roofing clay.

Artifacts found on or near the floor were two small points, one hammerstone, one scraper, two utilized flakes, one bone awl, and a small number of sherds.

Room 5. The *walls* of Room 5 (Fig. 45) were constructed in the same manner as those of Rooms 2, 3, and 4. The smooth face of the east and west walls is to the exterior of the room, and the south wall has the smooth face on the interior. Both sides of the north wall are rough. The northwest and northeast corners are bonded, but the south wall abuts to the east and west walls. An opening is located in the east wall. The width of this opening is 25 cm., and the base of it is 23 cm. above the floor. There is no sill. The wall at this point stands only 44 cm. above the floor, so it could not be determined whether this opening was a doorway or served some other purpose. If it was a doorway, it must have been wider at the top, possibly T-shaped, in order to allow room for passage, such as the doorway postulated for Room 7. There is the possibility, however, that it was not much higher than the present 21 cm. and served as an air vent.

Where definable, the *floor* was formed by a layer of clayey sand 5 to 20 mm. thick, laid over some of the subfloor mealing bins and sterile sand. The floor of Room 5 had been leveled by cutting into the sand about 20 cm. deep in the northwest corner.

The hearth is located adjacent to the north wall. The main part of the hearth is a shallow, unlined basin 43 to 47 cm. in diameter and 7 cm. deep. This basin had later been enlarged to form an extension 65 cm. long, 42 cm. wide, and 25 cm. deep. The wall next to the hearth is oxidized and fire-blackened.

Slightly east of the center of the room is a set of six mealing bins. The slab-bottomed catch basins range from 10 to 26 cm. below the floor, the deepest ones at the south end. These mealing bins appear to have been constructed at the same time by digging a long pit in which to place the bins. The metates had been removed and most of the bins destroyed, leaving only the catch basins, formed by horizontal slabs ringed with clay, and fragments of the upright end and side walls. At least two, and probably three or four of the bins, the ones on the south end, were destroyed before the floor was constructed. The floor is poorly defined at the north end of the room, and it could not be determined when the more northerly bins had been destroyed.

Near the center of the room, superimposed on the ruins of portions of two mealing bins, was a flat-bottomed pit 1.20 by 1.45 m. and 25 to 27 cm. deep. The function of this pit could not be ascertained. It had been dug down into sterile soil and the rubble which resulted from the destruction of the southernmost mealing bins. It was filled with ashy and trashy sand. It had been floored over and the hearth was in part superimposed on it.

A layer of windblown sand and a little trash 10 to 20 cm. thick rested on the floor. The remainder

of the room *fill* was composed of wall rubble and windblown sand.

A large number of sherds, two scrapers, 35 hammerstones, eight utilized flakes, three manos, one metate, and a piece of hematite were recovered from this room. Most of the hammerstones were in close association with the mealing bins, suggesting that they were used in the preparation of metate surfaces.

Room 6. The *walls* of Room 6 (Fig. 45) were constructed in the same manner as those of Rooms 2 to 5. The east, north and west walls have the smoothed surface to the exterior, and the south wall is rough on both faces. All corners are bonded. No direct evidence of a doorway was found even though the walls stand 59 to 161 cm. above Floor 2. However, adjacent to the center of the east wall on Floor 1, a possible step was found. This was formed by a sandstone block 25 cm. square and 16 cm. thick, resting on and partially in the upper floor.

Two *floors* are present in Room 6. Floor 2, the earlier, laid on sterile soil, was formed mostly of flat sandstone slabs and partially of 2 to 4 cm. of clay. Floor 1 is separated from Floor 2 by 10 to 13 cm of slightly trashy sand. It was constructed of 1 to 3 cm. of red clay. Other than the possible doorstep mentioned above, no floor features are present.

The room *fill* was fallen wall rock and wind-blown sand. The proportion of sand to rock was greatest near the floor, but there was no definable sand or clay layer as found in Rooms 1 to 5.

A moderate number of sherds and utilized flakes were found above Floor 1. The only artifacts recovered between the two floors were a small number of sherds.

Room 7. Room 7, like Room 1, is a later addition to the main room block. It has a larger east-west dimension than the other rooms, and is almost 3 m. square (Figs. 45, 46).

This room was constructed against and into a sandy hill. The lower 50 to 70 cm. of the north and

west *walls* and the west end of the south wall were therefore formed by simply lining the regular sides of the excavated dune with small stones. The portions of walls thus formed are 10 to 22 cm. thick, completely unfaced and irregular on the exterior. The upper portions of those walls and the east wall were then built up with masonry similar to that used in Rooms 2 to 6. The north wall may have been at least partially double, with a dirt core. The north and west walls have no special foundation. The east wall, however, has two courses of large blocks laid in a trench 20 cm. deep for a foundation. The northwest corner is bonded. The southwest corner is also bonded, but the portion of south wall belonging solely to Room 7 is abutted against the northwest corner of Room 6. The east wall abuts against the north and south walls.

The doorway is present in the center of the east wall. The portion preserved, 47 cm. high, is 29 to 32 cm. wide. Although this is narrow for a doorway, it is interpreted as such because the sill, a large sandstone slab, is well worn on the exposed portion. The upper part of the doorway probably widened out into a T-shape. This doorway, or at least the portion remaining, had been carefully blocked up with rocks and mortar.

The poorly preserved *floor* was formed of 1 to 3 cm. of sandy clay. On the east side it was apparently even with the old ground surface, but along the north and west sides, where the room had been cut back into the hill, it was 50 to 70 cm. below the surface.

A partially slab-lined hearth is located near the center of Room 7. This hearth had been remodeled, the original one being slightly east of the second. The first was apparently oval, approximately 40 by 70 cm. and 8 cm. deep. It was slab-lined, at least along the east side. The second hearth was placed inside of and slightly to the west of the first, and is 58 by 70 cm. in diameter and 9 cm. deep. It too was slab-lined on the east side, and partially lined on the other sides.

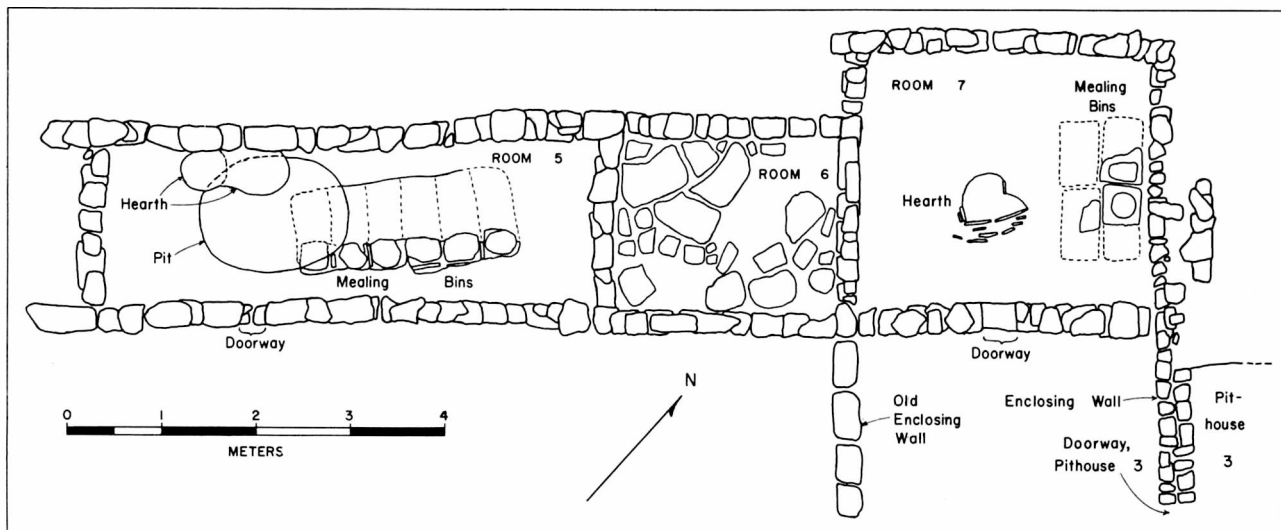


FIGURE 45. Plan of Rooms 5-7, NA7498.

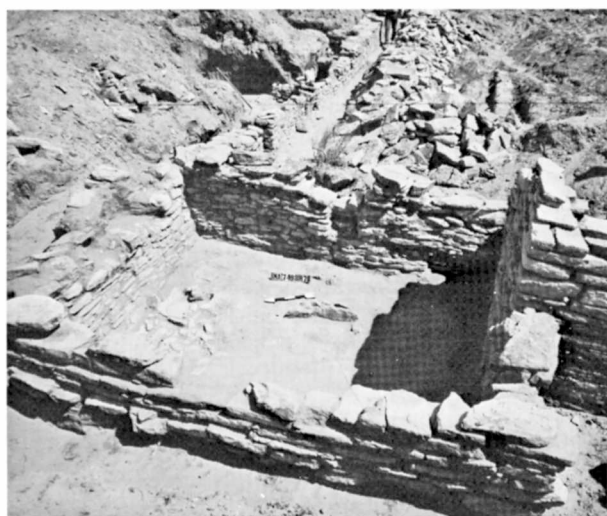


FIGURE 46. Room 7, NA7498.

A layer of sand 18 mm. thick evenly separated two layers of ash in the later hearth.

The remains of at least two mealing bins are adjacent to the center of the north wall. They had been destroyed and the metates removed, leaving only two catch basins against the wall. Enough remained, however, to show that these two bins had been placed end to end against the wall and that there may have been another pair adjacent to the first. The catch basins, 16 cm. below the floor level, were formed of flat slabs ringed by yellowish clay that had been molded against the slab sides of the bin. The remains of the bins had not been floored over, so they were probably destroyed at the time the room was abandoned.

Spots of burned material up to 2 cm. thick rested on the floor. This material was not concentrated enough, however, to assume that the room had burned. The remainder of the *fill* was tumbled wall



FIGURE 47. Pithouse 1, NA7498.

debris and windblown sand, with a slightly higher concentration of sand near the floor.

A relatively large number of sherds, two unclassifiable knife or point fragments, one chopper, one scraper, 18 hammerstones, 21 utilized flakes, 11 manos, five stone beads, and a bone awl were recovered from this room. The great majority of these artifacts were on or near the floor.

Pithouse 1. The walls of Pithouse 1 were formed by cutting a pit into sand (Figs. 47, 48). They could be traced to within 50 cm. of the ground surface, or 50 to 65 cm. above the floor. The walls probably extended above the surface, but no evidence of above-surface walls was found. The sand walls had been smoothed, but apparently not lined or plastered.

The doorway is on the south side, opening through the main enclosing wall. The width of the opening is 34 cm. A ramp 35 to 47 cm. wide slopes into the room, connecting it with the doorway. The

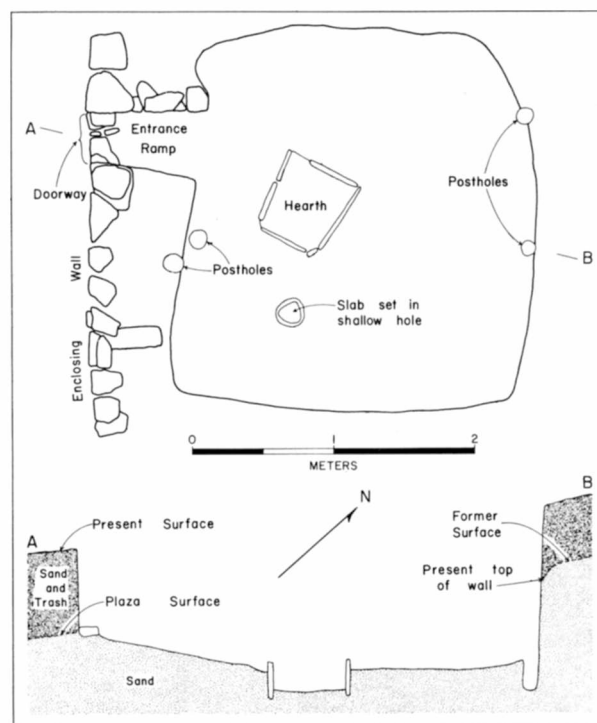


FIGURE 48. Plan and section of Pithouse 1, NA7498.

west wall of this ramp is of masonry.

The floor was formed of 5 to 15 mm. of clay laid on the bottom of the pit. It is 1.0 to 1.15 m. below the present surface, and was probably about 70 cm. below the surface at the time of occupation.

The hearth is nearly rectangular and lined with upright slabs. It contained ash and two small sand lenses. South of the firepit is a shallow hole, deliberately filled in with sand and capped by a small slab. Four postholes, one containing rotted wood fragments, were found. These range from 13 to 48 cm. deep and 11 to 16 cm. in diameter. One is slightly recessed into the wall and another almost completely recessed.

The top 20 to 50 cm. of *fill* was nearly sterile sand and fallen rock. Below this was light trash, sand and fallen rock.

A maul found in the firepit, one scraper and 13 utilized flakes were the only artifacts found in addition to the small number of sherds. The artifacts were distributed throughout the fill.

Pithouse 2. Pithouse 2 (Fig. 49) is outside the east end of the north enclosing wall, and appears to predate the wall.

The nearly vertical unplastered *walls* were formed by the sides of the excavated pit. They could be traced to within 30 cm. of the present surface, or 50 to 60 cm. above the floor. What appears to have been an entrance ramp is located on the south side. It was traceable for a length of 70 cm. The enclosing wall was built over this ramp. A floor-level opening, 35 cm. in diameter, is in the west wall. The origin or function of this opening could not be determined.

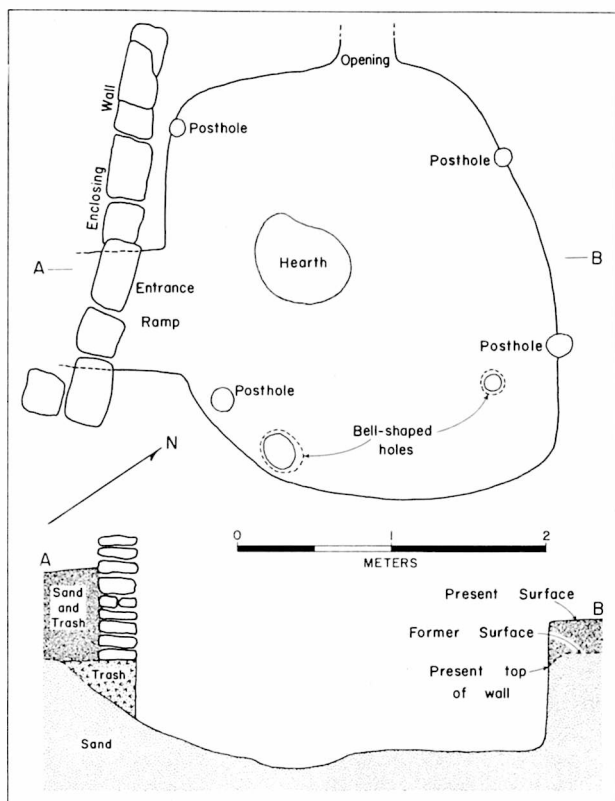


FIGURE 49. Plan and section of Pithouse 2, NA7498.

It may have been a ventilator shaft or connection with Pithouse 5 or simply a very regular animal burrow.

The *floor* was formed partially of 1 to 2 cm. of clay, the remainder of sand. The floor averages 85 cm. below the present surface. It was probably about 55 to 70 cm. below the occupation surface.

Four postholes 16 to 32 cm. deep are near the sides of the room, two of them partially recessed into the walls. These probably served as roof supports. The hearth is a poorly defined shallow unlined basin. Two

small bell-shaped pits are in the floor on the east side of the room. The larger one is 37 cm. deep, the smaller 25 cm. deep.

The room appeared to have been deliberately filled, as most of the *fill* was trashy sand. This was capped by 20 to 30 cm. of relatively sterile sand. Over 400 sherds were recovered from this room, most of them from within the trash fill. Stone artifacts found in the fill include one point fragment, one crude knife, two scrapers, six hammerstones, 11 utilized flakes, and two manos. A miniature clay bowl was found on the floor.

Pithouses 3, 4, and 5. These structures were not excavated completely, but were tested to determine the relationship of the rooms to the enclosing wall. Like Pithouse 1, all are on the north side of the masonry wall and were in use at the same time as the wall. The south wall of these rooms is formed by the enclosing wall. At the points where Pithouses 3, 4, and 5 abut to the wall, it is double, faced on both sides, whereas elsewhere it is faced only on the south side. The south end of the west wall of Pithouse 4 was of masonry. Pithouses 4 and 5 are contiguous, separated by a well constructed masonry wall. Elsewhere, the walls of this group of structures were the unplastered sides of the pits. All have well defined doorways 40 to 45 cm. wide, opening directly into the room through the enclosing wall. The doorways of Pithouses 4 and 5 had been filled in with rough masonry.

Ceremonial Structure

Kiva 1. The kiva at NA7498 (Figs. 50, 51) is circular, with a bench around the perimeter and a recess on the southeast side. It had been cut down through Feature 1, an area of bins and hearths. At least one major and several minor remodelings had taken place. Unless otherwise noted, the following description refers to the last stage of construction.

The kiva *walls* are masonry. The stones had been placed with the straightest edge facing the kiva interior. Chinking with small spalls and sherds had been used to strengthen and smooth the wall at several locations. The topmost slabs of the bench wall were larger and smoother than the other wall stones, forming a smooth surface on top of the bench. Four posts, 16 to 28 cm. in diameter, had been recessed into the bench walls. The bottoms of these postholes are 15 to 20 cm. below the floor. The "southern" recess is from bench height upwards, the bench being circular, and lined in the same manner as the rest of the walls. Three layers of plaster over the masonry are spottily preserved on the bench walls. The layer closest to the wall was formed of red clay 1 to 5 mm. thick, and served to smooth off the slight irregularities of masonry. Over this was placed a hard layer of white clay 1 to 2 mm. thick. This was covered in turn by 1 to 2 mm. of red clay. The walls are preserved to within 30 cm. of the present surface, or 1.80 to 2.00 m. above the floor.

The horizontal tunnel of the ventilator enters the kiva 22 cm. above floor level, penetrating the bench near the center of the recess. The bottom and

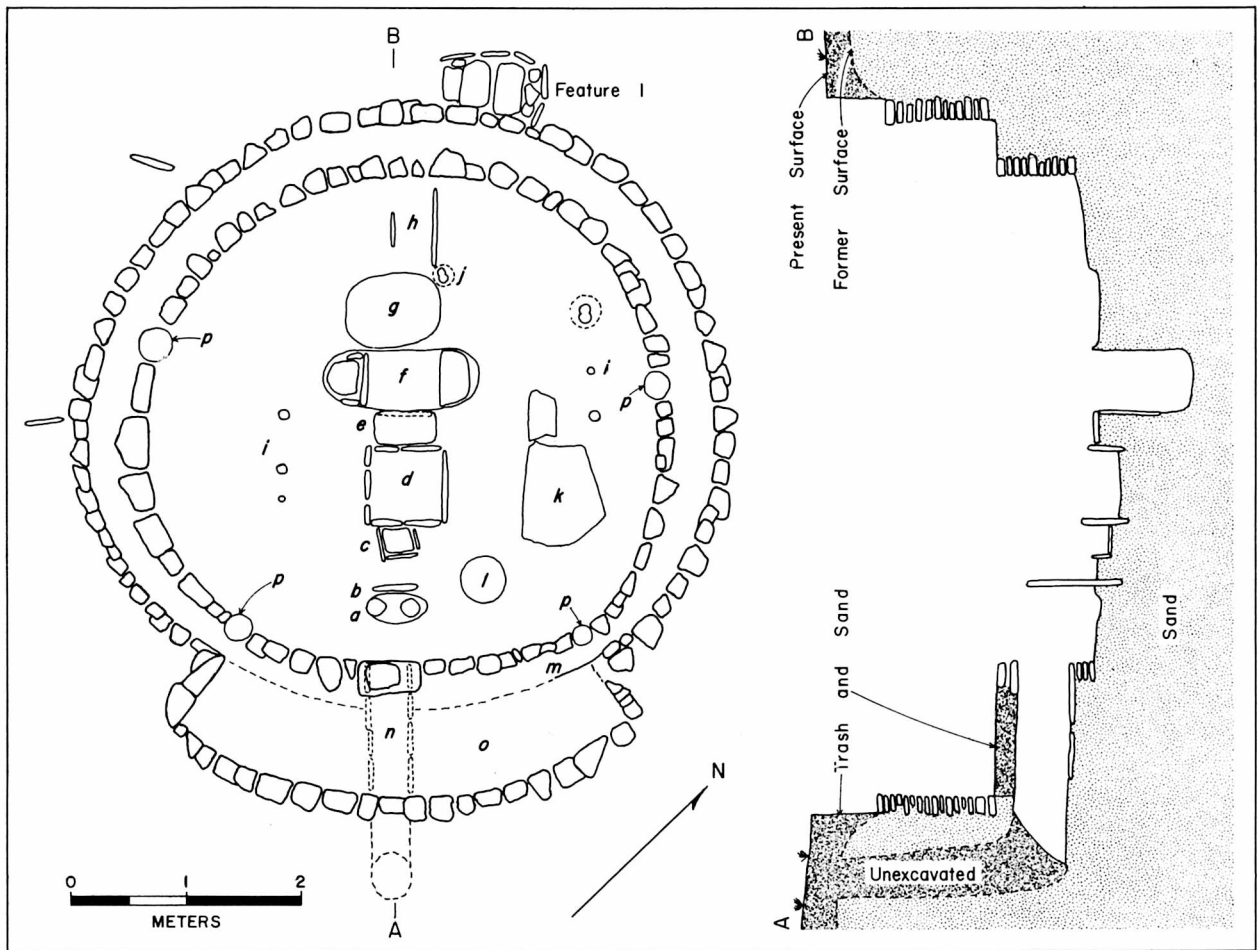


FIGURE 50. Plan and section of Kiva 1, NA7498. *a*, ladder rests; *b*, deflector; *c*, slab-lined box; *d*, hearth; *e*, slab; *f*, magic pit; *g*, shallow depression; *h*, grooves; *i*, loom anchor holes; *j*, bell-shaped hole; *k*, slabs; *l*, hole; *m*, early wall; *n*, ventilator; *o*, recess; *p*, postholes.

sides of the tunnel are slab-lined, and it appears to have been roofed with small timbers. The vertical shaft was not excavated.

Evidence was found that the bench was a later addition. In some places behind the bench earlier walls were preserved. These were flush with the main walls, not masonry lined, but covered with two coats of plaster. These earlier walls continued straight to the floor, without a bench. It could not be determined whether the masonry lining above the bench was later or contemporaneous with the earlier walls.

The floor had been formed by placing 1 to 5 cm. of clean sand on the uneven bottom of the kiva excavation, and covering it with 1 to 3 cm. of red clay. This had later been plastered with a coat of brown clay 1 to 2 mm. thick. The floor is 2.20 to 2.70 m. below the present surface. The surface from which the kiva was excavated could not be defined accurately due to slumpage, but was probably about 2.10 to 2.20 m. above the floor.

The hearth is square and lined with vertical slabs. It was filled with ash, some small pebbles, and a few artifacts.

Adjacent to the southeast side of the firepit, set into the floor, is a small rectangular box with slab sides and bottom. It was filled with sterile sand. The deflector was formed by a large rectangular upright slab, 22 cm. of which is set below the floor between the firepit and the ventilator opening. Between the deflector and the ventilator opening are two holes 10 and 14 cm. deep and both in a shallow depression. These features are interpreted as the sockets for the side pieces of the entry-exit ladder.

Adjacent to the northwest side of the firepit a flat rectangular slab was set into and flush with the floor. The later coat of plaster covered it.

Adjoining this slab is a deep rectangular pit, partially slab-lined (Fig. 52). At either end of this pit there are semi-circular, slab-bottomed depressions 2.5 to 4 cm. deep. These depressions appear to have been used to support a plank or large stone laid across the top of the pit. The pit is large enough to hold a man easily either in a sitting or crouching position. It is probable that this pit was used during ceremonies to conceal a man who would assist in magical feats such as making things appear from

below ground or making inanimate objects speak. It was filled with clean sand and plastered over prior to the abandonment of the kiva. The obvious parallels between this pit and a similar one at Jemez (Ellis, 1952:149-53) suggest the possibility that it may have been used only once, during the kiva dedication ceremony.

On the northwest side of the magic pit, in the location where sipapu is often found, is a large, shallow, oval depression. The location of this depression and its occurrence in kivas at other sites in the Navajo Mountain area suggests that it served a purpose similar to that of a sipapu.

On the north side of this depression is a bell-shaped hole with an irregular opening, 15 cm. deep. It was filled with sand.

Between the depression and the northwest kiva wall are two grooves, 5 to 16 mm. deep. They appear to have once held upright slabs, but no slabs were found.

Northeast of the firepit several large slabs had been laid flush with the floor. Since the slabs did not form a recognizable pattern, and nothing was found above or underneath them, their function could not be determined. Between these large slabs and the ladder rest is a basin-shaped depression 21 cm. deep. It had been filled with sand and plastered over. In the floor on each side of the kiva are two alignments of small holes. Each row has three holes, averaging 7 cm. in diameter and 6 cm. deep, with the exception of the northwest hole on the northeast side, which is bell-shaped and 25 cm. deep. The location and nature of these features strongly suggests anchor holes for tying down the lower bar of a weaving loom.

The lowest stratum of kiva fill consisted of a layer of clean sand 3 to 20 cm. thick, which rested directly on the kiva floor. The sand apparently blew in after the kiva was abandoned. Sometime later the roof caught fire, and a layer of charred beams, twigs, grass, and some bark and clay 1 to 20 cm. thick rested on the sand. Upon this was a poorly defined layer of rocks, water-laid clays, and sand averaging 1 m. thick. Most of the rocks in this layer apparently came from the upper portions of the kiva walls, but many along the southeast side originally were probably part of the front enclosing wall nearby. Slumping of



FIGURE 51. Kiva 1, NA7498.

