THE ARCHAEOLOGY OF BARREL SPRINGS SITE (NV-Pe-104), PERSHING COUNTY, NEVADA

by

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with

ANALYSIS OF FAUNAL REMAINS

by

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THE BARREL SPRING SITE (NV-Pe-104)
AN OCCUPATION-QUARRY SITE IN NORTHWESTERN NEVADA

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INTRODUCTION

The Barrel Springs excavation and report is the result of the joint co-operation of the Nevada Archeological Survey and the University of California at Berkeley. Discovered by the Howard Mitchells, a family of amateur archeologists, in the spring of 1966, site NV-Pe-104 was test pitted by C. William Clewlow and Richard A. Cowan in July, 1966, as part of a program of archeological reconnaissance in the Black Rock Desert for the University of California at Berkeley. For seven weeks in June and July, 1967, Cowan conducted extensive excavations at Barrel Springs for the Nevada Archeological Survey. This paper is the report of both seasons' work.

Many people have aided in the excavation of site NV-Pe-104 and the preparation of this report. At Barrel Springs, the Ben Constant family, our landlords for both the site and our camp, were helpful and co-operative in every possible way, and the Howard Mitchells, the other Barrel Springs family, were excellent neighbors. Thanks are also due to Ethel Hesterlee for setting up camp for both field parties, to Joan Moll for cooking in 1967, to Eldridge Nash for surveying both in 1966 and 1967, and to Hank Chipman for running the bulldozer in 1967.

Volunteer students from the University of California did the shovel work in both 1966 and 1967: Donna Chong, Caleb Cushing, Steve Frankel, and Hazel Wald in 1966, and Caleb Cushing, Lynn Dole, Steve Gabow, Carolyn Hills, Patrick Hallinan, Harry Merrick, Gail Pool, Peter Schireson, Evelyn Seelinger and Janet Shaw in 1967. Several fellow graduate students have helped in the preparation of this report. James O'Connell visited the site, Robert Elston gave advice on the analysis of stone technology, Thomas Layton advised on point typology, and David Thomas identified the faunal remains.

Robert F. Heizer of the University of California at Berkeley provided useful advice before the Barrel Springs project, as did Dr. Robert L. Stephenson, Coordinator of the Nevada Archeological Survey. Thanks are also due to the various staff members of the Nevada Archeological Survey for their aid in the preparation of this report. Sheryl Burrows washed and sorted the artifacts, Donald L. McCaughey photographed them and Patricia Headrick typed the manuscript. Dr. John H. Schilling, Associate Director, Nevada Bureau of Mines, identified stones and gave advice on the mineralogical and hydrological processes at work at Barrel Springs. Jamie Huberman of Berkeley drew maps and soil profiles.

A special note of thanks is due to C. William Clewlow, Berkeley, who gave advice on every phase of the Barrel Springs project and took time off from his work at Berkeley to assist in the mapping of the site, the typing of the artifacts and the final editing of the manuscript.

METHOD OF EXCAVATION

Site NV-Pe-104 is bounded on its west, south, and east sides by flash-flood gullies and on its north by almost twenty feet of overburden pushed up and onto the site by a modern excavation for a pond (Map 3). The entire area of the site south of the pond is covered with from three to four feet of this disturbed, culturally sterile overburden as well as flash-flood debris and stamp mill tailings.

The west flash-flood gully is quite deep, in places exposing more than twenty feet of vertical wall. Thus, the site was discovered by Mr. Mitchell by observing the east section. The spot chosen for the 1966 test pit (pit 2) was one where the midden seemed sufficiently rich, while at the same time the overburden was deemed not to be too thick. The spot chosen was right next to a small pit where pothunters had dug into the site.

Upon returning to Barrel Springs in 1967, it was decided that since the vertical face of the west gully indicated that the entire site was covered with a sterile overburden, it would be an effective aid to excavation to bulldoze it off. Four trenches (A, B, C, and D: see Map 3) were cut with a D-7# caterpillar bulldozer to a depth which was deemed to be immediately above the top of the midden. The Cat's height above the midden was gauged by its depth in relation to the vertical face of the west gully. The blade was set so that it could only scrape off three inches at a time. After bulldozing, Trenches A, B, and C were subdivided into ten by ten foot pits, while D, a twenty by twenty foot area was quartered into four ten by ten foot units. Since the debris resulting from the pond excavation contained artifact material, Trench A was cut to determine the northern boundary of the site. Trenches B and C were cut to follow the midden stains visible in the west gully, while D was cut to determine the site's eastern extent in the area of apparent heaviest artifact concentration.

Alternate ten by ten pits (A-3, A-5, A-7, B-3, B-5, C-2, C-4 and D-3) were at various times shovel-shaved down to the midden (see Map 3). This pit system rather than a trench of five by five pits was utilized as the method of excavation because it was felt that ten by ten test pits would cover more site surface area and give a better opportunity for discovering architectural features than would a five foot wide trench. The combination of projectile points, blades, scrapers, charcoal, and bone from Pit 2 indicated that the site might be a buried habitation area with house pits and the like. Thus, a method of excavation was chosen that could best elucidate these features. As it turned out, site NV-Pe-104 is a limited occupation-quarry site, nevertheless. I believe that the pit system adopted proved adequate for reconstructing its history.

Once the midden was reached by shovelling, it was then troweled. Originally it was believed that site NV-Pe-104 contained several distinct midden layers, and efforts were made to dig by natural levels. However, the fact that the midden proved to be dissected by flash-flooding rather than divided into discrete layers made it imperative that we record each artifact in terms of an absolute depth from the surface. Thus the depths given for artifacts are those taken from the top of the uppermost midden level for each pit. All pits were taken down by a combination of troweling midden and shovelling sterile matter to the underlying bentonite clays.

During the analysis of the Barrel Springs material, the artifacts from Pit 2 were correlated with those from the 1967 excavation. Since the former are located in the Lowie Museum of Anthropology at Berkeley, while the latter are the property of the Nevada Archeological Survey at Reno, there are two different numbering systems used for the site artifacts. All artifacts numbered with a 2 followed by a dash and five digits are in Berkeley; artifacts numbered with one or two digits are housed in Reno.

THE SETTING

Barrel Springs is located on Nevada State Route 48, fifty-eight miles north of Lovelock (see Map 1). It is situated on the eastern slope of a spur of the Kamma Range, above and to the northwest of a flat which marks the western opening of Rosebud Canyon. The course of Rosebud Creek, an ephemeral stream, runs through this flat to where it joins Rabbithole Creek, an intermittent stream which flows northwesterly through a break in the Kammas into the Black Rock Desert. However, since site NV-Pe-104 is on the inner slopes above the flat, the drainage through the site is southerly and into Rosebud Creek rather than into the Black Rock Desert. Barrel Springs lies at an elevation of 4,550 feet, a few hundred feet below the northern lip of the slopes which rim the flat to the north and almost two thousand feet below the mountains which rise to its northeast, south, and east (see Map 2).

Vegetation in the Barrel Springs area includes the typical xerophytic-Upper Sonoran plant assemblages of northern Nevada. However, the increase in ground water caused by the several springs in the area as well as the high water table of the flat has encouraged growth of plants of the sagebrush assemblage, in contrast to the drier shadescale assemblage of surrounding areas. Nevertheless, in terms of rainfall the whole northwest slope of the Kammas can be classified as a semi-desert environment. Lizards and small mammals are the predominant fauna; however, local residents have noted the occasional presence of deer and bobcat, and coyotes are common. The Jackson range which joins the Kammas to their north and bounds the Black Rock Desert on its east was reputed to be full of deer prior to the advent of Twentieth Century hunters, and antelope once frequented the wetter portions of the Black Rock Desert.

The spur of the Kammas on the slopes of which site NV-Pe-104 is located was apparently formed by a flow of Tertiary rhyolitic lavas. Rhyolite is the country rock throughout the immediate vicinity of the site, and Majuba Mountain, ten miles to the southeast, is, itself, a rhyolite dome. Volcanic formations predominate in all mountain ranges near the site. Dr. John H. Schilling of the University of Nevada, upon inspection of rock samples from site NV-Pe-104 indicated that its native rhyolite is one with a very high silica content. He furthermore conjectures that bands of color within the rocks probably indicate that the rhyolite beds were the result of lava flow rather than the compaction of volcanic ash.

Matthew Taylor, a mining geologist who visted the site, inspected the soil profiles and noted that underlying the rhyolite-bearing strata (and for that matter the cultural deposits) was a deposit of bentonite clay laden with chunks of phyllite. Phyllite, a low-grade metamorphosed shale very similar to slate -- the higher grade metamorphosed shale -- commonly forms Cenozoic rock formations in this area of Nevada. Bentonite clay is often formed by the weathering of rhyolite. It would, therefore, appear that the geological history of Barrel Springs was one in which beds of Cenozoic phyllite were overlaid by a flow of Tertiary rhyolitic lava which has consequently been partially weathered to form a strata of bentonite clay.

In regard to the archeology of site NV-Pe-104, the geological situation, along with the availability of water to be discussed shortly, gives the rationale for the site's utilization. The Barrel Springs site is a quarry site where the main activity was the making of tools from the local beds of rhyolite. The predominant number of artifacts within the cultural deposits at the site are fashioned from this stone; furthermore, the hills bordering the site are littered with rhyolite cores, roughouts, and blades. Moreover, all other raw materials, save obsidian, utilized in the Barrel Springs stone tool inventory are readily available within the rhyolite beds. The igneous rocks used for manos occur in dikes within rhyolitic lavas, while cryptocrystallines occur as inclusions. The one slate knife found can be associated with the Cenozoic phyllite formation.

Site NV-Pe-104, rather than a nearby area, was chosen for the location of a quarry site due to a spring which flowed in the vicinity of pits B5 and 1. In the adjoining portions of these two pits at depths ranging from four to eight feet, calcium carbonate lumps were discovered. These pieces, ranging in size from one to three inches in diameter, are quite irregularly shaped. Upon inspection, Dr. Schilling conjectured that they most likely formed part of a buried spring deposit. The closest lake terraces noted by the two field parties lay at lower elevations several miles to the southwest. No terraces were discovered below the site in the flat or above it on the eastern slopes of the spur where site NV-Pe-104 is situated. This is in accordance with Morrison and Frye (1965:11) who state that Lahontan Beach, the highest Pleistocene lake Lahontan terrace had an elevation of 4,375 to 4,400 feet. Thus, site NV-Pe-104 lies above the highest recorded Pleistocene lake terrace and we can assume that the calcium carbonate deposits are the residue of a buried spring.

STRATIGRAPHY

Strata, both cultural and geological, at the site slope from north to south. This is in accordance with the present-day drainage pattern in the Barrel Springs area and indicates that this pattern can be projected back through time. Drainage is of great importance in reconstructing the history of the site, for the soil profiles indicate that its two cultural levels were heavily dissected by flash-floods and are separated by a sterile layer of brown silt which may have been water-laid.

Profiles 1, 2, and 3 demonstrate the stratigraphic history of the site. The upper cultural level is comprised of, in places, two and elsewhere three strata of black silt, each separated by a layer of yellow silt mixed with rock debris of various sizes. There is little doubt that this yellow layer represents flash-flood deposition. The black silt is neither heavily flecked with charcoal nor is it distinguishable in texture from the yellow rock-filled silt. However, some areas of charcoal concentration are found within this black stratum. While artifacts are more common within the dark layers, they are by no means confined to them, occurring in the yellow strata as well. Projectile points (here used as a chronological index) differ neither in type nor in measurements throughout the thirty-six inches of the upper cultural level. In fact, the two seemingly most recent points (Specimens 25 and 2-40542) occur in the second lowest black stratum. It thus appears that the upper levels of black silt do not represent several different cultural strata each separated by substantial gaps in time, but rather a one-phase occupation which was interrupted by periodic flash-flooding.

A similar situation pertains to the lower cultural level. Here, there are in places, one and elsewhere two black strata which are identical in composition to those of the upper cultural level. Again these strata are separated by a layer of rock debris-filled yellow silt which again contains a fair amount of cultural material. However, the lower cultural level does not have the extent of the upper, ending in the south at C-2 (see Profile 3) and in the northeast at A-7 (see Profile 2). The upper level extends in these directions beyond the limits of the excavation.

It now appears that flash-floods have done a fair amount of damage to the site NV-Pe-104 cultural deposits. In places the cultural leavings have been washed away; in other areas artifacts have been redeposited in other cultural strata or with flash-flood debris; in still other areas the cultural deposits have been diffused but not destroyed. Often these deposits have been capped by debris and not even disturbed. This is all in accordance with flash-flood patterns, which seal and erode in an erratic fashion. Thus it should be kept in mind that while the two cultural levels must be viewed each as a discrete unit, the exact depth of artifacts within each may not be in accordance with their original deposition.

If the breaks in the cultural levels caused by the strata comprised of yellow silt with pebbles represent short intervals in time, this may not be the case for the brown silt. This stratum separates the upper cultural level from the lower in all pits save A-7, where it is replaced by a band of red and yellow clay (see Profile 2). The brown silt is quite fine and does not contain any rock debris, while the red and yellow clay is bedded and pure. Both are devoid of artifacts. The area between the upper and lower cultural levels also contains strata of yellow silt with pebbles. These strata represent several different flash-floods, for the brown silt is undercut, dissected, cut into or capped at different places within the deposit. These particular bands of yellow silt with pebbles are also devoid of artifacts.

It is supposed that the brown silt/red and yellow clay stratum represents the residue of still water lying over the terrain of NV-Pe-104. There are no unsorted rocks indicative of moving water within this level and the fact that the brown silt merges into red and yellow clay toward the northeast seems to argue against aeolian deposition. The Barrel Springs area is one of continuous spring activity, containing the aforementioned buried spring, as well as the modern spring which fills the pond to the northwest. Perhaps, as a result of this spring activity, a seep was created, flooding the site and forcing it to be abandoned for a while. After the seep dried up, several flash-floods cut into its residue before the site was reoccupied.

