MANAGEMENT SUMMARY

EXCAVATION OF THE SAND DUNE SITE (AZ.K:6:11) AT HUBBELL TRADING POST NATIONAL HISTORIC SITE, GANADO, ARIZONA

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MANAGEMENT SUMMARY

INTRODUCTION

Excavation of the Sand Dune Site (AZ.K:6:11), one of eight known archeological sites located at Hubbell Trading Post National Historic Site, was recently completed by Southwest Archaeological Consultants under contract to the National Park Service. The site is located on a stabilized sand dune near the entrance to the historic site about 100 m west of Wide Reed Ruin, a fourteenth century Puebloan site. The Sand Dune Site is bounded by Pueblo Colorado Wash on the north, by a smaller tributary to the wash on the east, and by the road into the trading post on the south. The core area of the site extends 52 m east-west along the edge of the wash and at a maximum 8 m north-south from the wash edge (Fig. 1). This represents the southernmost portion of the original site as approximately 60 to 75 percent of the site has been lost through erosion.

The recognition by the Park Service that erosion has seriously threatened the Sand Dune Site prompted this excavation as well as previous work at the site. The problem of erosion was first noted during the winter of 1978-79, and a program to monitor it was established (Bradford 1987). In 1981 Steve Adams conducted salvage excavations on features that were in danger of immediate destruction or damage. Part of a small pithouse and a slab-lined hearth, both eroding out of the northeast corner of the site, were excavated (Adams 1982, cited in Bradford 1987). Further test excavations were conducted by Bradford in 1983 in connection with road improvements along the entrance road to Hubbell Trading Post. Three backhoe trenches were dug along the edge of the road to establish the southern boundary of the site, which was determined to lie about 2 m north of the road (Fig. 1).

Continuing erosion and plans to strengthen the bridge on the entrance road to the trading post brought Adams back to the site in October 1983. Four trenches and two 2 by 2 m units were excavated in the northeast corner of the site (Fig. 1) and an occupation surface was identified (Bradford 1987).

In an attempt to protect Wide Reed Ruin from erosion, rock gabions were constructed below the site. This inadvertently resulted in increased erosion by redirecting the water towards the bank beneath the Sand Dune Site. During spring floods in 1985, approximately 832 sq m of the Sand Dune Site was lost to erosion. The Park Service took emergency action to rechannel the wash and protect the site from further damage. During the summer of 1985, Bradford conducted test excavations at the site to determine the nature and extent of the remaining deposits. Those excavations established the core area of the site, exposed nine features (Fig. 1), and provided samples for radiocarbon dates (Bradford 1987).

At that time, plans were made to reduce erosion at the park by building a gabion dam north of the visitor center and a series of gabions along the wash below the site. The gabions are eventually going to be filled in with sediments from the bank underlying the Sand Dune Site, thus providing a more gentle slope along the southern bank of the wash, but in the process destroying the remains of the site (Bradford 1987). Consequently, complete excavation of the remaining site area was required. Work was conducted by Southwest Archaeological Consultants in September and October, 1987.

SCOPE OF WORK

As specified in the scope of work, the primary intent of the excavation was to gather data that would 1) allow the site to be dated, 2) provide information on site function and activities occurring at the site, and 3) allow comparison of the Sand Dune Site with other sites from the same time period(s). The contract negotiated between NPS and Southwest called

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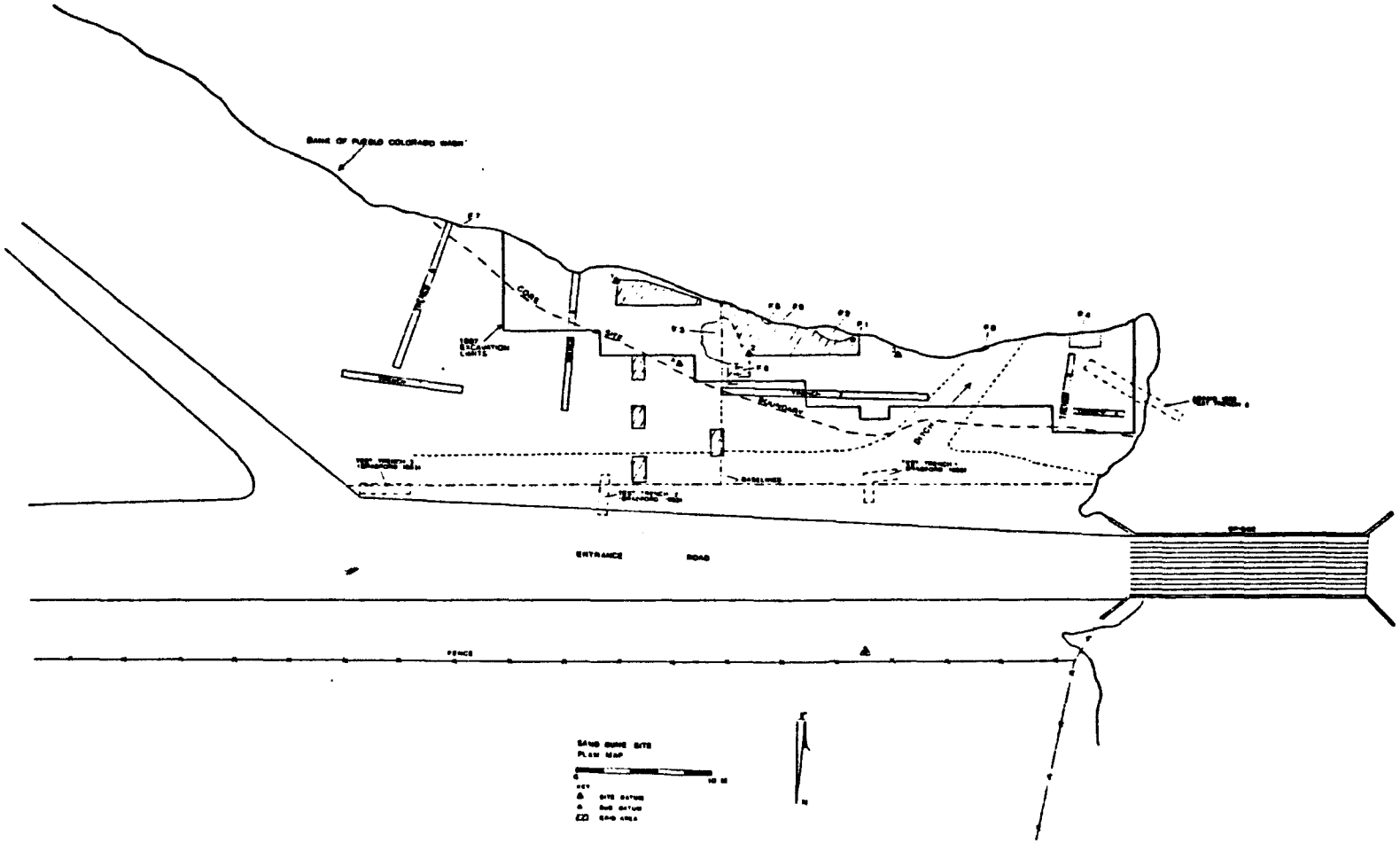