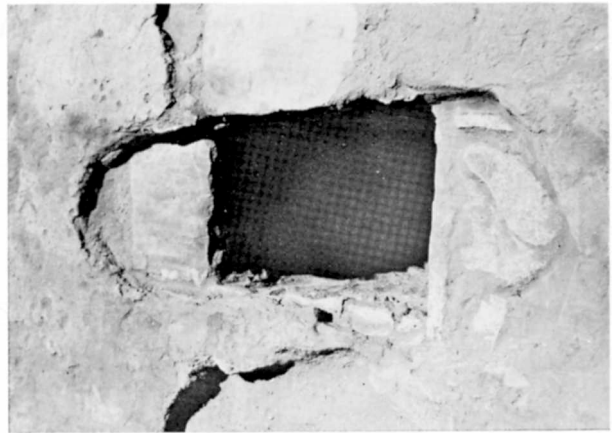


FIGURE 52. Magic pit in Kiva 1, NA7498.

the kiva walls had resulted in a large part of Feature 1 and the structures associated with it to become incorporated into the kiva fill. The topmost portions of the fill were formed of fine lenses of water-laid material and windblown sand.

Artifacts found within the fill were sherds, an unidentified black-on-white dipper, two scrapers, one notched flake, four hammerstones, nine utilized flakes, and four manos. On or near the floor were found a small oval unnotched point, two scrapers, one hammerstone, eight utilized flakes, four manos, one rubbing stone, an unidentified black-on-white bowl and a Tusayan Polychrome bowl. A small Kiet Siel Gray jar was resting on the southern corner of the recess. Within the firepit were found two scrapers, four utilized flakes, one mano, one piece of hematite, a nearly complete clay figurine and 66 fragments that may have been parts of other figurines, a small clay sphere, a small clay object resembling a miniature spindle whorl, and a worked sherd.

Other Architectural Features

Feature 1. Around portions of the northwest side of the kiva were the remains of several bins and hearths most of which had been destroyed by the construction of the kiva. The best preserved of these (Fig. 53), a hearth, was about 5 to 10 cm. deep, with the sides and bottom slab-lined. A poorly defined occupation surface could be traced for a short distance to either side of it. Artifacts recovered from within and around this hearth are one point or knife fragment and three manos. It is unfortunate that most of this feature apparently was destroyed by the construction and post-abandonment slumping of the kiva. This appears to be a manifestation of the first part of the occupation at NA7498.

Plaza. Extending southeast from the corners of Rooms 1 and 7 are walls enclosing an area and forming a large courtyard or plaza. At a distance of 17 to 20 m. from the room block, these walls form right angles and extend toward each other stopping near the middle to leave a gap 4 m. wide that undoubtedly served as the main entrance to the pueblo. The southwest wall is abutted to the corner of Room 1. It



FIGURE 53. Feature 1, NA7498.

is formed mostly of selected stones that extend through the width of the wall (Fig. 54). The northeast wall is a bonded extension of the northeast wall of Room 7. It is breached by four doorways leading into the pithouses on the northeast side of it. Where these pithouses abut against the wall, it is double, faced on both sides; where it was built against sand it is a single course wide, faced only on the inside; and where it was above the surface it was constructed in the same manner as the southwest wall. The lack of stone and poor quality of the masonry near the entranceway suggests that in that area it was not over 1 m. high. Elsewhere, however, the enclosing walls may have risen 1 or 2 m.

Abutted against the east corner of Room 6 is an earlier enclosing wall. Most of this wall had been destroyed, probably at the time of construction of Room 7, so only the foundation stones remain at the same level as the foundation of Room 6.

The area enclosed by the room block and walls was extensively tested by means of trenches. No well defined occupation surface was found, nor were any additional architectural features located. Several fire areas, especially near Room 7, were found. Small fires simply had been built on the surface in this area. The unprepared plaza surface was found at an average depth of 20 cm. below the present surface. It was defined mainly on the basis of the change in soil color and slight compaction, as very few artifacts rested upon or near it.

Summary of Architectural Features

All seven surface rooms at NA7498 were formed of masonry. Most of the walls are one stone thick, but occasionally two stones side by side were used. Five partially subterranean living rooms were also located. These are mostly unlined, but in several cases one or more walls are of masonry. The subterranean kiva is masonry lined.

Study of the wall construction reveals the approximate sequence in which the pueblo grew. Rooms 2 to 6 were constructed first. Of these, Rooms 4 and 6 appear to have been used as storage units, and the others for habitation. The kiva was probably built at

about this time. Room 1, probably another storage room, was added. Then walls were built onto the ends of the existing room block, enclosing the kiva and a large plaza area. Probably about this time Pithouse 2 was constructed and the kiva modified to include the bench. The enclosing wall abutted against Room 6 was then torn down, Pithouse 2 abandoned, and Room 7, a new enclosing wall, and Pithouses 1, 3, 4, and 5 were constructed at the same time. Room 7 and the pithouses were apparently all used as living quarters. The pueblo probably was not abandoned in haste, for relatively few artifacts were found in the rooms. The kiva is the only structure that burned and this took place only after sufficient time had elapsed to allow a considerable quantity of sand to drift into the structure.

Other Excavations

In addition to the excavations carried out within the rooms, many trenches were dug throughout the site (Fig. 41), mainly to define known architectural features, to search for features not visible on the surface, and to test the condition and vertical and horizontal extent of the trash. These tests showed that Surprise Pueblo was constructed on a sand-capped gravel terrace. The surface at the time of initial occupation, 20 to 100 cm. below the present surface, is a



FIGURE 54. Southwest enclosing wall, NA7498, looking southeast from Room 1.

stratum of sterile reddish-brown sand. This was covered by a layer of cultural debris 10 to 75 cm. thick. The cultural content of this stratum generally increased toward the top. Upon this, especially in the area of the surface structures, and extending to the present surface, was a layer of post-occupational debris, mostly windblown sand and fallen wall stones. Trenches 2 and 3 were excavated through somewhat trashy sand that had accumulated before the room block was constructed. Ceramic analysis, discussed later, demonstrates that this trash was indeed earlier. Other trenches encountered mixtures of early and late materials.

The principal trash deposit was to the southeast of the pueblo, just outside the main entrance. The central parts of this midden deposit averaged 40 to 70 cm. thick. No widespread stratification of the trash was noted. The lower 20 to 50 cm. of trash was light, generally reddish-brown in color, with scattered charcoal and pottery. The upper 10 to 35 cm. contained much more cultural debris. This topmost portion of the trash was gray, with many charcoal flecks, stones, sherds, and ash lenses, and some localized clay and sand lenses. Initial exploration of the trash by means of Trench 11 indicated that enough depth was present possibly to discern cultural stratigraphy, so then a large part of the trash was excavated in units of 3 sq. m., by levels 25 cm. deep. The results of this testing, discussed more thoroughly later, revealed that in addition to a limited amount of vertical stratigraphy, horizontal stratigraphy could also be defined, as the portion of the trash nearest the pueblo proved to be generally earlier.

Burials

Eight burials were excavated at NA7498. All were located in the trash area to the southeast of the pueblo entrance (Fig. 41).

Burial 1. The first burial found was that of a two to three year old child. The body had been placed in an elliptical pit 130 cm. long by 90 cm. wide. This vertical-walled pit apparently had been dug from a surface about 50 cm. below the present surface and was 60 cm. deep, making the total depth at present 110 cm. No definite evidence was seen to indicate that

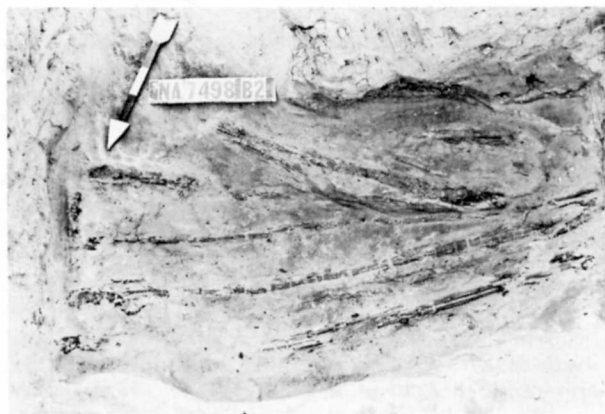


FIGURE 55. Roofing over Burial 2, NA7498.

Image containing human burial has been removed from the electronic edition.

FIGURE 56. Burial 2, NA7498.

the pit had been roofed, but a fragment of decayed wood was found, and a layer of red clayey sand that could have covered a roof extended slightly to either side of the pit and slumped into it. The bottom of the pit is nearly flat, with a slight shelf 7 cm. high along the southeast edge.

The body had been placed on its right side in a flexed position, with the femuri at approximately right angles to the axis of the body. The head was to the southwest. The hands rested near the knees.

Partially under the head and extending 25 cm. to the southeast was a layer of charcoal 1 to 3 cm. thick, indicating that something had been burned before or at the time of burial. Artifacts accompanying the burial were all placed on the southeast side of the pit, in front of the body. These were: a Tusayan Black-on-white bowl containing 50 shell beads, a Tusayan Black-on-white jar, a partial Tusayan Polychrome bowl with the design on the exterior, a Kiet Siel Gray jar, a large Tusayan Polychrome sherd, and a large sherd of Tsegi Orange Ware that appears to have been slipped but not painted.

Burial 2. The grave for this old adult male was an elliptical pit 130 cm. long and 80 cm. wide. This vertical-sided pit was dug from a surface 45 cm. below the present ground level, and was 80 cm. deep. The pit had been roofed over with juniper timbers 4 to

10 cm. in diameter (Fig. 55). These timbers were aligned with the long axis of the pit and extended a short distance beyond either end of the pit. The timbers were charred on the ends. No further roofing material was found.

The body had been placed on its back with the head to the southwest (Fig. 56), with the knees flexed at almost a right angle to the body and to the right side of the body. The hands rested on the pelvis.

On the right side of the head was a Flagstaff Black-on-white bowl, on the other side a Moenkopi Corrugated jar, near the feet a small Tusayan Corrugated jar, near the left shoulder a worked sherd, and near the left elbow a bone tool.

Burial 3. This adult male had been placed in an irregular pit 125 cm. long and 90 cm. wide. The outline of the pit could be traced to within 60 cm. of the present surface, and the bottom is 145 cm. below the present surface. The roof was not well preserved, although a juniper pole 4 cm. in diameter and 56 cm. long was found on the southeast side of the pit, and bark and wood fragments covered the bones.

The body was on its back, parallel to the northwest side of the pit, with the head to the southwest. The knees were flexed and resting on the chest. The arms were folded across the abdomen.

On the southeast side of the body, were a Tusayan Polychrome bowl, a Tusayan Black-on-red (Dogoszhi Var.) jar containing squash seeds, and parts of a Tusayan Black-on-white jar. Also found deep in the pit, but not directly associated with the bones, were a circular worked sherd and a large stone knife.

Directly above the burial, 70 cm. above the bottom of the pit, the remains of a dog were found. Although these bones had been badly disturbed, enough remained articulated to indicate that the dog was probably purposefully buried. This dog burial had apparently been intruded into the same pit containing Burial 3 after the roof over that burial had collapsed and the pit filled with sand and trash.

Burial 4. The pit in which Burial 4 had been placed was crudely rectangular with rounded corners, 120 cm. long and 60 cm. wide. The outline of the grave could be traced to within 45 cm. of the present surface. The bottom is 1.10 m. below the present surface. Many rotted fragments of wood were found

over the bones indicating that the pit was probably roofed over.

The body, that of a female over 50 years old, had been placed on its back with the head to the southwest (Fig. 57). The legs were almost fully flexed and to the right side of the torso. The arms were folded, with the hands resting on the right shoulder. Six pottery vessels were to the left of the head and upper torso. These are a Tusayan Black-on-red "seed jar" nested in a Kiet Siel Black-on-red bowl, a Flagstaff Black-on-white dipper in a Tusayan Black-on-white bowl, and a Flagstaff Black-on-white jar in a Kiet Siel Gray jar. To the right of the head were six bone awls.

Burial 5. This young infant had been placed in a grave 85 cm. long and 55 cm. wide. The vertical-sided pit could be traced to within 50 cm. of the present surface. The flat bottom of the pit is 85 cm. below the present surface. There was no evidence of a roof.

The body had been placed on its back, with the head to the west-southwest. The post-cranial skeleton was very poorly preserved and slightly disturbed, so degree of flexure could not be determined.

The only artifact accompanying the body was a small Kiet Siel Gray jar placed near the feet.

Burial 6. This body, of an approximately three year old child, had been placed in a pit 90 cm. long and 36 cm. wide. The bottom of the grave is 50 cm. below the present surface, and could be traced to within 20 cm. of that surface. No evidence of a roof was found.

The body had been placed flat on its back with the head to the southwest. The legs were flexed, resting above the lower torso, and the arms were extended beside the body.

Close to the left hip was a small Flagstaff Black-on-white jar.

Burial 7. An elliptical pit 78 cm. long and 53 cm. wide had been dug for this infant. The bottom of the pit is 80 cm. below the present surface, and could be traced to within 20 cm. of it. No roofing was found.

The body was on its back, with the legs apparently flexed and the head to the west-southwest. The bones were not well preserved and some disturbance was apparent.

On the left side of the cranium was a large Tusayan Polychrome sherd. To the right were a small Moenkopi Corrugated jar and a partial Tusayan Black-on-red (Dogoszhi Var.) bowl nested inside a Tusayan Black-on-white bowl.

Burial 8. This burial had been placed in a grave 140 cm. long and 90 cm. wide. The bottom of the pit is 1.30 m. below the present ground surface. The somewhat undercut sides were definable to within 55 cm. of the present surface. There was no evidence of a roof. The body, that of a 20 year old female, had been placed on the left side with the head to the south-southwest. The legs were badly disturbed, but apparently had been flexed.

Several large sherds were in the trashy fill, but no artifacts were definitely associated with the burial.

Image containing human burial has been removed from the electronic edition.

FIGURE 57. Burial 4, NA7498.

Behind the body, however, was the skeleton of a dog that had quite definitely been buried with the woman. On the southeast edge of the pit were the remains of a post 10 cm. in diameter. What function this post served could not be determined.

Summary. All eight burials excavated at NA7498 were oriented with the head between west and south, most of them almost exactly to the southwest. Six had been placed on their backs. Of the remaining two, one was on its right side, the other on its left. Seven burials were flexed, two fully flexed and five semi-flexed. The arms of most individuals were extended to the abdominal region or in one case to the right shoulder. The mortuary offerings accompanying the bones were generally few, ranging from none to six pottery vessels, with a few other artifacts sometimes added. The graves were generally elliptical, vertical-sided, and deep. One grave had been definitely roofed over, and indications of roofing were recovered in three more instances. The average age of the burials recovered is about 20. A few isolated human bones were found scattered in the trash, probably the result of disturbance of burials by later interments, dogs, or rodents. One skull fragment was found near the surface in Room 7.

ARTIFACTS

Lithic Material

In contrast to sites in the Glen Canyon (Adams, Lindsay and Turner, 1961:54), stone artifacts, especially those of chipped stone, were not plentiful at NA7498 (Table 19). With minor revisions, the taxonomy employed for the chipped stone artifacts found in the Glen Canyon (Adams, Lindsay and Turner, 1961:14-9) has been employed here. Ground stone artifacts were relatively more numerous, and the typology used here is modified from that of Woodbury (1954).

Chipped Stone

Projectile Points. Only nine artifacts, all of chert and chalcedony, were identified as projectile points or small knives. Five of these are unclassifiable tip portions. Of the remainder, two classes can be recognized.

Small, triangular points without notches and with straight or a slightly concave base are very common in Kayenta sites. The two specimens (Figs. 58 *a, b*) exhibit a finer and more careful finish than any other chipped artifacts. The width of both is 15 mm., but the estimated original lengths are 26 and 52 mm.

Leaf-shaped unnotched points or small knives (Fig. 58 *c*) are much more crudely flaked. All have square to slightly rounded bases and sides which are nearly parallel near the base. Estimated lengths range from 35 to 50 mm., widths are 17 to 19 mm.

Large Knives. Eleven artifacts, made of chert and jasper, are classified as large knives. Four are too fragmentary for further classification.

Three (Fig. 58 *e*) have a square base and nearly straight sides. They are 24 to 30 mm. wide. Length could not be estimated.

One (Fig 58 *d*) has a base that is greatly ex-

panded in relation to the average width of the blade. Its width is 28 mm. Its length could not be estimated with any degree of accuracy.

Three were classified as crude knives. Implementations of this sort were formerly (Adams, Lindsay, and Turner, 1961:18) classed as knife-choppers, but have been reclassified because of the lack of indications that they were used as chopping tools. The one

Points	
Small, triangular, no notches	2
Oval and leaf-shaped, no notches	4
Unclassified	5
Knives	
Square base	3
Expanded base	1
Crude knives	3
Unclassified	4
Chopper	
Large ovoid	1
Scrapers	
Circumphural edge	
Small	3
Limited edge	
Nodular	6
Flake	39
Graver	1
Notched Flake	1
Metates	6
Manos	
Two-hand	19
One-hand	14
Rubbing Stone	1
Cylindrical Rubbing Stone	1
Mortar (?)	1
Maul	1
Ball	1
Disk	1
Hammerstones	146
Utilized Flakes	224
Cores	16
Chips	232
Hematite	8
Unmodified Pebbles	20

TABLE 19. Stone artifacts from NA7498.

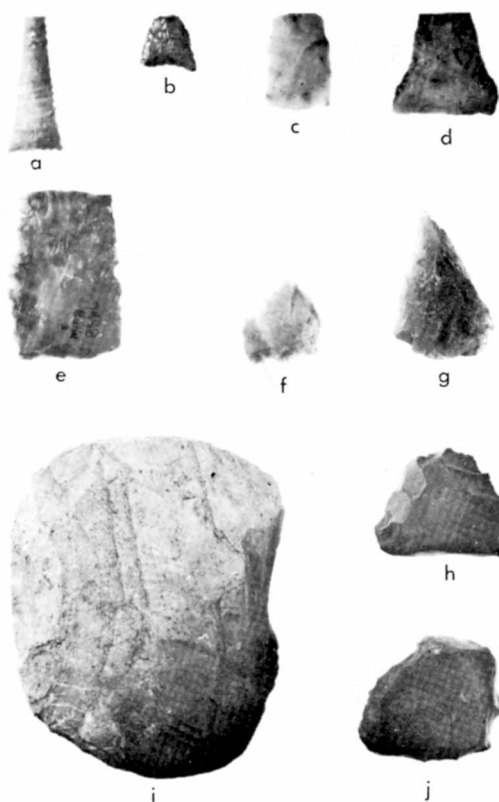


FIGURE 58. Chipped stone artifacts from NA7498. *a*, *b*, small triangular points; *c*, leaf-shaped point; *d*, large knife, expanded base; *e*, large knife, square base; *f*, notched flake, *g*, graver; *h*, scraper, limited working edge; *i*, chopper; *j*, scraper, circumphural working edge. Length of *i*, 87 mm.

complete specimen is 64 mm. long, 24 mm. wide, and 16 mm. thick.

Choppers. One chopping tool, a large ovoid, was found (Fig 58 *i*). It had been constructed by bifacially flaking a piece of cherty-limestone around the circumference. It is 87 mm. long, 71 mm. wide, and 28 mm. thick.

Scrapers. Unifacially chipped tools are more common than bifacial ones at NA7498. Scrapers are commonly of the cryptocrystalline varieties of quartz, but some are of quartzite and porphyry. A distinction had been made between those scrapers with a working edge encircling the tool and those with a limited working edge.

The three scrapers with a working edge all the way around (Fig. 58 *j*) are all roughly oval in outline and fall into the small hemispherical class (Adams, Lindsay, and Turner, 1961, Table 8). They are 33 to 48 mm. long, 28 to 40 mm. wide and 10 to 28 mm. thick.

Scrapers with a limited working edge can be divided into two categories, "nodular" and "flake." The six nodular scrapers all have high backs terminating in a nearly vertical edge opposite the working edge. A typical specimen is 80 mm. long, 46 mm. wide, and 34 mm. thick.

The great majority of scrapers, 39, were manufactured by unifacially flaking a portion of a rough flake (Fig. 58 *h*). Little or no deliberate shaping is evident. A typical specimen is 36 mm. long, 28 mm. wide, and 11 mm. thick.

Graver. One tool identified as a graver (Fig. 58 *g*) was found. A fine point had been created by unifacially chipping either side of the tip of a flake to form a fine point.

Notched Flake. One chert flake (Fig. 58 *f*) has three notches chipped into the end, suggesting that it may have been used as a saw.

Ground Stone

Metates. The six metates found are classed into three categories. None show other than very minor shaping except on the grinding surface.

1. Trough, closed at one end. These two metates (Fig. 59 *a*) have scoop-shaped grinding surfaces that do not extend the full length or width of the stone. These two are nearly the same size averaging 38 cm. long, 31 cm. wide, and 8 cm. thick. The troughs average 20 mm. deep.

2. Flat. This type of metate is often called slab, but in view of the fact that the term slab has also been used for other types (Woodbury, 1954:50), the term flat is used. This fragmentary metate has a slightly concave grinding surface which extends the full width and length of the slab, which is 26 cm. wide, 8 cm. thick, and was an estimated 45 cm. long.

3. Basin. Three slabs with shallow oval grinding surfaces (Fig. 59 *b*) were found. The slabs were not shaped, although the grinding surfaces show some pecking. They are 33 to 46 cm. long, 17 to 28 cm. wide, and 7 to 9 cm. thick. The depressions average 26 cm. in greatest dimension and 8 mm. deep.

Manos. On the basis of size, manos can be grouped into two classes; two-hand and one-hand manos. There is no intergradation in size between the two divisions at NA7498, as the greatest length of the one-hand mano is 14.7 cm. whereas the shortest

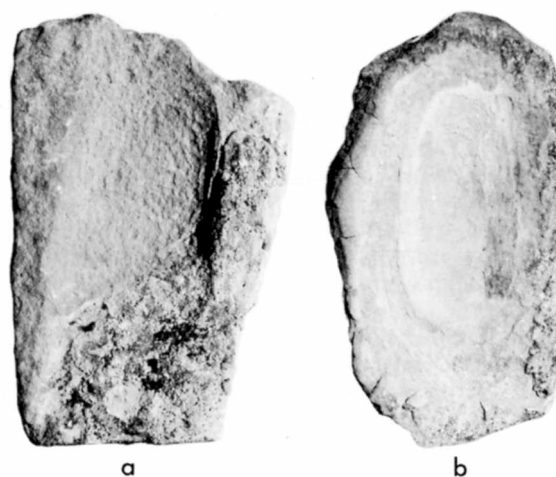


FIGURE 59. Metates from NA7498. *a*, trough, closed at one end; *b*, basin. Length of *a*, 38.5 cm.

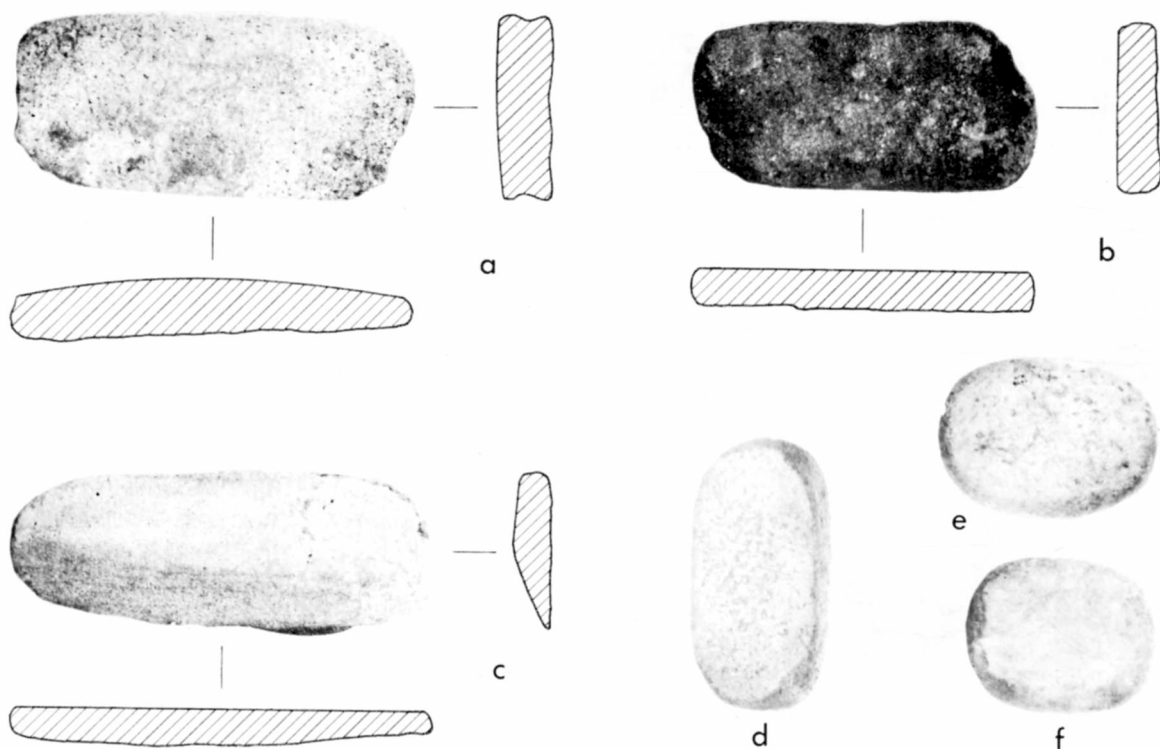


FIGURE 60. Manos from NA7498. *a*, two-handed, one convex surface; *b*, two-handed, one flat surface; *c*, two-handed, one faceted surface; *d-f*, one-handed. Length of *c*, 26.5 cm.

length of the larger manos is 22.3 cm. All tools classified as manos were used with a reciprocal motion, but some of the one-hand manos apparently also were used with rotary motion. Almost all the 33 manos were made of fine to medium grained sandstone. The exceptions are three constructed of a sandy conglomerate. Most, including those of conglomerate, are of locally available materials, but several, including four of Navajo sandstone, were of materials gathered below the mesa top.

Manos large enough to be used with both hands are separated into five groups, based on number, location, and shape of the grinding surfaces:

1. One convex grinding surface. This mano (Fig. 60 *a*) apparently was used on a trough metate, whereas all others apparently were used in conjunction with flat metates. The upper surface is unworked. This is the only mano in the collection with finger grips, shallow grooves in both leading and trailing edges. It is 25.1 cm. long, 11.6 cm. wide, and 3.5 cm. thick.

2. One flat grinding surface. Seven manos (Fig. 60 *b*) have a single grinding surface which is almost perfectly flat. The grinding surface is generally parallel to the upper surface, but one specimen is beveled, and two more are slightly beveled. The upper surfaces are unworked generally, but a few show a slight amount of smoothing. Complete specimens are 22.3 to 25.1 cm. long, 9.6 to 11.6 cm. wide, and 1.5 to 3.5 cm. thick.