A determination of the duration of the occupational hiatus at Barrel Springs must await the radiocarbon tests. Water deposits can build up at an amazingly rapid rate; however, the fact that the only complete projectile point from the lower cultural level is concave based could be used to argue for a lengthy abandonment. Because the length of the occupation hiatus at site NV-Pe-104 is unknown and because of the aforementioned problems concerned with original artifact placement due to flash-flood disturbance, artifacts are here described in terms of their absolute depth from the top of the uppermost black silt strata, rather than assigned to specific levels. If the brown silt represents only a few years, then it would be misleading to make a sharp division between artifacts found above and below it. Furthermore, it is less intuitive and more neutral to utilize this method than to attempt to reconstruct flash-flood processes which, as mentioned above, are totally irregular.

Utilizing Tables 1 and 2 which note the inventory of site NV-Pe-104 by levels within specific pits, the break between the upper and lower cultural levels can be demonstrated by the fact that between 36 to 54 inches only in Pits A-7 and B-5 is there any cultural material. These charts further indicate that no finished artifacts whatsoever and only one obsidian flake and two pieces of unmodified bone occur from 36 to 48 inches. It should also be noted that the artifact yield above the brown silt deposit is much greater than below. Whether this is a function of duration or intensity of occupation is, at this time, strictly a matter of conjecture. Finally, in terms of artifact concentration, the charts also demonstrate that the most heavily utilized part of site NV-Pe-104 was the area around B-5 and Pit 2, the area close to the ancient spring (see Map 3).

THE OBSIDIAN INDUSTRY

Because projectile points are here considered to have chronological significance, the obsidian industry will be discussed prior to the rhyolite industry in order to give time perspective for the non-obsidian artifacts. Although obsidian is not native to the immediate Barrel Springs area, it does occur at localities fairly close by. Ragir and Lancaster (1966) have reported on an obsidian quarry and workshop to the northwest of Barrel Springs in Highrock Canyon and the 1966 field party located a large source to the north near Orovada, as well as a smaller source of inferior obsidian to the south in the Trinity Mountains. Since the mountains in all directions from Barrel Springs were the scene of intensive volcanic activity, there may be many other as of yet undiscovered or unreported sources.

The obsidian industry at site NV-Pe-104 has three features: projectile points, scrapers, and utilized flakes. It is interesting that the Barrel Springs assemblage contains no rhyolite points and only twenty rhyolite utilized flakes. This suggests the possibility that the local rhyolite was unsuitable for fashioning into these classes of artifacts and obsidian was imported to the site for this reason.

PROJECTILE POINTS

Nineteen projectile points were excavated at site NV-Pe-104. Of these, utilizing the system of nomenclature first proposed by Heizer and Baumhoff (1961), thirteen are of the Elko Series, two are of the Rose Spring/Eastgate Series, one is concave base, and three can be classed as unfinished blanks. All but two were excavated above the brown silt stratum. Table 3 gives the find locations, weights, and dimensions for site NV-Pe-104 projectile points.

Elko Series - Elko Series points are illustrated by the upper three rows of Plate I. Missing is Specimen 2-40537, which is almost identical to Specimen 2-40538. Elko points are large and triangular, with straight sides, corner-notches and lenticular cross-sections. They are well-made and are finished by bifacial pressure flaking. In distinguishing between the Elko-Eared and Elko Corner-notched subtypes, this report will utilize Lanning's (1963:251) suggestion, and term an Elko point with a straight or convex stem base "corner-notched" and one with an inverted V-notched stem base "eared". Thus, the pieces in Plate Ia, b, are corner-notched, and Plate Ic, g are eared. The rest are too damaged to be typed and can be identified as Elko Series points only by their shape and more importantly by the form of the breakage scars at their bases.

While all but 17 Elko Series points may be utilized to arrive at an average breadth, the damaged nature of the points from the site do not allow this for the other average measurements. Average width and weight determinations are taken from points 19, 20, 21, 24, 2-40536, 2-40537, and 2-40538, while average length is derived from points 19, 23, 24, 2-40536, 2-40537 and 2-40538. Due to the small number of Elko Series points from NV-Pe-104, eared and Corner-notched points will be lumped together for comparative purposes.

Average measurements for Elko Series points from site NV-Pe-104 are as follows: average weight: 3.6 grams; average length: 3.97 cm.; average width: 2.73 cm.; and average thickness: 0.45 cm. These measurements compare closely with those for the Wagon Jack Shelter site. Combining the averages given by Heizer and Baumhoff (1961:129) for Elko Eared and Elko Corner-notched points at Wagon Jack Shelter, we find that here the Elko Series' average weight is 3.7 grams, average length is 3.75 cm., and average width is 2.4 cm.; an almost identical correspondence to site NV-Pe-104. At both sites Elko Eared points are somewhat larger than Elko Corner-notched.

Elko points at Barrel Springs also compare closely to those at South Fork Shelter (Heizer, Baumhoff and Clewlow, 1968:7-8), but are smaller than those at the Rose Spring site (Lanning 1963:250). They are larger than what appear to be Elko points at the Karlo site (Riddell 1960:16-17). Elko points at Barrel Springs are thus most similar to those found in west-central Nevada. Further comparisons with Elko Series points can be made by consulting O'Connell's (1967:135-136) list of "Published References to Elko Eared/Elko Corner-notched Projectile Points", as well as Fowler's recent works on sites in eastern Nevada (Fowler 1968a; 1968b).

Rose Spring/Eastgate Series - Two points at Barrel Springs are members of the Rose Spring/Eastgate series. Specimen 2-40542 (Plate Im) can be typed as an Eastgate Split-Stem point and specimen 25 (Plate In) as a broken Eastgage Expanding-stem point, which has been re-used as a scraper. Both points are somewhat larger than the average for these types given by Heizer and Baumhoff (1961:129) in the Wagon Jack Shelter report. This is not surprising, for as Heizer and Baumhoff (1961:128) point out in regard to the smaller sized Eastgate Split-stem, the Eastgate Series is quite possibly typologically derived from the Elko Series. Thus, these two points can be seen as transitional in the Eastgate Series from the Elko Series.

Concave-base Point - One concave base point was excavated at Barrel Springs. It was the only complete point found below the brown silt stratum. Specimen 26, the Barrel Springs concave base point, has nearly parallel sides and is rather small (see Plate Io and Table 3). It is thus quite different from points typical of the chronologically early Humboldt Concave-base Series, which as Clewlow (1967:144) points out, "bears some similarities to Pinto points, especially the Pinto Shoulderless variety". However, the stratigraphic placement of specimen 26 argues for its consideration as an early point type - perhaps a local variant of the Humboldt Series.

Projectile Point Blanks - Three projectile point blanks (specimens 15, 16 and 2-40539) are illustrated on the bottom row of Plate II. Blanks are artifacts whose primary shape has been formed by pressure flaking, but which lack final basal alteration in the form of stems, notches, etc. Specimens 16 and 2-40539 are triangular in outline. The latter has one ill-made flake taken out of the side which appears to the left in Plate II. Specimen 5 was apparently parallel-sided and is slightly modified at its base. It occurred below the brown silt stratum.

Before turning to chronological considerations, a few observations concerning projectile point re-use and manufacture at Barrel Springs site may be made. First, three broken points at Barrel Springs were reused as scrapers. Specimen 21 was mis-flaked on its upper right-hand side and this side was consequently reused. Specimens 23 and 25 are both heavily worn down from scraping on what appears in Plate I as their left-hand sides. Secondly, the tip of specimen 2-40539 shows reuse as a drill. Finally, the flakes from which specimens 17, 24, and 2-40538 were made are only partially modified, the original flake surface being incorporated into the form of the point. All this suggests that since obsidian had to be imported into the area, it was conserved as much as possible by the occupants of the site.

Site NV-Pe-104 above the brown silt stratum is basically an Elko component site. O'Connell (1967:133-135) has noted this series' utility as a time marker, with an initial occurrence in western and central Nevada at about 1000 B.C. The Elko Series "declined in importance after 200-600 A.D." (O'Connell 1967:135), when it was replaced by Rose Spring and Eastgate points which "appear to cover the period from 600 - 1300 A.D., or the time between the end of the Elko Series and the appearance of the Desert Side-notched form" (Clewlow 1967:144). Thus, subject to refinement by radiocarbon determination, the period of occupation of part of Barrel Springs site lying above the brown silt stratum can be dated ca. 1000 B.C. to 700 A.D. This time-range includes that for the Elko Series and allows for the transitional Eastgate points at the site. It is interesting to note that additional Rose Spring/Eastgate points as well as Desert Side-notched points occur at other springs near site NV-Pe-104. These late type points from nearby indicate that only the site but not the general Barrel Springs area was abandoned after approximately 700 A.D. It would be foolhardy, with only one projectile point from below the brown silt to hazard a guess at when site NV-Pe-104 was first occupied.

SCRAPERS

Thirteen scrapers were recovered from site NV-Pe-104. They are illustrated in Plates II and III and described on Table 4. Ten are bifacially worked; the other three (specimens 5, 8, and 2-40545) are shaped only on one side. The three uniface scrapers are concave-convex with shaping on their convex sides. The other scrapers are essentially lenticular in cross-section. There is no stratigraphic distinction between uniface and biface scrapers.

Several classes of scrapers occur at the site. Specimen 2-40540 is large and pear-shaped, as apparently were specimens 9 and 10 (Plate II, top row). These three scrapers are somewhat larger than the others from Barrel Springs. Furthermore, specimen 2-40540 evidences a different pattern of utilization wear on its cutting edges than the other scrapers at the site. Not only is its right edge on Plate II beveled from the unifacial scar characteristic of scraping, but also its left edge is evenly ground down from cutting or sawing. It is, thus, a double-purpose scraping/cutting tool. Specimens 9 and 10 evidence scraping wear all around their curved bases.

Specimens 11, 12, 13, and 14 (Plate II, middle row) are all approximately rectangular. Scraping wear is present along their long edges and on the base of specimens 12 and 14. The top right side of specimen 13 has, furthermore, been made concave from scraping wear. Specimens 6 and 7 (Plate III, b, c) are less purposefully shaped than the other scrapers from Barrel Springs, but the bottom edge of specimen 6 and the top edge of specimen 7 show a fair amount of utilization.

Utilization on the three uniface scrapers (Plate III, d, f) parallels that of the bifaces. Specimen 2-40545 is beveled from scraper utilization on both long edges of its shaped side. Specimen 5 is beveled on the unshaped side of its lower edge. The right edge of the shaped side of specimen 8 is beveled. Furthermore, on its left side, the unshaped edge above the nipple and the shaped edge below the nipple are both beveled. Thus, there does not seem to be any correspondence between the unifacial nature of these last three scrapers and the edge chosen for scraping.

Scrapers at Barrel Springs indicate both the conservative nature of the obsidian industry at this site and the eclectic nature of this tool. Several different edges on the same artifact are commonly utilized. One tool can be shown to have two different functions. Two partly shaped lumps of obsidian were used for scraping. Furthermore, if straight, concave, convex edges were all used for scraping different substances, differently shaped objects, both likely possibilities, then most site NV-Pe-104 scrapers can be considered to be multi-use tools. The scrapers at Barrel Springs do not evidence a one-to-one correspondence between tool and job. Rather, each scraper apparently filled the number of jobs that the shape of its edges allowed.

UTILIZED FLAKES

Of the 631 obsidian flakes recovered from site NV-Pe-104, 71 (or 11 percent) showed some degree of utilization (see Table 2). However, if only waste flakes over an inch in length are considered, the percentage increases significantly to over 30 percent. Flake utilization appears to be random. No one shape of waste flake seems favored, and straight, convex, and concave edges all may show wear usage. No waste flakes, however, show excessive usage. The highest percentage of utilized flakes in comparison to waste flakes occurs in Pit 2 where twenty-one percent of all flakes are utilized. This pit is followed by C-4 with seventeen percent, B-5 with fifteen percent, B-3 with fourteen percent, A-7 and C-2 with eight percent each, and D-3 with five percent. A-5, where only 10 flakes were recovered, has too low a sample for meaningful comparison.

The percentage of utilized flakes in relation to waste flakes for the site pits correlates well with the artifact distribution for the site. Pits with high artifact yield evidence relatively high utilized-flake percentages. While there is a decrease in the absolute numbers of utilized flakes with increasing depth, the above ratios do not significantly change in regard to the stratigraphy. Percentages do fluctuate or drop slightly in most pits with increasing depth; nevertheless, pits with high percentages retain them, as do pits with low ones. It should be pointed out that pits with high artifact yield also evidence a larger number of combined used and unused obsidian flakes than do pits with low artifact yield.

THE RHYOLITE INDUSTRY

The fashioning of rhyolite blades from the local quarry material was the most prevalent industry at Barrel Springs. There are subsidiary rhyolite tools at the site as well. Thirty blades and blade rough-outs four choppers, one hammerstone, one drill and twenty utilized rhyolite flakes were excavated at site NV-Pe-104. While rhyolite has a world-wide distribution as a tool material, the high silica content of the Barrel Springs rhyolite makes it particularly favorable for fashioning tools. Ordinarily rhyolite is granular, causing its fractured planes to undulate. The striking fractures of highly silicified rhyolite, on the other hand, are smooth and nearly conchoidal. Nevertheless, the Barrel Springs rhyolite tools are slightly more irregularly shaped and evidence more percussion and less pressure flaking than do typical cryptocrystalline tools from this area of Nevada. Referring to Table 1, it is evident that rhyolite tools have a stratigraphic distribution at site NV-Pe-104 comparable to tools fashioned from the other materials found at the site.