Figure 1: Plan view of site and test locations from 1983 and 1985.

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for complete excavation of the site and the processing and cataloguing of artifacts and samples recovered from those excavations. Analysis of artifacts and write-up of a final interpretive report will be contracted for at a later date. Two reports were required, a management summary and a final descriptive report.

Bradford's excavations in 1985 established the presence of five strata at the site, three main cultural strata overlain by more recent deposits of accumulated sand, and nine features. The scope of work called for the removal of layer 1, the recent overburden, from the core area of the site using mechanized equipment where feasible. Layer 2, a thin layer of mainly sterile sand, was to be removed by hand but not screened. Layer 3, the first cultural layer identified in 1985, was to be excavated by hand in 50 grid squares within the core area. All excavated sediments were to be screened. Layer 4, possibly representing prehistoric deposits with some mixing of later deposits, was to be excavated and screened in arbitrary 5 cm levels to insure careful vertical control of artifacts. Layer 4 was to be excavated in 25 grid squares within the core area, and layer 5 in 15 grid squares within the core area and screened. All layers were to be excavated within 2 by 2 m grid squares using the grid system established in 1985. The scope of work also called for excavation of all features "according to accepted standards in current archeological method" and for nonartifactual samples to be taken from features where possible.

EXCAVATION METHODS

In the absence of surface artifacts, no surface collections were made. A grab sample of artifacts present on the surface in 1978 was collected by Dave Brugge of the National Park Service, Southwest Regional Office (James Bradford, National Park Service, personal communication, November 2, 1987).

Excavation units were controlled horizontally by using the 2 m grid system superimposed over the site by National Park Service personnel in 1985. Grids were numbered consecutively beginning in the northwest corner of the site and proceeding west (Fig. 2). When discrete features were encountered, they were given numbers beginning with 10 (following the nine features identified during test excavations), and they then became the primary horizontal control. Excavations continued using those designations. All direction references were made from true north. Rooms and features were excavated in halves depending upon their size. This approach facilitated mapping and stratigraphically based soil removal in accordance with natural deposition or cultural layers. Large features, such as pit structures, were divided further into quarters to allow tighter horizontal control. When a feature was recognized within the confines of another feature, e.g., a hearth within a pit structure, it received a separate numerical designation. Vertical provenience was maintained both through below present ground surface (pgs) readings and elevations established from a known point. A number of balks had been left in tact for the below pgs readings. The term layer was used to distinguish natural and cultural strata from arbitrarily defined levels. Levels within layers are designated by an Arabic number following a dash or decimal point, e.g., 4.1. All elevations below pgs for arbitrary levels within the stratigraphic layers were taken from the southwest corner of the grid square. That depth was then assigned to all artifacts from that level (e.g., 52-57 cm below pgs is the depth of layer 4.1 in grid square 497 as defined from the depth of that level at the southwest corner of 497).

Fill of architectural features was removed in arbitrary 10 cm levels in the first quarter of the feature excavated. The remaining portions of the feature were excavated by cultural or natural strata if present. The terms layer and level were used in the same manner for features as in the excavation of grid squares. Feature fill with no internal stratigraphic variation was excavated in arbitrary levels to 10 cm above the floor. The last 5 cm was assigned floor fill status with artifacts bagged separately. All formal artifacts within any layer or level and on any surface were triangulated and received field specimen