3. One faceted grinding surface. These eight

manos (Fig 60 *c*) exhibit one unworked surface and one with a distinctly faceted grinding area. They are frequently tapered, or "airfoil" in cross section. The one complete specimen, apparently larger than average, is 26.5 cm. long, 10.4 cm. wide, and 2.8 cm. thick.

4. Two flat grinding surfaces. The surfaces of this specimen are parallel, and both had been used for grinding. It is 26.0 cm. long, 10.5 cm. wide, and 3.3 cm. thick.

5. One flat and one faceted grinding surface. These two manos were each used on both sides, but in a different manner on each side, creating one flat grinding surface and one that is slightly faceted. The complete specimen is 25.3 cm. long, 11.3 cm. wide, and 16 mm. thick.

Fourteen one-hand manos (Fig. 60 *d-f*) were recovered. Measurable specimens are 9.1 to 14.7 cm. long, 6.8 to 10.1 cm. wide, and 2.7 to 4.8 cm. thick. It is possible to divide the one-hand manos into several groups on the basis of the nature of the grinding surfaces as follows:

two convex surfaces	6
two flat surfaces	5
one flat and one rounded surface	2
one convex and one rounded surface	1

The term convex is used here to signify those surfaces that are rounded from one side to the other, but not from end to end, whereas those called rounded are rounded in any direction. The former type of surface apparently was produced by recipro-

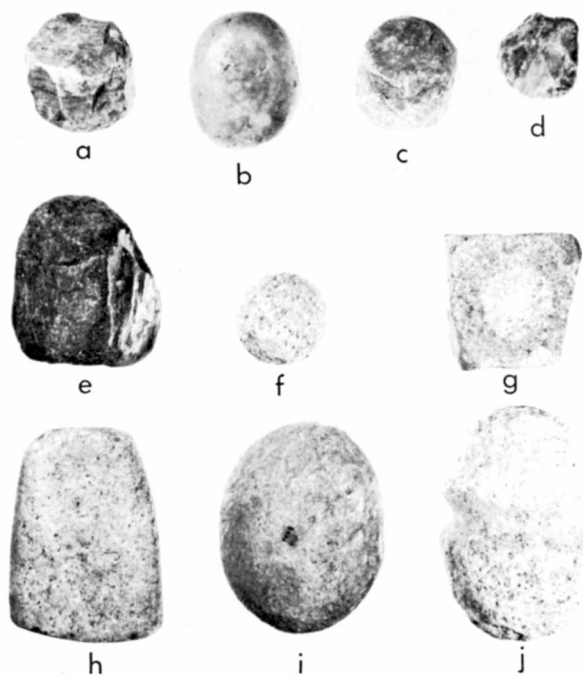


FIGURE 61. Stone artifacts from NA7498. *a-e*, hammerstones; *f*, ball; *g*, mortar (?); *h*, cylindrical rubbing stone; *i*, rubbing stone; *j*, maul. Length of *h*, 10.8 cm.

cal grinding motion, and the latter by rotary motion. These distinctions are not always clear-cut, and the one-hand manos form an essentially continuous series, so detailed descriptions of the above groupings are not attempted. Two of these manos appear to have been formed of fragments of larger manos.

Rubbing Stone. A rounded river cobble of well-cemented sandstone had been used for grinding, mainly in a reciprocal manner (Fig. 61 *i*). Traces of red ocher remain on the grinding surface. The sides and ends exhibit some signs of battering. It is 10.9 cm. long, 8.8 cm. wide, and 6.8 cm. thick.

Cylindrical Rubbing Stone. This well-formed sandstone artifact is loaf-shaped, 10.8 cm. long, 7.8 cm. wide, and 4.4 cm. thick (Fig. 61 *h*). One face, parallel with the long axis, was extremely flattened from reciprocal grinding use. One end is slightly convex, smoothed by rotary grinding. The other end is battered, indicating that it may have been used as a pestle.

Mortar (?). This implement (Fig. 61 *g*) has been fashioned from a roughly square block of sandstone, (averaging 70 mm. on a side and 33 mm. thick), by pecking a hemispherical depression into the center of one of the greater sides. The concavity is 34 mm. in diameter and 7 mm. deep, but shows no sign of use.

Maul. One full-grooved maul was found (Fig. 61 *j*). It was made from a conglomeratic sandstone. It is 11.8 cm. long and 6.1 to 7.7 cm. in diameter. The groove, 19 to 21 mm. wide and 9 mm. deep, encircles the center of the well-shaped stone. Both

ends show signs of battering, and several spalls had been broken off one end.

Ball. A piece of sandstone had been pecked to an almost perfect sphere 50 mm. in diameter (Fig. 61 *f*). Its use is unknown.

Disk. Another object of unknown use was fashioned by grinding a piece of fine-grained sandstone to form a perfect disk 50 mm. in diameter and 5 mm. thick (Fig. 70 *a*).

Beads. Five stone beads (Fig. 70 *b*) were found during the excavation of Room 7, and were presumably parts of a single item of ornamentation. They are made of gray and black slate. Diameters range from 2.4 to 5.3 mm., thickness from 1.2 to 1.9 mm. Hole diameters range from 0.9 mm. to 2.1 mm. Other beads recovered were made of shell.

Other Lithic Material

Hammerstones. Stones used for pounding and pecking (Fig. 61 *a-e*) are extremely common at NA7498. The two largest concentrations of hammerstones were recovered from Rooms 5 and 7 in close association with mealing bins, suggesting that one of the primary uses of hammerstones was in the preparation of milling stones. Over one-half of the hammerstones are of quartzite. Most of the remainder are of chert and petrified wood, with a few of igneous rocks and cherty-limestone. Most hammerstones appear to have started as smooth river cobbles and cores remaining from the manufacture of other tools. Repeated hammering has resulted in battered surfaces, especially on the ends and protuberances. During use, many flakes and spalls were knocked off accidentally, resulting in scarred surfaces. Some flakes probably were removed purposefully in order to provide a sharper point or edge. Shapes are all irregular, but approach being spherical. Maximum diameters range from 4.5 to 10.7 cm.

Utilized Flakes. The most common tool found at NA7498 were flakes showing no deliberate modification, but exhibiting signs that they had been used for scraping and cutting. The great abundance of these tools compared with deliberately shaped tools suggests that for most operations requiring a cutting or scraping tool a fortuitously-shaped flake was selected, and discarded after the edge had become slightly dulled.

Chipping Residue. Several cores and many chips and flakes showing no signs of use were recovered also. The presence of such material suggests that much of the stone suitable for chipping was imported to Cummings Mesa from the canyon lands below in the form of raw material rather than as finished or roughed-out tools.

Hematite. Eight pieces of hematite, ranging from siliceous to earthy, were recovered. All exhibit two or more facets created by grinding. No deliberate shaping is apparent, the facets being the result of the removal of some of the pigment.

Unmodified Stones. Many small waterworn pebbles, primarily of cryptocrystalline quartz, had been brought to NA7498. One calcite crystal was found also.

Summary

Stone artifacts were not plentiful at NA7498. The great majority of chipped tools were manufactured from the various cryptocrystalline varieties of quartz, with chert, jasper and milk-gray chalcedony predominating. Other siliceous rocks, such as quartzite, cherty-limestone, and porphyry occasionally were used. A few chips, but no tools, of obsidian were found. Cruder artifacts, such as hammerstones, commonly were made of coarser materials such as quartzite. Ground stone artifacts were made almost universally of sandstone.

All the cryptocrystalline quartz, quartzite, igneous rocks, and some of the sandstone was imported from areas adjacent to Cummings Mesa, much of it probably from the Glen Canyon proper. Most of this stone was imported in the form of raw material, rather than as finished tools. The relatively long trip to the river (8 miles in a straight line) is a major reason for the smaller quantities of chipped stone artifacts at NA7498 in comparison with sites in the Glen Canyon, where tool stone is easily procured from the riverside gravel deposits.

Pottery

Twenty-five whole, nearly whole, or restorable vessels and over 11,000 sherds were recovered during the course of excavation at NA7498. Since this is by far the largest collection from a single site on Cummings Mesa, it was deemed advisable to study and describe it in some detail, and utilize the following discussion as a basis for the study of ceramics of other sites on the mesa.

Methods of Analysis

All sherds encountered during the excavations were saved, and kept separate by provenience. Rooms and pithouses were excavated in two or three levels, most test trenches in one level, and loose sherds found in the burial pits were kept separate from the rest of the trash. Extensive stratigraphic testing was done in the trash, sherds being kept separate from each 25 cm. level within each 3 m. square unit. All sherds were returned to the laboratory where they were washed and stamped with the site number and provenience.

Using published type descriptions, especially those of Colton (1952, 1955, 1956), sherds from each of the 82 proveniences were then classified into wares and types. Most of this classification was based on macroscopic examination, but all sherds about which there was doubt were subjected to an examination through a binocular microscope in an attempt to determine the nature of the clay, tempering ingredients, and presence or absence of a slip. Most of the pottery could be easily classified as belonging to previously recognized types, almost all assignable to the Kayenta branch of the Anasazi. Some sherds, such as those from undecorated portions of vessels, could not be classified into types, and so were listed as unclassified sherds within the ware to which they could be assigned. Some sherds, mainly black-on-whites and black-on-grays, could not be classified with the use

of existing descriptions, and were listed as unidentified, with additional gross breakdowns on the basis of tempering materials.

The total numbers of sherds and whole vessels by type are presented in Tables 20 and 21.

Description

Since the sherds not assignable to types are of

Tusayan White Ware	
Black Mesa B/W	85
Sosi B/W	134
Dogoszhi B/W	111
Flagstaff B/W	201
Tusayan B/W	655
North Creek B/G	10
Unclassified	821
Mesa Verde White Ware	
Mancos B/W	1
McElmo B/W	13
Mesa Verde B/W	3
Unclassified	12
Little Colorado White Ware	
Walnut B/W	7
Unidentified B/W	218
Tsegi Orange Ware	
Medicine B/R	29
Tusayan B/R	506
Cameron Poly.	32
Citadel Poly.	52
Tusayan Poly.	422
Tsegi Orange	21
Kiet Siel B/R	4
Unclassified	605
Tusayan Gray Ware	
Tusayan Corr.	1505
Moenkopi Corr.	2567
Kiet Siel Gray	2707
Lino Tradition	221
O'Leary Tooled	1
Unclassified	278
Unidentified Corr.	3
Unidentified Gray	3
TOTAL	11,227

TABLE 20. Pottery from NA7498, all proveniences.

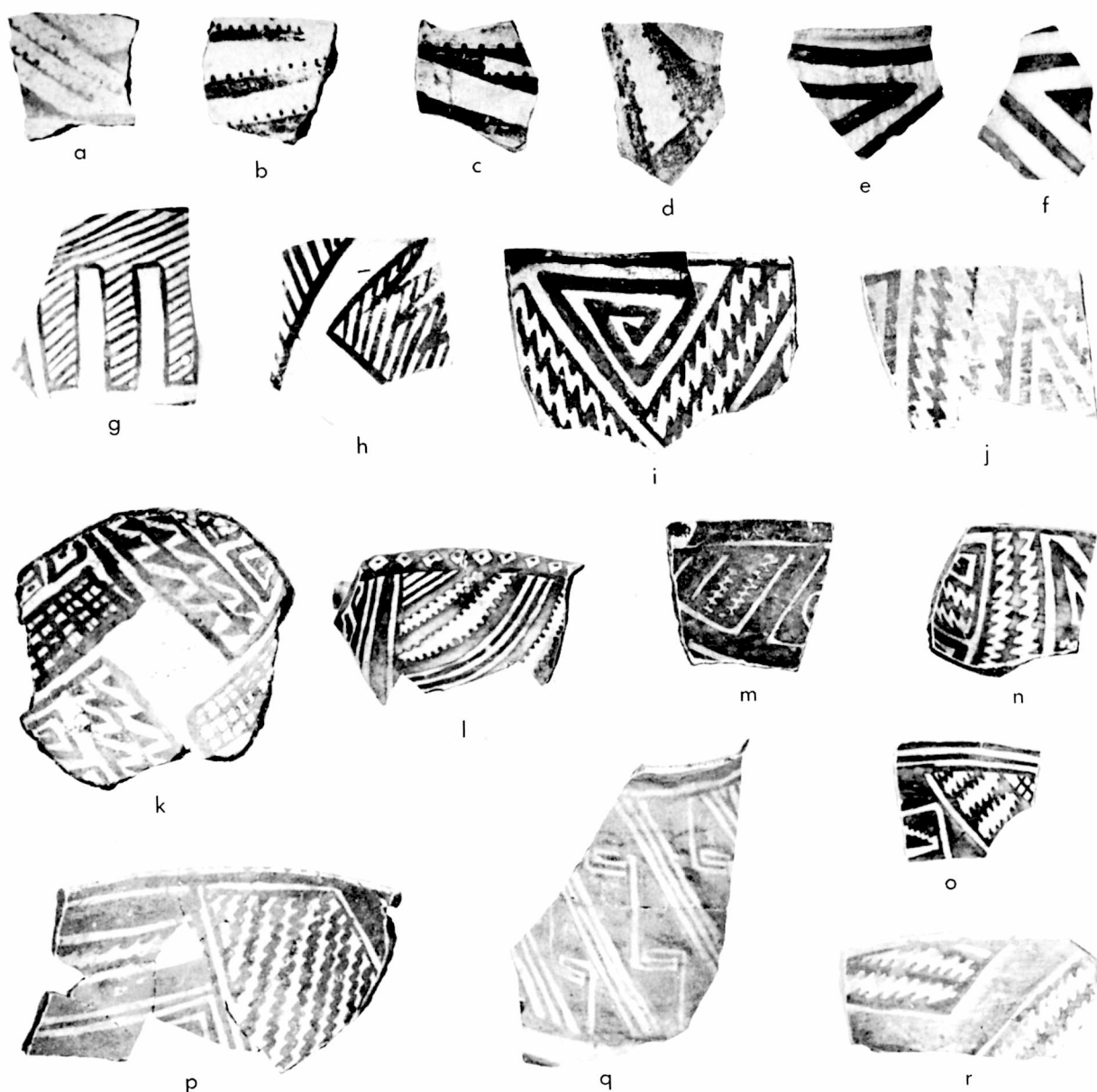


FIGURE 62. Black-on-white sherds from NA7498. *a-d*, Black-on-white; *e, f*, Sosi Black-on-white; *g, h*, Dogoszhi Black-on-white; *i-k*, Flagstaff Black-on-white; *l-r*, Tusayan Black-on-white. Length of *p*, 13.0 cm.

unknown origin and too few to warrant the establishment of additional types or varieties, and since most of the pottery corresponds in all features to recognized types, no new type descriptions are presented here. In a few cases, however, existing descriptions are slightly revised or expanded, and a few suggestions are made concerning the temporal and stylistic relationships of different types.

Tusayan White Ware. Tusayan White Ware presented relatively few problems of classification because the defined types are usually distinct and well described (Colton, 1955, 1956). The collection from NA7498 displays the continuity in design from Black Mesa Black-on-white through Sosi and Flagstaff

Black-on-whites to Tusayan Black-on-white (Fig. 62). The only break in the design continuum occurs with Dogoszhi Black-on-white; this hatching style is, however, also seen on contemporary black-on-red and later polychrome pottery. Shato Black-on-white was not separated as a type during the classification. Instead, the few bowl sherds with corrugated exteriors were classified according to the design elements on the interior, and a notation made concerning the presence of corrugation. Betatakin Black-on-white poses a special problem, as it could be separated only when in *small* sherds. Larger sherds that displayed the cross-hatching typical of Betatakin Black-on-white also had elements typical of Tusayan Black-on-white,

and were classified as the latter. Although our sample is too small to lead to conclusive results, the data suggest that so-called Betatakin Black-on-white is in actuality Tusayan Black-on-white with some areas filled in with crude cross-hatching. Thirty-six sherds exhibiting only cross-hatching, however, were separated as Betatakin Black-on-white because of the possibility of temporal or areal significance which can only be demonstrated by further work. An attempt was made also to separate Wupatki Black-on-white. Only two sherds were classified as this type, however, and both of them could be called Tusayan Black-on-white without distortion of the published descriptions. Essentially, therefore, Wupatki Black-on-white appears indistinguishable from Tusayan Black-on-white. If it is a valid type of the Kayenta series, it should be found in the Navajo Mountain area. Since it is not, it may be that Wupatki Black-on-white can only be recognized if the classifier knows the particular sherd came from the Flagstaff area. In Table 20, both Betatakin and Wupatki Black-on-white are combined with Tusayan Black-on-white.

Tsegi Orange Ware. Prior to the classification of the pottery from NA7498, the question arose concerning the practicality of separating Tusayan Black-on-red from Dogoszhi Polychrome, as the latter is distinguished mainly by the fact that the red slip does not cover the entire vessel exterior, and to a minor degree by the presence of a horizontal handle on bowls (Colton, 1956). Many sherds, especially small ones and those from the upper portions of jars, can-

not be distinguished. For initial classificatory purposes, it was decided therefore to call them all Tusayan Black-on-red, but indicate how many of those so called could be further distinguished as "Dogoszhi Polychrome" by the lack of a slip over the entire vessel exterior. Of the 506 sherds classified as Tusayan Black-on-red, 97 can be called Dogoszhi Polychrome. As will be shown below, the frequency of these increases through time. Since many sherds cannot be distinguished, however, we are of the opinion that it would be better to consider "Dogoszhi Polychrome" a variety of Tusayan Black-on-red rather than as a distinct type. Unless otherwise specified hereafter it will be referred to as Tusayan Black-on-red (Dogoszhi Variety).

Cameron, Citadel, and Tusayan Polychromes present a somewhat similar problem. All are generally similar (Fig. 63 *f-p*), with one of the primary distinguishing characteristics being the presence or absence of a slip over bowl exteriors as opposed to a relatively narrow red band or bands (Colton, 1956). Again in this case, slipped exteriors are evidently earlier. To be consistent we should suggest therefore that these are just varieties of one type. Excavations in other areas, however, have produced greater quantities of Cameron and Citadel Polychromes and have demonstrated the almost separate temporal placement of these types, so no attempt will be made here to modify the existing typology.

The existing description of Tusayan Polychrome (Colton, 1956) can be enlarged somewhat with the range exhibited by the collection from NA7498. Black hatching on unpainted areas had been noted previously. This collection also has several examples of black hatching on red areas (Fig. 63 *n, o*). One example has the same hatchures extending across both painted and unpainted areas. Several sherds show an elaboration in black of exterior design beyond that of simple red bands or stripes. The exterior red bands of two are outlined in black. Two others have more elaborate decoration in black over the red band; one, a series of upright triangles set along a line, and the other, hatched panels. Sherds from two deep bowls exhibit decoration solely on the exterior, in typical Tusayan style (Fig. 64 *n*). Also included within Tusayan Polychrome, for the lack of a better place to put them, are nine sherds and one nearly whole bowl that stylistically appear to be combinations of Tusayan Black-on-red, Kiet Siel Black-on-red, and Tusayan Polychrome (Figs. 63 *p, 64 l*). On these, the area to be decorated is laid out in an "orange peel" fashion in red. This is outlined in black, leaving a lens-shaped undecorated area in the center of the bowl. The red area is then decorated in black, with large pendant triangles filled with cross-hatching, stepped elements, and parallel lines being common. One specimen is decorated with a Dogoszhi style hatched meander.

One bowl (Fig. 64 *o*) and four sherds (Fig 63 *e*) were classified as Kiet Siel Black-on-red. All display parallel lines, stepped elements, and a slipped exterior. Several sherds classed as Tusayan Polychrome would fit into Kiet Siel Black-on-red also except

Type	Form	Maximum Diameter	Min Diameter	Height	Provenience	Figure
Flagstaff B/W	Bowl	19.1	18.6	11.9	Burial 2	64 <u>a</u>
Flagstaff B/W	Jar	8.1	5.9	7.9	Burial 6	64 <u>b</u>
Flagstaff B/W	Jar	9.0	6.0?	9.0	Burial 4	-
Flagstaff B/W	Dipper	9.9	9.9	4.0	Burial 4	64 <u>c</u>
Tusayan B/W	Bowl	15.5	15.2	9.1	Burial 7	64 <u>d</u>
Tusayan B/W	Bowl	11.1	10.9	6.2	Burial 1	64 <u>e</u>
Tusayan B/W	Bowl	23.6	23.6	11.5	Burial 4	64 <u>f</u>
Tusayan B/W	Jar	10.2	8.3	8.2	Burial 1	64 <u>g</u>
Unidentified B/W	Bowl	15.8	15.8	8.8	Kiva Floor	64 <u>h</u>
Unidentified B/W	Dipper	13.0	13.0	7.1	Kiva, L 1-2	64 <u>i</u>
Tusayan B/R	"Seed Jar"	20.5	10.5?	12.9	Burial 4	64 <u>j</u>
Tus. B/R, Dog. Var.	Bowl	12.3?	12.3?	7.9	Burial 7	-
Tus. B/R, Dog. Var.	"Seed Jar"	22.8	9.5	14.2	Burial 3	64 <u>k</u>
Kiet Siel B/R	Bowl	19.3	19.0	9.6	Burial 4	64 <u>l</u>
Tusayan Poly.	Bowl	27.1	26.8	14.4	Burial 3	64 <u>m</u>
Tusayan Poly.	Bowl	24.2	24.2	13.2	Burial 8	-
Tusayan Poly.	Bowl	11.5?	11.5?	8.8	Burial 6	64 <u>n</u>
Tusayan Poly.	Bowl	15.6	15.6	8.1	Kiva Floor	64 <u>o</u>
Tusayan Corr.	Jar	9.5	5.0?	9.5	Burial 2	65 <u>f</u>
Tusayan Corr.	Jar	11.4	9.2	8.3	Kiva Recess	65 <u>g</u>
Moenkopi Corr.	Jar	11.9	11.0	10.7	Burial 7	65 <u>h</u>
Moenkopi Corr.	Jar	18.1	12.8	18.0	Burial 2	65 <u>i</u>
Kiet Siel Gray	Jar	Not restored			Burial 4	
Kiet Siel Gray	Jar	10.6	8.8	8.1	Burial 1	65 <u>a</u>
Kiet Siel Gray	Jar	9.6	7.0	8.8	Burial 5	65 <u>b</u>

TABLE 21. Whole and restorable pottery vessels from NA7498. Measurements are outside dimensions in cm. Question marks indicate estimated dimensions. Dipper measurements are for the bowl only.

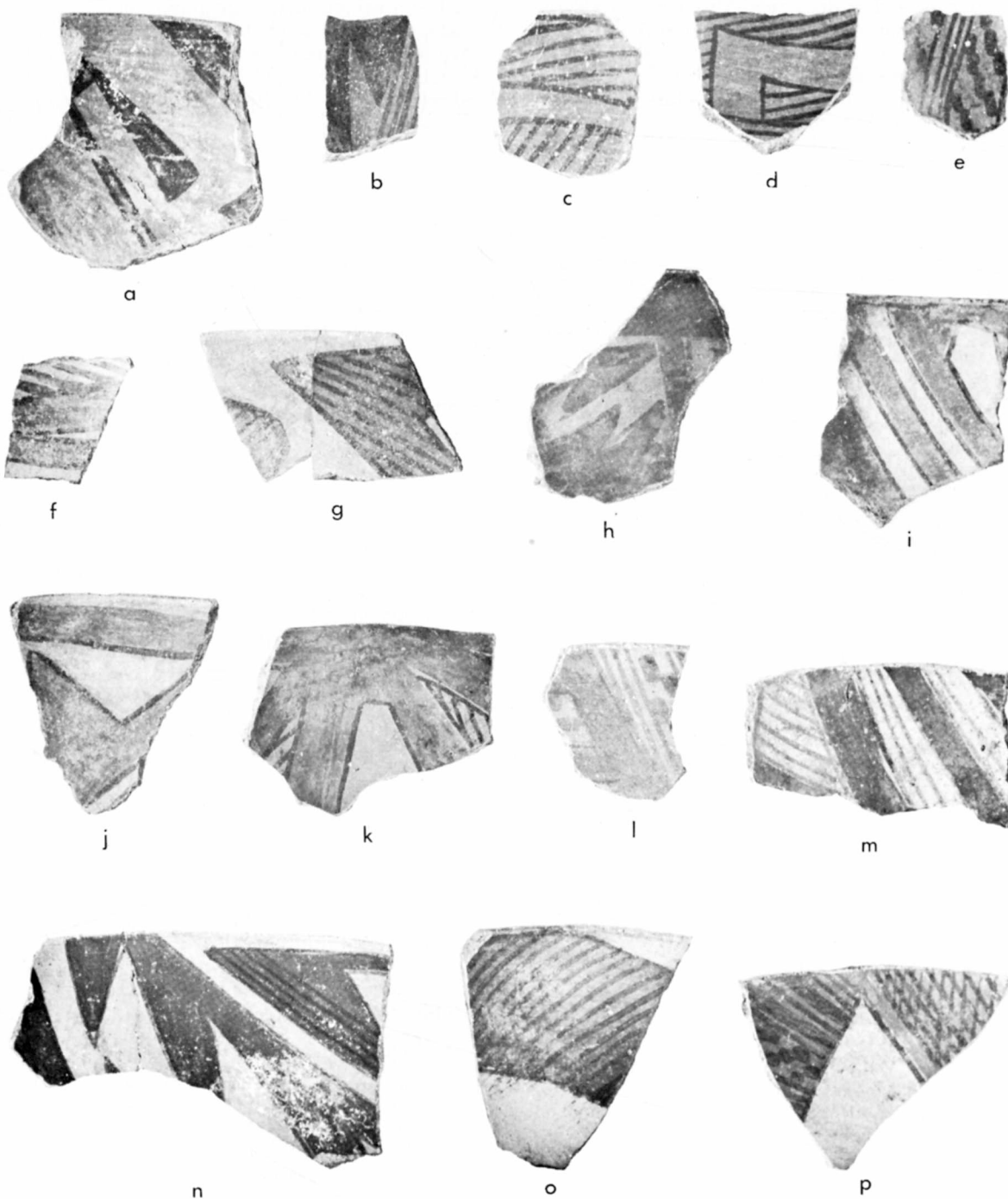


FIGURE 63. Tsegi Orange Ware sherds from NA7498. *a, b*, Medicine Black-on-red; *c, d*, Tusayan Black-on-red; *e*, Kiet Siel Black-on-red; *f, g*, Cameron Polychrome; *h*, Citadel Polychrome; *i-p*, Tusayan Polychrome. Length of *n*, 13.5 cm.

that the exterior is banded rather than slipped.