ROUGHOUTS AND BLADES

As Table 5 indicates, roughouts and blades occur in all cultural levels at site NV-Pe-104, but are much more common above the brown silt stratum than below it. In this report, a roughout is an unfinished blade which is here defined as a fairly large, bifacially worked, basically leaf-shaped rhyolite artifact. Referring to Plates IV and V only six examples (specimens 47, 49, 51, 59, 65, and 2-40560) are here considered to be finished artifacts; the rest are classed as roughouts.

Four stages in the manufacture of finished blades from quarry roughouts are here postulated for the Barrel Springs material. Nevertheless, criteria can be advanced for defining the stages that allow for a fairly objective sorting of the artifacts. It should be kept in mind that more important than the stages themselves is the process of blade manufacture that they illustrate.

Stage 1 (specimens 57, 62, 1135, 2-40553, 2-40559, and 2-40568; Plate IV, f-g, j-m) - This initial stage of blade manufacture is characterized by a minimal modification of the original stone. Flake roughouts (specimens 57, 62, 1135 and 2-40553) exhibit an unreduced striking platform. Two specimens (57 and 62) still evidence vestiges of the flake's original bulb of percussion. Core roughouts (specimens 2-40557 and 2-40568) evidence their original cortex on both sides. Both outlines and cross-sections are irregular and the original size and shape of the stone are still apparent. Flaking is by percussion, with deep flake scars common around the edges of the artifact giving them a somewhat scalloped appearance. There is some stepped battering immediately above the edges from the formation of new striking platforms. As a technological aside, specimen 62 was discarded when an inclusion apparently hindered further shaping.

Stage 2 (specimens 48, 54, 55, 61, 66, and 2-40552; Plate IV, a-e, i) - In the second stage of manufacture, the basic shape of the finished artifact now prevails over the original shape of the stone. Flake rough-outs (specimens 48, 54, 61, and 66) still exhibit unreduced striking platforms. However, bulbs of percussion are not visible and the striking platform has been somewhat incorporated into the artifact. Specimen 55 is a core rough-out and exhibits cortex only in two deep hinge fractures. Specimen 2-40552 has incorporated the cortex into the form of the artifact. In Stage 2, artifacts have attained their basic leaf-shaped outlines. However, there are still large irregularities over the surface of the artifact. Cross-sections approach the lenticular finished form, but the aforementioned surface irregularities prevent them from being even or symmetrical. Percussion flaking still prevails; however, flake scars are less deep, resulting in smoother edges. Battering above the edges is no longer present save on specimen 54. This artifact is an anomoly to Stage 2 since it was apparently finished to this stage of manufacture and then broken. A start at reshaping was made on the area above the broken edge but subsequently the piece was rejected. Thus, specimen 54 exhibits Stage 1 workage on a broken Stage 2 artifact.

Specimen 58 (Plate IV, <u>h</u>) which also has been worked to a Stage 2 level of completeness, represents a sub-type of blade rough-out. It has a greater length to width ratio than do the other Stage 2 artifacts. Its cross-section, rather than being lenticular, is somewhat biconvex with steeper sides on one face than the other, forming a ridge along the long axis of this side. In this report a biconvex cross-section has a greater breadth to width ratio and is more rounded than a lenticular one. This usage parallels that of Ragir and Lancaster (1966:7). The technique of manufacture for specimen 58 is identical to the other rough-outs from Stage 2. Furthermore, in Stages 3 and 4, blades and rough-outs with high length to width ratios and biconvex cross-sections exhibit identical techniques of manufacture to the wider blades with lenticular cross-sections. Thus, while both sub-types will be noted, they will all be described together. Specimen 58 is a flake rough-out whose striking platform has been incorporated into the form of the artifact.

<u>Stage 3</u> (specimens 50, 52, 53, 56, 60, 63, 64, 2-40562, 2-40567, 2-40570, and 2-40571; Plate V, <u>g-p</u>). The third stage of manufacture represents the nearly completed artifact. Unreduced tips and original cortexes are no longer present. It is impossible at this point to determine whether the rough-out was fashioned from a core or a flake. In outline the artifacts have practically assumed the finished shape of the blade. Edges have been retouched with pressure and low-angle percussion flaking, and any further modification of the artifacts will be by these techniques. Specimens 50, 52, 53, and 63 (Plate VI, <u>i-e</u>) all have greater length to width ratios than do the other artifacts in this stage. Their cross-sections have been reduced in size and are now more nearly biconvex. Again the sides of one face are more steeply flaked than the other, creating a ridge on the long axis of this face. The other Stage 3 rough-outs have essentially lenticular-cross sections. The faces of artifacts in Stage 3 have not been subject to low-angle percussion retouch. They still exhibit hinge fractures, small projections, and other irregularities. This

lack of finish for wide surfaces is the marker for Stage 3.

Breakage of Stage 3 artifacts is perpendicular and across the wide axis. This type of breakage parallels that of blades found at the Stockhoff site. Bryan and Tuohy (1960:506) in the Stockhoff site report, state that a series of experiments they conducted demonstrate that such breakage can result from the rough-outs being dropped face down on a hard surface, but not from oblique blows to the tip or side-struck blows. Specimen 56 exhibits such breakage. This artifact is especially interesting because it illustrates the use of low-angle percussion or pressure flaking to form the finished edge from the wider and more irregular rough-out. It further indicates the amount of diminunation which occurs in the fashioning of the finished artifact from its original blank.

Stage 4 (specimens 47, 49, 51, 59, 65, and 2-40560; Plate V, a-f). This stage represents the finished form of the artifact. The entire surface has now been smoothed by low-angle percussion flaking. Edges are even and sharp. No deeply cut flakes remain and hinge fractures are either tiny or not present. Surface irregularities are absent or incorporated into the form of the blade. The cross-section of specimen 59, the one finished example of high length to width ratio blades, is biconvex. The other Stage 4 blades have lenticular cross-sections. However, in all cases these cross-sections are somewhat flattened on the areas adjacent to two diagonal edges of the upper and lower faces. This results, as Bryan and Tuohy (1960:491) have pointed out, from turning the artifact over in the hand during its fashioning. Such flattening is especially apparent in specimen 49, which stands in a transitional relationship to Stages 3 and 4.

Specimen 2-40560 is the one complete blade from site NV-Pe-104 and thus can be used as an example for the broken ones. The incomplete blades are broken perpendicularly to their long axis in like manner to Stage 3 rough-outs. The entire surface area of specimen 2-40560 has been shaped by low-angle percussion flaking and apparently some secondary pressure retouch has been applied to its edges. Faces are fairly smooth. A few tiny hinge fractures remain, but they are quite miniscule. Wide surfaces also retain vestiges of nipples from the low-angle pressure flaking. Edges are finely made and quite sharp. In cross-section specimen 2-40560 is basically lenticular, but evidences the aforementioned flattening of the areas adjacent to two diagonal edges of the upper and lower faces.

Plate VI summarizes the rhyolite industry at site NV-Pe-104. It demonstrates pictorially how a block of rhyolite (a) is shaped through the four stages just discussed (e, g, i, and k) to form a finished artifact. Three utilized flakes (f, h, and j) are pictured at the approximate stages where they would occur in the manufacturing of a finished artifact. Utilized flake b is a good-sized flake with a quite prominent bulb of percussion. It must have been struck from a large block of rhyolite such as a. Also shown, for comparative purposes, are two core hammering tools (c and d). The differences in flaking patterns between the Stage 1 rough-out (e) and these crude core tools should be noted. The rough-out has a scalloped outline due to the deep cuts made by the percussion flakes utilized in blocking out its form. The outlines of the hammering tools are irregular. Flake scars over the face of the rough-out form a generalized pattern, running from the edge of the artifact to its middle. Flake scars on the crude core tools are much more at random. Finally, the rough-out exhibits a greater length to width ratio than do the hammering tools.

It is likely that the amount of rough-out reduction in the fashioning of finished blades that is depicted in Plate VI is approximately correct. Apparently the original Stage 1 rough-out was one and one half times to slightly over two times longer and wider than the Stage 4 finished blade which was made from it. These ratios are derived from the sequence shown on Plate VI, as well as the relationship of the large Stage 4 blades (specimens 49 and 65, Plate V, e-f) to the large Stage 2 rough-out (specimen 2-40552, Plate V, i) and the sequence of Stage 2, 3, and 4 biconvex rough-outs and blades. The missing stages for these latter two categories were interpolated in conjunction with the complete sequence of Plate VI. While the examples from site NV-Pe-104 are too fragmentary for more sophisticated comparisons, these broad ratios do seem to cover the excavated artifacts. Using the same method of analysis, it appears that the original breadth of the Stage 1 rough-out was reduced from three to five times in fashioning the finished blade.

The four stages of blade manufacture do not seem to evidence any stratigraphic segregation. On the other hand, it is interesting that all Stage 3 biconvex rough-outs were excavated at various depths above the brown silt stratum in D-3. No reason is postulated for this horizontal clustering. If we discount the four artifacts collected by amateurs who excavated Pit 1, it is evident, referring to Table 5, that the bulk of rough-outs and blades were recovered from Pits D-3, B-5, and 2. This is consonant with the general artifact patterning for the site (see Table 1). However, the anomalous position of D-3 is once again evident, since its Stage 3 biconvex rough-outs constitute the bulk of its artifact inventory.

From the foregoing, it seems obvious that one stage of blade manufacture cannot be separated from another in terms of the stratigraphy. Rather, it indicates that broken or otherwise unsuitable blades were discarded randomly throughout the history of the site. Furthermore, it would appear from Plate V and Table 5 that rough-outs most often broke at the Stage 3 and 4 levels of completeness, or were discarded whole during the initial two stages of manufacture. The hiatus evidenced by Stages 1 and 4 is considered to be part of the random pattern of blade discarding, and, thus, not significant. There is no corresponding increase, but in fact a slight decrease, in the frequencies of the other blade stages during the Stage 1 and 4 hiatus.

Blade size is also not stratigraphically significant. Large Stage 4 blades occur at depths of 0 to 6 inches (specimen 65) and thirty-two inches (specimen 49). The smaller Stage 4 blades overlap with this distribution, since they occur at depths of 3 (specimen 59), 21 (specimen 2-40560), 28 (specimen 51) and 66 (specimen 47) inches. The two largest Stage 3 rough-outs were excavated at depths of 8 (specimen 58) and 14 (specimen 2-40552) inches. Finally, blade workmanship is not stratigraphically significant since the four finely worked small Stage 4 blades mentioned above occur at various depths above and below the brown silt stratum.

Since Kirk Bryan (1950), commenting on Holmes (1919) HANDBOOK OF ABORIGINAL AMERICAN ANTIQUITIES, has stated that most blade rough-outs were in reality hafted as axes or used as hoes, it might do well to summarize the evidence leading to our conclusion that the site NV-Pe-104 Stage 1, 2 and 3 rough-outs were unfinished tools. Bryan and Tuohy (1960:505-506) and Sharrock (1966:169-172) have all aptly summarized this controversy and each agrees that Holmes was basically right in contending "that large crude blanks were worked, by stages, to blade-like blanks."

The first line of evidence that site NV-Pe-104 rough-outs were not used as tools comes from the artifacts themselves. No rough-out edge shows any indication of use wear. In fact the unreduced striking platforms of Stage 1 and 2 flake rough-outs still retain their original outlines. Such would not be the case if they had been used as axes. The great majority of Stage 3 rough-outs and finished blades excavated at site NV-Pe-104 are broken perpendicularly to their long axis, and as Bryan and Tuohy (1960:506) have pointed out, such breaks are the result of their being dropped and not of chopping usage. The apparently unworkable inclusion found in specimen 62 indicates why at least one Stage 1 rough-out was discarded. Furthermore, specimen 56 (Plate V,d) clearly depicts how a tip of Stage 4 manufacture was being formed from a larger midsection of Stage 3 manufacture.

The second line of evidence comes from the stratigraphic placement of the rough-outs with reference to other artifacts. At corresponding depths to the core rough-outs there are differently fashioned core tools with definite evidence of battering use. It seems peculiar, if the rough-outs are indeed "axes", that they are at the same time unused and associated with differently made utilized battering or chopping tools.

The final line of evidence comes from the rough-out's place within the probable cultural practices of the site NV-Pe-104 inhabitants. There is no evidence, as far as I am aware, of large stone tools being used for digging in the Western Great Basin. Rather, the usual tool was the wooden digging stick.

Whether Stage 1, 2, and 3 rough-outs were or were not finished tools is a question that may never be satisfactorily answered. The Barrel Springs stonesmiths who knew have long since died. However, the bulk of evidence induces us to conclude that they were, indeed, unfinished and unused rough-outs. This is not to say that some of them could not have functioned as axes or hoes, but merely to state that in our belief they did not.

The use of finished blades at site NV-Pe-104 is also largely a matter of conjecture. It is possible, as Bryan and Tuohy (1960:509) have pointed out in regard to the Stockhoff site, that the larger ones could have had a ceremonial function analogous to the large obsidian blades of California and Oregon. The smaller blades, we believe, were most likely used as knives.

OTHER RHYOLITE ARTIFACTS

In addition to rough-outs and blades several other rhyolite artifacts were excavated at site NV-Pe-104. These are described in Table 6.

Rhyolite Drill - Specimen 2-40554, a rhyolite drill, is illustrated in Plate VII,k. It was fashioned from a flake which still shows on the right side of the photograph the bulb of percussion where it was struck from its core. The cortex of the original stone is still visible on the underside. All edges, and especially the bit, were subsequently refined by pressure flaking. This artifact is typical of drills found at many quarry sites. It compares closely with examples from Pine Spring (Sharrock 1966) and is similar, although with a slightly longer bit, to drills from the Coleman site (Tuohy, n.d.).