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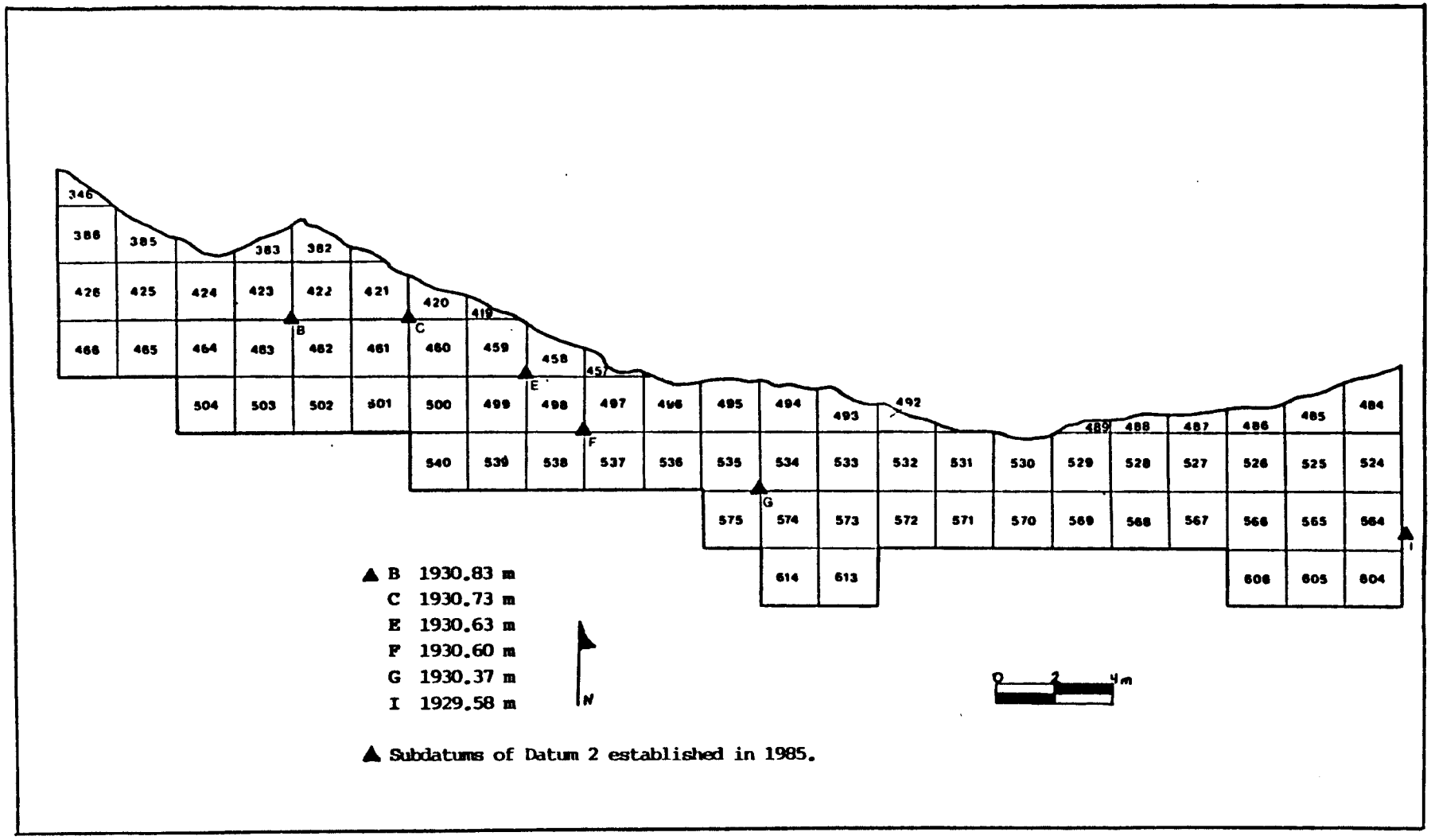

Figure 2: Grid system established in 1985 at the Sand Dune Site. All subdatum elevations above sea level are based on the 1985 site datum established south of the entrance road.

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numbers.

Fill from extramural features and small, intramural features were excavated in halves. If cultural or natural strata were identified in the profile, the remaining half was excavated accordingly. All nonartifactual samples were removed from the second half of the fill and their locations plotted on feature maps.

Screening

Quarter-inch hardware cloth was used for screening, except small features, which were screened with one-sixteenth inch mesh. Site fill was screened according to the scope of services requirements. All floor deposits as well as stratified trash and other distinct cultural deposits were screened.

Excavation Limits

Excavation limits were established by the contract. The actual extent of the site slightly exceeded the southern site boundaries in some areas, while the areal extent of the cultural layers associated with site deposition varied dramatically. Figure 3 outlines the extent of each cultural layer. The vertical extent of the site was determined by sterile remains, which varied from 30 to 90 cm below pgs.

Nonartifactual Sample Collections

Samples for macrobotanical, pollen, radiocarbon, dendrochronology and other laboratory analyses were retrieved from every potential source of information. Hearths, cists, pits, floors and stratified cultural deposits were sampled routinely. In most circumstances, pollen and macrobotanical samples were recovered from the same strata to ensure interpretive comparability. Sample locations were plotted on feature forms. Information pertinent to pollen and macrobotanical samples was recorded on specially labeled bags to ensure its consistency. Pollen sample retrieval included distilled water washes of the sampling instrument. All samples were double-packaged. Radiocarbon and dendrochronological samples were wrapped in tin foil, and string if required, prior to their packaging in paper bags.

General Recording

All site information was documented by the field supervisor and her assistant. Additionally, the geoarcheologist on-site was responsible for recording his activities. Feature forms were completed for each excavated feature, complete with plan view and profile maps. All other notes were recorded in notebook form. Photographic record sheets were compiled for both black-and-white prints and color slide shots. Both pre- and post-excavation photographs were taken as well as general site activity shots. Field specimen sheets were completed at the end of every day; each bag of artifacts was assigned an FS number to track it from the field to the laboratory and during analysis.

The site was mapped using an alidade and plane table. All elevations were recorded on the site map relative to the site's central datum, located south of the entrance road. Individual features were mapped separately on feature forms and on the overall site map.