Tusayan Gray Ware. Three previously recognized types (Colton, 1955) of Tusayan Gray Ware; Tusayan Corrugated, Moenkopi Corrugated and Kiet Siel Gray, could be distinguished at NA7498. Some sherds, similar to Kiet Siel Gray but with finer temper and smoother, scraped surfaces, did not fit the description of any pottery from this period, and so were put into a class called Lino Tradition, as they are very similar to Lino Gray and appear to represent a continuation of the Lino method of surface treatment. Some of these may be body sherds of Medicine Gray, but no rims of that type were found. Tusayan Corrugated, Moenkopi Corrugated, and Kiet Siel Gray were each sub-divided into two to four categories partially patterned after those used by Beals, Brainerd, and Smith (1945:139). These subdivisions are:

- Tusayan Corrugated
 - Indented
 - Exuberant
 - Obliterated
 - Unindented
- Moenkopi Corrugated
 - Coils overlapping
 - Coils not overlapping
- Kiet Siel Gray
 - Coils obliterated
 - Coils overlapping
 - Coils not overlapping
 - Finger indented

Both Tusayan and Moenkopi Corrugated were further subdivided on the basis of the widths of the coils. Rather than measuring the coils directly, the method employed by Beals, Brainerd, and Smith (1945:12) was used. A hole 4 cm. square was cut into a piece of cardboard, and this template then placed against the sherd. The number of coils visible per 4 cm. was easily counted, and then expressed in terms of average coil width (in mm.) by means of a conversion table.

It was found that the great majority of Tusayan Corrugated fitted previous descriptions and could be placed in the "indented" category. Some sherds were characterized by wider coils and exaggerated indentations, and were called "exuberant." Only minor quantities of obliterated and unindented were found. The indented sherds were found to have coils generally ranging from 2 to 9 mm. wide, most of them between 4 and 6 mm. Exuberant coils ranged from 5 to over 10 mm. wide, mostly 7 to 9 mm. The few measurable unindented sherds had coils averaging 3 to 4 mm. wide.

Moenkopi Corrugated sherds with overlapping coils slightly outnumber those with coils that do not overlap. Those with overlapping coils range from 3 to over 10 mm. in coil width, with the majority having coils 5 to 7 mm. wide. The coil width of those with non-overlapping coils ranges from 4 to over 10 mm., with a concentration near the larger extreme.

The coils on about two-thirds of the Kiet Siel

Gray sherds are completely obliterated. Those with the coils still visible are divided about equally between those with overlapping and those with non-overlapping coils. A minor amount of sherds do not exhibit the divisions between the coils, but do have noticeable finger indentations.

Intrusives and Unknowns. Relatively few sherds were recognized that could be traced to an area other than the Kayenta. The presence of Mesa Verde types indicates some contact with peoples to the northeast, probably in the "triangle" area between the San Juan and Colorado Rivers.

The taxonomy and terminology of Abel (1955) is used here for the Mesa Verde types, but it should be noted that the classification of these types is currently under revision by Arthur Rohn (personal communication).

Contact with the west is shown by the presence of sherds identified as North Creek Black-on-gray. Limited trade with the Flagstaff area is indicated by Walnut Black-on-white sherds, most of them from the same small jar. A notable lack in the ceramic complex from Surprise Pueblo is the complete absence of Middleton Black-on-red and Middleton Polychrome, types which are found in abundance a short distance away on the other side of the Colorado River (Gunnerson, 1959:348; Lister, Ambler, and Lister, 1960:205-8).

A number of unidentified black-on-white and black-on-gray sherds were recovered also. Almost all of these differ in design from typical Kayenta types, in specific elements, layout, and preciseness of execution. Surface finish on many sherds is of a much poorer quality than on most Kayenta types, often being rough, soft, or gray, even though some are slipped. Although designs are generally Pueblo II and early Pueblo III, most do not fall within the established range of elements of typical Kayenta types. Some show a high degree of skill in the execution of the design, but most designs were somewhat carelessly applied. Many also differ in the physical constituents of the pottery, mainly temper. Most are tempered with quartz sands, as are the typical Kayenta types, but about one-half of these have much larger grains than usually is found in the Kayenta area. Some sherds are tempered with light, gray, or dark angular fragments that appear to be crushed sherds, but could not be assigned definitely to any recognized types defined as having sherd temper. A few contain numerous glassy spicules that appear to be of volcanic origin. The presence of these particles suggests that either the pot was made of clays derived from altered volcanic debris or deliberately tempered with ash. The former possibility seems the more likely, as these sherds (and two nearly whole vessels) have a conspicuous lack of consistency in features of design and finish. The origin of this volcanic debris is not known, as none is present in the vicinity of Cummings Mesa.

It is interesting to note in this connection that a random microscopic examination of several hundred sherds identified as Tusayan Black-on-white revealed

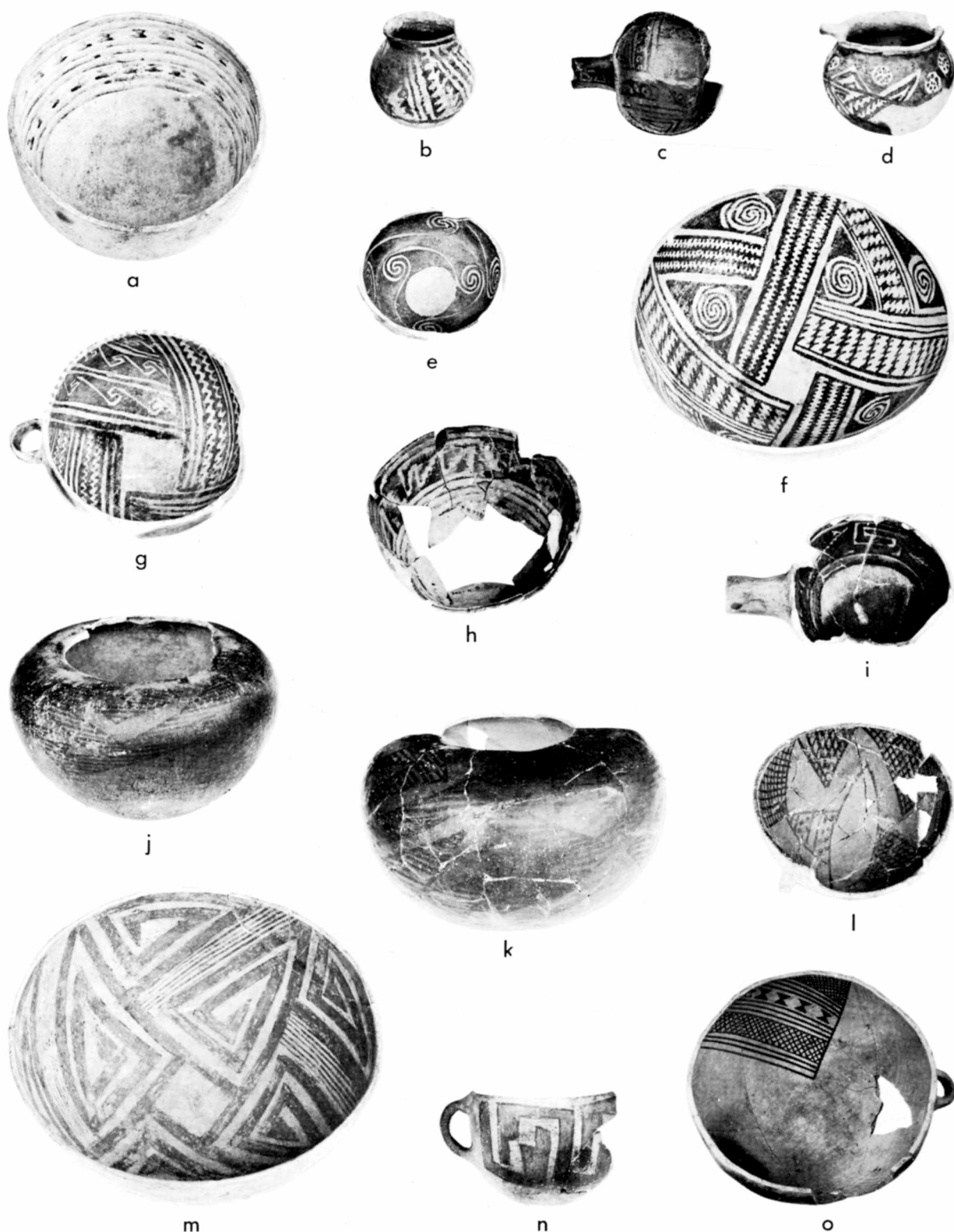


FIGURE 64. Decorated vessels from NA7498. *a-c*, Flagstaff Black-on-white; *d-g*, Tusayan Black-on-white; *h, i*, unidentified black-on-white; *j*, Tusayan Black-on-red; *k*, Tusayan Black-on-red (Dogoszhi Variety); *l-n*, Tusayan Polychrome; *o*, Kiet Siet Black-on-red. One quadrant of the design of *o* is retouched. Diameter of *m*, 27.1 cm.

seven sherds containing such glassy spicules. Because these seven sherds resembled Tusayan Black-on-white in all other respects, they were retained in that category. The same microscopic examination also revealed one sherd of Tusayan Black-on-white that appeared to be tempered with crushed sherds. These data indicate that some paste variations, possibly regional or temporal, exist within pottery of a single "type" produced by Kayenta potters.

Although the unidentified sherds could not be equated with types named at present, most of them are very similar in surface treatment and design, pigment, and temper, and over-all appearance to black-on-gray and black-on-white pottery found in abundance on the west side of the Colorado River in southern Utah (Florence C. Lister, personal communication), indicating some degree of contact with the Kayenta peoples inhabiting that area. It is also possible that some of these unidentified sherds may have been made on Cummings Mesa.

It is possible, but cannot be demonstrated without extensive technological analysis, that many of the identified black-on-white and orange ware types were not manufactured on Cummings Mesa, but were imported there from nearer the heartland of the Kayenta area.

Whole or Restorable Pottery. Twenty-five whole or nearly whole pottery vessels were recovered from NA7498 (Figs. 64, 65). Almost all of these were found in association with burials. These grave offerings tend to be vessels smaller than those in general

use at the site, and also most of them are decorated vessels rather than gray ware, so a true picture of the ceramics of the site is not gained through a study of the whole vessels. Many, however, show signs of extensive use before being buried, so it is not specialization in grave goods that is implied, but selection.

Dimensions and proveniences of the pottery vessels are given in Table 21. From this it can be seen that most of the bowls are of two types, Tusayan Black-on-white and Tusayan Polychrome. The Tusayan Polychrome bowls are slightly larger than the ones of Tusayan Black-on-white, averaging 19.6 cm. in maximum diameter and 11.1 cm. in height as opposed to 16.7 cm. in diameter and 8.9 cm. in height. Most of the jars are of Tusayan Gray Ware which average 11.9 cm. in maximum diameter, 9.0 cm. in rim diameter, and 10.6 cm. in height. Sherd material indicates that most gray ware jars were considerably larger, possibly averaging 25 cm. in maximum diameter.

Worked Sherds. Included within the pottery tabulations are 125 sherds that had been chipped and ground into various shapes (Fig. 66). Most of these were recovered from the trash. Of these, 79 are of various black-on-white types, 37 of Tsegi Orange Ware types, and nine of Tusayan Gray Ware, showing a consistent selection for decorated sherds, with black-on-whites being preferred. The majority, 101, are circular or nearly so, ranging in diameter from 14 to 61 mm. Six of these have a single hole drilled near the center, and another has three holes. Ten sherds, most of them fragmentary, are somewhat elliptical and larger, ranging in length from 9 to 15 cm. Some of these apparently were used as scoops, while others may have been used in the manufacture of pottery. Nine worked sherds are irregular with sharp angles, ranging from 37 to 65 mm. in length. Most of these probably were used to smooth pottery. Two sherds are T-shaped, and two more are nearly square. One of the latter shape has a hole near the center. One is oval, constructed from the portion of a jar with the lug handle attached.

Discussion

Pottery Chronology. The life spans of most of the pottery types recovered from NA7498 have been assigned calendrical dates by Colton (1955, 1956), mainly based on dendrochronological data. The temporal range of several of the types has been extended in Fig. 67 on the basis of various associations. The tightest association is that of the mortuary offerings found associated with Burial 4. Here were found whole vessels of Flagstaff Black-on-white, Tusayan Black-on-white, Tusayan Black-on-red, Kiet Siel Black-on-red, and Kiet Siel Gray. These types therefore were contemporaneous in at least one point in time. The possibility of heirlooms is not overlooked, but the fact remains that these types were in use at the same time, whether or not they were all still being made. When a particular pottery type went out of style and was no longer being made, there were undoubtedly vessels of that style still in existence that did not get thrown away until they were accidentally

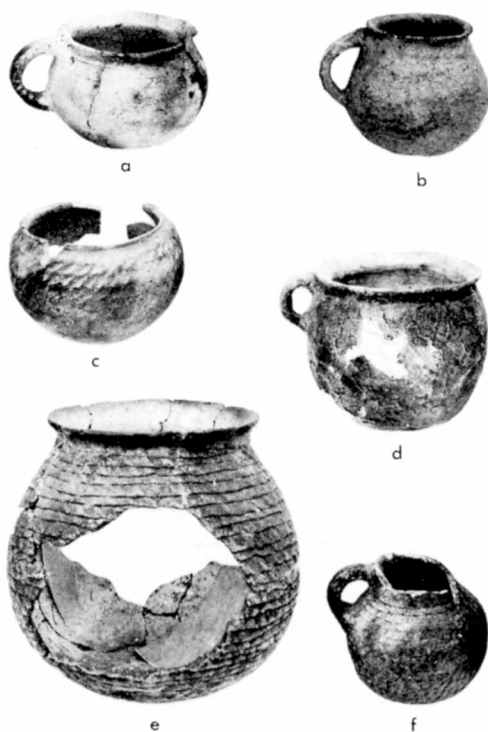


FIGURE 65. Gray ware vessels from NA7498. a, b, Kiet Siel Gray; c, f, Tusayan Corrugated; d, e, Moenkopi Corrugated. Maximum diameter of e, 18.1 cm.

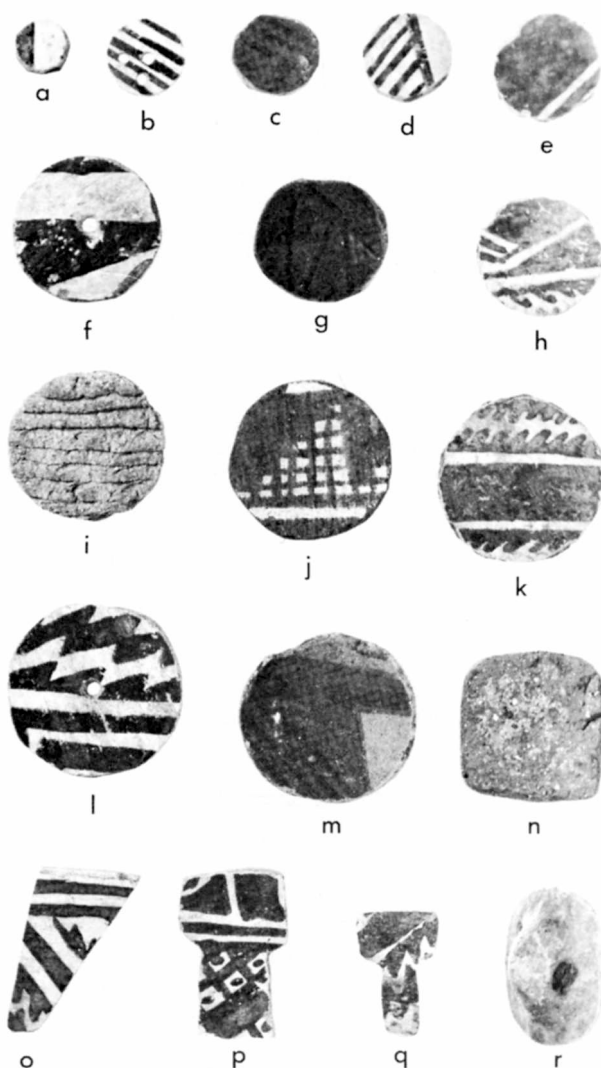


FIGURE 66. Worked sherds from NA7498. Diameter of l, 45 mm.

broken. We also tend to forget that pottery was made by people, and it was probably common for some potters to continue decorating pots in a certain manner long after others had stopped doing so because the individual admired the designs used by her mother or grandmother and resisted the "new-fangled" notions of the "decadent" younger generation. The fact that these types were at least partially contemporaneous indicates the need for some revision of terminal or beginning dates previously assigned to them.

Colton (1956) assigns dates of A.D. 1050 to 1150 for Tusayan Black-on-red. Adams and Adams (1959: 24) suggest that the terminal date of this type be extended to about A.D. 1200. The data from NA7498 corroborate this revision and we suggest further that the terminal date could be somewhat later. This is based largely on the fact that in all proveniences, even the latest, Tusayan Black-on-red (excluding Dogoszhi Variety) formed a significant part of the ceramic assemblage, although decreasing somewhat in quanti-

ty through time. The association of true Tusayan Black-on-red with "later" types in Burial 4 tends to substantiate this.

Adams and Adams (1959:24) have already proposed that "Dogoszhi Polychrome," the late unslipped variety of Tusayan Black-on-red, appeared much earlier than the previously supposed A.D. 1250. At NA7498 the Dogoszhi Variety of Tusayan Black-on-red is constantly present in significant numbers in all except the earliest parts of the site. Although this variety therefore was made earlier than previously thought, it can be demonstrated that the popularity of this practice of only slipping part of black-on-red vessels increased through time. At the later proveniences from Surprise Pueblo, unslipped Tusayan Black-on-red forms a significantly larger percentage of the total Tusayan Black-on-red than it does from the earliest proveniences (Table 22).

Provenience	Time	Total No. Tusayan B/R	Number of Dogoszhi Var.	Per Cent
Trash, L 2-3	Early	73	7	10
Trash, L 1	Late	125	27	21
Trash, N. end	Early	137	7	5
Trash, S. end	Late	174	44	25
Trenches 2-3	Early	13	0	0
Feature 1	↓	29	3	10
Trenches 4-12		46	7	15
Burials		21	6	29
Test Trench 1		22	5	23
Rooms 1-7		37	17	46
Pithouses 1-2	Late	21	5	24
Entire Site		506	97	19

TABLE 22. The percentage of total Tusayan Black-on-red sherds that are Dogoszhi Variety, from various provenience groupings, NA7498.

It must be admitted that evidence from NA7498 is meager for the revision of the temporal spans of Cameron and Citadel Polychromes. The dates assigned are extended to overlap, however, because of their nearly constant association from most groups of proveniences.

Colton (1956) dates the introduction of Tsegi Orange and Kiet Siel Black-on-red at A.D. 1250. However, types that should be associated with these, such as Kayenta Polychrome and Kayenta Black-on-white, were not found at NA7498, indicating that Tsegi Orange and Kiet Siel Black-on-red made their appearance before A.D. 1250.

The absence of Kiet Siel Polychrome at NA7498, a type that apparently makes its appearance about A.D. 1225 (Colton, 1956), suggests that either NA7498 was not occupied after A.D. 1225, or the time of introduction, at least in the Navajo Mountain area, was later. The former possibility seems more likely, as types previously thought to date even later were found at NA7498, and it seems improbable that at least some Kiet Siel Polychrome would not

have found its way there also. Since it appears that the occupation at Surprise Pueblo ended about A.D. 1225, the initial date for Tsegi Orange and Kiet Siel Black-on-red was at least that early.

The temporal ranges of Flagstaff and Tusayan Black-on-whites are extended so they overlap in Fig. 67 because of the evidence from Burial 4 and because in many other proveniences at NA7498 Flagstaff Black-on-white sherds were found associated with Tusayan Black-on-white. This frequent association of Flagstaff Black-on-white with Tusayan Black-on-white had been noted previously in surveys and excavations along the San Juan and Colorado Rivers (Adams and Adams, 1960; Adams, Lindsay, and Turner, 1961), although Tusayan Black-on-white was classed there as "Wupatki Black-on-white" because dates previously assigned to Wupatki Black-on-white agreed more closely with the dates for the associated ceramic materials. Colton's (1955) dates for Flagstaff and Tusayan Black-on-white seem to indicate a 25 year hiatus at the beginning of the 13th century during which no black-on-white pottery was manufactured in the Kayenta area. This unlikely situation is remedied by revising those dates as is shown in Figure 67.

The initial date of Kiet Siel Gray is revised to approximately A. D. 1175, and may be even earlier. This is based on the fact that it was found in appreciable quantities in all proveniences, even the earliest, although generally increasing as Tusayan Black-on-white and Tusayan Polychrome also increase.

It should be mentioned that in a re-evaluation of pottery types and dendrochronological data Breternitz (1963) substantiates most of the foregoing revisions, but at the same time may change some of the ideas presented here by extending the terminal dates of types such as Black Mesa and Sosi Black-on-whites.

Site Chronology. With these mostly minor alterations in the temporal placement of pottery types recovered from NA7498, it is possible to bracket the time for which they all occur, somewhat before A.D. 1100 until about 1225. It is likely that the life of the site did not extend much earlier or later than the lines drawn in Fig. 67. It is not considered to have gone on any later in time because of the absence of Kayenta Black-on-white, Kayenta Polychrome, and Kiet Siel Polychrome. It is doubtful whether the site was occupied much earlier because of the relatively small percentages of Black Mesa, Sosi, and Dogoszhi Black-on-whites and Medicine Black-on-red. It is postulated that the first 50 or 100 years of occupation at the site was only slight or intermittent, with the major occupation occurring about A.D. 1200, shortly before the pueblo was abandoned.

Relatively little evidence could be seen during excavation concerning the relative ages of various parts of the site. This evidence included the following observations:

1. The kiva had been dug down through what

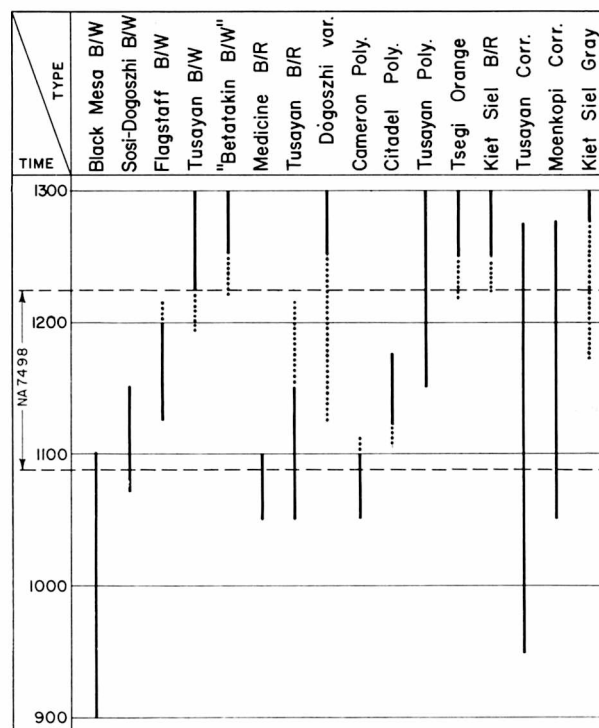


FIGURE 67. Temporal ranges of pottery recovered at NA7498. Solid lines indicate dates given by Colton (1955, 1956), dotted lines indicate extensions of those dates based on data from NA7498. Horizontal dashed lines indicate time during which NA7498 was occupied.

appeared to be an earlier structure. After the kiva was abandoned, slumpage caused parts of this structure to be deposited in the kiva fill.

2. Rooms 1 and 7 were constructed after Rooms 2 to 6.

3. Pithouses 1, 3, 4, and 5 were constructed at the same time as Room 7.

4. Pithouse 2 was abandoned at the time Room 7 and the other pithouses were constructed.

5. At about the time Room 7 was constructed, an earlier enclosing wall extending from the corner of Room 6 was torn down.

6. The main room block, especially Rooms 5, 6, and 7, was constructed against earlier trash-laden sand.

In order to test these and other relationships by means of ceramic data, Figure 68 was prepared. In this figure, the 82 proveniences recognized at the site have been grouped into 10 lots, with some proveniences repeated for a comparison of Levels 1 and 2 in the trash. The proveniences grouped are from the same general area of the site, and from the above evidence are not considered to differ greatly in contemporaneity. In addition, only those proveniences which preliminary ceramic inspection indicated were essentially contemporaneous were grouped together.

Several anomalies do occur, however, which upon detailed examination are not as serious as they may seem at first. One of these irregularities is the

grouping of Pithouses 1 and 2 together, where, as shown above, probably they were not contemporaneous. This is justified for several reasons. First, the figures for the pithouses taken separately show no significant differences, so one is not altered by grouping it with the other. Secondly, relatively few sherds were recovered from within Pithouse 1, and if graphed separately would not be reliable statistically. Most significant is the fact that the great majority of the sherds from Pithouse 2 were recovered from within the trash fill, whereas a much higher percentage of the sherds found in Pithouse 1 were found on the floor. Most of the two lots therefore are contemporaneous, as it is assumed that Pithouse 2 was being filled with trash at about the same time Pithouse 1 was being lived in. Trench 1 would have been grouped with these two pithouses, having passed through them both, were it not for the fact that the percentages are appreciably different.

Since no detailed sherd count by provenience will be presented, a brief summary of what proveniences are included within each group follows:

Trash, L 2 and 3—this group includes all sherds from the second and third 25 cm. levels excavated in 11 of the 12 squares excavated in the trash. The sherds from Levels 1 and 2 in Square 9 were omitted from this and the following grouping because they were inadvertently mixed in the field.

Trash, L 1—the sherds from the topmost level of all squares, again omitting those from Square 9, Levels 1 and 2.

Trash, north half—included here are sherds from all levels of Squares 5, 6, 11, and 12, Trench 13, and the north half of Trench 11.

Trash, south half—includes Squares 1, 2, 3, 4, 7, 8, 9, and 10, and the south half of Trench 11. These last two groupings were made in the hope of defining horizontal stratigraphy in the trash, and cannot be compared with the first two groupings by level, as many sherds are counted in both pairs of groupings.

Trenches 2 and 3—includes sherds from the trenches outside the rear pueblo wall.

Feature 1—this grouping includes not only sherds from within Feature 1, but sherds recovered from the contemporaneous level around the sides of the kiva and sherds from within the kiva fill. The latter are included here as most are thought to have been derived from the slumping of Feature 1 and the associated features into the kiva after its abandonment.