Rhyolite Hammerstone - The rhyolite hammerstone (specimen 43) is illustrated on Plate VIII,i. It is essentially a sub-spherical core with battering on its prominent flake edges.

Rhyolite Choppers - Specimens 44, 45, 46 and 2-40586, the four rhyolite core choppers, differ from hammerstones in that they have edges which are somewhat pointed. These edges all show usage battering. Choppers are illustrated on the top row of Plate VII.

Most likely the shape distinction between choppers and hammerstones is fortuitous. All are basically cores which have been used for striking some hard surface. Perhaps these rhyolite tools, as well as the quartz hammerstone described below, were used in the fashioning of the more complicated tools at Barrel Springs.

Utilized Flakes - As Table 2 indicates, only twenty utilized rhyolite flakes were excavated at site NV-Pe-104. The distribution of these flakes is consistent with the general stratigraphic picture for the site, since pits with high artifact frequencies have a relatively large number of rhyolite utilized flakes. Furthermore, the absolute number of rhyolite utilized flakes decreases with depth, which is also the case for the whole site artifact count. Utilized rhyolite flake frequency appears low in comparison with utilized obsidian flakes. As mentioned above, 71 obsidian flakes showed utilization, and obsidian frequency exceeds that of rhyolite both within specific pits and at specific depths. Only at the very bottom of the deposit are rhyolite utilized flakes on a par with obsidian. However, the low number of artifacts from these lower levels makes such comparison statistically somewhat unsound. As was suggested above, perhaps the reason for the greater number of obsidian flakes is found in the nature of the stone, with rhyolite being a less suitable material than obsidian for the types of use to which obsidian was put.

Cores -Eight cores were excavated at site NV-Pe-104. Six are rhyolite; the other two being cryptocrystalline rock. Referring to Plate VII, e-h, the difference between rhyolite exhausted cores and Stage 1 core rough-outs can be seen. In contradistinction to the cores, specimen 2-40568 retains much of its cortex, and while they are irregular, its edges are shaped. It also has a greater length to width ratio than do the cores.

OTHER STONE ARTIFACTS

In addition to rhyolite and obsidian, artifacts fashioned from quartz, slate, sandstone, and igneous rocks were excavated at site NV-Pe-104 (see Table 7). These artifacts include seven manos, one slate knife, and one quartz hammerstone.

Manos - Six of the seven manos from the site were fashioned from igneous rocks which occur as dikes in rhyolite lava flows. The seventh (specimen 32) is made of sandstone and was excavated just below the surface in D-3. All manos save specimen 28 which was discovered lying on the very top of the lower culture level, occur above the brown silt stratum.

As can be seen in Plate VIII, manos from site NV-Pe-104 are somewhat irregularly shaped and broken. Two are worn on more than one face. The lower third of specimen 28 is worn on both its right and left sides, and the underside of this artifact is worn as well. Likewise both the lower third of the illustrated side of specimen 2-40565, as well as its underside, are worn. Visually, utilizing Plate VIII, manos from site NV-Pe-104 can be sorted into three groups. Specimens lettered a, b, and c are tetragonal in shape; e and f are oval in outline and flat; and d and h are egg-shaped. However, since Table 7 shows that these differences correlate neither with the stratigraphy nor with mano measurements, they are just as likely a consequence of the original shape of the rock as a result of purposeful artifact shaping.

Quartz Hammerstone - One quartz hammerstone (specimen 27) was excavated at site NV-Pe-104. It is illustrated on Plate VIII (bottom left), and described in Table 7. The stone utilized for specimen 27 is a nodule of almost pure milky white quartz. Battering is present only on the lower edge of the artifact as it is positioned in Plate VIII.

Slate Knife - One slate knife (specimen 33) was also excavated. It is unifacially flaked and acquires its cutting edge from a bevel beginning approximately one-quarter of the width of the artifact from one side. This cutting edge is made sharp by secondary retouch. On the flat side of the artifact (Plate VII,j), there is a slight bulb of percussion at the top showing where it was struck from a larger mass. Specimen 33 is reminiscent of the slate "tule knives" common in the lower Humboldt Valley. It is described in Table 7.

WORKED BONE OBJECTS

Three bone artifacts and one cut artiodactyl rib were excavated at site NV-Pe-104 (see Table 8). The three artifacts are illustrated in Plate III. Specimen 1 was fashioned from an artiodactyl cannon bone, while specimen 3 was made from an artiodactyl shin splint. It is impossible to identify the bone from which specimen 2 was fashioned, but most likely it was also a big bone from a deer, antelope, or mountain sheep. The points of both awls are slightly off-center, the one shown in Plate III, i being humped to the left, and that in Plate III,h quite markedly humped to the right. This is characteristic of awls used for basketry-making. No use is postulated for the incised palette. A cut rib was the only other animal bone from the site which showed modification. It occurred in the 6 to 12 inch level of B-5. It indicates the use of cutting tools on animal bone at Barrel Springs.

FEATURES

No architectural features were discovered at site NV-Pe-104. However, firepits were common within the midden layers of all pits. These fire pits were merely irregular concentrations of charcoal, containing neither large quantities of stones nor animal bones.

COMPARISONS AND CONCLUSIONS

Projectile points have been already compared to other localities in the Western Great Basin. This discussion will concentrate on those sites which apparently were utilized as quarry and workshop areas. Such comparisons are unfortunately somewhat negative in nature. Few Intermountain West quarry sites have been excavated and fewer still have been reported. The great majority of reports concern only the description of surface rubble.

In the Great Basin area of Nevada several quarry sites are now known, but only the Highrock Canyon surface collection of obsidian quarrying material has been described. Ragir and Lancaster's report is "an exercise in technique for the analysis of a surface artifact collection" (1966:4), and as such, while excellent, yields little of comparative utility save comparisons of tool manufacturing technology. Such comparisons, furthermore, are limited due to the intrinsic differences in the composition of rhyolite and obsidian. Nevertheless, Ragir and Lancaster found that the largest category of artifacts at the Highbrock Canyon quarry was that of rough-outs and blanks which "represent different stages in the manufacture of a flake or core into an oval pointed at either end and lenticular in cross section" (1966:8). The basic process of blank manufacture described by Ragir and Lancaster (1966:12-13) seems also (given the differences in the stones) analagous to that at site NV-Pe-104. The obsidian blanks evidence more detailed workmanship than do the site NV-Pe-104 Stage 4 blades, but they were formed by the same sequence of rough percussion, controlled percussion, and, finally, pressure flaking.

The Coleman basalt quarry site at the north end of Winnemucca Lake has been described by Tuohy in an unpublished manuscript (Tuohy, n.d.). It is again a surface site. Through Mr. Tuohy's generosity, I was able to examine the Coleman site artifacts at the Nevada State Museum in Carson City. Aside from the presence of large blades and drills, the artifact inventories at the two sites appear quite different. The Coleman site lacks manos and obsidian, and has many more chert artifacts than does site NV-Pe-104. Blades from both sites are quite similar, the differences appearing to be more a result of stone composition than of differences in technique of manufacture.

Two other surface quarry sites in Nevada are the Conour site near the Carson Sink and the Dansie site north of Fernley (R. Tuohy, personal communication). Since, I have neither visited these locations, nor seen the artifacts from them, it is impossible to do more than note their existence. Robert Elston (personal communication) has located further quarries in the Steamboat Springs area of the Truckee Meadows south of Reno. These sites await future excavation.

Bryan and Tuohy (1960) have reported on the Stockhoff site, a basalt quarry in northeastern Oregon. They note that many of the artifacts recovered from a combination of surface collecting and limited excavation appear to be blanks, but state that the site "lacks an adequate series from the crude 'blank' to the finished lanceolate blade". Their illustrated blade blanks appear similar to the site NV-Pe-104 Stage 1 rough-outs, but the finished artifacts appear less finely flaked than those at Barrel Springs. Bryan and Tuohy note that some blanks have unreduced tips. The artifact inventory at the Stockhoff site is much more restricted than that at site NV-Pe-104 and produced only basalt quarry material and three obsidian points.

The Pine Spring site, located in the extreme southwestern corner of Wyoming, is the quarry site in the Intermountain West most nearly comparable to Barrel Springs. Sharrock (1966:43-44) has noted five stages in the manufacture of finished blanks from the tiger chert outcroppings in the area. These stages compare well with the four stages at Barrel Springs, for, despite the disparity in number of stages, the techniques of manufacture at the two sites seem almost identical. Sharrock has merely cut the process of blade manufacture in a slightly different manner than this report has.

The Pine Spring site has three different occupation levels, the oldest of which has a bone collagen date of 7,745 B.C. ± 195 years. It is, however, Occupation 2, with a collagen date of 1,685 B.C. ± 80 years, that is most nearly comparable to Barrel Springs. This level, in addition to the ubiquitous quarry artifacts, contains bone awls, projectile points, manos, firepits and unworked bone (1966:25, 149). Thus both Pine Spring and Barrel Springs show not only quarry activity but also limited occupation connected with the gathering and fashioning of the quarry material.

All other large leaf-shaped blades in Nevada are claimed to be of great antiquity and to be part of that postulated generalized hunting tradition which has been termed San Dieguito (Warren 1967) or Lake Mojave (Davis 1967). The main Nevada expression of this complex is surface collected artifacts from Hathaway Beach above the Carson Sink, which according to Warren (1967:180) appear "transitional between the San Dieguito complex in the south and early materials in the Northwest". While not wishing to enter into the controversy as to the antiquity of this complex, we must point out that at Barrel Springs the biface blades are not of great antiquity and are associated with seed grinding tools. Thus, at least in this area of Nevada, they can be used neither as an early time marker nor as evidence of a culture oriented solely towards hunting.

This is of particular importance in dealing with the Black Rock Desert area, for artifacts collected from the desert floor include Lind Coulee points and crescents which Clewlow (1968) considers to be of relatively great antiquity and which, further, have often been associated with the San Dieguito Complex. No blades have been discovered in association with these points and crescents. In regard to the area of Nevada here discussed, we must reiterate Heizer's (1964:121) caution in discussing the surface aggregates of the dry lakes of Southern California, and state that manifestations of the entire "San Dieguito Complex" may not everywhere be contemporaneous or of great antiquity.

The Barrel Springs site was a limited occupation-rhyolite source which can be relatively dated, utilizing Elko Series and Rose Spring/Eastgate Series projectile points, at _ca_. 1000 B.C. to 700 A.D. It is situated in an area of rhyolitic lava flows which provided the raw material for the quarry and workshop activity. Calcium carbonate deposits are taken as evidence of a now-buried spring which gives the rationale for the choice of this particular area of the lava flow as the location for the site. Perhaps the disappearance of this spring caused the abandonment of site NV-Pe-104. A number of other rhyolite outcroppings in the vicinity of Barrel Springs as well as the occurrence of projectile point series which occur later in time than the Barrel Springs projectile points indicate that this site most likely was not the only workshop site in the area. One concave base projectile point excavated below a fairly thick sterile stratum indicates, however, that the Barrel Springs site may have had a considerable antiquity.

Forty percent of the artifacts excavated at Barrel Springs were rhyolite rough-outs and blades. These artifacts form a continuum of manufacture from crude rough-outs to finished forms. All but one of the excavated Stage 3 rough-outs and Stage 4 finished blades were broken in a manner that does not result from usage. Most of the rough-outs and blades collected in the immediate environs of the site were unfinished rather than finished forms. This implies that finished or nearly finished blades were carried away to other locations. Of course, some artifacts in all stages of completeness could have been carried away.

A fair amount of obsidian was imported to the site. Obsidian was used to fashion projectile points and scrapers. The importing of obsidian was necessitated by the flaking properties of rhyolite. Despite the high silica content of the Barrel Springs rhyolite, it apparently still was not suitable for the delicate pressure flaking used in making projectile points nor could it hold a scraping edge. This is further indicated by the fact that only twenty rhyolite utilized flakes as opposed to seventy-one obsidian ones were excavated at Barrel Springs. The projectile points also imply that hunting was a subsidiary activity to quarrying at Barrel Springs.

As is evident from the Appendix on faunal remains (see below), these bones indicate that the bighorn sheep (Ovis canadensis) was a primary source of animal food for the Barrel Springs dwellers. This dietary item was supplemented with some smaller animals such as rabbits. It is possible that the bighorn's regular pattern of seasonal reuse of favored grazing and watering areas insured the food supply that made the Barrel Springs region a suitable quarry and workshop location. Thus the use of this particular rhyolite outcropping may correlate with the inhabitant's knowledge of the seasonal presence here of a band of bighorn sheep.

Secondary artifacts excavated at Barrel Springs enlarge our knowledge of the activity pattern of the site's occupants. The rhyolite and quartz hammering tools could well have been used in roughing out the more finely made artifacts. Manos imply seed grinding carried on at the site. The bone awls indicate basketry or perhaps the fashioning of animal skins. The rhyolite drill, as well as the aforementioned scrapers, imply some form of wood or bone working. Several scrapers have concave edges and could well have been used in fashioning arrow shafts. The presence of firepits but not house remains fits in well with the limited occupation pattern of the site.

The Barrel Springs site, then, is basically a quarry and workshop site. It, however, evidences the full complement of hunting and gathering activities that would be necessary in order to stay in the area long enough to effect the quarrying.