SUMMARY OF WORK CONDUCTED

Features

A total of 53 features, inclusive of the nine located in 1985, was identified (Fig. 3). Three of those, features 21, 28 and an unnumbered feature at the base of feature 10,

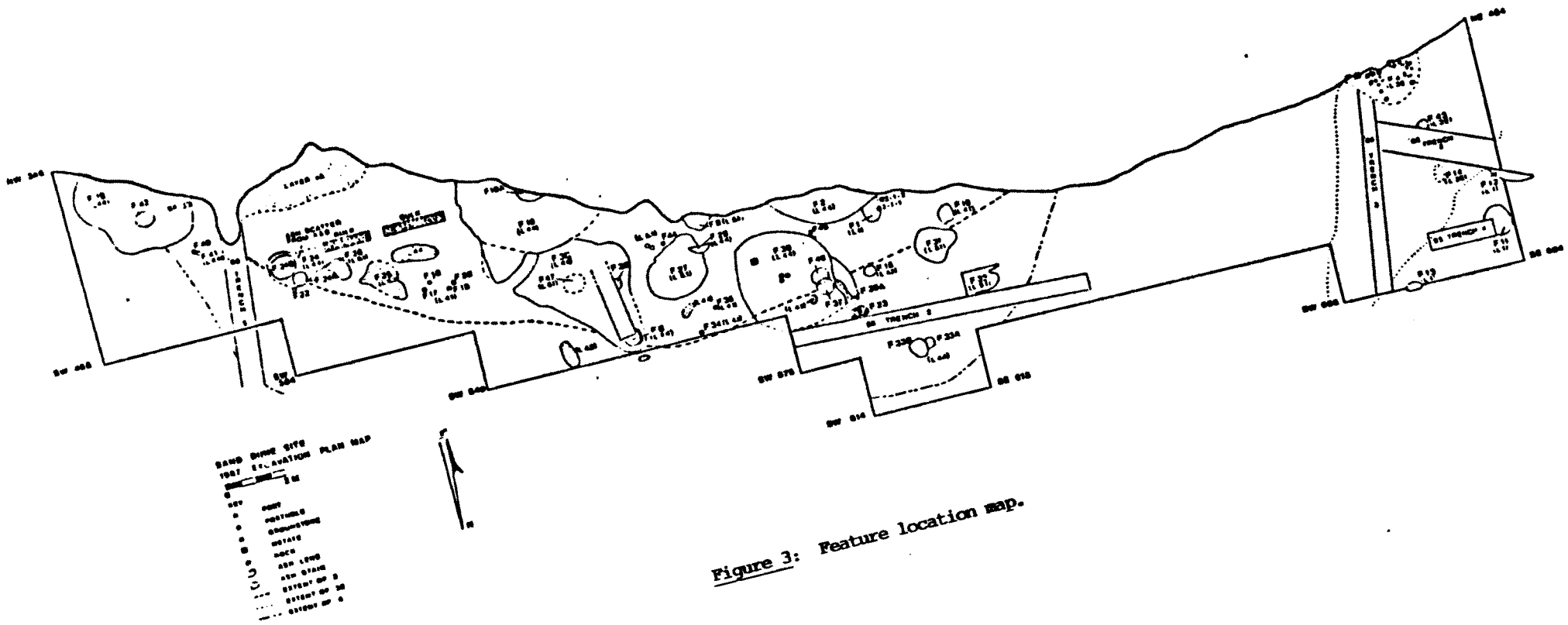

Figure 3: Feature location map.

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were the result of rodent disturbance. A fourth, feature 30, proved to be part of feature 27. Those four features have been removed from the feature list and site map. Feature 23 consisted of a broken, unmodified sandstone slab and a smaller, angular sandstone cobble with slight ash staining around the rocks. Although this was not strictly a feature, it was left on the map and feature list since it seems to have resulted from cultural activity.

Most of the remaining 48 features occurred in the central part of the site at the base of layer 4 and within the top 5 cm of layer 5, and appear to be associated with the Navajo occupation of the site. These include the occupation surface identified and exposed in the 1985 excavations (feature 3), the pit structure excavated in 1985 (feature 2), a second pit structure (feature 10), an occupation surface and associated fill above it (feature 36), and a large pit reused as a refuse pit, which was probably a storage structure or sweat lodge initially (feature 27). These features and the subsidiary features associated with them appear to be the result of the same occupation.

Contrary to conclusions based on the 1985 test excavations, feature 3 is not situated at the top of layer 4 but at the base, from 3 to 5 cm above layer 5. Feature 47, a small hearth found immediately below feature 3C in grid square 499, indicates this 5 cm is probably the result of reuse or resurfacing of the occupation surface. The lower occupation surface is associated with a second occupation surface, feature 36, and two associated hearths, features 37 and 46. While the two surfaces are not contiguous, they both occur at the base of level 4. In contrast to the pit structures, these appear to represent the remains of small, exterior ramadas or covered working areas. That each is immediately adjacent to one of the two pit structures helps support this inference.

Two other small, patchy surfaces were found at the base of level 4, but they could not be traced over a large area and were not associated with any other features. Those surfaces, features 29 and 32, probably are the result of puddling on the occupational ground surface rather than an intentionally prepared work area.

Those features occurring at higher levels consisted primarily of small, shallow amorphous lenses of ash and charcoal, or postholes. All occurred in layer 4. The ash lenses were treated in two different ways. If the lens was well defined or was large enough, deep enough, or contained enough charcoal to recover radiocarbon, macrobotanical or pollen samples from, it was given a feature number and treated as such. If the lens was not well defined, e.g., only 1 to 3 cm in depth, and did not contain enough material for samples, it was mapped on the grid and site maps and its level of occurrence recorded. No feature form was filled out and it did not receive a feature number. All other features are listed below.

Feature List and Descriptions

Pollen and macrobotanical samples were taken from all features excavated this year with the exception of the postholes, which provided only enough sediments for pollen samples, the two patchy fragments of surface that could not be traced over a large area (features 29 and 32), and some of the more ephemeral ash stains. Feature forms are available for all features listed except features 14 and 43, both ephemeral ash stains from which no samples could be recovered, and feature 45, which consisted of a post taken as a dendrochronological sample. Radiocarbon and other samples taken are noted.

Feature 1. A rock concentration identified and exposed in 1985 and excavated this year consisted of 15 sandstone slabs and was located in grid square 494. There were no charcoal, ash, or other cultural deposits associated directly with the slabs. The feature is in layer 1, 20 cm below pgs (Bradford 1987).