Trenches 4, 5, 6, 7, 8, 9, 10, and 12—sherds from these somewhat scattered proveniences were grouped together because ceramically they are contemporaneous and because they all appear to have been excavated through the same late, living surface and into a minor amount of earlier trash.

Burials—the sherds found scattered within the burial pits were all grouped together rather than with the trash because it was felt they were all from churned trash that slumped and was placed into the pits. Of course they do not date the burials, as some

sherds are from trash deposited before the burial was made, and others from later trash that slumped into the collapsed pit.

Trench 1—sherds from this trench were kept separate because ceramically they differed from the lots from the other trenches and from Pithouses 1 and 2, and because Trench 1 intersected all the pithouses rather than just the open living area as did the other trenches.

Rooms 1-7—sherds from all levels within all surface rooms were grouped together for this analysis because no single room or level within a room yielded enough sherds to make statistical comparison reliable.

Pithouses 1 and 2—includes sherds from both the fill and floor of these two pithouses.

Kiva—this category includes sherds found on the kiva floor, in the floor fill, and in the firepit. This is statistically the most unsatisfactory group because of the small number of sherds.

Referring again to Figure 68, the total length of each bar represents 100 per cent of the sherds from each provenience group that could be identified to type within each ware. Sherds which do not have enough identifying features are not included in this analysis. Each bar is divided on the basis of the frequency of each type within the ware. For simplicity, some lumping has been done, but percentage trends of these combined types are given below. In Tusayan White Ware, Sosi and Dogoszhi Black-on-whites have been combined because they are contemporaneous and for practical purposes are only stylistic variations of the same type (Colton, 1955). "Betatakin" Black-on-white has been lumped with Tusayan Black-on-white, because as mentioned earlier, Betatakin seems to be a stylistic variant of Tusayan Black-on-white. ("Betatakin" Black-on-white increases erratically as Tusayan Black-on-white increases, but never exceeds 10 per cent in any provenience group.)

In Tsegi Orange Ware, Medicine Black-on-red has been combined with Tusayan Black-on-red (see Adams and Adams, 1959:24). (The highest percentage of Medicine Black-on-red was found in Trenches 2 and 3, where it totals 11 per cent of the Tsegi Orange Ware, but averages only 3 per cent for the entire site.) Tusayan Black-on-red (Dogoszhi Var.) has also been combined with Tusayan Black-on-red (it reaches its highest proportion in Rooms 1 to 7, with 17 per cent, and decreases as true Tusayan Black-on-red increases). Since neither Cameron nor Citadel Polychrome forms a significant percentage alone, they have been lumped for this graphic representation. The "late" types that occur in minor quantities, Kiet Siel Black-on-red and Tsegi Orange, have been combined with Tusayan Polychrome for simplicity, as neither is common enough to represent on the graph (a slight tendency is apparent for Tsegi Orange to increase as Tusayan Polychrome increases, but it never exceeds 7 per cent of the Tsegi Orange Ware, averaging only 2 per cent for the entire site).

In Tusayan Gray Ware, the only lumping has been of sherds identified as "Lino Tradition" with Kiet Siel Gray, as the former always form only a

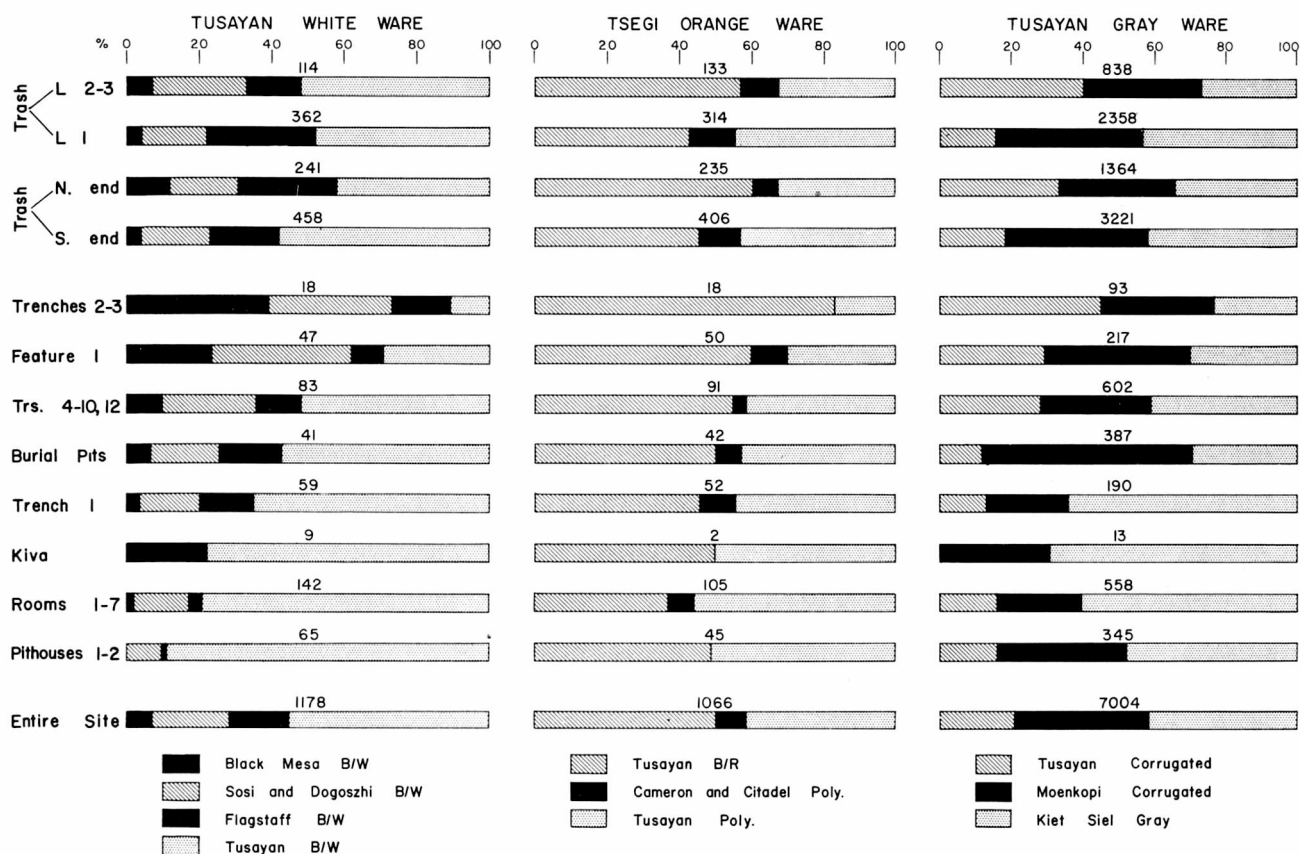


FIGURE 68. Pottery type percentages by ware from various provenience groupings, NA7498. Number of sherds on which percentages are based are shown above each bar. Unclassified, unidentifiable, and intrusive sherds are omitted.

small amount (up to 5 per cent) of the total, and have an erratic distribution.

The provenience groups are arranged chronologically from early to late in three groups; the separate levels in the trash, the different ends of the trash, and the eight other provenience groupings. The chronological ordering of all except the trash levels is based primarily on the different relative percentages of types of Tusayan White Ware. On the basis of Tusayan Black-on-white, Level 1 of the trash appears slightly earlier than Levels 2 and 3, but it can be seen that Black Mesa, Sosi, and Dogoszhi Black-on-whites form a greater percentage in Levels 2 and 3. The generally poor ceramic differentiation, except in the Tusayan Gray Ware, between the trash levels is explained by the constant churning by walking, burials, and animals and the fact that the earlier trash is concentrated at the upper (north) end, whereas at the south end most of the trash was later. Consequently, Levels 2 and 3 in the southern squares produced a much higher proportion of later sherds.

This crude seriation of Figure 68 is considered valid because the orange and gray ware types reveal fairly consistently the same trends as do the black-on-whites. It is apparent that the original observations concerning the chronology of the site are all supported by the ceramic evidence. Feature 1 and the trash en-

countered by Trenches 2 and 3 are earlier than other parts of the site, and the surface rooms, pithouses, and kiva are roughly contemporaneous. The horizontal differentiation within the trash was first recognized in the laboratory and is an example of the kind of additional information that can be gained by means of this sort of analysis.

Another method of establishing some degree of contemporaneity of different proveniences is the finding of sherds that are unquestionably parts of the same pot in those different proveniences. No exhaustive search was made for such sherds, but over 20 matches were noted during the course of analysis. In this manner, almost every trench, square, and level within the trash can be said to be at least in part contemporaneous with every other, due to the churning of the trash as mentioned before. Other instances show that different parts of at least three different vessels were found in the trash and again in the fill of Pithouse 2, showing that Pithouse 2 was being used as a trash dump at the same time the hillside in front of the pueblo also was being so used. It is considered unlikely that Pithouse 2 was filled in deliberately with trash taken from the trash area for that purpose, because of the closer proximity of an abundance of sand that could have been used if the principal object was to fill the abandoned structure. Sep-

arate pieces of one vessel were found in the trash, in the floor fill of the kiva, and on the surface. Different pieces of another bowl were found on the floor of Feature 1 and in the fill of the kiva, substantiating the idea that some of Feature 1 slumped into the kiva. Separate pieces of two vessels were found in the trash and in Trench 7, and the partial contemporaneity of Trench 2 with Trench 4 was doubly established in the same manner. It is noteworthy that of the instances determined, none indicated partial contemporaneity of two proveniences that had, on the basis of other evidence, been considered decidedly separated in time.

Tusayan Gray Ware Subdivisions. Very little temporal differentiation could be distinguished between the various subdivisions of Tusayan Corrugated, Moenkopi Corrugated, and Kiet Siel Gray that were separated during the initial stages of analysis. Utilizing only the data from the trash, because the greater quantities of sherds derived from there make the comparisons more statistically reliable, the following

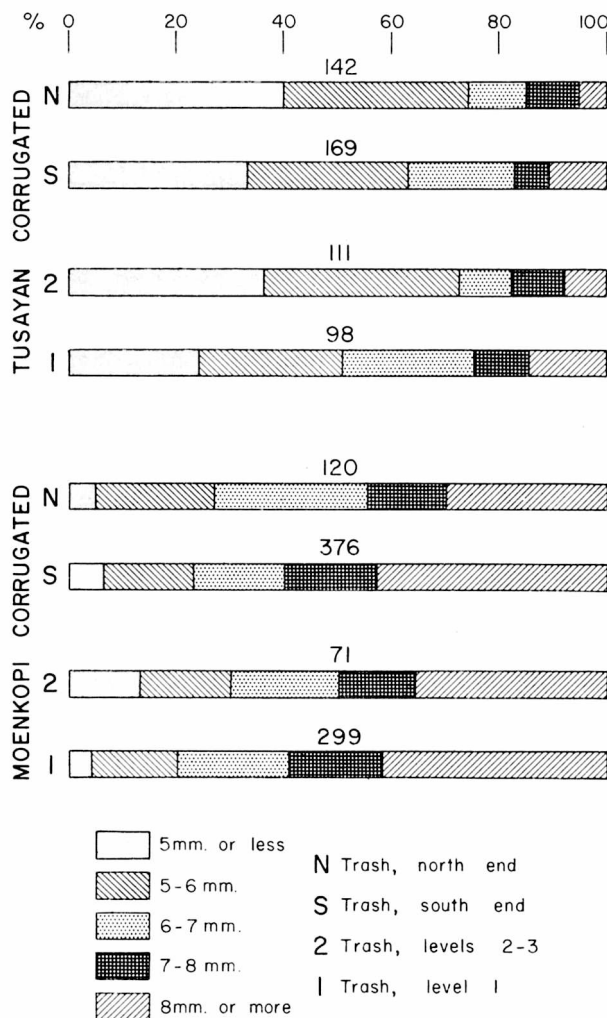


FIGURE 69. Coil width on Tusayan and Moenkopi Corrugated, NA7498.

tentative observations are possible.

In Tusayan Corrugated, there is an apparent tendency for the subtypes of exuberant, obliterated, and unindented to increase in the lots determined to be later (Level 1 and the lower end), but together they never exceed 13 per cent of the total amount of Tusayan Corrugated from any group of proveniences.

The subtype of Moenkopi Corrugated with overlapping coils shows a small tendency to form a larger percentage of the total Moenkopi Corrugated in the later lots, being 42 and 44 per cent in Level 1 and the lower end as opposed to 39 and 36 per cent in Levels 2 and 3 and the upper end. This is a reflection of the fact that Moenkopi Corrugated and Kiet Siel Gray are parts of a continuum, and as Kiet Siel Gray increases, so does the form of Moenkopi Corrugated that most closely resembles Kiet Siel Gray.

Kiet Siel Gray, in turn, is formed of a slightly higher percentage of pottery on which the coils are completely obliterated in the later lots, 66 and 68 per cent in Level 1 and the lower end of the trash, as opposed to 63 and 60 per cent in Levels 2 and 3 and the upper end.

More definite tendencies are noted in the matter of coil width of Tusayan and Moenkopi Corrugated. As can be seen from Figure 69, coil width in both types is noticeably greater in the later lots. This observation is at odds with that made by Beals, Brainerd, and Smith (1945:66-67), a difference we are unable to explain at present. The data from NA7498, however, can be explained logically as a result of the gray ware continuum from relatively narrow indented coils (Tusayan Corrugated) through broader flattened coils (Moenkopi Corrugated) to even broader obliterated coils (Kiet Siel Gray). Through time, more Tusayan Corrugated resembles Moenkopi Corrugated, which in turn tends more to resemble Kiet Siel Gray.

The data from NA7498 indicate that further subdivision of the established types of Tusayan Gray Ware, at least for the Cummings Mesa region in the early 1200's, will not yield any significant results, whereas examination of coil width may lead to the definition of certain tendencies and therefore to more precise chronological placement of sites and individual features within sites.

Summary

The pottery complex found at NA7498 indicates that the site was occupied during the 12th and early part of the 13th centuries, with the peak of occupation occurring shortly before abandonment. Most of the pottery can be classified as belonging to typical Kayenta Anasazi Wares. The majority of these types have been adequately described earlier, but descriptions of a few are slightly expanded to include stylistic variations found at NA7498. The temporal ranges of some have been extended also to correspond with the data from this pueblo. A number of sherds found indicate contact with Kayenta peoples on the west side of the Colorado River. A few indicate some degree of trade with peoples of Mesa Verde origin and with the Flagstaff area. A number of black-on-white sherds could

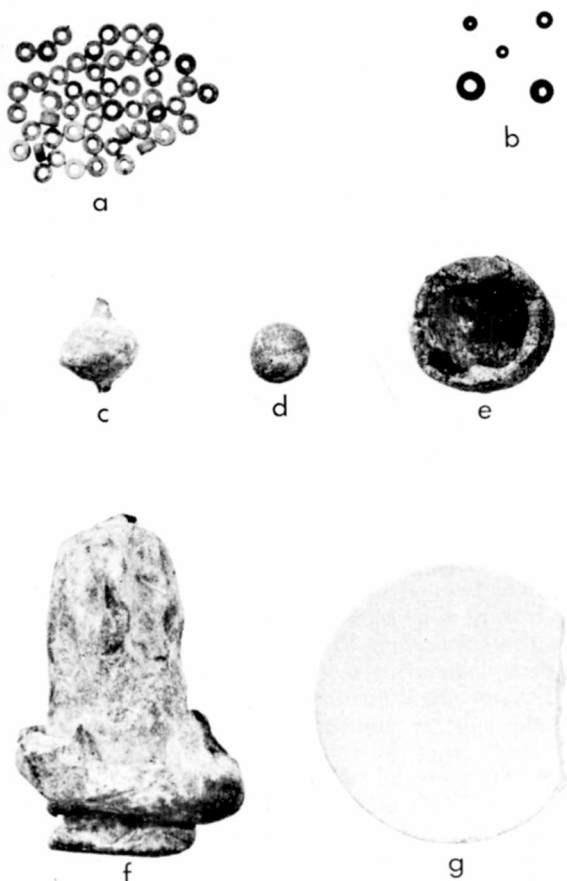


FIGURE 70. Miscellaneous artifacts from NA7498. a, shell beads; b, stone beads; c, clay object; d, clay ball; e, miniature clay bowl; f, clay figurine; g, sandstone disk. Length of f, 60 mm.

not be identified, indicating the need of more work in marginal areas and in the Kayenta heartland itself.

Clay

Several artifacts of clay were recovered. None appear to have been fired purposefully, although some were hardened by virtue of having been deposited in the kiva firepit.

Figurine. In the ash of the kiva firepit was a crude figurine (Fig. 70 f) 6 cm. high, made of brownish sandy clay. Only the head and neck are represented. It is almost cylindrical, being flattened only slightly. The base of the neck is flattened and slightly enlarged, making it possible for the head to stand upright. The nose had been made by pinching up the sides of the face. The left eye had been formed by incising with a sharp tool. The right eye was not represented. The mouth is circular, the lips being formed by a small rim of clay. Completely encircling the neck is a fillet of clay, reminiscent of the ruff or collar found on many Hopi kachinas. Now missing, but originally extending upward from the collar on either side of the head to a point about even with the center of the nose were additional pieces of clay that

may have represented hair. Some sort of appendage had been attached to the top of the head, but only a fragment remains.

Figurine (?) Fragments. Also found within the kiva firepit were 66 clay fragments, many of which appear to have been parts of figurines. Most are of brownish-yellow clay and some are of brownish-red clay. All show signs of modeling. No recognizable parts are present, although several appear to have been limb-like appendages.

Ball. A small ball of reddish clay (Fig. 70 d) 10.5 to 11.4 mm. in diameter was also in the kiva firepit. Its use is unknown.

Miniature Spindle Whorl (?). Also within the kiva firepit was a bi-conical object resembling a spindle whorl (Fig. 70 c), made of yellowish-brown clay. It had been modeled around a small stick or piece of grass 1 mm. in diameter which had subsequently disintegrated or been pulled out. The body is 14.4 to 14.8 mm. in diameter. It is sharply tapered on either end, and has a length of 17.2 mm.

Miniature Bowl. A miniature bowl (Fig. 70 e) was found in the floor of Pithouse 2. It had been modeled from a single lump of gray clay. It measures 18 mm. high and has a maximum diameter of 25 mm.

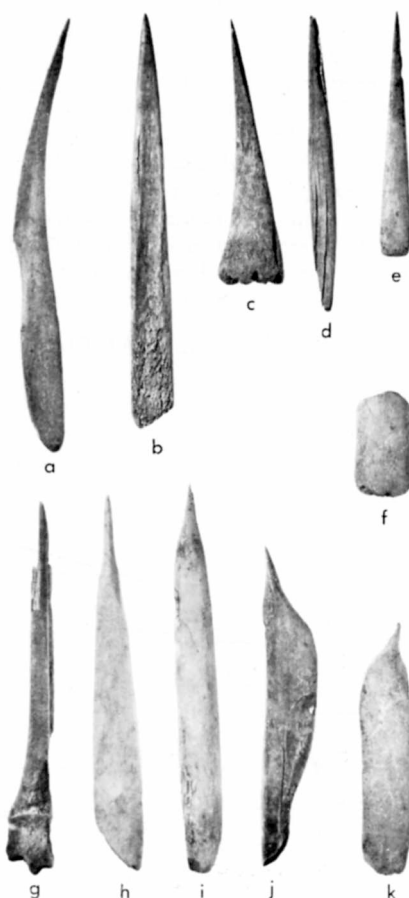


FIGURE 71. Bone artifacts from NA7498. a-e, g-k, awls; f, gaming piece (?). Length of a, 12.4 cm.

Miscellaneous. An amorphous, small lump of clay that had been irregularly molded around a tuft of grass was found in Square 10, Level 1.

Bone and Shell

Only 20 bone artifacts were recovered from NA 7498. No artifacts of horn or antler were found.

Awls. Seventeen awls (Fig. 71) were recovered, six of them associated with Burial 4. Most awls were manufactured from splinters of large mammal bones. Four include part or all of the head of the bone, and one was made from a rib. Complete specimens range in length from 7.0 to 12.4 cm. On the basis of the shape of the point, the awls can be divided into two groups. Ten have points that are narrow, long, tapering, and usually sharp (Fig. 71 *a-e*). One of these is tapered on both ends. Six have points that are broad, short, abruptly tapered, and often blunt (Fig. 71 *h-k*). One (Fig. 71 *g*) had been long and narrow originally, but had been broken and re-used as a short, broad point.

Gaming Piece (?). A fragment of a limb bone had been broken, and the ends somewhat rounded off by grinding to form an oval piece 30 mm. long and 17 mm. wide (Fig. 71 *f*).

Smoothed Bone. A fragment of a large mammal limb bone had been lightly smoothed on all broken edges, probably by use as a scraping tool. A fragmentary mountain sheep rib has one end ground down at an oblique angle, but shows no sign of use.

Beads. The only shell artifacts recovered from NA7498 are a group of 50 beads associated with Burial 1. These cylindrical beads (Fig. 70 *a*) range in diameter from 3.5 to 4.2 mm., and in thickness from 1.3 to 2.5 mm. The center holes are all somewhat conical, having been drilled principally from only one side of the bead. The smallest part of the holes range from 1.1 to 1.9 mm. in diameter.

NON-ARTIFACTUAL MATERIAL

Bone. Relatively little unmodified bone was recovered from NA7498, hinting that the inhabitants may have placed little reliance upon hunting to supplement the diet. Identified bones and fragments are listed in Table 23. Mountain sheep commonly was eaten, with cottontail rabbit second in importance.

<u>Mammal</u>	<u>Number</u>
Mountain sheep, <u>Ovis canadensis</u>	96
Cottontail rabbit, <u>Sylvilagus</u> sp.	19
Dog, <u>Canis familiaris</u>	11
Gray fox, <u>Urocyon cinereoargenteus scottii</u>	3
Jackrabbit, <u>Lepus californicus texianus</u>	1
Bobcat, <u>Lynx rufus baileyi</u>	1
Rock squirrel, <u>Citellus variegatus</u>	1

TABLE 23. Identified non-artifactual faunal remains from NA7498.

Plant Remains. A number of squash (*Cucurbita pepo*) seeds were found in association with Burial 3 (Appendix I). No other domesticated plant remains were recovered.

Wood. Two specimens for dendrochronological analysis were found associated with Burial 3. One of these is juniper and the other ponderosa pine. Neither could be dated. The presence of ponderosa pine is surprising for Cummings Mesa, as none grows there today. However, it is possible that if such a tree became established near NA7961 it would continue to grow in that moister and cooler local environment.

SUMMARY AND DISCUSSION

NA7498 was named Surprise Pueblo primarily because of the unexpected finding of the pithouses, built as an integral part of the surface unit. The prominence of pithouses in the architectural pattern of the Pueblo II and III Kayenta Anasazi has become recognized only within recent years as a result of different types of salvage operations. The form and the manner in which those at Surprise Pueblo were constructed adds a new dimension to the increasing body of information concerning this architectural form. NA7498 was occupied during a period from about A.D. 1100 to 1225. Occupation during most of this period was probably light or intermittent, with the most intense period occurring shortly before the pueblo was abandoned. Most of the architectural features associated with the early parts of the occupation, in late Pueblo II times, were destroyed by later Pueblo III construction, which began with the building of a five room masonry surface pueblo and possibly an isolated pithouse. This was then enlarged to six rooms with wing wall appendages added to either end enclosing a completely isolated circular kiva. In the last phase of construction the size of the pueblo was almost doubled by the addition of another surface room and four pithouses. Since these pithouses apparently were used as domiciles, it is possible that some surface rooms formerly used as living quarters were then remodeled to serve as storage units.

Although Surprise Pueblo seems large in comparison with most of the other sites excavated on Cummings Mesa, it is doubtful that it ever housed more than 30 people at any one time, and 20 seems a reasonable estimate.

Pottery recovered from NA7498 is principally of Kayenta Anasazi wares and types. Some contact with peoples outside the Kayenta heartland is indicated by the presence of pottery from Kayenta-like peoples to the northwest, Mesa Verde peoples to the northeast, and peoples of the Flagstaff area.

Evidence gathered previously in the Glen and San Juan Canyons has suggested the need for revision of some of the dates assigned to certain pottery types. The much larger ceramic collection from Surprise Pueblo confirms this need, so these dates are adjusted accordingly.

The approximate length of occupation and cultural affiliation was predicted quite accurately from the sherds recovered on the surface survey in 1960, indicating that surface data from unexcavated sites

are also reliable in these respects. Caution is suggested, however, in taking surface indications at face value for unexcavated sites. The gross form and size of Surprise Pueblo was estimated correctly before excavation, but the presence of five pithouses was totally unexpected.

In summary, excavations at Surprise Pueblo have provided architectural and ceramic data that are applicable not only to other sites on Cummings Mesa, but to the entire Kayenta area.

NA7902

INTRODUCTION

History, Location, and Physical Description

This site was first recorded in 1961 and was excavated in April, 1961. No previous record of the site exists.

NA7902 is a one room structure with several associated hearths (Fig. 72) about 35 yd. north of and slightly below NA7485, at an elevation of approximately 5780 ft. It occupies a flat platform, approximately 40 ft. long by 30 ft. wide, on a narrow rock terrace which is an extension of a series of ledges that form the north side of Catfish Canyon. Immediately northwest of the room the terrace slopes down into a shallow drainage leading into the main streambed. This terrace is about 20 to 30 ft. above the streambed, and drops off almost vertically at the southwest into the stream channel. Water occurs irregularly in potholes in the streambed, which has been entrenched to a depth of 6 ft. The dominant plant cover at the site is blackbrush; while ephedra, pinyon, juniper, yucca, arrowweed, and grasses occur on the ledge shelves in shallow soils and alluvial sediments below the site.

Surface Indications

Parts of the room walls stood approximately 30 cm. above the present ground surface. A thin trash deposit is located to the west and downslope from the room. Sherds and lithic debris were scattered rather sparsely over the site area. Upright slabs and



FIGURE 72. General view of NA7902, looking south.



FIGURE 73. Room 1, NA7902.

charcoal-stained sand marked the location of three hearths on the slope, below and northwest of the masonry room. The site was undisturbed at the time of excavation.

Problem

NA7902 was excavated in order to sample a one room structure and the associated features. The fact that only one room appeared to be present suggested that it may have been an outlying field house, and the temporal and spacial relationships to nearby larger excavated sites (NA7485, NA7456, and NA 7498 are located within a mile radius of NA7902) were deemed worthy of investigation.