TABLE 1

Occurrence of Artifacts by Pit and Level

	0-6	6-12	12-18	18-24	24-30	30-36	36-42	42-48	48-54	54-60	60-66	66-72	72	Surface or No Provenience
Projectile Points	A5:2 B5:1 2:2	A7:1 B3:1 B5:1 2:2 C2:1	B5:1 2:3		B5:2				B5:1			B5:1		
Scrapers	A5:1 2:2 C4:2	A7:1 D3:1	B5:1	B5:1	A5:1						B3:1 B5:1	A3:1		
Manos	C4:1 D1:1		2:1	2:1 C4:1		C2:1			B5:1					
Slate Knives (a) and Rhyolite Drills (b)	(b) 2:1	(a) A5:1												
Hammerstones						A3:1 C2:1								
Choppers			A7:1		A5:1									2:2
Cores	A5:1	A7:1			A3:1	C2:1			A5:1	B3:1	B5:1		B3:1	
Blades and Rough-outs	A3:1 A5:1 B3:2 B5:1 2:2 D3:2	B5:1 C4:1 2:1	2:2	B5:2 2:2 D3:1	B5:1 D3:1	A7:1 D3:1					B3:1 B5:1			1:4 2:1
Worked Bone	B5:1 C4:1		B5:1											

TABLE 2

Unmodified Bone, Obsidian waste (Number and Number Utilized) and Utilized Rhyolite Flakes (Number) by Pit and Level

	0-6	6-12	12-18	18-24	24-30	30-36	36-42	42-48	48-54	54-60	60-66	66-72	72
Rhyolite	A3:1 A5:1 C2:1 C4:1	A5:1 B5:1 C4:1 D3:2		2:1	A5:1 B5:1	A3:1			B5:1		A5:1 B5:1	A3:1 B5:1	A5:2
Obsidian	A7 (62/8) B3 (4/1) B5 (9/4) 2 (20/4) C4 (4/1) D3 (26/3)	A7 (9/2) B3 (16/0) B5 (30/8) 2 (8/2) C4 (17/3) D3 (26/2)	A5 (9/2) A7 (101/4) B3 (6/2) B5 (29/2) D3 (40/1)	B5 (29/2) C4 (3/0) D3 (45/2)	B5 (35/5) D3 (1/0)	B5 (35/4)		A5 (1/1)	B5 (6/1)	B5 (6/2) C2 (1/1) D3 (3/0)	B5 (6/1)	B5 (6/1)	C2 (38/2)
Bone	A5 B3 B5 2 C4	A5 B3 B5 2 C4	A5 B3 B5 2	A5 B3 B5 2	B3 B5 C2	C2	B5			2 D3		B3 C2	A7

TABLE 3
PROJECTILE POINTS

Number	Type	Pit	Depth	Weight	Length	Width	Breadth
2-40546	Elko Series	2	1"	1.5 g.	2.6 cm.	2.4 cm.	0.4 cm.
21	Elko Eared	A-5	1"	7.1 g.	4.3 cm.	3.6 cm.	0.6 cm.
17	Elko Corner-Notched	B-5	3"	1.3 g.	3.4 cm.	1.7 cm.	0.3 cm.
19	Elko Eared	A-5	4"	3.0 g.	3.5 cm.	3.2 cm.	0.4 cm.
2-40537	Elko Corner-Notched	2	5"	2.0 g.	4.3 cm.	2.0 cm.	0.4 cm.
16	Blank	B-5	7 1/2"	4.9 g.	6.1 cm.	2.1 cm	0.5 cm.
2-40536	Elko Eared	2	8"	2.7 g.	3.5 cm.	2.9 cm.	0.5 cm.
24	Elko Series	B-3	9"	5.1 g.	4.7 cm.	3.1 cm	0.5 cm.
25	Eastgate Expanding Stem	A-7	10"	1.6 g.	3.3 cm.	1.5 cm.	0.4 cm.
2-40538	Elko Corner-Notched	2	11"	2.1 g.	4.1 cm.	2.1 cm.	0.4 cm.
22	Elko Series	C-2	12"	2.8 g.	2.6 cm.	2.4 cm.	0.5 cm.
2-40542	Eastgate Split-Stem	2	12"	2.5 g.	3.1 cm.	2.2 cm.	0.5 cm.
2-40541	Elko Series	2	13"	1.7 g.	1.8 cm.	2.8 cm.	0.4 cm.
18	Elko Eared	B-5	13 1/2"	2.9 g.	3.0 cm.	2.6 cm.	0.5 cm.
2-40539	Blank	2	15"	8.7 g.	6.4 cm.	2.5 cm.	0.7 cm.
23	Elko Series	B-5	25"	2.1 g.	3.7 cm.	1.6 cm.	0.4 cm.
20	Elko-Eared	B-5	27"	3.4 g.	3.4 cm.	2.2 cm.	0.4 cm.
15	Blank	B-5	48-54"	3.7 g.	3.7 cm.	2.3 cm.	0.5 cm.
26	Concave Base	B-5	66-72"	2.2 g.	3.1 cm.	1.6 cm.	0.4 cm.

TABLE 4

SCRAPERS

Number	Type	Pit	Depth	Weight	Length	Width	Breadth
2-40595	Uniface	2	1"	6.5 g.	5.6 cm.	3.0 cm.	0.5 cm.
11	Biface	C-4	1"	8.5 g.	3.8 cm.	3.4 cm.	0.7 cm.
9	Biface	A-5	2 1/2"	9.9 g.	3.7 cm.	3.7 cm.	0.7 cm.
2-40540	Biface	2	5"	26.0 g.	6.7 cm.	4.3 cm.	0.9 cm.
12	Biface	C-4	6"	8.7 g.	4.5 cm.	2.7 cm.	0.7 cm.
10	Biface	D-3	6"	11.5 g.	3.3 cm.	4.8 cm.	0.7 cm.
6	Biface	A-7	12"	15.7 g.	4.0 cm.	3.3 cm.	1.2 cm.
7	Biface	B-5	16"	10.1 g.	3.8 cm.	3.0 cm.	0.9 cm.
4	Biface	B-5	18-24"	3.7 g.	2.4 cm.	2.4 cm.	0.6 cm.
5	Uniface	A-5	28"	6.2 g.	4.8 cm.	2.6 cm.	0.5 cm.
14	Biface	B-3	60-66"	6.5 g.	3.6 cm.	3.0 cm.	0.7 cm.
8	Uniface	B-5	61"	3.7 g.	4.5 cm.	1.3 cm.	0.6 cm.
13	Biface	A-3	68"	7.1 g.	4.6 cm.	2.6 cm.	0.6 cm.

TABLE 5

ROUGH-OUTS AND BLADES

Number	Pit	Depth	Weight	Length	Width	Breadth	Stage
64	1	No provenience	50.2 g.	9.7 cm.	4.6 cm.	1.6 cm.	3
2-40553	1	No provenience	241.9 g.	14.8 cm.	6.4 cm.	3.0 cm.	1
2-40570	1	No provenience	45.7 g.	11.6 cm.	5.5 cm.	1.0 cm.	3
2-40571	1	No provenience	52.6 g.	8.9 cm.	5.2 cm.	1.2 cm.	3
1135	2	Surface	272.9 g.	13.7 cm.	7.1 cm.	3.0 cm.	1
65	2	0-6"	67.5 g.	8.8 cm.	6.5 cm.	1.3 cm.	4
63	D3	0-6"	21.6 g.	6.7 cm.	3.1 cm.	1.1 cm.	3
66	A5	1"	24.2 g.	6.1 cm.	4.0 cm.	1.0 cm.	2
62	A3	2"	78.8 g.	7.8 cm.	4.7 cm.	2.2 cm.	1
57	D3	2 1/2"	179.1 g.	14.2 cm.	5.7 cm.	1.8 cm.	1
60	B3	3"	40.5 g.	8.0 cm.	4.3 cm.	1.1 cm.	3
59	B3	3"	12.4 g.	5.8 cm.	2.6 cm.	1.0 cm.	4
2-40562	2	4"	12.5 g.	3.2 cm.	4.4 cm.	1.1 cm.	3
58	B5	5"	249.0 g.	18.1 cm.	5.7 cm.	3.0 cm.	2
56	C4	7 1/2"	27.3 g.	6.3 cm.	4.7 cm.	1.1 cm.	3
2040557	2	8"	158.2 g.	12.0 cm.	5.5 cm.	2.4 cm.	1
55	B5	11"	131.6 g.	12.6 cm.	5.4 cm.	2.3 cm.	2
2-40552	2	14"	505.7 g.	21.3 cm.	8.6 cm.	2.9 cm.	2
2-40567	2	17"	54.4 g.	6.2 cm.	6.0 cm.	1.8 cm.	3
54	B5	18-24"	20.7 g.	7.0 cm.	3.1 cm.	0.7 cm.	2
2-40568	2	21"	162.6 g.	11.7 cm.	5.1 cm.	2.1 cm.	1
2-40560	2	21"	20.7 g.	9.5 cm.	3.3 cm.	0.6 cm.	4
53	D3	23"	15.9 g.	5.5 cm.	2.5 cm.	1.1 cm.	3
61	B5	23"	54.9 g.	8.7 cm.	4.9 cm.	1.3 cm.	2
52	D3	25"	17.4 g.	7.3 cm.	3.1 cm.	1.0 cm.	3
51	B5	28"	19.0 g.	7.2 cm.	3.5 cm.	0.8 cm.	4
50	D3	32"	20.2 g.	9.1 cm.	2.7 cm.	1.0 cm.	3
49	A7	32"	74.6 g.	6.2 cm.	6.5 cm.	2.0 cm.	4
48	B3	60-66"	44.8 g.	9.2 cm.	3.2 cm.	1.2 cm.	2
47	B5	66"	25.2 g.	7.1 cm.	4.0 cm.	0.7 cm.	4

TABLE 6

RHYOLITE DRILLS, HAMMERSTONES AND CHOPPERS; RHYOLITE AND CRYPTOCRYSTALLINE CORES

A. Drills

Number	Pit	Depth	Weight	Length	Width	Breadth
2-40554	2	6"	29.5 g.	8.6 cm.	4.9 cm.	1.0 cm.

B. Hammerstones

Number	Pit	Depth	Weight	Length	Width	Breadth
43	C2	30-36"	288.6 g.	7.7 cm.	7.7 cm.	5.2 cm.

C. Choppers

Number	Pit	Depth	Weight	Length	Width	Breadth
46	2	No Provenience	181.0 g.	9.6 cm.	6.1 cm.	2.8 cm.
2-40586	2	"	387.8 g.	10.7 cm.	8.6 cm.	5.5 cm.
45	A7	13"	402.5 g.	10.6 cm.	7.8 cm.	4.9 cm.
44	A5	26"	169.6 g.	9.7 cm.	6.8 cm.	2.8 cm.

D. Cores

Number	Material	Pit	Depth	Weight	Length	Width	Breadth
41	Agate	A5	6"	18.4 g.	3.8 cm.	3.2 cm	1.5 cm.
40	Rhyolite	A7	11"	153.5 g.	9.8 cm	6.0 cm.	2.6 cm.
39	Rhyolite	A3	24-30"	52.9 g.	5.2 cm.	5.0 cm.	2.2 cm.
38	Rhyolite	C2	30-36"	162.2 g.	10.9 cm.	6.1 cm	3.1 cm.
37	Rhyolite	A5	52"	298.3 g.	11.1 cm.	7.2 cm.	3.7 cm.
36	Rhyolite	B3	58"	253.2 g.	11.7 cm.	7.3 cm.	3.4 cm.
35	Rhyolite	B5	60-72"	96.6 g.	6.5 cm.	5.2 cm.	3.1 cm.
34	Chalcedony	B3	82"	159.9 g.	9.2 cm.	5.1 cm.	3.4 cm.

TABLE 7

OTHER STONE ARTIFACTS

A. Manos

Number	Material	Pit	Depth	Weight	Length	Width	Breadth
32	Sandstone	D3	2"	935.4 g.	12.7 cm.	9.2 cm.	6.2 cm.
31	Andesite	C4	3"	1123.8 g.	11.6 cm.	8.4 cm.	7.1 cm.
2-40565	Andesite(?)	2	17"	467.1 g.	10.5 cm.	8.1 cm.	4.0 cm.
2-40566	Basalt(?)	2	19"	578.1 g.	9.6 cm.	6.8 cm.	4.3 cm.
30	Andesite(?)	C4	19 1/2"	459.5 g.	6.3 cm.	9.6 cm.	5.3 cm.
29	Andesite	C2	30-36"	691.3 g.	12.7 cm.	10.3 cm.	4.2 cm.
28	Granite(?)	B5	53"	1614.1 g.	17.1 cm.	10.2 cm.	6.8 cm.

B. Hammerstone

Number	Material	Pit	Depth	Weight	Length	Width	Breadth
27	Quartz	A3	35"	724.9 g.	11.2 cm.	8.3 cm.	6.0 cm.

C. Knife

Number	Material	Pit	Depth	Weight	Length	Width	Breadth
33	Slate	A5	10"	60.9 g.	8.5 cm.	7.0 cm.	0.9 cm.

TABLE 8

ARTIFACTS OF BONE

Number	Type	Pit	Depth	Weight	Length	Width	Breadth
1	Awl	C4	3"	10.7 g.	13.1 cm.	1.3 cm.	0.5 cm.
2	Awl	B5	4"	4.5 g.	7.4 cm.	0.9 cm.	0.6 cm.
3	Incised Palette	B5	12-24"	1.2 g.	5.9 cm.	0.7 cm.	0.2 cm.