Feature 2. A pit structure eroding out of the side of the wash in grid squares 494

and 495 was excavated in 1985 and interpreted as an early Navajo hogan. It measures 3.22 by 1.18 m and was .56 m deep at the deepest point. The top of the feature was 80 cm below pgs. The walls were coated with a thin layer of sandy plaster, but the floor was indistinct. No internal features were found within the structure. The feature is associated with the primary occupation of the site and is believed to date from the second half of the eighteenth century (Bradford 1987). Two support posts were recovered next to feature 2 after removal of feature 1. They appear to be pinon and may provide dendrochronological dates. These were collected as samples 2-1-1 and 2-1-2.

Feature 3. An occupation surface and its associated features, possibly resulting from a ramada or exterior work area, covered most of grid square 499 and part of grid squares 500, 459, 439, 458 and 538. The feature is associated with the historic Navajo occupation of the site and consists of 3A, a stack of sandstone slabs, 3B, a posthole, and 3C, the surface itself. The slabs and most of the surface were exposed in 1985, and the posthole was excavated at that time (Bradford 1987). A radiocarbon sample from the posthole gave an age of 360 B.P. ± 50, or about A.D. 1590, and a second sample from the occupation surface provided an age of 220 B.P. ± 70, or about A.D. 1730. The later date is more closely in accord with ceramic evidence. Dinetah Utility Ware, dating between A.D. 1750 and 1790, was found on the occupation surface. Feature 6, a slab-lined hearth, was set into the surface, and an earlier hearth, feature 47, was found beneath it associated with an earlier use of the surface. Feature 3 was completely exposed and a 1 by 1 m test probe was excavated below it. All artifacts occurring on the surface were piece plotted on a feature map.

Feature 4. A deposit of unmodified sandstone slabs and cobbles was located in grid square 485, which was eroding out of the edge of the wash. The rocks were set into extremely well compacted, indurated clayey sand and underlain by similar sediments containing small amounts of charcoal. The feature was uncovered in 1985 and thought to be a roasting pit (Bradford 1987). Further erosion of the wash edge in the intervening two years and more complete excavation exposed more rocks, but the exact function of the feature remains unclear. Approximately one-half of the feature was excavated. The western half of the fill was removed to the top of the darker unit, then a 50 cm test trench was excavated through the center of the feature to determine the extent of the rocks. Occasional rocks were found projecting back to within 10 cm of the southern balk of grid square 485. There were very few artifacts in feature 4, but one of the artifacts found was a piece of glass. Due to the recent nature of the feature, the hardness of the well-indurated sediments, and a shortage of time, it was decided not to excavate completely the remainder of the feature. The feature may be the remains of an historic camp associated with the trading post or a recent dump. There was no evidence of a structural alignment.

Feature 5. A firepit located in grid square 457 between features 2 and 3 was excavated in 1985 and yielded a radiocarbon age of 470 B.P. ± 50, or around A.D. 1480 (Bradford 1987).

Feature 6. A small slab-lined hearth associated with the occupation surface, feature 3C. The feature was exposed in 1985 and excavated this year. A radiocarbon sample taken during the 1985 excavation gave an age of 480 B.P. ± 70, or A.D. 1470, although it was clearly set into the occupation surface dated to the mid-eighteenth century. A second radiocarbon sample was taken during excavation.

Feature 7. A small concentration of charcoal eroding out of the wash at the western edge of the site. This was originally identified as an ash pit, but on reinspection it appears to be a charcoal concentration resulting from burned roots. It was not excavated.

Feature 8. A pit eroding out of the wash in grid square 489. The pit was located in 1985 but was not excavated. Attempts to relocate the pit during this excavation failed.

Since very little of grid square 489 remains, it is assumed that the rest of the pit was lost to erosion.

Feature 9. A large, deep pit eroding out of the wash in the exposed north faces of grid squares 496 and 497 was identified in 1985 and excavated this year. Due to the large size of the pit and the difficulty of excavating it on the edge of the wash, only the east half was excavated.

Feature 10. A pit structure located in grid squares 420, 460, 500, 459 and 458. The feature was shaped irregularly, possibly as a result of a pit dug into the southwest corner of the structure, and measures 3.75 by 4.5 m, inclusive of the pit. There was no distinction between the fill of the pit and the fill of the rest of the structure, and they were not treated separately during excavation. The walls of the structure are of compacted, reddish brown sand from layer 5 into which the structure was dug. The floor is an uneven, compacted surface identical to that of the walls, and in the northwest corner of the feature it rises almost 10 cm. A sample of fecal matter and a fragment of a post were collected from floor fill in the east half of the structure.

Feature 10A. A small hearth, 49 by 71 by 9 cm, located in the center of feature 10 on the edge of the wash. The east half of the remaining portion of the hearth was excavated and a radiocarbon sample taken.

Feature 11. An ash pit, 93 by 123 by 3 cm, in grid square 604. The feature was located in layer 1 at the same level as the top of layer 3E, which ends just west of the feature. The pit contained bone from either sheep or goat, ceramics, lithics and groundstone. A radiocarbon sample was taken from the feature.

Feature 12. An ash pit similar to feature 11 that was dug out and reused. The feature was cut by Adam's test trench 2 from the 1983 excavations at the site. Approximately one-third of the feature remained and measures 150 cm northwest-southeast by 36 cm northeast-southwest by 10 cm deep. A radiocarbon sample was taken.

Feature 13. A small, shallow, irregularly shaped ash pit, 60 by 70 by 10 to 15 cm, located in the southwestern corner of grid square 605 and the northwestern corner of grid square 645. A radiocarbon sample was taken.

Feature 14. A small, irregular stain of ash and charcoal with no appreciable depth located on the west edge of grid square 564 in layer 3E. No samples were taken.