EXCAVATIONS

Excavation consisted of removing the fill around the perimeter of the room in one level, and removing the fill inside the room from the surface to the floor in one level. In addition, three hearths were cleaned out, and tests were made in the area around the hearths.

Domestic Structure

Room 1. All four walls of the room (Figs. 73, 74) were formed of irregularly shaped slabs of sandstone, probably derived from local ledge outcroppings 50 ft. to the northeast. The sandstone blocks vary in thickness from 4 to 17 cm., and in length from 14 to 54 cm. The interior wall surfaces were roughly faced, and the exteriors crude and uneven. The stones were set in copious amounts of mortar, with small slabs and spalls used for chinking. The corners of the room are not square, and the walls are slightly bowed outward. The walls were footed on bedrock in the southeast corner of the room, and on sand elsewhere. No plaster was found. The walls range from 18 to 47 cm. thick, averaging 37 cm. thick.

The doorway may have been near the south end of the west wall. However, it was not well preserved and could not be definitely defined as an entry.

The floor was composed of compacted sand and reddish clay, with some bedrock in the southeast corner. In most cases, the floor condition was poor and could be found only by the presence of charcoal flecks or clay laminae. The floor is located approxi-

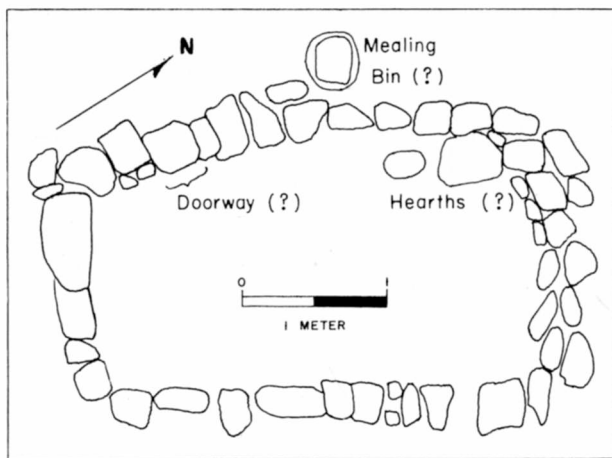


FIGURE 74. Plan of Room 1, NA7902.

mately 30 cm. below the present ground surface, and probably was continuous with the ground surface at the time of original construction. The presence of two hearths in the room is assumed from two elliptical charcoal stains, basin shaped in cross section, and approximately 5 cm. deep. No slabs were found to indicate lined hearths. One hearth is located adjacent to the west wall, and the other is in the northwest corner of the room.

The fill around the outside of the room was sandy and included rocks and spalls from fallen walls. Two mano fragments were found on the occupation surface next to the east wall. One open trough metate was adjacent to and leaning against the west wall, and a chopper and a mano fragment were found near the west wall. Sherds were sparsely scattered in the fill. This deposit immediately outside the walls ranged from 5 to 20 cm. deep. The fill inside the room averaged 30 cm. deep. It was composed of fallen masonry and windblown sand.

Other Architectural Features

Feature 1. Adjacent to the west wall of Room 1 and about 10 cm. below the base of that wall is a feature that may represent a catch basin for a mealing bin. It consists of a flat slab 10 mm. thick laid horizontally and rimmed with white clay. The fact that mano fragments and a metate were nearby support the interpretation of this feature as a mealing bin.

Hearths. Three slab-lined hearths are located about 7 m. northwest of the room, in a row which follows the contour of the slope on which they were built. The occupational surface associated with the hearths is 15 cm. below the present ground surface. All of the hearths were made of nearly upright unworked sandstone slabs and blocks measuring between 2 and 4 cm. thick, 10 to 40 cm. wide, and 15 and 50 cm. long. The bottom lining slabs, which abut to the sides, tend to be quite thin. Charcoal debris is most dense at the bottoms of the hearths. There is a slight mixing of hearth debris outside the hearths to a distance of 2 to 5 cm.

Hearth 1 is the largest and deepest of the three

hearths. It measures 90 cm. in diameter at the rim, 80 cm. in diameter at the bottom, and 60 cm. deep from the rim to the bottom. The fill, of burned sand mixed with charcoal, contained a few sherds.

Hearth 2 is very shallow and in poor condition. The fill of charcoal and burned sand was about 15 cm. deep. This hearth was 80 cm. in diameter.

The fill of Hearth 3 was 30 cm. deep and consisted of burned sand and charcoal. The charcoal in this hearth was much more concentrated than in Hearths 1 and 2. Very little charcoal staining occurred outside of this hearth. Of the three hearths, this one is the best preserved (Fig. 75).

The sherds excavated from the hearths unfortunately were lost; however, field identifications made at the time of excavation indicate that they were either Tusayan or Moenkopi Corrugated. No other artifacts were found.

ARTIFACTS

Lithic Material

Very little lithic material was recovered from NA7902. The three mano fragments and a chopper recovered by excavation were lost between the field and the laboratory, and therefore, only one metate and the surface collections of stone remain.

Metate. The one metate recovered, of sandstone, is a trough, closed at one end. It is 38 cm. long, 28 cm. wide, and 9 cm. thick. The grinding surface is 32 cm. long, 19 cm. wide, and 1.5 cm. deep.

Hammerstones. Two hammerstones were recovered from the surface. Both are small, one is chert and the other quartzite. Both show extensive battering on protuberant edges, and appear to be purposefully shaped nodules. They are 5 and 7 cm. in greatest diameter.

Chopper. One small, crude quartzite nodular chopper was collected from the surface. It had been chipped bifacially to form a jagged cutting edge.



FIGURE 75. Hearth 3, NA7902.

Tusayan White Ware	
Dogoszhi B/W	2
Tusayan B/W	1
Tsegi Orange Ware	
Tusayan B/R	2
Tusayan Poly.	1
Unclassified	5
Tusayan Gray Ware	
Tusayan Corr.	4
Moenkopi Corr.	11
Kiet Siel Gray	2
Unclassified	4
TOTAL	32

TABLE 24. Pottery from NA7902, surface.

Part of the stone's original cortex is present. The tool is 50 mm. in diameter and 28 mm. thick.

Other Lithic Material. Several flakes of chert were found, some of which have use chipping on them. Two large flakes, one of chert and one of quartzite, show evidence of battering on some edges, and perhaps these are hammerstone fragments.

Pottery

Unfortunately, the few sherds recovered during the course of excavations at NA7902 were lost en route to the laboratory, so the only pottery available for study is the surface collection. These surface sherds (Table 24) indicate that the site was occupied in late Pueblo II and early Pueblo III times.

SUMMARY AND DISCUSSION

NA7902 consists of a rectangular masonry surface room and three circular slab-lined hearths. The room lacks formalized floor features and appears to have been constructed carelessly. The nearby hearths apparently were associated with the room, as one contained contemporaneous pottery. Pottery recovered from the surface indicates that the site was occupied sometime between A.D. 1100 and 1225. The paucity of trash and lack of formalized floor features in the room suggests that the site was occupied only sporadically, possibly seasonally during the times crops required attention. If the site was used as a temporary farmhouse, probably it was associated with a larger site some distance away, rather than close by where the farmers could return home easily at night. However, since the site appears to be slightly earlier than the majority of the sites on Cummings Mesa, especially the larger ones, it is difficult to determine what site or sites it may have been associated with, and it is possible that it may have been a self-contained unit.

The circular slab-lined hearths are interesting because they show that the use of a type of feature often found in Basketmaker horizons continued well into the Pueblo periods.

NA7940

INTRODUCTION

History, Location, and Physical Description

NA7940 was surveyed in April, 1961, and a por-

tion of it tested in May, 1961. It is located on a low promontory at the south side of the Catfish Canyon drainage system on Cummings Mesa. Eolian dune sand has formed a ridge line on the underlying bedrock, the Saltwash member of the Morrison formation. Bedrock outcrops in a series of ledges around the site and at the southwest in a small butte less than 50 ft. above the site. At least two large ruins of more than 10 rooms are within 1 mi. of this site. The dune sand underlying the masonry structures of the site is cut by numerous small gullies formed by intense sheet erosion. The main gully, on which five masonry terraces occur, originates about 10 yd. south of the site, is oriented northeast by southwest, and drains to the northeast into the Catfish system. Nearly level arable land occurs .2 mi. to the northeast of the site in a narrow bottomed valley. A shale outcropping occurs near the site, and building stone has been quarried from a jointed ledge outcropping of bedrock a few dozen yards from the site. Areas where the stones have been pried away are evident on the outcropping, and a pile of the quarried, lichen-covered, unutilized stone is nearby. A partially constructed room built of the quarried material lies a few yards south of the building stone stockpile.

No good water sources occur in the immediate vicinity, although there are a few plunge pools and potholes in the nearby Catfish Canyon tributaries. The site location presents an excellent view of the northern and southern rims of Cummings Mesa. Blackbrush covers the site, and scattered stands of silvertassel, ephedra, pinyon, yucca, and grasses occur spaced widely over the area. The site is open to the elements at all times, as is evident by the erosion taking place, and is easily accessible from all directions except from the west, which is near the vertical escarpment of Catfish Canyon. This area is used today for grazing by the Navajo, and a sweathouse is located about .5 mi. east of the site.

Surface Indications

Before excavation, the site was known to consist of several terrace structures, one partially constructed room, four hearths, one circular masonry unit, and several room structures. A large trash deposit is eroding rapidly into the gully. The masonry walls of the several structures were partially covered by dune sand. The five terrace walls were definable in the center of the gully a few meters distant from the masonry rooms.

Problem

Testing of the site was undertaken because the terrace structures which occur here were the first and largest agricultural structures found on Cummings Mesa.

EXCAVATIONS

Agricultural Structures

Excavations were carried out below the masonry pueblo in the gully, and consisted of the clearing and testing of the uppermost or first terrace, and the preparation of the others for photography (Fig. 76). The



FIGURE 76. Agricultural terraces at NA7940.

gully in which the terraces are located has an average gradient of 15 per cent; however, the upper end in the vicinity of the first three terraces is steeper.

Five terraces make up the agricultural complex at this site. From the uppermost alignment to the lowest, the distances between each are 2.8 m., 2.4 m., 9.0 m., and 4.0 m. respectively. The distance of 9 m. between the third and fourth terraces reflects the abrupt change in the longitudinal profile of the gully to a less inclined slope below the third terrace. The top of the first terrace wall was taken as an arbitrary datum point and levels were studied by natural stratification. The first level, consisting of the first 10 cm. of deposit, was stripped from both sides of the terrace for inspection and photography. This layer consisted of light tan, loosely compacted sand, and contained many sherds. The tan sand is slope-wash which has been held in place by the terrace wall.

A test pit was dug on either side of the terrace, and the sediments were removed in natural levels. The first level, 0 to 10 cm., consisted of the tan sand and sherds previously mentioned. The next level, from 10 to 25 cm. below the datum line, consisted of a layer of red, charcoal-stained sand, which apparently had been washed in from the shale bed on top of the

mesa to the south. This layer abutted to the terrace wall on both sides. It also contained sherds and debris deposited probably at the time of occupation. The layer of red sand overlay a layer of sterile orange sand, 25 to 50 cm. below the datum line. This orange sand was slightly calcified at the base of the trench.

The terraces were all made of large unshaped boulders from a local source. Where small stones were used, they were reinforced usually on the downhill side by stone slabs. All of the terraces were crudely built of one to three courses of stone. The rocks used in construction were from 50 to 70 cm. in diameter, and when slabs were used, they ranged from 5 to 10 cm. in thickness. Mortar was used between some stones, but generally the courses are dry laid. The terraces ranged between 3 and 3.8 m. in length. The stones of the terraces project from 5 to 30 cm. above the ground surface, and the terraces ranged in thickness from 25 to 70 cm. Terraces 1, 2, and 3 were slightly curved. The tested terrace, Terrace 1, is 15 m. below the walls of the rooms, and abuts to rock ledges on the southeast and to a sand dune on the north.

ARTIFACTS

Lithic Material

The stone collection from this site is solely from the surface, since none came from the excavations. Two ground stone implements were collected; a one-hand mano and a full-grooved maul (Fig. 77). The mano is formed of pinkish medium-grain sandstone and is 78 mm. long, 70 mm. wide, and 46 mm. thick. In transverse cross-section the implement has two convex surfaces, nearly parallel. The maul is made from a piece of medium-grain sandstone, and prepared for hafting by a full encircling groove. The specimen is triangular in transverse cross-section and measures 113 mm. long, 75 mm. wide, and 55 mm. thick. Each side of the object displays grinding facets, and one surface in particular reflects a secondary use as a mano.

Stone chips were common to the site and nearly half of those collected displayed use and secondary chipping derived from cutting and scraping functions. Jasper and chert were the most prominent rock types used, with chalcedony, quartzite, and agate appearing in lesser numbers. Two pieces of hematite were recovered also.

Pottery

The excavated ceramic material is approximately one-half that taken by surface collecting, yet the smaller collection seems to reflect some information when the two samples are compared (Table 25). The sherds collected from the terrace excavations represent a slightly later complex than from the site as a whole. The surface material indicates at least two ceramic periods of Kayenta occupation at NA 7940, middle and middle-late.

SUMMARY AND DISCUSSION

From surface indications, NA7940 appears to be a linear pueblo comprising four or more rooms and

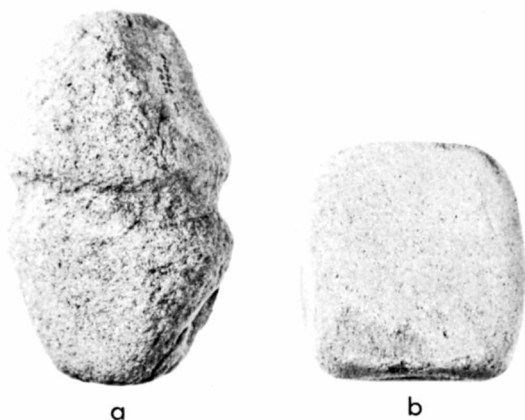


FIGURE 77. Stone artifacts from NA7940. *a*, maul; *b*, mano. Length of *a*, 11.3 cm.

possibly a kiva. Associated with this unit in a nearby gully are five stone terrace agricultural structures. The terraces were examined and one was tested to determine the structural characteristics and to study the sedimentation caused by their presence.

The terraces are constructed of slabs and rocks on sandy fill in a manner quite similar to the terraces at the Beaver Creek Community, particularly at NA 7175 and NA7179 (Lindsay, Turner and Long, in preparation). Some similarities with the structures at NA3735 in Forbidding Canyon are recognized, specifically the use of upright slabs to form a portion of the terrace. This structural character was not recognized at the time the report for NA3735 was written, but on a visitation subsequent to its publication (Adams, Lindsay, and Turner, 1961:33-36).

Occupation took place at NA7940 during two

ditions were favorable enough to preclude the necessity of agricultural features. Possibly the method of crop planting and care did not warrant rock alignments and artificial watering systems. Two other unlikely possibilities exist; the structures were few in number and have been eradicated since abandonment, or the materials are buried beneath dune deposits. The work at NA7940 resolved none of these questions or problems. It was learned that the existing terrace structures continued to function in their inferred capacity to retard runoff, trap soil, and retain moisture. If the Anasazi built these terraces for the purposes proposed, as well as gardening plots, their success as soil engineers is indisputable.

NA7961

INTRODUCTION

History, Location, and Physical Description

Certainly one of the shortcomings of a hurried extensive survey, as was conducted in April, 1960, is that important sites, although small perhaps, may be missed and go unrecorded. This is the case for the site to be discussed below. NA7961 was not recorded until late in the 1961 survey and thus we were forced by other commitments to limit the work here to minor testing and the excavation of one room. This circumstance has proved both embarrassing and unfortunate since the site displays great time depth and promise for artifactual yield. That the site locality was well known to various Indian groups is attested by the ceramic record and the modern trash at nearby NA7960. The relationship of NA7960 to the site under discussion will be discussed below.

NA7961 is located on Cummings Mesa in the western tributary to Catfish Creek, approximately 300 yd. upstream from the point where the mesa top drainage terminates and drops off into the west branch of Catfish Canyon. For approximately two-thirds of its lower length this intermittent mesa top drainage occupies a shallow valley, which is flanked on either side by blackbrush vegetated dune deposits. The streambed is often on bedrock. At the site, and for 100 yd. both up and down stream, the drainage passes through a ravine which has been cut through bedrock to a depth of 50 ft. Short lateral tributaries from the north join the main drainage at this location. Ledges, often covered with blowsand and dune sand, form the sides of the ravine. It is beneath the lowest ledges, 10 to 15 ft. above the intermittent streambed that both NA7960 and NA7961 are situated (Fig. 78). The major portions of both sites are on the north side of the drainage, facing south, with exposure to the sun from early morning hours into late afternoon. Shelter from all but strong winds is provided by the ravine's depth.

Ample proof of subsurface moisture in the surrounding dune deposits and bedrock fissures is attested by dense vegetation. Pinyon, juniper, sagebrush, four-wing saltbush, prickly pear, mountain mahogany, and grasses are common in and adjacent to the ravine. At several locations very large juniper and pinyon

	Test 1, 0-10 cm.	Test 2, 10-25 cm.	Surface	TOTALS
Tusayan White Ware				
Sosi B/W			5	5
Dogoszhi B/W			6	6
Flagstaff B/W	1		6	7
Tusayan B/W	2		9	11
Unclassified	6	1	5	12
Unidentified B/W			8	8
Tsegi Orange Ware				
Medicine B/R			1	1
Tusayan B/R			7	7
Citadel Poly.			1	1
Tusayan Poly.	1		14	15
Tsegi Orange			8	8
Tsegi R/O			1	1
Unclassified	3		13	16
Tusayan Gray Ware				
Tusayan Corr.			1	1
Moenkopi Corr.	8		4	12
Kiet Siel Gray	19	4	8	31
Unidentified Gray	5	1	8	14
TOTALS	45	6	105	156

TABLE 25. Pottery from NA7940.

ceramic periods of which the middle-late period is the most characteristic. This Kayenta Anasazi occupation was probably permanent, judging from the large trash deposits and the favorable location. The ceramic evidence indicates a period of site use between A.D. 1150 and 1225.

Ceramic evidence also points to an occupation at the site slightly prior to the erection of the terrace system. This situation is thought to be reflected at the Beaver Creek Community as well.

Just why no more than five agricultural terrace systems were found on Cummings Mesa is open to speculation. Certainly there are numerous likely and seemingly necessary locations for the construction of terraces, linear borders, and ditch systems on the mesa. Perhaps the rainfall pattern and erosion con-

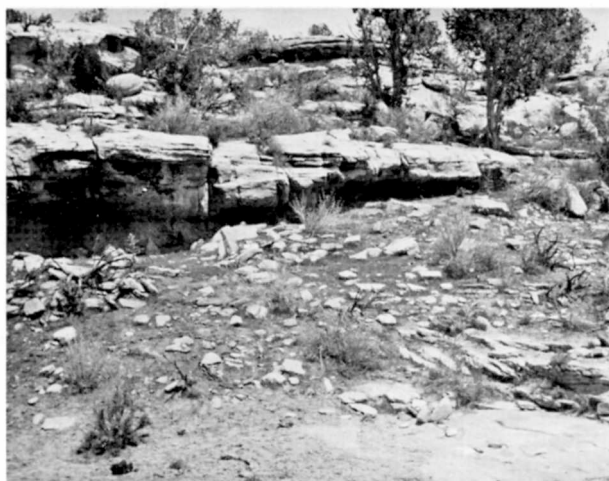


FIGURE 78. General view of NA7961, looking north.

trees appear to be rooted in seeps. Some indications are present for springs at seams near the streambed in the Saltwash member of the Morrison formation. These are perhaps active during wetter conditions.

Today potable water is scarce on the mesa. Because of this situation the Navajo, who occupy a hogan about 40 yd. from NA7961, have built a 500 to 700 gal. capacity masonry dam across the streambed to catch the intermittent runoff from upstream. Although this is primarily a water source for sheep, goats, and horses, it is undoubtedly intended for human consumption as well, since this formed the water supply for the personnel of the 1961 expedition. Numerous weathering pits downstream at the mesa's edge also would supplement the water supply after rains and snows.

Arable land in the form of dune sand is plentiful to the north and west, but its utilization is dependent mainly on rainfall.

Building stone, mortar, timber, and plant products are plentiful in this locality.

Since NA7961 is a portion of NA7960, comment should be made about the latter. NA7960 is located in the same ravine 40 to 100 yd. upstream. Like NA7961 it also has two pre-A.D. 1800 occupations, a Kayenta Anasazi and possibly a Pueblo IV and V occupation. The vestiges of these occupations are sherds, lithic debris, and pictographs. However, all but traces of the structure and occupation areas have been obliterated by the modern structures and occupation of a Navajo family. The structures in use today include a stone and pole hogan, sheep corrals, and the masonry dam mentioned above.

Surface Indications

Masonry architecture of at least three rooms was visible beneath an overhanging ledge at NA7961. A fourth ledge type room is located about 20 yd. to the east. Dark gray soil, stone implements, chipping waste, and sherds lay downslope, south and east of these structures. It was evident that livestock had caused considerable damage and disturbance to all

of the site. Remnants of pole and masonry fence sections indicated the former use of this location for a corral.

Problem

Surface collections from this site promised to provide more time depth than other sites known on Cummings Mesa. Testing of the trash and one room were done in anticipation of recovering stratigraphic data for the Anasazi and Pueblo IV and V ceramics. It was also conceived that more might be learned about the suspected trade or visitations into the Glen Canyon Basin by individuals from the Jeddito area.

Another problem also presented itself concerning the rather sparse recovery of obsidian artifacts and chipping waste in the Lower Glen and San Juan Canyons. When obsidian is found it is usually one artifact or several chips and on occasion these occur with Pueblo IV and V ceramics. Since both obsidian and Pueblo IV and V sherds were collected from the surface at NA7961, it was hoped that excavation might shed light on this interesting association.

Although a great deal was learned by testing the site, the results of sherd and stone analysis are somewhat disappointing. Disturbance by both livestock and human activity is obvious from the ceramic analysis. Time depth was revealed and the collection of Pueblo IV and V ceramics was increased significantly. The association of these later ceramics and obsidian tools is still tenuous.

EXCAVATIONS

Three units were excavated at NA7961, a room and two stratigraphic tests in a trash midden. All of the deposits removed were screened and all of the artifacts saved. Excavation of the room and trash deposits was initiated by arbitrary metric levels. This standard was altered in the room after a floor or occupation surface was encountered. Metric levels in the stratigraphic tests were adjusted with each encounter of a new change in soil color and apparent artifactual change. Excavations began with Test 1, followed by Room 1. Test 2, located in the midden east and in front of the room north of Room 1, was dug last. This test proved the deposits too shallow here to warrant enlarging the excavation.

Domestic Structure

Vestiges of masonry showed the outlines of three rooms at the time of excavation. The room ground plans varied from sub-rectangular to rectangular. Only one room was excavated.

Room 1. This room (in tables abbreviated to R1) lay to the west of the two unexcavated rooms and was the last in the series placed beneath a smoke-stained overhanging ledge of sandstone. The room is sub-rectangular with a crude masonry wall forming the outer perimeter (Fig. 79). The north ends of the east and west walls abut to the irregular rear of the shelter which serves as the back wall of the room.

The *walls* that formed the east, south, and west sides of the room were of varied construction. The west and south walls are three courses high, built of

large and small stones piled one on top of another without the use of mortar. The height is generally 30 cm., with thicknesses averaging 25 cm. The footings on the west and south were on a hard-packed sandy surface. The wall on the east was formed of a large, oblong boulder and two upright slabs.

A doorway may have been located at the south-east corner of the room between the unattached ends of the south and east walls.

The roofing over the room was provided by the overhanging ledge. Evidence for a superstructure rising above the low walls to enclose the room to ceiling height was not found.

The only recognizable *floor* in Room 1 was found in Level 3. This floor or occupation surface was marked by an ash bed spread over a deposit of loosely packed sand. Its depth below the present ground surface was 50 cm. A partially slab-lined hearth, measuring 35 cm. wide, 45 cm. long and 20 cm. deep was associated with this surface.

Artifacts from Level 3 and the associated features include: sherds (mostly Anasazi), a projectile point, a crude knife, a two-hand mano from the hearth, stone chips, and an open-ended trough metate.

Four levels of *fill* were removed from Room 1. Level 1, 0 to 40 cm., was composed of tan sand. It terminated with a stratum of trash which rested on a surface of orange windblown sand. In this level were encountered the east and west walls, and minor amounts of cultural refuse. The deposit of Level 2, 40 to 60 cm. below the surface, was a mixture of trashy stained sand and orange windblown sand. A considerable amount of cultural refuse was screened from this deposit. The upright stones of the hearth in Level 3 projected into this level. It terminated at another zone of orange blowsand. Level 3, only 10 cm. thick (70 to 80 cm.), comprised a bed of charcoal and ash-laden sand spread over an occupation surface. The artifactual recovery from Level 3 remained high but differed in character and amount from that of Level 2. The presumed floor or occupation surface of Room 1 rested in turn on Level 4, a shallow deposit of brownish colored blowsand. Four artifacts were found in this fourth level. Bedrock lay beneath Level 4. Resting on this bedrock in the south portion of the room was a bed of charcoal 30 cm. in diameter.