Explanation of Plates

Plate 1.
Projectile Points

a. 17
b. 2-40538
c. 18
d. 19
e. 2-40536
f. 20
g. 21
h. 22
i. 23
j. 24
k. 2-40541
l. 2-40546
m. 2-40542
n. 25
o. 26

Plate 2.
Scrapers and Projectile Point Blanks

a. 2-40540
b. 9
c. 10
d. 11
e. 12
f. 13
g. 14
h. 2-40539
i. 15
j. 16

Plate 3.
Scrapers and Bone Tools

a. 4
b. 6
c. 7
d. 2-40545
e. 5
f. 8
g. 3
h. 2
i. 1

Plate 4.
Stage 1 and 2 Roughouts

a. 60
b. 54
c. 56
d. 63
e. 2-40557
f. 48
g. 61
h. 55
i. 65
j. 2-40552
k. 2-40553
l. 58
m. 57

Plate 5.
Roughouts and Finished Blades

a. 64
b. 51
c. 59
d. 2-40567
e. 60
f. 2-40560
g. 50
h. 2-40571
i. 2-40570
j. 2-40562
k. 53
l. 49
m. 65
n. 47
o. 52

Plate 6.
PE 104 Rhyolite Industry

a. Unworked Rhyolite Block (42)
b. Worked Flake (not cataloged)
c. Core Hammerstone (43)
d. Core Chopper (46)
e. Step 1 Roughout (1135)
f. Worked Flake (not cataloged)
g. Step 2 Roughout (55)
h. Worked Flake (not cataloged)
i. Step 3 Roughout (56)
j. Worked Flake (not cataloged)
k. Finished Blade (2-40560)

Plate 7.
Choppers, Cores, Knife and Drill

a. 46
b. 2-40586
c. 45
d. 44
e. 38
f. 36
g. 37
h. 2-40568
i. 34
j. 33
k. 2-40554
l. 41

Plate 8.
Manos and Hammer-stones

a. 31
b. 2-40566
c. 32
d. 30
e. 2-40565
f. 29
g. 27
h. 28
i. 43

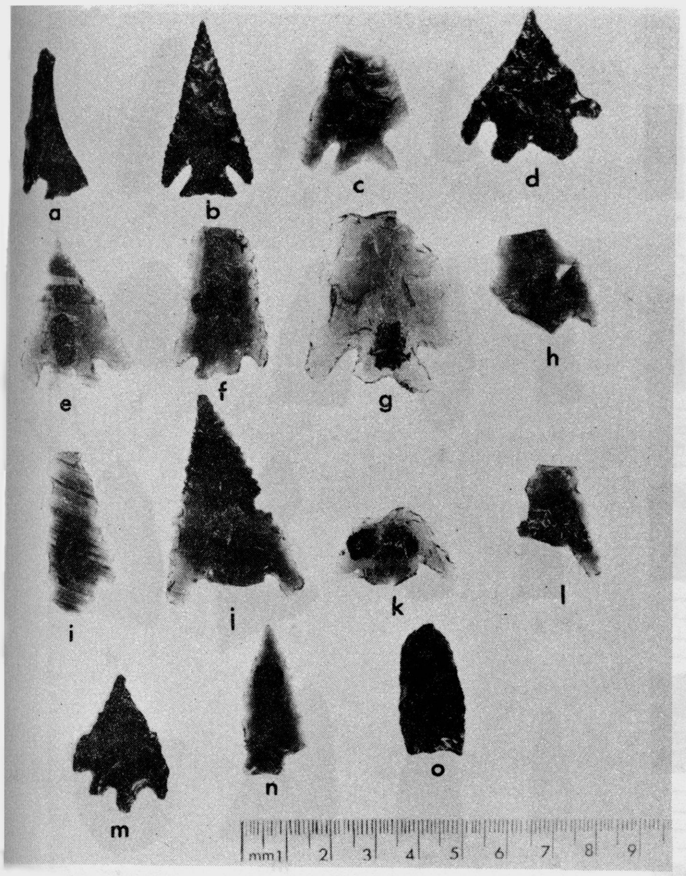
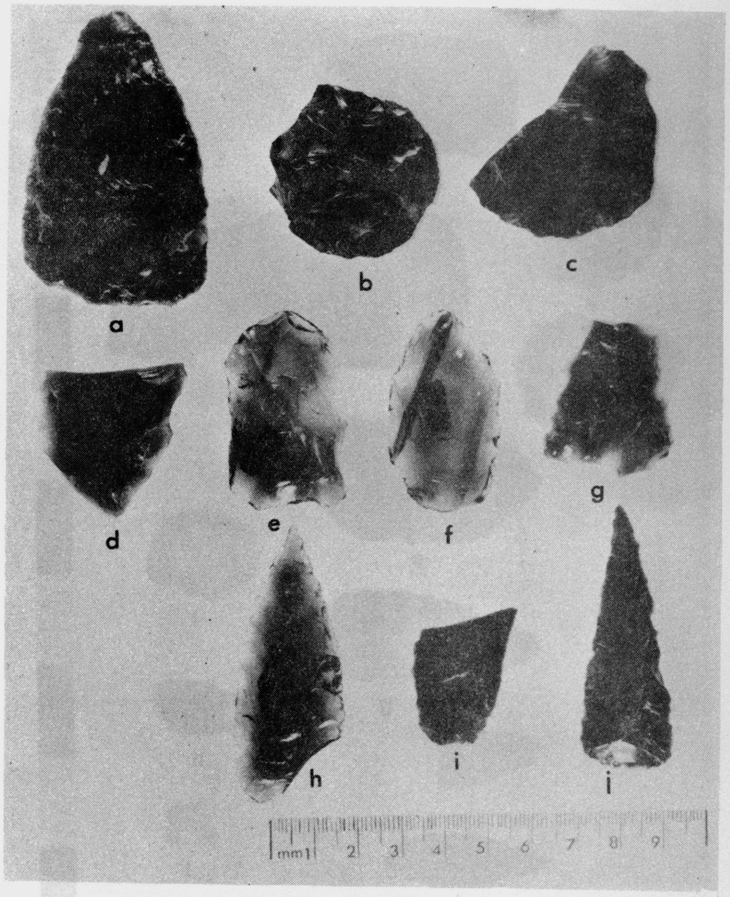


Plate I



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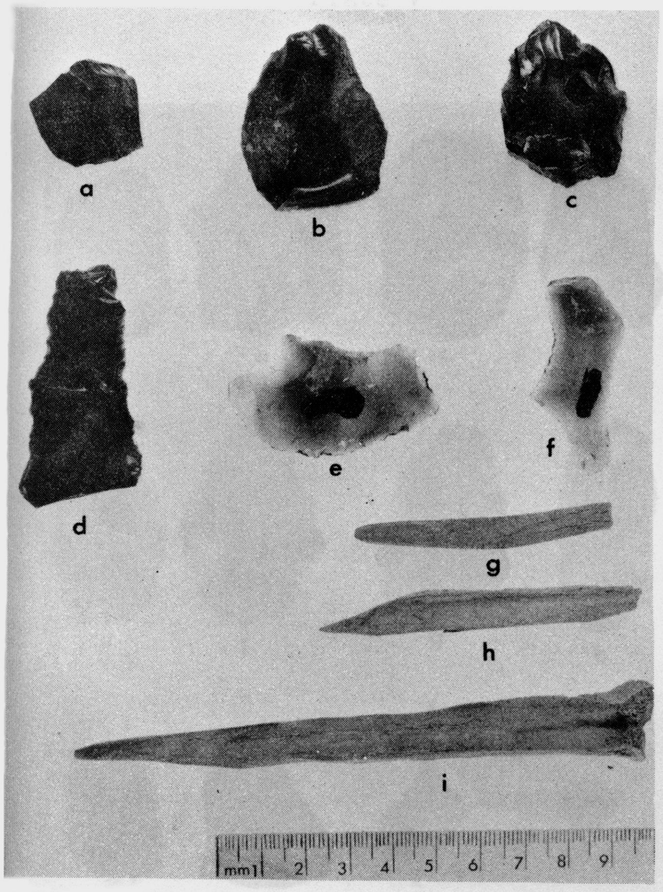

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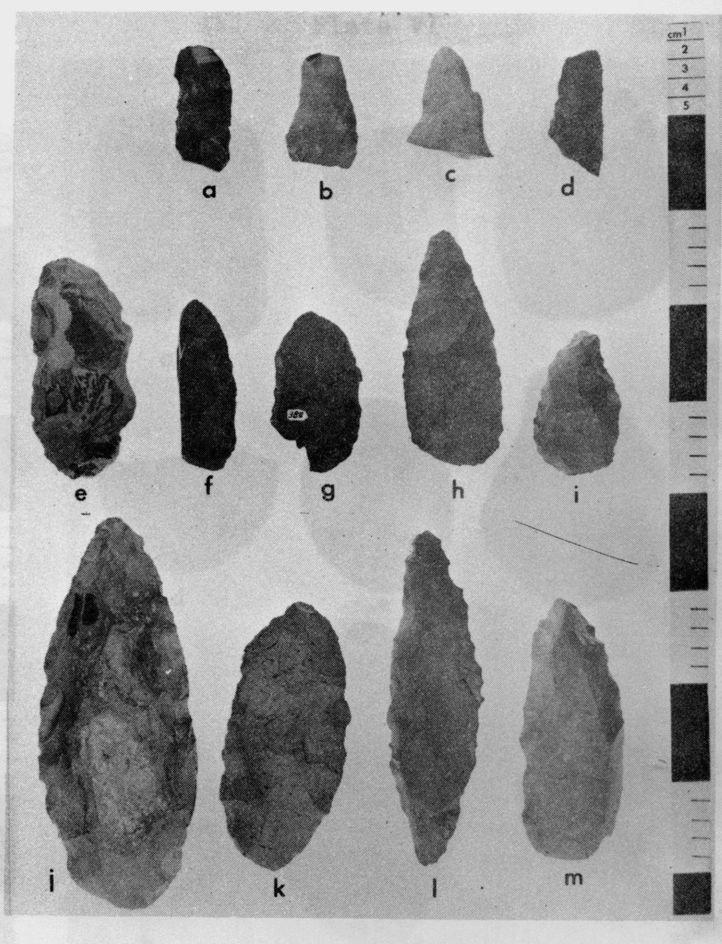

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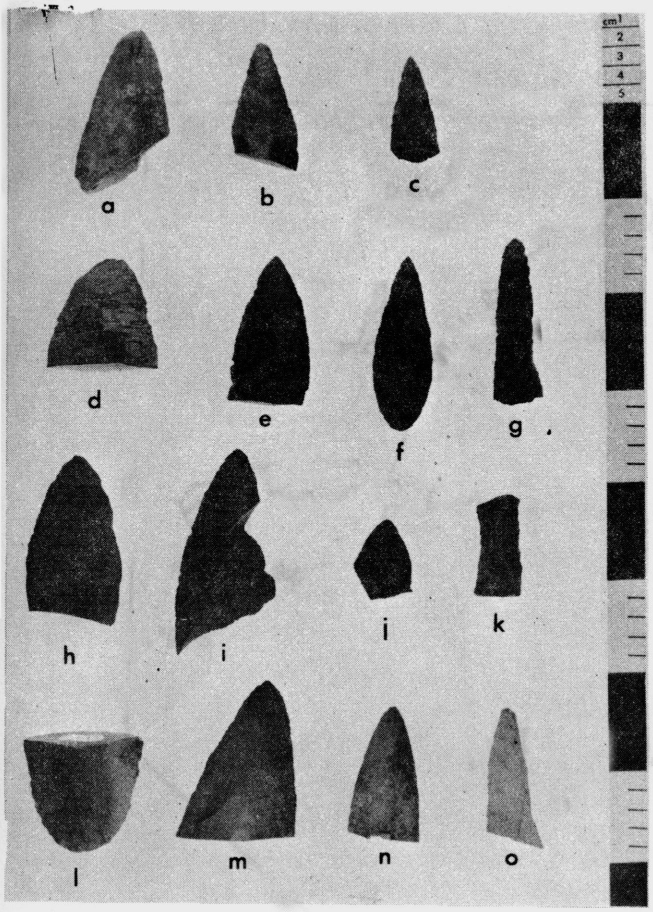

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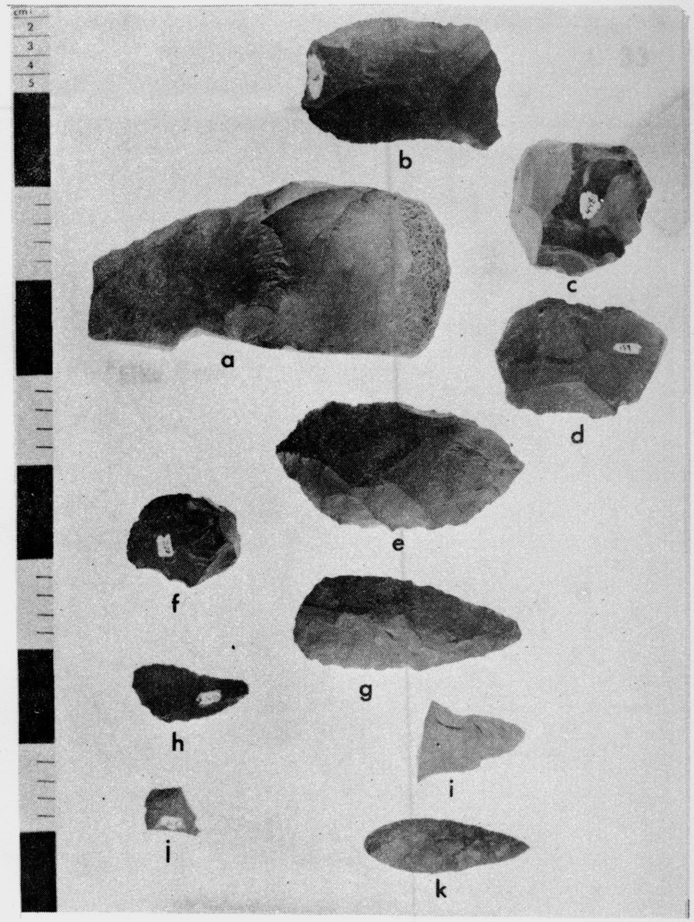