Feature 15. A small, ephemeral ash lens, approximately 30 cm in diameter and 1 to 2 cm deep, located in grid square 534, 5 cm below the top of layer 4 and 50 cm below pgs. A radiocarbon sample was taken.

Feature 16. A small, irregular ash pit, approximately 62 cm in diameter and 6 cm deep, located at the northeastern corner of grid square 493, 5 cm below the top of layer 4. Two radiocarbon samples were taken.

Features 17 through 20. A group of four small, extremely shallow postholes in grid squares 501 and 461 at the top of layer 4. The postholes were all 10 to 11 cm in diameter and 2 to 3 cm deep. Pollen samples were the only samples taken.

Feature 22. A small, shallow posthole similar to features 17 through 20, 5 cm below the top of layer 4 and 56 cm below pgs in grid square 463. The posthole also was 10 cm in diameter and 3 cm deep. A pollen sample was the only sample taken.

Feature 23. A broken, unmodified sandstone slab and an angular sandstone cobble associated with smears of charcoal and ash that apparently resulted from rodent or root disturbance. The position of the slab may have resulted from cultural activity, but it was not a true feature.

Feature 24. A cooking pit (feature 24B) and associated ash pit (feature 24A) were located 15 cm below the top of layer 4, 3 to 5 cm above the top of layer 5 in grid square 463. The two pits were covered by a smear of ash and charcoal up to 5 cm thick and were originally identified as a single feature. The cooking pit is oval, 73 cm northwest-southeast by 88 cm northeast-southwest and 27 cm deep, and located in the northwest corner of the grid square. The sand at the base of the pit is oxidized. The ash pit is smaller, 50 cm in diameter and 10 cm deep, and was located 10 m southeast of the cooking pit in the center of the grid square. The two pits were at the same level as the occupation surfaces and pit structures and are probably associated with the Navajo occupation of the site. Two radiocarbon samples were taken from the smear of ash and charcoal at the top of the features, and one was taken from within each of the pits.

Feature 25. An irregular, thin lens of ash and charcoal associated with layer 4A and located in grid square 461. The lens extended 54 by 38 by 5 cm. Although this appeared to be part of a larger, patchy, discontinuous lens of scattered ash and charcoal covering parts of four grid squares (layer 4A), it was treated as a feature because a radiocarbon sample was taken. No pollen or macrobotanical samples were taken.

Feature 26. A pit located in the northwest corner of grid square 462, approximately 15 cm below the top of layer 4 and 5 cm above the top of layer 5. It measured 64 by 74 by 14 cm and was 67 cm below pgs. The fill consisted of relatively clean, light brown sand. No artifacts were found.

Feature 27. A large pit or small pit structure located in grid squares 537 and 497, 5 cm below the top of layer 5. The pit measured 195 by 205 cm and is a maximum of 44 cm deep. The fill consisted of discontinuous lenses of ash and charcoal separated by lenses of ashy brown sand. It contained a high density of bone, much of it burnt, sherds and lithics. The walls and floor of the pit consist of light reddish brown sand. There are no compacted or prepared surfaces. However, a posthole (feature 44) and several possible remnants of postholes with traces of post shims were found on the northwestern edge of the pit. Three radiocarbon samples were taken. The feature appears to be associated with the primary Navajo occupation of the site.

Feature 29. A small, irregular area, possibly an occupation surface, measuring 30 by 60 cm and located at the base of layer 4 in the eastern half of grid square 497 and the western half of 486. The surface overlays the northeastern edge of feature 27 but could not be traced across that entire feature, perhaps partially because of rodent disturbance. The west edge of the feature was cut by a rodent hole. The feature may be the result of puddling from surface water rather than an intentionally prepared surface.

Feature 31. A series of ash dumps resulting in an irregularly shaped deposit of ash, charcoal and brown sand lenses containing corn cobs, bones, sherds and lithics. The top of the dump was located 5 cm below the top of layer 5 in grid square 533. The feature was 1.06 by 1.52 by .25 m. A radiocarbon sample was taken from the first lens of ash and charcoal.

Feature 32. An irregular surface at the base of layer 4 in the northern half of grid square 572. The surface did not appear to continue to the south or east but may have been dug through on the north and west prior to discovery. The feature measures 95 by 125 cm. No artifacts were associated with it, and no samples were taken. The feature, like feature 29, may have resulted from water puddling on the occupational ground surface rather than from an

intentionally prepared or heavily used occupational surface.

Feature 33. A small pit (33A) and hearth (33B) located on the southwestern corner of grid square 533, 5 cm above the base of layer 4. The pit was 30 cm in diameter, 5 cm deep, and cuts into the hearth. The hearth is 83 by 48 by 7 cm. A radiocarbon sample was taken from each.

Features 34 and 35. Two postholes located about .85 m apart in grid square 537 at the top of layer 4. They are similar to features 17-20 and 22, although slightly larger. Feature 34 measures 18 by 15 by 4 cm, and feature 35, 13 by 12 by 2 cm. No samples were taken from either feature.

Feature 36. A slightly dish-shaped occupation surface, possibly from a hogan or ramada, and the fill above it. The feature was located in grid squares 494, 496, 535, 536, 575 and 576. Two hearths were associated with the feature: feature 37, which was located on the east edge of the floor, and feature 46, which was located slightly east and below feature 37 and was associated with an earlier use of the structure. The floor of feature 36 partially covered an earlier surface, feature 36A, which formed an oblong mound of compacted sand beneath the east edge of feature 36 and extended about .35 m into grid square 534. The floor of feature 36 extended over the top of the west side of the mound. Feature 36A appears to be the remnants of an earlier floor associated with feature 46. It continued underneath feature 36, sloping down to the west towards feature 47, but could not be traced up to the feature. The mound was oriented northwest-southeast, was 100 cm long by 25 cm wide by 15 cm high, and was underlain by what appeared to be yet another occupation surface merging into 36A at the base of the mound. The series of use surfaces appear to represent the reuse and resurfacing of the floor in the structure or enclosed area the feature represents. The function of this mound in unknown, but it may be part of a doorway or the juncture of the floor and wall.