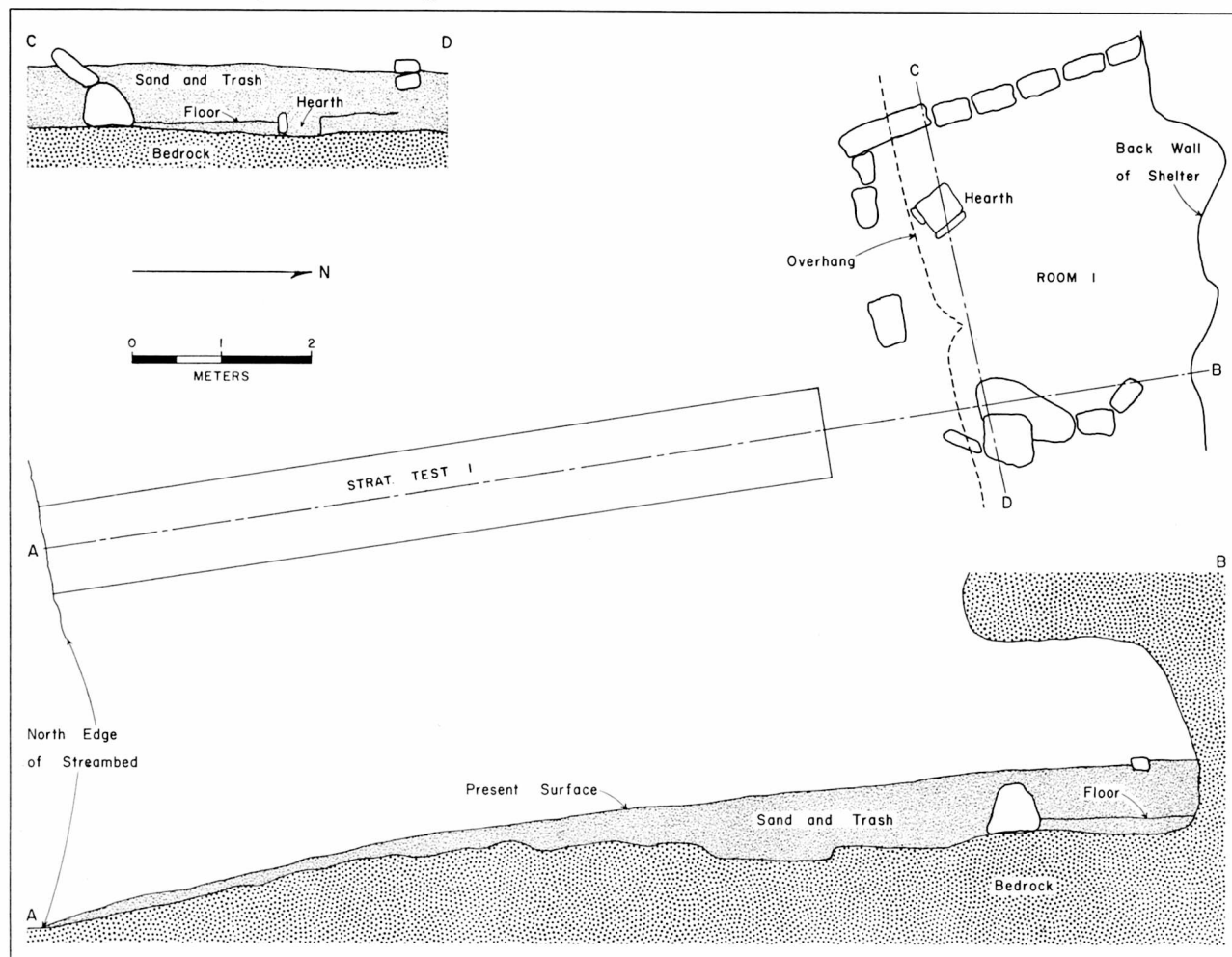


FIGURE 79. Plan and sections of NA7961.

	R 1, L 1	R 1, L 2	R 1, L 3, Hearth	R 1, L 4	ST 1, L 1	ST 1, L 2	ST 1, L 3	ST 2, L 1	ST 2, L 2	ST 2, L 3	Surface	TOTALS
Projectile Points-Small Knives												
Small triangular												
No notches, straight base		2			1	1	1					5
No notches, concave base		3					2					5
Side notched		3					1				1	5
Side and base notched		2					5					7
Large triangular												
Straight base, serrated edge		1										1
Straight base, side notched						1						1
Oval and leaf-shaped												
No notches (oval)		2										2
Side notched, convex base						1						1
True stemmed												
Shouldered					1	3	1					5
Shouldered, expanding stem											1	1
Barbed, expanding stem, with convex base			1				2					3
Unclassified		5		1	4	3	3		1		1	18
Knives												
Rounded base, intermediate						1						1
Stemless, pointed base						1						1
Crude knives		1	1			2	1				1	6
Unclassified			2	2	4	6	7				1	22
Choppers												
Small ovoid											1	1
Nodular	1											1
Scrapers												
Limited edge												
Nodular	1											1
Rough flake		1				3			2			6
Gravers						2	1					3
Drills							1		1			2
Notched Flakes		1							1			2
Utilized Flakes	1	43	5	8		27	16	5	6	4	12	127
Chips	10	153	26	17	36	142	175	3	18	15	11	606
Cores			2		3	3	7					15
Pebble Pounder										1		1
Hammerstones	2	4				1	1				1	9
Polishing Pebble						1						1
Concretion							1					1
Gypsum		2		1	1							4
Hematite			1			2	2			1		6
Mano, one-hand												
One convex surface		1					1					2
Two flat surfaces						1						1
Mano, two-hand												
One flat-one faceted surface			1									1
Metate, closed end, troughed			1									1

TABLE 26. Stone artifacts from NA7961.

Other Excavations

Stratigraphic Test 1. This test (in tables abbreviated to ST1) was approximately 9 m. long, 1 m. wide, and a maximum of 80 cm. deep. It was oriented north and south, beginning on bedrock in the streambed with virtually no depth and terminating 1 m. from Room 1, in 80 cm. of trash fill. Excavation began at the north end in the deepest portion of the deposit. The levels roughly followed the surface contour of the trash deposit.

Level 1, 0 to 40 cm. below the surface, consisted of gray-stained sand grading to almost black charcoal-stained sand mixed with rocks, lithic tools and implement fragments, bone, and about equal quantities of Kayenta Anasazi and Pueblo IV and V pottery. Level 2, 40 to 60 cm. began with a soil color change to light tan mixed with charcoal fragments. Lithic tools and refuse became more abundant as did bone and potsherds, the Kayenta ceramics being nearly twice the number of Pueblo IV and V. Fire-cracked rock and building stones persisted. Level 3, 60 to 80 cm., was a continuation of the natural deposit encountered in Level 2 to bedrock. Rock fragments were most numerous. Recovery of stone artifacts, bone, and sherds remained high, with the number of Kayenta ceramics still twice the occurrence of Jeddito area Pueblo IV and V sherds. It is worth noting that the largest number of Pueblo IV and V sherds recovered from any provenience and presumably the latest sherd represented at the site came from this level. This situation is not as alarming as it might appear, since toward the south end of the test the younger deposits were heavily eroded and undoubtedly this resulted in younger materials being let down into older deposits. Bedrock was stained dark by leaching of the trashy soil.

Stratigraphic Test 2. This test was 1 m. wide and 2 m. long. Excavations were held to three 10 cm. levels. Level 1, 0 to 10 cm., was through a tan colored soil in which were three sherds, bone, and stone chips. Level 2, 10 to 20 cm., consisted of a trash-stained sand which included two sherds, bone, and considerably more lithic materials. Level 3, 20 to 30 cm., contained two sherds also, some bone, and some lithic material, mixed with heavily charcoal-stained sand. Below this, sterile blowsand was encountered.

ARTIFACTS

Lithic Material

Surface collections and excavations at NA7961 produced 203 classifiable stone artifacts. This large number of stone implements from a minor amount of excavation in 11 proveniences does not include numerous stone chips, broken tools, and bits of hematite and gypsum. Undoubtedly the yield of lithic material is at least in part attributable to screening the deposits as opposed to other excavations on Cummings Mesa where screening was not practiced. However, screening was practiced with lower yields at nearly every site excavated by the Museum along the Colorado and San Juan Rivers. The long occupation at the site, resulting in a concentration of trash, is

probably a major factor contributing to the high artifact yield.

All of the artifacts are tabulated in Table 26 by type and provenience. Typology of the stone tools follows that used for the Glen Canyon region (Adams, Lindsay, Turner, 1961:14-9) with adaptations from Woodbury (1954).

Chipped Stone

Projectile Points. Thirty-six classifiable points and 18 fragments were found, represented in all but two proveniences. Only 19 points were whole and suitable for complete measurements. However, stems and blades were measured when possible, and material recorded (Table 27).

All of the points are made from flakes, some still retaining the original surface of the flake. Secondary chipping is uniformly bifacial, but ranges between coarse and extremely fine workmanship. No single class of points are made better than another.

Four major groupings of points and small knives have been distinguished, each further subdivided into two to four classes. Each class of projectile points will be discussed below and measurements given when possible. The points will not be discussed in turn by proveniences since these data are presented in Tables 26 and 27. Measurements are taken from tip to base for length, at the greatest width, and at the point of maximum thickness.

Small, triangular points without notches and with straight bases (Fig. 80 *a, b*) are represented by five specimens, two of obsidian, two of jasper, and one chert. The two obsidian points are nearly identical in shape. The points of jasper are fragmentary bases. There is a gradation from this type of point into fully concave base small triangular points. In four instances the classification into one or the other group was difficult because of irregular chipping.

Small triangular points without notches and with concave bases (Fig. 80 *c-f*) are also five in number. Three of the specimens have a basal concavity of 1 mm., the remaining two are less concave at the base.

There are five small, triangular points with notched sides and straight bases (Fig. 80 *g-i*); one obsidian, two chert, one agate, and one chalcedony. Notches are pronounced, ranging from 1 to 2 mm. deep. The points are of varied sizes.

Small, triangular points with notched sides and bases (Fig. 80 *j-m*) number seven, five of which show cruder technique than the remaining two, one each of obsidian and chert.

Large triangular points are represented by two specimens, probably of similar shape. Both are side notched with straight bases (Fig. 80 *o*). The fragmentary specimen has serrated edges.

One leaf-shaped point with side notches was found. As the tip and a portion of the base are missing, the length measurement is approximated to the nearest 2 mm. (Fig. 80 *p*). The sides of the implement show considerable wear.

Oval-shaped, small knives without notches (Fig.

<u>Point Type - Rock Type</u>	<u>Provenience</u>	<u>Length</u>	<u>Width</u>	<u>Thickness</u>
Small Triangular				
No notch, straight base				
Obsidian	R 1, L 2	20	13	3
Obsidian	ST 1, L 1	20	13	3
Chert	ST 1, L 3	20	13	3
Jasper	ST 1, L 2	-	15	3
Jasper	R 1, L 2	-	11	2
No notch, concave base				
Chert	R 1, L 2	25	14	3
Chert	ST 1, L 3	16	12	4
Chert	R 1, L 2	-	15	6
Chert	R 1, L 2	-	14	4
Jasper	ST 1, L 3	-	13	4
Side notched, straight base				
Obsidian	R 1, L 2	21	15	4
Chert	R 1, L 2	16	11	2
Chert	Surface	18	10	2
Agate	R 1, L 2	18	-	3
Chalcedony	ST 1, L 3	18	8	3
Sides and base notched				
Obsidian	R 1, L 2	24	-	4
Obsidian	ST 1, L 3	-	15	3
Chert	ST 1, L 3	-	12	2
Chert	ST 1, L 3	27	15	3
Agate	ST 1, L 3	19	14	3
Agate	R 1, L 2	-	12	2
Chalcedony	ST 1, L 3	15	11	2
Large Triangular				
Side notched				
Chert	R 1, L 2	-	33	6
Chert	ST 1, L 2	30	22	5
Oval and Leaf Shaped				
Side notched, convex base				
Chert	ST 1, L 2	33	16	5
No notches				
Agate	R 1, L 2	30	19	6
Chert	R 1, L 2	25	17	4
Stemmed				
Shouldered				
Obsidian	ST 1, L 2	-	9	3
Chert	ST 1, L 2	-	11	4
Chert	ST 1, L 2	20	10	4
Jasper	ST 1, L 1	-	-	-
Agate	ST 1, L 3	23	12	3
Shouldered expanding stem				
Chert	Surface	35	19	5
Barbed expanding stem				
Chert	ST 1, L 3	-	18	4
Chert	ST 1, L 3	-	-	3
Chalcedony	R 1, L 3	-	21	5

TABLE 27. Projectile point characteristics, NA7961. Measurements all in mm.

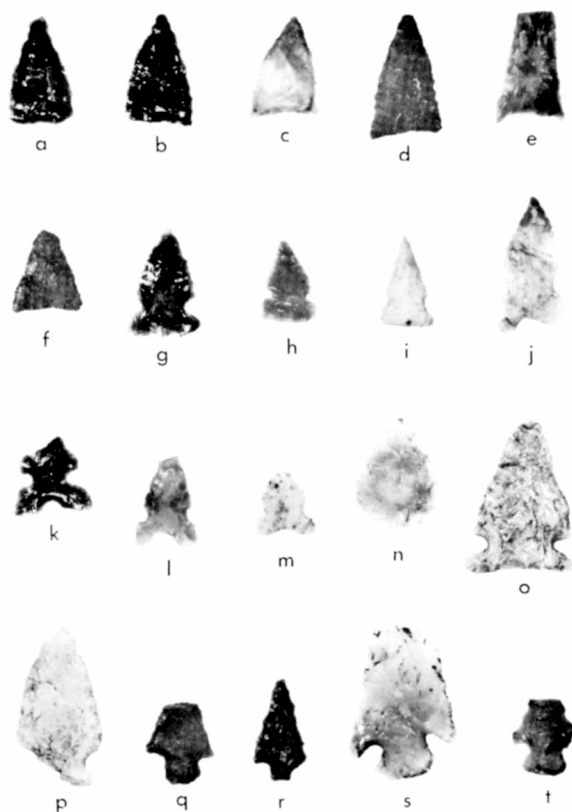


FIGURE 80. Projectile points and small knives, NA7961. *a-f*, small triangular, no notches; *g-i*, small triangular, side notched; *j-m*, small triangular, side and base notched; *n*, oval, no notches; *o*, large triangular, side notched; *p*, oval, side notched; *q, r*, stemmed, shouldered; *s, t*, stemmed, barbed. Length of *p*, 30 mm.

80 *n*) are crudely chipped from flakes to an oval outline and finished by secondary chipping. The length of both specimens is estimated to 2 mm. accuracy.

Stemmed, shouldered points are five in number, two whole and three fragments. All are small and narrow, which is undoubtedly a function of utility and hafting of this form (Fig. 80 *q, r*). The stems of measurable points are: 5 mm., 4 mm., 4 mm., and 4 mm. in length and in width 6 mm., 7 mm., 5 mm., and 5 mm., respectively. Two of the points have slightly expanding stems, all have straight bases.

One stemmed point, larger than the above specimens, differs slightly in form as the stem expands slightly and the base is convex. The item is roughly finished and shows signs of use along the sides.

There are three stemmed points with expanding stems and convex bases (Fig. 80 *s, t*). The points are well finished and do not appear to be broken in manufacture. Two of the points are approximately the same size, but a third is nearly one-third smaller.

Large Knives. Eight tools made of jasper, quartzite, and fine grained siliceous rocks were classified as various large knife forms. Thirteen specimens were too fragmentary to classify into various knife shapes. All of the knives, both classified and unclassified,

show little wear along the cutting edges.

One knife (Fig. 81 *b*) has a rounded base, and its length, approximately 48 mm., is twice its maximum width, 23 mm. It is 18 mm. thick. Its edges are secondarily flaked.

Another knife has a slender oval outline with a pointed base (Fig. 81 *a*). Although well made, the edges appear to be chipped by use rather than secondarily flaked. The specimen is 67 mm. long, 35 mm. wide, and 11 mm. thick. In the transverse plane the knife displays a slight twist, while longitudinally it is slightly bowed.

Six specimens were classified as crude knives, this tool type formerly being referred to as knife-choppers (Adams, Lindsay, and Turner, 1961:18). Shape varies considerably from long slender to oval, and bases are rounded, pointed, or straight (Fig. 81 *c*). All appear to be fashioned crudely with a paucity of secondary chipping. Widths range from 32 mm. to 39 mm., and lengths between 51 mm. and 64 mm. The average thickness of all six knives is 15 mm.

Choppers. Two tools of this category were found. Both are fashioned from quartzite. The small ovoid is roughly circular in form, bifacially flaked, and measures 56 mm. in diameter and 20 mm. thick. It shows little use. The nodular chopper is a flat, oval-shaped stream cobble which has been bifacially flaked around one-third of its greater circumference and displays battering marks over all the perimeter. It is 90 mm. long, 69 mm. wide, and 23 mm. thick.

Scrapers. Six specimens were found, all having limited working edges and displaying minor amounts of purposeful chipping. Tool stone includes obsidian, jasper, quartzite, and chert. The nodular scraper is a cobble fragment with two opposing edges dressed to roughly uniform surfaces. It measures 65 mm. long, 57 mm. wide, and 26 mm. thick. The rough flake scrapers are, as the name implies, fashioned from irregularly-shaped flakes. Modification seldom exceeds the unifacial preparation of one edge or two adjoining edges. There is a subtle gradation of this tool type into the category of utilized flakes.

Gravers. Three specimens were recovered, all similar in method of manufacture, but varied in size (Fig. 81 *d, e*). The tips of the tools were prepared by unifacial chipping along opposite edges of a pointed piece of stone. This operation creates a fine-pointed

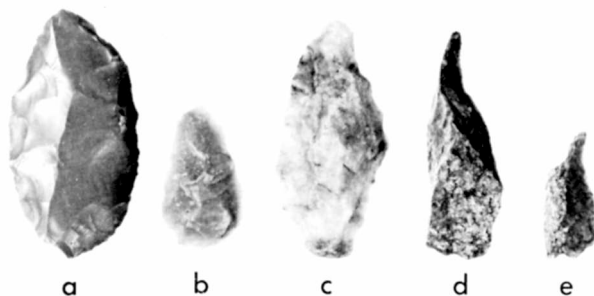


FIGURE 81. Knives and graters from NA7961. *a*, pointed base knife; *b*, round base knife; *c*, crude knife; *d, e*, graters. Length of *a*, 67 mm.

tool with a ridge or spine left to support the delicate tip. Obvious chipping did not exceed 10 mm. rearward of the implement's tip. The projecting tips of all three tools curve slightly clockwise with respect to the long axis of the implement's body.

Drills. The two drill fragments found are made of chert. Both are bifacially flaked and have slightly expanded bases. The larger specimen is 13 mm. wide, 3 mm. thick and an estimated 33 mm. long, while the shorter is 11 mm. wide and 4 mm. thick.

Notched Flakes. Two notched flakes were recovered, one of chert and another of jasper. Both flakes are irregular in shape, and each displays unifacially chipped notches along one side, resulting in a saw-like edge. The edge of the jasper flake has five notches along a straight edge while the chert tool has seven notches along a curved side.

Ground Stone

The large amount of chipped stone artifacts recovered by excavation is in direct contrast to the paucity of ground stone tools (Table 26).

Metate. A closed-end troughed metate was found on the occupation surface of Room 1. It was shaped from a sandstone slab and measures 45 cm. long, 35 cm. wide, and 13 cm. thick. The maximum dimensions of the trough are 27 cm. long, 16 cm. wide, and 3 cm. deep. The mano from the hearth in Room 1 would fit this metate.

Manos. Only one two-hand mano was recovered. It has one flat and one faceted surface, or what is often called the airfoil shaped mano. In longitudinal section, both surfaces are nearly flat. In transverse section, the upper or faceted surface is rounded slightly. The mano is sandstone and measures 17 cm. long, 9 cm. wide, 2.4 cm. thick. The rounded character of the mano ends suggests use with a troughed metate.

Three one-hand manos were recovered. All were made of sandstone cobbles, and each shows some evidence of peck marks on the grinding surfaces. Two manos have one convex grinding surface. The respective measurements are 9.6 and 11 cm. in length, 7.6 and 8.5 cm. in width, and 4 and 5 cm. thick. The mano with two flat surfaces measures 11 cm. long, 8.8 cm. wide, and 3.5 cm. thick. Metates or grinding slabs suited for use with these manos were not found. None of these one-hand manos show secondary use as mauls or hammerstones.

Other Lithic Material

Partially modified pieces of stone and waste from tool manufacture were common at the site (Table 26).

Hammerstones. Five of the hammerstones are of quartzite, three of chert, and one of fine-grained siliceous stone. The specimens were made from river cobbles and cores. All show percussion marks, some restricted to a small area such as a projecting tip, while others exhibit overall use. Shapes vary from oblong to spherical. An oblong, slightly flattened waterworn cobble, 99 mm. long, 55 mm. wide and

31 mm. thick, is designated as a *pebble pounder*. Slight battering of one naturally rounded end, and a smooth surface opposing a limy-encrusted surface, is the cause for the slight differentiation from the commonly battered pebble hammerstones (Woodbury, 1954:89).

Polishing Stone. A small, round quartzite pebble, 35 mm. in diameter and 17 mm. thick, shows a flat surface which is worn smooth and faceted at the edges of the smooth surface. It is possible that this pebble was used for smoothing and polishing ceramic vessels.

Utilized Flakes and Chipping Residue. Fortuitously shaped flakes resulting from tool preparation which show no modification, other than random chipping from scraping and cutting, number 127, or about one-seventh the total stone tool manufacture residue. It is interesting to note that every obsidian chip over 1 cm. in diameter is a used flake. The flakes display use along one or two edges by small flakes or dulling of a sharp edge before being discarded. Residue from tool manufacture was common in every provenience, usually greatly outnumbering the occurrence of utilized flakes. Chips of chert occurred twice as frequently as the next two most frequently occurring materials, jasper and quartzite. Other rock types in descending order of frequency are: agate, obsidian, chalcedony, sandstone, fine-grain siliceous, siltstone, and cherty-limestone. The relative occurrence of these frequencies was similar for each provenience. When obsidian occurs, it is usually more common in the upper stratigraphic levels and in all but one instance (S.T. 1, L. 3) absent from the lower levels. A similar situation exists for implements, mainly projectile points, made of obsidian.

When we consider the vast amount of tool stone waste, many broken tools, and the recovery of 15 cores, it is quite evident that tools were manufactured at the site. Undoubtedly raw materials were brought onto the mesa from the riverine gravel deposits and fashioned into implements. However, it is still suspected that much of the tool and tool blank preparation was conducted at the gravel deposits scattered along the banks of the Colorado River.

Concretion. It is not surprising to find an unmodified spherical-shaped piece of sandstone amidst the household trash since these concretions are quite common in the Navajo sandstone which underlies Cummings Mesa. The specimen measures 21 mm. in diameter.

Hematite and Gypsum. Six pieces of medium hard hematite were found. All show abrasion facets or grooves indicative of pigment removal. No artifact recovered exhibits staining with hematite pigment. Gypsum or selenite fragments are four in number, none of which evidence deliberate shaping or modification.

Summary

The inventory of stone artifacts from NA7961 is quite varied and impressive when one considers the small amount of work done at this site. The large percentage of chipped artifacts offers ample support

for the proposition that hunting was an important activity of the site's occupants. Tools were certainly manufactured at the site. A breakdown of the stone implements into groups which would match the ceramic components has been considered. Even an artificial division has been attempted. No division has proved satisfactory or convincing within the confines of these data and the stratigraphic evidence. There are several tenuous associations, however, which will be discussed at the end of this site report.

Pottery

The large volume of sherds recovered from the minor amount of testing is certainly a reflection of

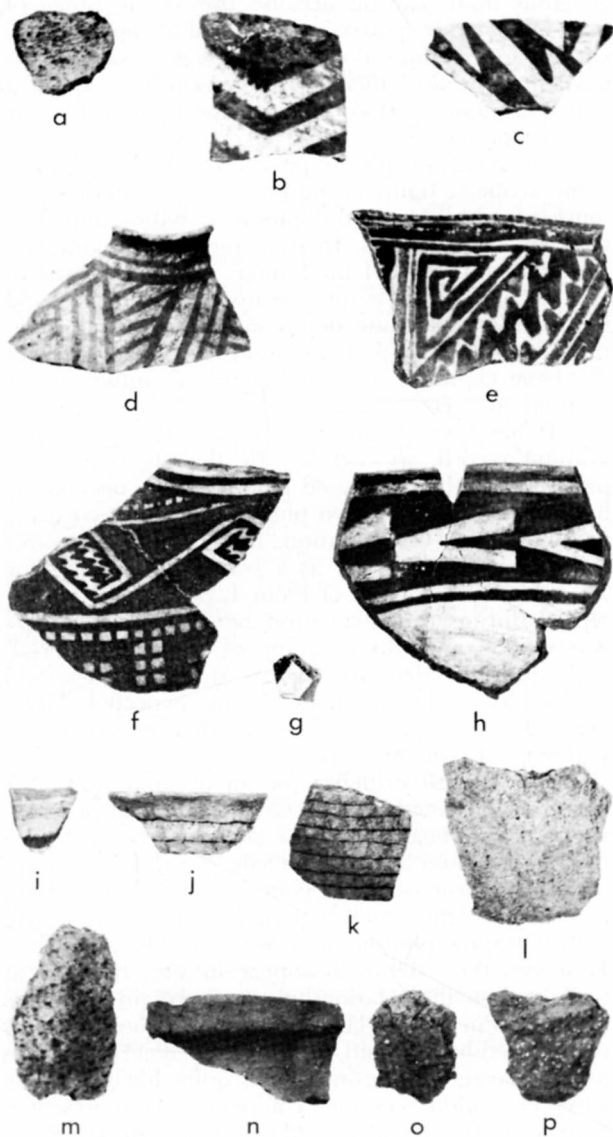


FIGURE 82. Pottery from NA7961. *a*, Lino Gray; *b*, Black Mesa Black-on-white; *c*, Sosi Black-on-white; *d*, Flagstaff Black-on-white; *e*, *f*, Tusayan Black-on-white; *g*, Jeddito Black-on-yellow; *h*, Holbrook Black-on-white; *i*, San Bernardo Black-on-yellow; *j*, *k*, Jeddito Corrugated; *l*, *n*-*p*, Jeddito Plain; *m*, Jeddito Tooled. Length of *m*, 7.9 cm.

the value of screening. At least six wares are represented at the site, only three of which represent indigenous Kayenta Anasazi, the others being intrusives (Table 28). In general terms, three time periods are represented by the ceramics: Basketmaker III, Pueblo II-III and Pueblo IV and V. A perusal of Table 28 will indicate the difficulties encountered when using sherds to assign temporal designations to various levels of the excavated units. Representative sherds of many types are shown in Figure 82.

The black-on-white sherds of Tusayan White Ware offer the most sensitive chronology, yet every type of the ware except the earliest and latest is represented in Level 2 of Room 1. To cloud the picture further is the occurrence of only late black-on-white sherds in Level 3. The stratigraphic situation is not resolved by reference to the stratigraphic tests or the suspected superposition of Pueblo IV and V ceramics. However, clues to the prehistory are reflected by the data.

Since most Tsegi Orange Ware pottery types can be demonstrated to be rather long lived, they are useful here only to corroborate the relative positioning of the black-on-white ceramics. The gray ware is useful in this respect also.

It is evident from the sherd analysis that Lino Gray and the Pueblo IV and V ceramics are relatively more abundant in stratigraphically lower and higher levels respectively. In summary, the stratigraphic situation appears confused, probably due to the disturbance by both humans and livestock. The periods of inferred occupation are assignable primarily because we can identify different types and wares and perhaps see some patterning in the excavation levels, and not because we have good stratigraphic relationships.