Plate VI

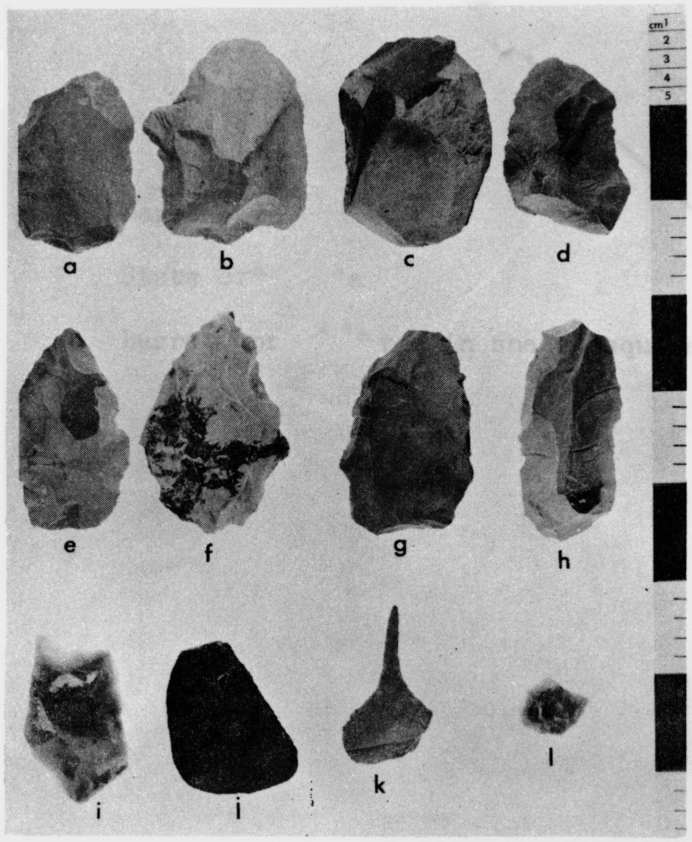


Plate VII

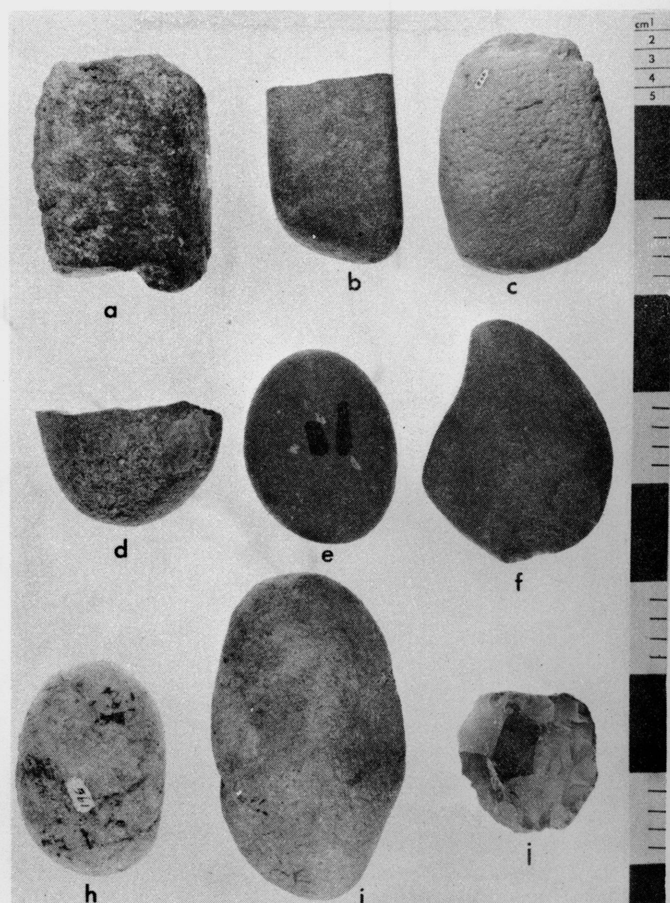
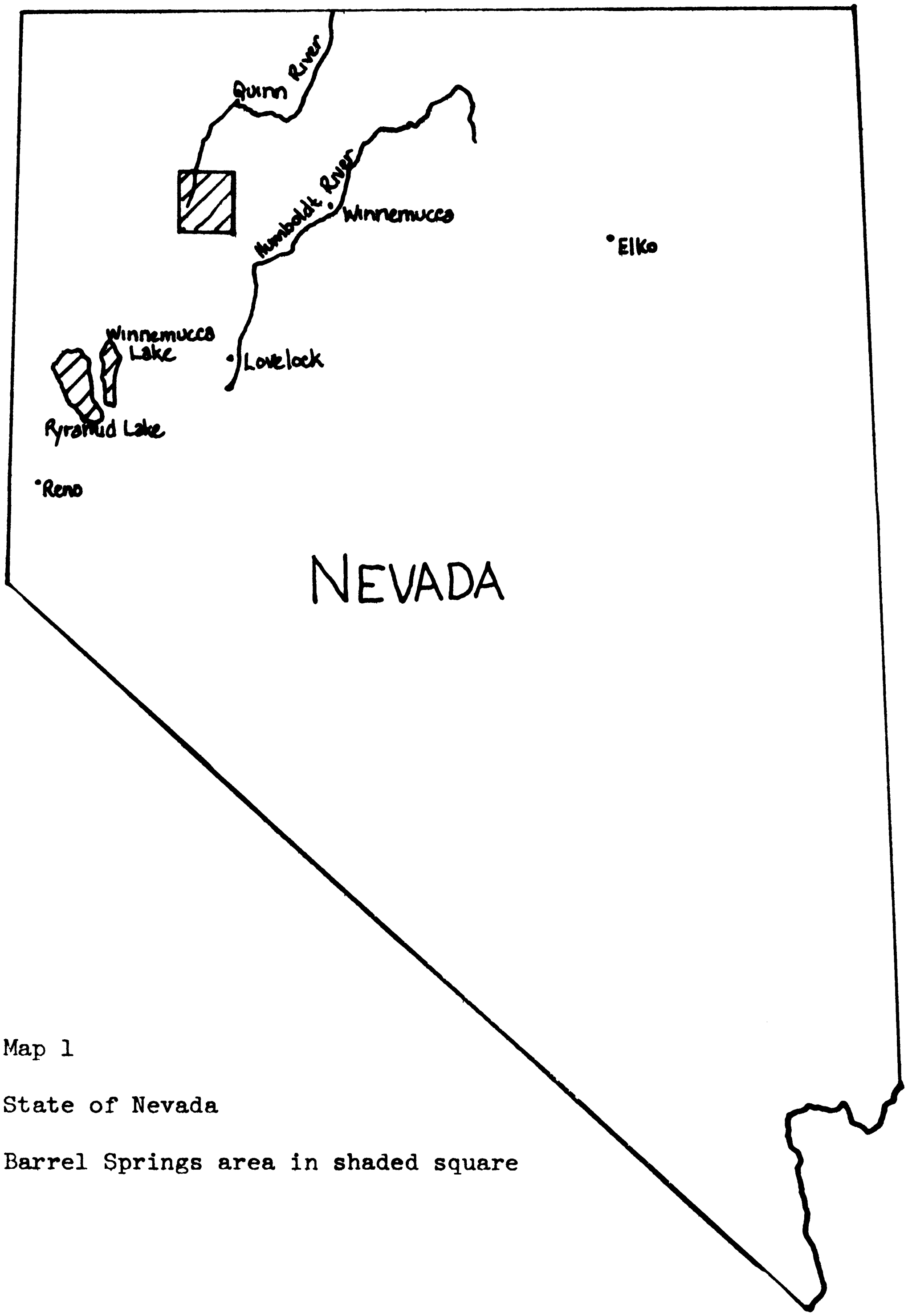