Feature 37. A hearth, 80 cm in diameter and 7 cm deep, located on the eastern side of the floor of feature 36. A radiocarbon sample was taken from the feature.

Feature 38. A large deposit of what appears to be sheep dung located at the base of layer 4 in grid squares 385, 386, 425 and 426. The feature extended 2.5 m by 3.5 m and was a maximum of .10 m deep. The deposit was associated with three small postholes, features 39 through 41, and probably represents the remains of a small corral or pen. However, a hearth, feature 42, also was associated with the feature. Since a hearth would not usually occur in a corral or sheep pen, it may slightly predate the corral, or the feature may have been used as a lambing pen. In addition to a pollen and macrobotanical sample, a phosphate sample was taken from the deposit.

Features 39 through 41. Three small postholes associated with feature 38. Feature 39 was located in the dung deposit and was 12 cm in diameter and 10 cm deep. The top of the posthole was 48 cm below pgs at the southwest corner of grid square 422. Features 40 and 41 were located 10 cm apart, about 90 cm south of the dung deposit and 175 cm south-southeast of feature 39. Feature 40 was 9 cm in diameter and 2 cm deep. Feature 41 was 15 cm in diameter and 6 cm deep. Pollen samples were the only samples taken from these features.

Feature 42. A hearth surrounded by feature 38 and dug into the sand below. It was located on the east edge of the dung deposit and ca. 50 cm below pgs at the southwest corner of the grid square 422. The hearth measured 51 by 70 by 12 cm. The sand beneath was reddened from burning. Burnt bones, retouch flakes and sherds were recovered from the hearth.

Feature 43. A shallow, amorphous stain of ash and charcoal in layer 3E and grid square 525. No samples were taken.

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Feature 44. A posthole with an intact post located 30 cm north of the northwest edge of feature 27. The top of the feature was 10 cm below the top of layer 5, 74 cm below pgs. The posthole is 13 cm in diameter and 39 cm deep. The post, which appeared to be pinon, is slightly smaller in diameter and is 39 cm long. The post was taken as a dendrochronological sample.

Feature 45. A post lying adjacent to two thin sandstone slabs, which were lying next to the north edge of feature 36, 30 cm south of the southern edge of feature 2. It is not clear which of the two features the post is associated with. If the features were contemporaneous, as they appear to have been, it may be associated with both. It was taken as a dendrochronological sample.

Feature 46. A small hearth, partially underlying feature 37, beneath the floor in the east half of feature 36. It appears to be associated with the floor, feature 36A. The hearth is 44 cm in diameter and 18 cm deep. The fill consisted of lenses of sand, ash and charcoal.

Feature 47. A small hearth, 60 by 70 by 10 cm deep, located immediately below the occupation surface, feature 3C. Due to a shortage of time, the surface was not followed beyond the area of the hearth. The hearth and patch of occupation surface rested directly on the top of layer 5. There were no cultural deposits below the feature in layer 5.

Site Stratigraphy

There was little deviation from the methodology specified in the scope of work. However, differences between the expected stratigraphy as revealed in the test excavations and the actual stratigraphy as it occurred over much of the site necessitated some changes in procedure, particularly with respect to layers 3 and 5. Layer 1 was removed with a bulldozer from most of the site during the first day of excavation. Along the northern part of the site near the wash edge, layer 1 was removed with shovels but not screened. When artifacts or nonartifactual samples were encountered during excavation of this layer, they were collected. Layer 2 was removed by hand wherever it occurred. This layer was patchy, extremely thin (1-2 cm) in many places, and primarily confined to the north edge of the site. No artifacts were recovered from the layer. Layer 3, dark reddish brown to brown sand ranging from 1 to 10 cm thick, did not occur across the entire site. It appeared to be limited to the north-central part of the site and was absent along the western, southern, and eastern edges. Layer 3 occurred in all or part of 36 grid squares and was excavated completely.

A layer similar in color, but unrelated stratigraphically, to layer 3 was found to underlie layer 1 on the eastern end of the site, east of a shallow drainage ditch extending from the road northeast to the wash. Although this was the second stratum encountered on that end of the site, it was called 3E because of its occupational context. All of the sediments on that end of the site were extremely well compacted and moderately well indurated. This was true of layer 3E, which also contained lenses of water-laid clay, apparently of natural rather than cultural origin. Layer 3E ranged from 5 to 15 cm in depth and sloped towards the north. It was thickest on the southern edge of its extent and thinnest along the edge of the wash. Based on artifacts and features associated with the layer, it was judged to result from historic occupation of the site. However, there was considerable evidence of disturbance to deposits by recent dumping and stream action. The latter may be associated with the drainage ditch, with flooding of the small wash that runs into Pueblo Colorado Wash from the south, or both. Whatever the source of the disturbance, mixing of artifacts probably occurred in the area. Layer 3E occurred in all or part of an estimated 11 grid squares and was excavated in nine of those. The sediments from the layer

were screened with the exception of those from the southern half of grid square 485; they were removed before the layer was recognized. Artifacts occurred in low densities in the layer. Deposits below the layer were sterile.

Layer 4, light, reddish brown, silty sand containing flecks of charcoal and ash stains, occurred throughout the central core area of the site. It was absent on the western and eastern ends of the site and along the southern edge near the road. Small discontinuous lenses of ash and charcoal occurred throughout the site in the layer. In grid squares 421, 382, 383 and parts of 461, a more extensive ash lens occurred in the bottom 5 to 10 cm of layer 4. This was called 4A and excavated separately. In the southwestern corner of the site, the layer contained few artifacts, very little charcoal, and was quite thin. In those grid squares, it overlay sterile deposits. There was no definable layer 5.