The presence of Lino Gray sherds was an interesting find, since this pottery type has eluded our field parties in nearly every area worked by the Museum's Glen Canyon staff. The one major exception is Navajo Canyon, where Basketmaker ceramics are present. Many of the sherds from NA7961 are very similar in surface finish, color and temper to those found in the Basketmaker component at NA5653, in Navajo Canyon.

The collection of Kayenta Branch black-on-white sherds show a great deal of variability in surface treatment and temper. Holbrook Black-on-white is intrusive and has been dated at A.D. 1050-1110 (Colton, 1955).

Sherds of Awatovi Yellow Ware are characterized by thick walls, variable yellow paste color, sometimes exfoliation of wall exteriors, and abundant use of quartz for temper (Fig. 82 *j-p*). The three types represented at NA7961 have a long time range extending from A.D. 1400 to post-1700. Sherds of this ware can be divided into early and late classes on the basis of color, temper and finish (Watson Smith, personal communication).

Both sherds of Jeddito Black-on-yellow are very small, nevertheless their identification is possible, as opposed to Awatovi Black-on-orange, an earlier de-

	R 1, L 1	R 1, L 2	R 1, L 3	R 1, L 4	ST 1, L 1	ST 1, L 2	ST 1, L 3	ST 2, L 1	ST 2, L 2	ST 2, L 3	Surface	TOTALS
Tusayan White Ware												
Black Mesa B/W		1										1
Sosi B/W		10			3							20
Dogoszhi B/W		2					7					8
Flagstaff B/W		3	21		1		2	1	1			32
Tusayan B/W		7	3	1	3	2	2					18
Unclassified	1	11	8	2	10	6	2			1	7	46
Little Colorado White Ware												
Holbrook B/W			3									3
Tsegi Orange Ware												
Tusayan B/R		1	1		1	6					3	12
Tusayan Poly.		9	2	5	1		1		1		1	20
Tsegi Orange		1					2				1	4
Unclassified	1	13	8		1	1	6			1	7	38
Tusayan Gray Ware												
Lino Gray					3	1	14				6	24
Tusayan Corr.	1	13	3	1	4	12	9	1			1	45
Hoenlopi Corr.		9	3	1		21	16				5	55
Kiet Siel Gray	1	6	3	6			6	3				25
Lino Tradition		7	1	1	1	2						12
Unclassified												
Awatovi Yellow Ware												
Jeddito Plain	1	7	1		21	23	39	1			25	118
Jeddito Corr.		1	1		3	3	2				3	13
Jeddito Tooled		3	1		1	1						6
Jeddito Yellow Ware												
Jeddito B/Y					2							2
Unclassified					2							2
San Bernardo Group								1				1
San Bernardo B/Y												
TOTALS	5	104	59	17	57	88	109	3	2	2	59	505

TABLE 28. Pottery from NA7961.

sign style resembling Jeddito Black-on-yellow. Black-on-orange sherds and Pueblo IV polychromes could not be identified definitely. Jeddito Black-on-yellow occupies roughly the period between A.D. 1325 and 1600 (Colton, 1956).

The identification for this single sherd of San Bernardo Black-on-yellow (Fig. 82 i) is tenuous and is based on an undescribed type designated at Awatovi (Watson Smith, personal communication). This type is associated with the post-Spanish period at the Awatovi Ruin in the Jeddito area.

Within the period represented by the Pueblo IV and V ceramics there appear to be two occupations, each indicated by a decorated type; Jeddito Black-on-yellow and San Bernardo Black-on-yellow. This reconstruction is very shaky and recognized as questionable, since temporally definitive sherds are few in number and associated polychromes to confirm this hypothesis are absent.

The ceramic and stratigraphic situations will be discussed at the end of this report.

NON-ARTIFACTUAL MATERIAL

No artifactual bone tools were found at NA7961. However, fragmented animal bones from kitchen refuse did occur in every excavated provenience. A high percentage of this bone was not identifiable due to its fractured nature, usually into unmodified small fragments, many of which display burning or carbonization. Similar treatment of animal bones has been recognized also at another suspected Pueblo IV and V site, NA6424, in West Canyon. It is not possible to give an accurate estimate of the number of individuals represented. Remains from all proveniences include: deer, *Odocoileus hemionus*; dog, *Canis familiaris*; cottontail, *Sylvilagus*; and antelope squirrel, *Citellus leucurus cinnamomeus*. Deer remains occurred in all excavation units and seven of the ten levels,

while dog came from the upper levels of all excavated units. Cottontail and squirrel had only one appearance each. From the paucity of material, we can do no more than speculate at the importance of hunting, and we prefer not to assign the remains to any occupation horizon.

Other forms of non-artifactual material were not found at the site.

SUMMARY AND DISCUSSION

Use of the ledges and sheltered ravine at NA7961 by agriculturists and perhaps traders or hunting groups extended over a considerable time span, perhaps as much as 1000 years. This estimate is more generous than realistic because this is the range of time indicated by pottery types found at the site. The various occupations do not represent a continuous development, and there is no reason to suspect a long continuous period of human occupation for any ceramic period.

The locale of this site provides arable land, water from artificial dams or natural sources, natural resources for building and domestic activities, and shelter from the elements. In sum, the small ravine is a haven, even today, for the hunter, wanderer or sedentary farmer, and it is quite reasonable to expect and find considerable time depth in the human occupation here. It is felt that the minor excavations at this site have captured at least in part a sample of the occupation record.

It has been pointed out already that the stratigraphic record, as revealed by the sherd analysis, presents a slightly confused picture of the occupation horizons at this site. Two phenomena are recognized to account for this situation. First, it seems possible that Room 1 was used as a trash dump sometime after the abandonment of Floor 1. Second, it was observed during the excavation of Test 1 that there was mixing and intertonguing of younger materials with the older deposits. To ask that the above will explain away the anomalies is not expected. However, their acceptance allows further interpretation without constant apology.

The earliest evidence for an occupation at NA 7961 is represented by Lino Gray sherds and probably some meager hearth remains along the bedrock surfaces outside and beneath the ledge overhang. Perhaps some of the true-stemmed points and one-hand manos could be assigned to this period as well, since there is stratigraphic positioning to warrant this association. However, these items do appear in later horizons as well, and so the relationship must remain tentative.

The Pueblo II-III development is most strongly represented by Flagstaff and Tusayan Black-on-whites and Tusayan Polychrome. It is quite likely that an early or middle ceramic component is represented here also (see Table 7). The presence of Holbrook Black-on-white adds weight to this thought. It is conceivable, although not probable, that the entire Kayenta ceramic complex (excluding Lino Gray) was in use at the same time during the Pueblo occupation, but more likely that there were two ceramically distinct periods of Pueblo II-III occupation.

The assignment of the floor in Room 1 is made preferentially to the late ceramic period of Tusayan and Flagstaff Black-on-whites, primarily on the basis of the sherds tallies for the lower level of Room 1 and Test 1. Corroboration of this assessment is only possible by the excavation of the rooms to the north of Room 1. This could provide the source for the earlier types also.

Stone tools specifically assignable to the floor occupation are the two-hand mano and the troughed metate. Allowing certain exceptions, the stone implements belonging to the Pueblo period occupation as a whole include the small and large triangular projectile points, possibly the stemmed, shouldered points, and some of the knives. The remaining unassigned lithic artifacts are objects which transcend several time periods, and are not diagnostic enough to allow specific temporal placement.

The mere presence of Pueblo IV and V pottery at this site is actually of more concern than its exact stratigraphic relationship because we know its relative position in time with respect to Kayenta ceramics (Burgh, 1959).

In general terms two post A.D. 1300 occupations, probably intermittent, are recognized for this site. No intermediate stages are recognized between these two periods. Jeddito Black-on-yellow and Jeddito Corrugated are probably indicative of the first. San Bernardo Black-on-yellow and possibly most of Jeddito Plain are attributable to the second. The sherds of Jeddito Plain exhibit a wide range of surface colors from pink to yellow to flesh and several sherds have a greenish tinge. Coarse pieces of quartz were used for tempering material.

We have asked ourselves at each new encounter with sherds from the Jeddito area found in the Glen Canyon region, and there are at least 35 occurrences, what their presence indicates. Does it represent an actual occupation by Jeddito area farmers and hunters, dispersal of Jeddito area ceramics by Jeddito traders, or presence of Pueblo IV and V ceramics in the hands of an unknown indigenous population? Certainly we cannot avoid mentioning the possibility that modern Navajo might possess these artifacts.

Some light is shed on the problem by the following facts. All the decorated sherds and the utility ware are exotic on Cummings Mesa and both resemble closely similar material from the Jeddito country. The material is usually stratigraphically later than the prehistoric Anasazi remains. The ceramics from this site and others in the area are evidence of both Pueblo IV and Pueblo V developments as defined by Burgh (1959) for Awatovi. The majority of the

sherds identifiable as to type are most likely post-Spanish in temporal placement, with due allowances for the relative time placement of Pueblo IV and V ceramics at Awatovi.

It is felt that the excavations at NA7961 have shed light on the presence of Jeddito area ceramics in the Glen Canyon area. We feel that the ceramic complex and quantity of sherds found at the site argue favorably for 15th to 17th century occupation on Cummings Mesa by inhabitants of the Jeddito area.

Although the question of obsidian occurrence was not resolved, there is still reason to suspect an association of this material with the presence of Pueblo IV and V sherds.

Most of the obsidian artifacts were found to be in the various shape classes of the small triangular projectile points. Twenty-one small triangular points were recorded, five of these were obsidian, and three of the five came from Room 1, Level 2. It is worth noting that there is considerable correspondence in artifact forms and rock type used, obsidian *vs.* siliceous. To add strength to the proposed association, and yet cause us to seek more evidence, are the similarities of the points from NA7961 with those from Awatovi. Woodbury (1954:124-5) in a discussion of small triangular points documents this material for the periods Pueblo III through Pueblo V. It is also interesting to note that less than one-half of the Awatovi points are made of obsidian, with the majority of chert, a situation comparable to that at NA7961 (see Table 27).

The pointed base, stemless knife is probably associated with the period of the Pueblo IV and V ceramics.

In broad terms there are thought to be three major occupations at NA7961, a two component Kayenta Anasazi period, and a post A.D. 1300 occupation. Between the major periods of the subdivisions there are no intermediate stages of cultural development.

The initial occupation took place during the Basketmaker III period, sometime between A.D. 500 and 750. A hiatus of perhaps 200 years was followed by a Pueblo II-III development which probably did not continue much beyond A.D. 1200. A second interval of lapsed time followed until probably post A.D. 1500, when Pueblo IV and V ceramics were introduced on the mesa. It is thought that two occupations took place after the Anasazi abandonment, possibly during the pre-Spanish era and certainly in post-Spanish times. These late inhabitations are believed to have been by the Pueblo IV and V inhabitants of the Jeddito area.

Summary

SURVEY AND EXCAVATIONS on Cummings Mesa during 1960 and 1961 have yielded a large amount of data on the prehistoric occupation of an area that was virtually unknown previously. It is still desired that sometime in the future more work will be done in the area, for the archaeological potentialities of Cummings Mesa have not yet been fully realized. Much of the preceding report has been in the form of simple presentation of factual data, time limitations influencing the amount of discussion. The following brief summary therefore is not intended to be the last word on the archaeology of Cummings Mesa, as further comparisons, synthesis, and interpretation of the information in this volume will lead to an even fuller understanding of this region and the Kayenta area as a whole.

Cummings Mesa is a large erosional remnant located immediately south of the Colorado River in Lower Glen Canyon, and west of Navajo Mountain. It is surrounded by vertical and nearly vertical cliffs rising 800 to 1200 ft. above the adjoining highly dissected area. The mesa has been cut into the shape of a three-fingered hand, with the palm at the south end. The elevation on the mesa top ranges from 4,800 ft. at the north to 6,483 ft. at the south. Access to Cummings Mesa is limited by the sheer escarpment, but trails are known to lead off the mesa in at least four widely separated places, providing contact with other areas.

Stone suitable for construction is plentiful on the mesa, and wood is readily available at the higher elevations. Arable land is common. The principal resource in short supply today, and presumably also in prehistoric times, is water. Enough water probably could be obtained from weather pits, plunge pools, small seeps, and perhaps earthen or rock dams to supply the domestic needs of a year-round population, but agricultural people on Cummings Mesa probably were faced often with the threat that not enough water would be available to bring the crops to maturity.

Almost all the 163 sites found on Cummings Mesa are near the south end, on the palm of the three-fingered hand. This is undoubtedly a direct reflection of the fact that the higher elevations near the south end receive more rainfall on deeper eolian and alluvial deposits with a less rapid evaporation rate. The result is a greater amount of wild plant products available for utilization, an increased water supply for domestic purposes, and an opportunity to practice agriculture.

Most of the prehistoric occupation of Cummings Mesa was limited to the 12th century and first portion of the 13th century, in late Pueblo II through middle Pueblo III times. At NA7961, however, there was an occupation into Pueblo IV and V. The same site may have been occupied earlier also, in Basketmaker III times, with evidence for this earlier occupation based on ceramic data.

Several sites in tributary canyons adjoining Cummings Mesa appear to have been occupied in the Basketmaker II period, but evidence of this development has not been found on Cummings Mesa proper.

Most sites are located in the open. These sites are often on elevations such as low ridges, buttes, and slight rises. Sheltering ledges and caves were utilized also, but the general paucity of such shelters on the mesa top limits the number of sites in these locations.

Pueblo II and III architectural features are developed noticeably better than in the adjoining Lower Glen Canyon (Adams, Lindsay, and Turner, 1961). Ruins vary in size and complexity from isolated one-room structures to multi-roomed pueblos with kivas, courtyards, and other associated features. Most common are small sites of one to three masonry rooms or no visible masonry.

Masonry is of finer construction than in Glen Canyon, but still does not exhibit a preciseness of execution. Sandstone blocks and slabs used in wall construction are of widely varying sizes, only roughly shaped or simply random blocks, often resulting in walls of different thicknesses and appearance from one section to another. Due to the varying thicknesses of the stones, true coursing is only rarely evident. Stones were usually set in moderate amounts of sandy mortar, with the interstices liberally chinked with small stones and clay. Jacal walls are rare or absent in the sites excavated.

Most structures can be grouped conveniently into four types; living rooms, storage rooms, pit-houses, and kivas. Living rooms are usually nearly square, 2 to 3 m. on a side. Rectangular slab-lined hearths near the center of the room are common, although circular unlined hearths, often near or against a wall, are found also. Entryboxes are often associated with the rectangular hearths, with one side serving as a deflector. Mealing bins, often with the catch basin appreciably below floor level, are common, but other features occur only sporadically.

Storage rooms are usually square also, but often slightly smaller than the living rooms. Floors of these rooms are sometimes paved with slabs, but other features, except for an occasional poorly defined hearth, are rare.

Some rooms are difficult to assign to either a living or storage function, as they appear to combine elements of both. These are usually rectangular, with a length up to three times their width. Circular, unlined hearths near the walls are often present in these rooms, and mealing bins also are encountered. Generally, however, these rooms have a somewhat barren appearance compared with the true living rooms, and it may be that they were used primarily for storage and sometimes grinding of food, but only served as domiciles occasionally.

Pithouses were encountered at three sites. The one at NA7472 could be defined only with difficulty,

and seemed to have few, if any, formalized features. Next to the pithouse, and possibly associated with it, was a rectangular masonry structure that had been constructed in a shallow pit. It contained few formalized floor features.

The pithouse at NA7455A was isolated. It was sub-rectangular and unlined, with a ventilator shaft in the southwest corner. A circular unlined hearth against the west wall was separated from the ventilator by a deflector, probably formed by an upright slab. Entrance was probably through the roof.

Five pithouses were found at NA7498, but only two were excavated completely. The first to be built and abandoned was irregular in form, with an entrance ramp on the southwest side. A circular, unlined firepit was near the center of the structure, and the roof apparently was supported by four posts. No masonry was associated with this structure. The other four were all built in conjunction with an enclosing wall associated with the surface rooms of the pueblo, and this masonry wall formed the southwest wall of most of them. Parts of some of the other walls sometimes were formed of masonry as well. Entrance to these pithouses was through doorways in the masonry wall, in one case connected to the pithouse by a sloping ramp. The only one of these that was excavated completely had a rectangular slab-lined hearth near the center of the structure and irregularly spaced postholes that probably supported the roof.

Kivas excavated on Cummings Mesa are circular, with a recess on the southeast side. Two were masonry lined, but the walls of the third were formed of hard natural sand. Ventilators entered the structures beneath the recess. All had rectangular slab-lined hearths, separated from the ventilator by a masonry or slab deflector. A feature common to all three was a large, nearly circular, shallow depression in the location where a sipapu is often found. Loom holes were found in two of the kivas. In addition, the kiva at NA7498 had an abundance of other features, including a masonry bench, ladder rests, a small slab-lined subfloor box, a large hole that may have been used in connection with magical feats, and miscellaneous slabs and holes in the floor.

In addition to rooms, pithouses, and kivas, less formalized structures such as courtyards, possible brush shelters, and large plaza areas are found also. The presence of hearths, meal bins, and other features, including artifacts on the floors, indicate that many domestic activities were carried on in these outdoor areas.

Structures associated with agricultural activities, such as terraces, are not common, but are present. Most of the agriculture presumably was carried on without the use of specialized structures.

Many sites do not show evidence of prolonged occupation, but refuse deposits are not uncommon, and it is probable that the prehistoric occupation on Cummings Mesa was a mainly permanent one. Some of the smaller sites, however, may have been occupied only seasonally.

Tool preparation from raw materials did not

constitute a major activity, as opposed to sites along the Colorado River where large deposits of cryptocrystalline rocks are easily available. The prominent lithic industry in the Lower Glen Canyon undoubtedly was allied to the occupation on Cummings Mesa, and probably many of the people permanently settled on Cummings Mesa made periodic trips to the river to gather stone and manufacture tools. The same types of stone tools were found on Cummings Mesa as in Lower Glen Canyon, but the stronger emphasis on agricultural pursuits on Cummings Mesa results in a higher proportion of milling stones than found in the canyon lands.

As would be expected from more permanent settlements, pottery is more common than in Glen Canyon. Nearly all the pottery recovered belongs to Tusayan White Ware, Tsegi Orange Ware, and Tusayan Gray Ware, most of it made between A.D. 1100 and 1225. Ceramic evidence indicates that trade with other areas was maintained, as pottery apparently manufactured on the north side of the Colorado River was recovered, and limited numbers of sherds from other areas also were found.

The greater quantity of ceramic material, in the form of both sherds and whole vessels, especially from NA7498, has created an opportunity for analysis and interpretation that previously has been limited by the small amounts of ceramic material from the canyon areas.

As a result of this larger body of data, descriptions of some pottery types have been expanded, some changes are proposed in the existing taxonomy, and the temporal ranges of several types have been extended. It is suggested that Wupatki Black-on-white and Betatakin Black-on-white should not be considered types, but only as regional or stylistic variations of Tusayan Black-on-white, as in most cases they are indistinguishable. It is proposed also that Dogoszhi Polychrome be considered simply the late variety of Tusayan Black-on-red, primarily distinguished by the lack of a slip over the entire vessel exterior.

Major changes in the dates assigned to certain pottery types include extending the initial date of Tusayan Black-on-white to before A.D. 1200, in comparison with the previous date of 1225; the extension of the terminal date for true Tusayan Black-on-red to slightly after 1200, in contrast to the previous date of 1150; the revision of the initial date of Tusayan Black-on-red; Dogoszhi Variety to approximately 1125 instead of the previously assigned 1250; the suggestion that Tsegi Orange was made at least as early as 1225 instead of 1250; and the revision of the initial date for Kiet Siel Gray to about 1175 instead of the previously proposed 1275.

Because of the large amounts of gray ware present at all sites, an attempt was made with the NA7498 material to subdivide the various types, Tusayan Corrugated, Moenkopi Corrugated, and Kiet Siel Gray, on the basis of various surface characteristics, in the hope of being able to define the development of these types more accurately, with the ultimate goal of being able to place sites or parts of sites more

precisely in time, especially those with little decorated pottery. Although the results were not conclusive, they do indicate that study of these attributes would be profitable with material from well-stratified or single phase sites.

Petroglyphs and pictographs are rare on Cummings Mesa, at least in part due to the lack of suitable rock surfaces. They are more common in the canyons immediately adjoining the mesa.

The general paucity of preserved perishable material makes it difficult to assess the subsistence pattern, but several inferences can be made. The primary means of subsistence was agriculture, with at least corn and squash known to have been grown. Gathering of wild plant products probably also played an important, although secondary role, but wild game apparently furnished only a minor portion of the diet.

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Appendix I

PLANT MATERIALS FROM FOUR CUMMINGS MESA SITES by Hugh C. Cutler Missouri Botanical Garden

All the materials from these sites (Table 1) are similar to other sites in the region. The variability of the corn falls within the pattern for larger collections and is similar to that reported for the Lower Glen Canyon (Cutler and Bower, 1961).

All of the cobs except two show evidence of scraping to remove the kernels while they were still slightly moist but practically mature. The two cobs from Room 5, NA7486, from which the grains were removed when dry, are softer and weaker cobs, have more slender lower glumes, and differ slightly in the direction of Basketmaker corn of this region. The two cobs from Room 1, NA7486, which were found in the pack rat nest, are interesting because they are harder and larger than all of the other cobs.

Provenience	Material Recovered
NA7485	
Room 2	1 corn cob
Room 4	1 corn cob
NA7486	
Room 1	2 corn cobs
Room 2	1 corn cob fragment
Room 4	4 corn cobs; 1 <i>Yucca</i> sp. leaf fragment and flower stalk fragment; 1 <i>Phragmites communis</i> (reed) stem fragment; 1 <i>Cucurbita pepo</i> (squash) seed, 18 by 10 mm., similar to common kinds of Glen Canyon, San Juan River, and Mesa Verde sites.
Room 5	11 corn cobs; <i>Phragmites communis</i> (reed) fragments.
NA7498	
Burial 3	62 <i>Cucurbita pepo</i> (squash) seeds, ranging from 16 by 8.5 to 18 by 9.5 mm. Similar to seed from NA7486, and the common kind found in other sites of this region.
NA7905	
Surface	<i>Phragmites communis</i> (reed) fragments.

TABLE 1. Plant remains from Cummings Mesa.

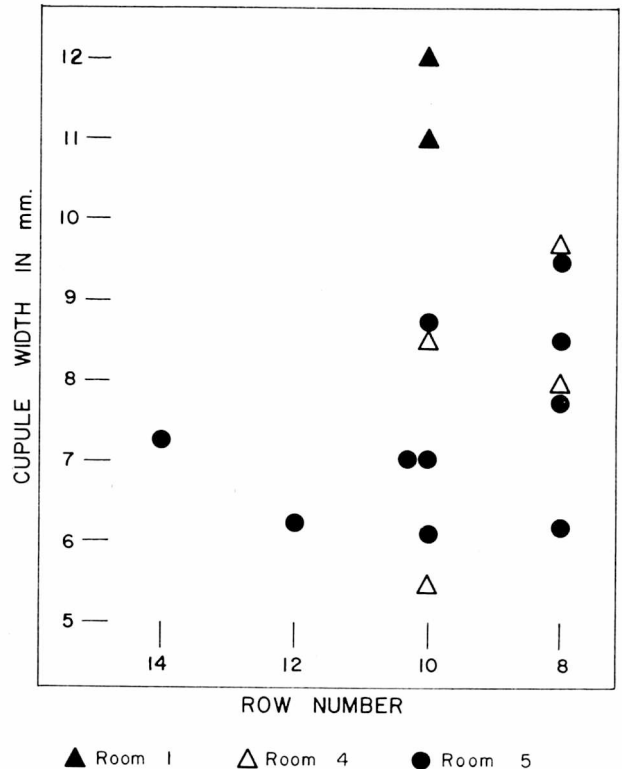


FIGURE 1. Cupule width and row number of corn from NA7486.

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Appendix II

COTTON CLOTH FRAGMENT FROM NA7472

by

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Author's Comment. The following appendix contains a detailed analysis of a cloth fragment recovered from NA7472. This information also is to be found in a report covering cotton material from the Glen and San Juan Canyons (Kent, 1963), but in view of the uniqueness of this fragment, the data is presented here again.

Description

Type of fragment. Small scrap of plain weave cotton cloth with one weft edge remaining.

Dimensions.

Maximum warp stretch (incomplete): 5 cm.

Maximum weft stretch (incomplete): 4 cm.

Material. Single-ply Z-spun cotton, discolored to orange and brown tones, but not dyed.

Thread Count.

Warps per centimeter: single - 14
paired - 12 prs. in 8 mm.

Wefts per centimeter: 11-12

Technique. Plain weave.

Weft Selvage. The 24 warps at the weft edge are paired and treated as 12. The weft is carried over and under these paired warps in regular plain weaving. There are no extra selvage strings, the weft simply passing around the edge pair and re-entering the weave.

DISCUSSION

The cotton cloth fragment (Fig. 30) was found clinging to the east wall of Room 1, 20 cm. above the floor. It may have served as a covering for the doorway. It is plain weave, indistinguishable from those recovered from Glen Canyon (Kent, 1963), with the exception of a weft selvage made by pairing the 24 edge warps and weaving weft threads over and under these pairs. This is a method used in commercial weaving to strengthen the edge of a cloth. Ordinary

plain weave commercial dish towels, linen or cotton, frequently show this device. It has never been described for woven material from the Southwest, nor was it used in prehistoric Peru. O'Neale (1945:51) notes a very limited use of this selvage technique in certain historic towns in highland Guatemala.

The piece from NA7472 has all the characteristics of a prehistoric pueblo product: Z-spun single-ply warps and wefts, a low thread count by comparison with contemporary cotton sacking used for towels (14 warps and 12 wefts per centimeter, as opposed to 19 warps and 20 wefts in commercial cloth), and unevenly spun threads. With regard to spinning, it should be noted that warps and wefts of some cotton toweling are very irregular, showing small lumps and marked variation in the diameter of a thread throughout its length. These thread qualities might lead to confusing a worn, discolored, and soiled fragment of commercial cloth with a hand-spun, hand-woven fragment of the same technique. However, the conditions of this find indicate almost beyond any doubt that the fragment is prehistoric, so we have here a selvage technique previously unrecorded for prehistoric textiles of the New World.

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