Layer 4 was completely removed in 30 squares, one-half of four squares, and one-quarter of one square. In two of the partially excavated squares, portions were excavated while the remainder was excavated to within 5 cm of the base of the layer. Layer 4 was excavated to within approximately 5 to 8 cm of the base of layer 4 and the top of layer 5.

Layer 5 consisted of what appeared to be an old, poorly developed soil of medium to dark, reddish brown sand blending gradually into lighter sediments. Apparently, it originally occurred across the entire site but was presently absent on the east end of the site because of erosion. The layer extends to the level of the wash at grid square 530. This coincides with the location of the drainage ditch crossing the site. A total of 17 squares and five partial squares were opened into layer 5. Of the 17 complete squares, eight were excavated 5 cm into layer 5, two were excavated 10 cm into the layer, two were excavated 15 cm into the layer, and four were excavated 20 cm into the layer. Layer 5 was completely removed from one square, but it was only 10 cm thick. Excavation was halted 20 cm below the top of layer 5 in the northern half of the square and 30 cm below the top of the layer in the southern half of the square. In all of those squares, artifacts were recovered primarily from the top 5 cm of the layer. The few artifacts and bones found below the level apparently resulted from displacement or rodent disturbance.

After discussion with Peter McKenna, it was decided that rather than continuing to open up entire squares in sterile deposits, 1 m sq test probes would be excavated into layer 5 to test for cultural deposits. Five such probes were excavated. The southwest quarter of grid square 575 was excavated to a depth of 15 cm below the top of layer 5, the northwest quarter of grid square 533 was excavated to a depth of 20 cm below the top of layer 5, the northwest quarter of 423 and the northeast quarter of 573 were excavated to 25 cm below the top of layer 5, and a 1 by 1 m square in the center of grid square 499 was excavated to 30 cm below the top of layer 5. Additionally, a 2 by 5 m test trench was opened 20 cm into layer 5 in one square. No cultural materials were recovered from any of the units.

In addition to those squares, four squares were excavated into sterile deposits underlying layer 4 in the southwestern corner of the site. Layer 5 could not be defined in those squares. The sediments from those units were lighter than layer 5, resembling the sand below layer 5 in color. Grid squares 502, 503, the east half of 504, and a 2 by 5 m test trench in the west quarter of 541 were excavated 10 cm into the sterile layer. This may represent an area of localized erosion, possibly an area of dune blowout.

Two squares were opened between grid 571, the eastern most square with stratigraphy corresponding to that in the western and central parts of the site, and the grid squares opened into layer 3E at the eastern end of the site. The stratigraphy in those two squares, 569 and 567, consisted of recent deposits overlying sterile layers. They were excavated to a maximum depth of 102 cm and 89 cm, respectively, below pgs. The units were extremely well

compacted and appeared to be mostly water-laid deposits.

As mentioned above, the main occupation at the site occurred at the base of layer 4 and the top of layer 5. That occupation is associated with the historic component at the site. Bones apparently of sheep, goat, cattle, and horse or mule occurred in features at that level. Dinetah Utility Ware also occurred in significant quantity in the layers. None of the strata excavated could be associated with a prehistoric occupation of the site. Either the prehistoric component of the site has been lost completely through erosion, none occurred, or it occurs at levels deeper than layer 5. One sherd was found eroding from the face of the wash 2.67 m below pgs, in all likelihood, the location of the sherd is a result of displacement.

Artifacts and Samples Recovered

A preliminary count indicates that approximately 600 bones, 400 sherds, 200 lithics, and 30 pieces of groundstone were recovered from the site. Approximately 30 pieces of glass and 10 pieces of metal from cans were collected from layer 1. Forty-one pollen samples, 27 macrobotanical samples, 23 radiocarbon samples, 7 dendrochronological and one phosphate sample were collected from features. Other samples recovered include 15 wood fragment samples, 8 macrobotanical samples of seeds and corncobs, 7 samples of minerals or pigments, 3 Olivella shells, probably used as beads, and one piece of eggshell.

SIGNIFICANCE OF THE WORK

The 1987 excavation at the Sand Dune Site has provided a more complete understanding of site stratigraphy and of the extent and time of the primary occupation. Future analysis of the artifacts and samples will allow a more complete assessment of the activities occurring at the site and the nature and duration of historic use.

Although final assessment of site significance must wait for a complete analysis of the artifacts and samples collected, initial results indicate that the primary occupation was historic Navajo. Based on recovered ceramics and the radiocarbon date from feature 3C, that occupation appears to have dated to the second half of the eighteenth century. Since few, well-documented early Navajo sites are known, the Sand Dune Site provides us with an opportunity to gain important information on the activities occurring at such a site, the duration of occupation, and its chronological and cultural relationship to later sites in the area. As the main occupation of the site predates the establishment of the trading post and use of the site continued after this occupation, valuable information may be gained on the effect of the trading post on the local economy and on the activities and material culture of the inhabitants. Likewise, more general acculturation processes may be illuminated. Important correlations between economic changes and settlement and social organization as defined by Kelley (1978) and York (1983) also may be examined.

RECOMMENDATIONS FOR ARCHEOLOGICAL CLEARANCE

An estimated 90 to 95 percent of all known cultural materials present at the Sand Dune Site have been excavated and all possible information bearing on cultural occupation at the site collected. The main occupation level at the site, situated at the base of layer 4 and the top of layer 5, was exposed completely and excavated. Test probes and entire squares were opened below the occupation level throughout the site into layer 5 to between 15 and 30 cm below the last cultural remains encountered. There is no evidence of cultural occupation at a depth greater than 5 cm below the top of layer 5 anywhere on the site, with the exception of one sherd found protruding from the bank of the wash 2.67 m below pgs. It seems most likely that the location of the sherd is the result of displacement or disturbance. Consequently, clearance is recommended.

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