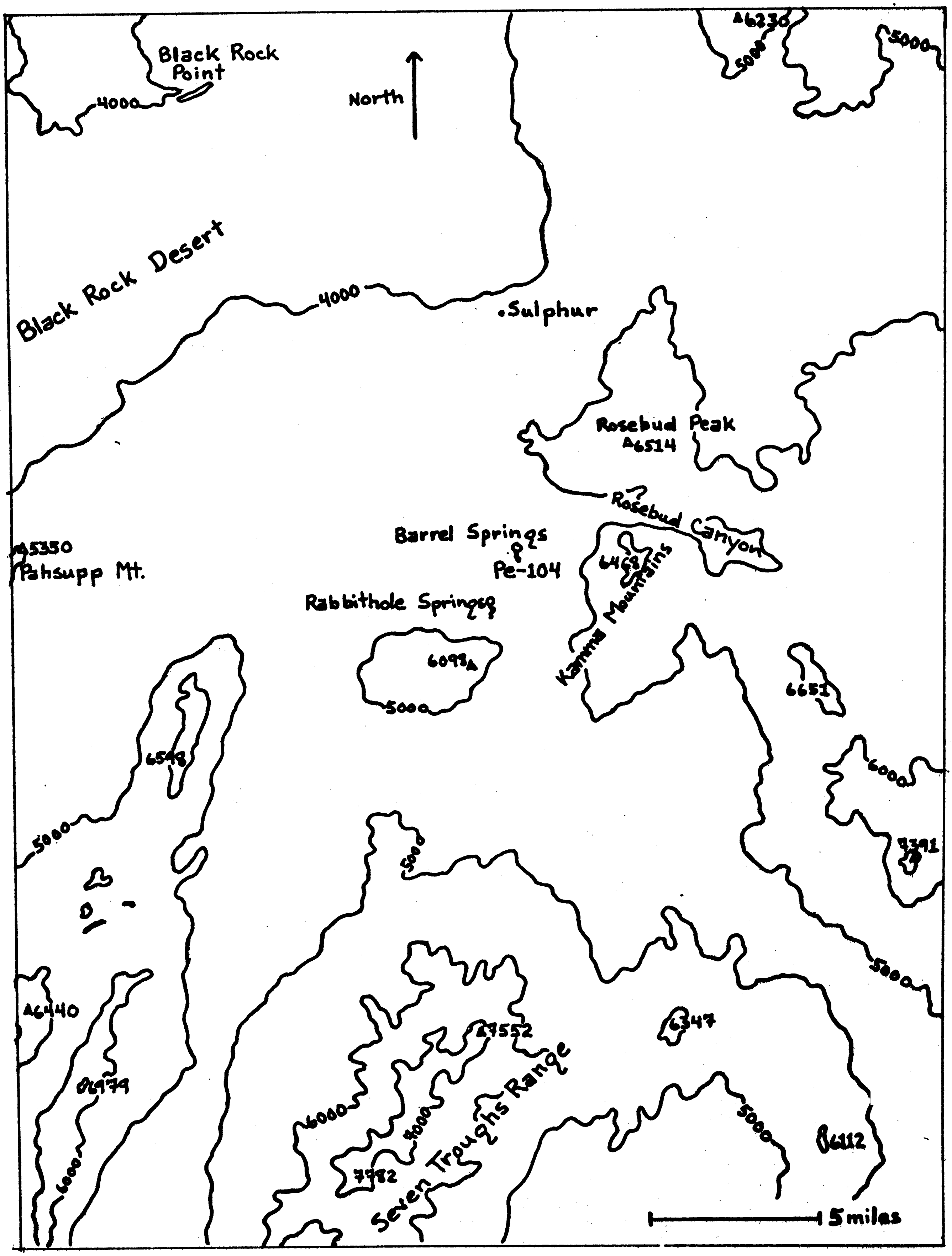
Plate VIII



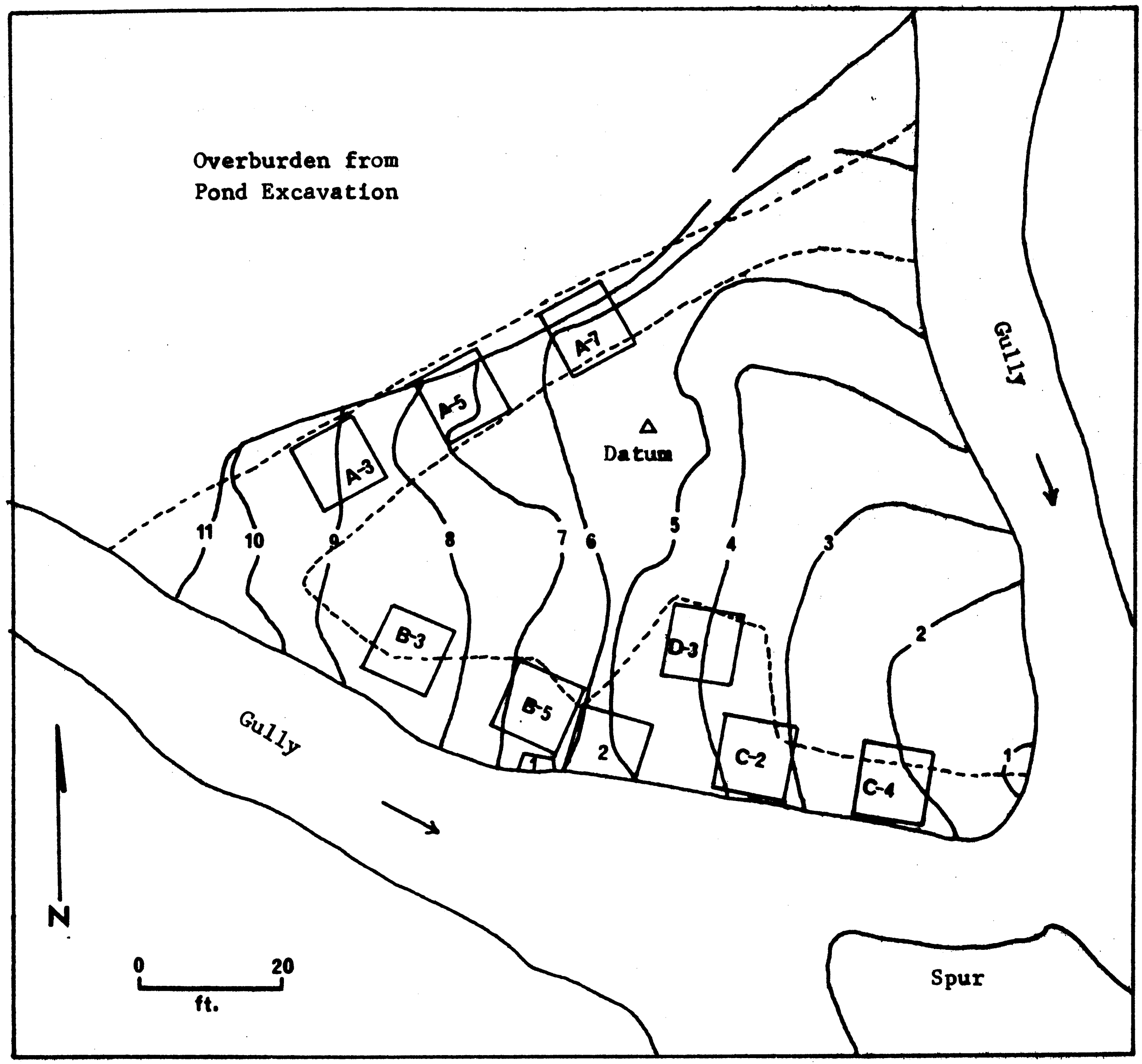
Map 1

State of Nevada

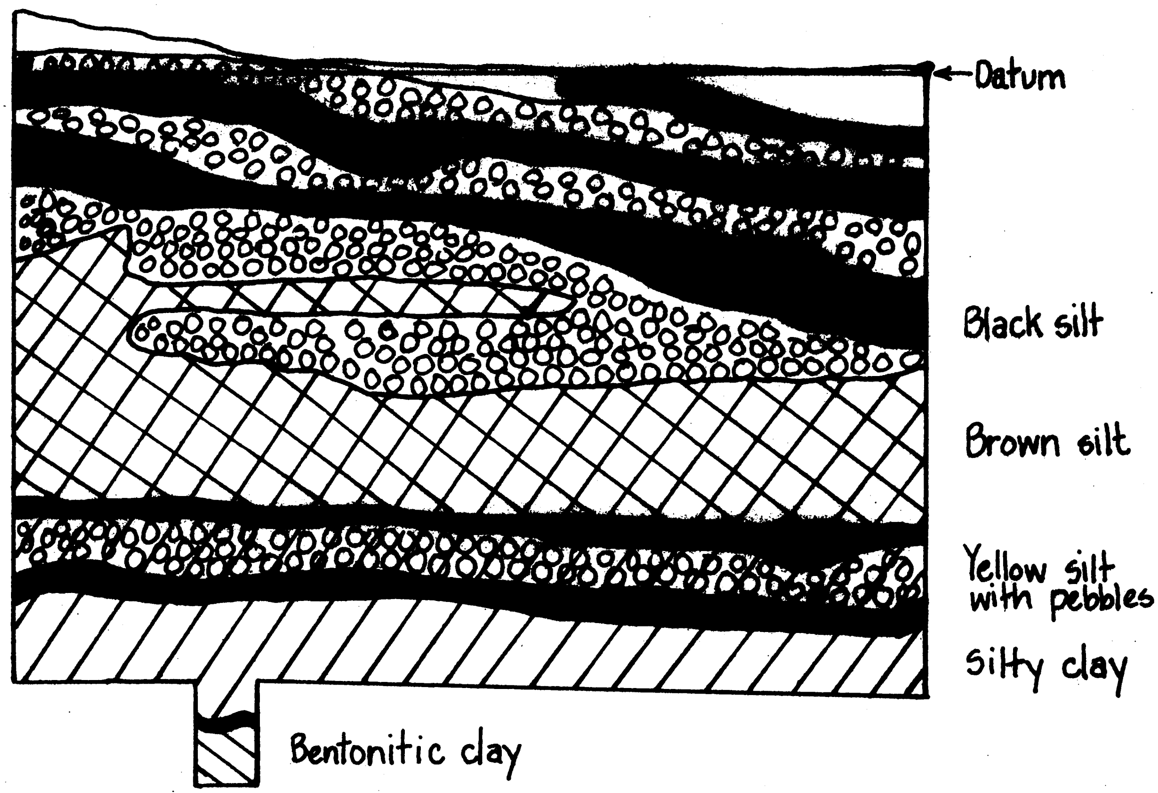
Barrel Springs area in shaded square



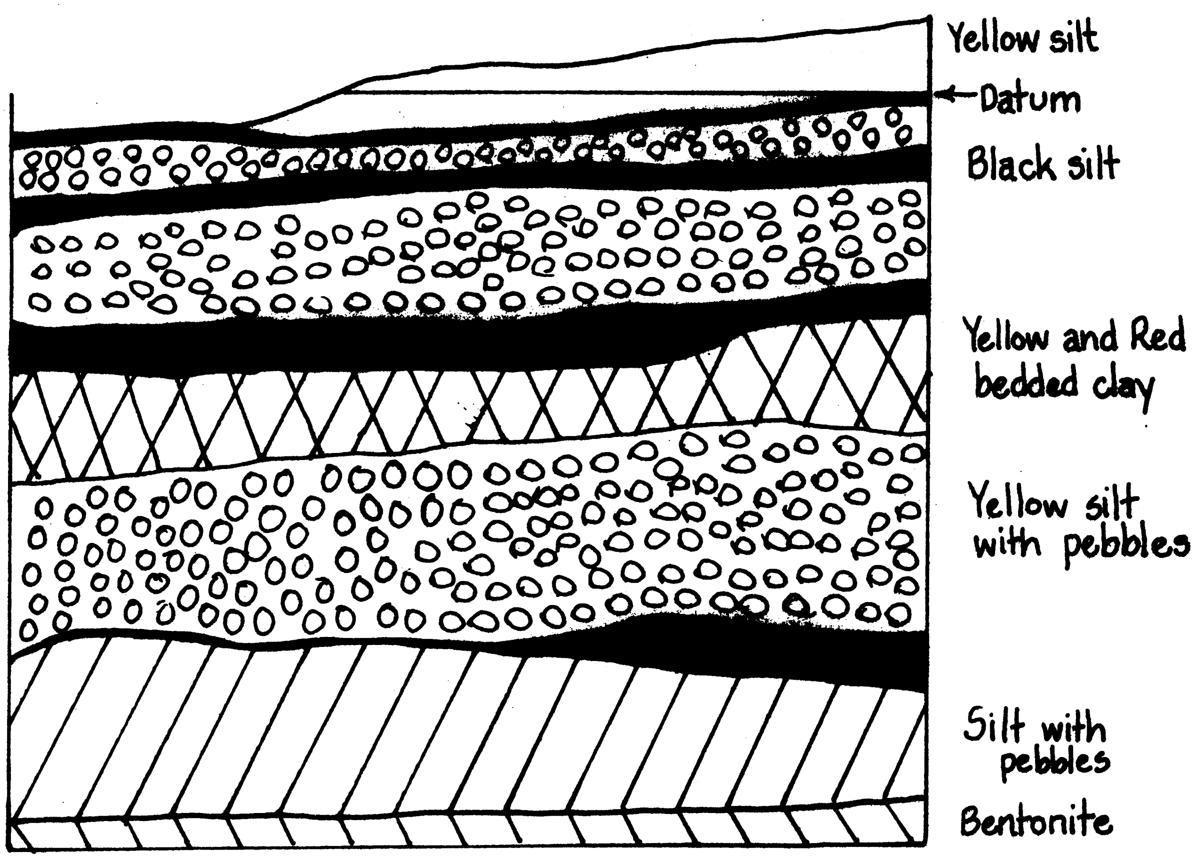
Map 2 Barrel Springs area



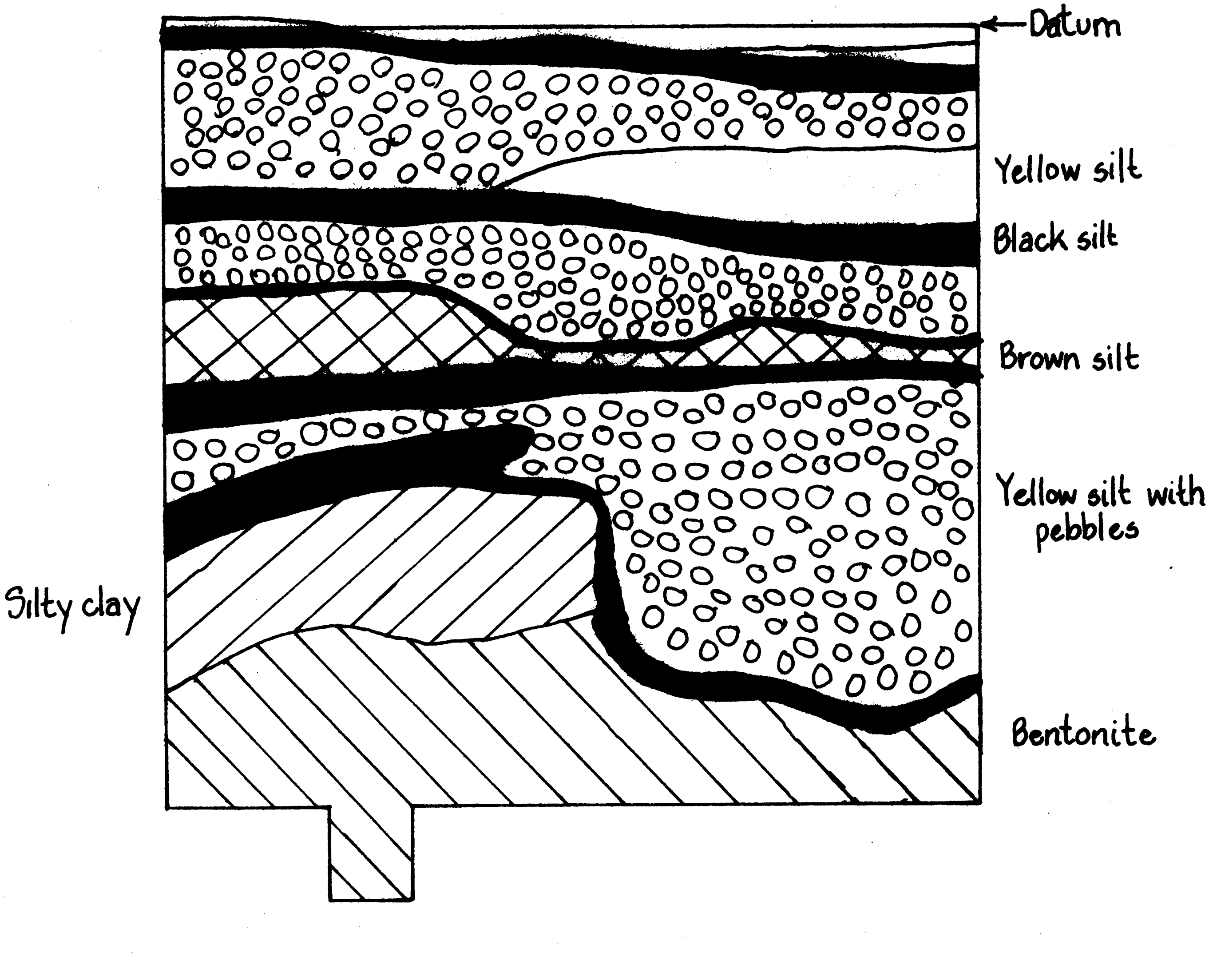
Map 3
Barrel Springs (NV-Pe-104) Site Map
Dotted line = Bulldozer Cut
1 ft. Contour Intervals



Profile 1
Pit B5
Northwest Wall
Scale: 1 centimeter = 10 inches



Profile 2
Pit A7
West Wall
Scale: 1 centimeter = 10 inches



Profile 3
Pit C2
Northeast Wall
Scale: 1 centimeter = 10 inches

BIBLIOGRAPHY

Bryan, Alan L. and Donald R. Tuohy
1960 A Basalt Quarry in Northwestern Oregon. American Philosophical Society Proceedings, Vol. 104, No. 5, pp. 485-510.

Bryan, Kirk
1950 Flint Quarries. Peabody Museum Papers, Harvard, 17:3:1-40.

Clewlow, C. W.
1967 Time and Space Relations of Some Great Basin Projectile Point Types. Univ. of Calif. Arch. Survey Report No. 70, pp. 141-149.

1968 Surface Archaeology of the Black Rock Desert, Nevada. Univ. of Calif. Arch. Survey Report No. 73, pp. 1-94.

Davis, Emma Lou
1967 Man and Water at Pleistocene Lake Mojave. American Antiquity, Vol. 32:3, pp. 345-353.

Fowler, D. D.
1968a Archeological Survey in Eastern Nevada, 1966. Desert Research Institute Technical Report Series, SSH #2. Reno.

1968b The Archeology of Newark Cave, White Pine County, Nevada. Desert Research Institute Technical Report Series, SSH #3. Reno.

Heizer, R. F.
1964 The Western Coast of North America. In Prehistoric Man in The New World, J. Jennings and E. Norbeck, eds., pp. 117-148. University of Chicago Press.

Heizer, R. F. and Martin A. Baumhoff
1961 The Archaeology of Two Sites at Eastgate, Churchill County, I, Wagon Jack Shelter. Univ. of Calif. Arch. Survey Report No. 20:4.

Heizer, R. F., M. A. Baumhoff and C. W. Clewlow, Jr.
1968 The Archaeology of South Fork Shelter (NV-El-11), Elko County, Nevada. Univ. of Calif. Arch. Survey Report No. 71, pp. 1-58.

Holmes, William H.
1919 Handbook of Aboriginal American Antiquities, Part I, Bureau of American Ethnology Bulletin No. 60.

Lanning, Edward
1963 Archaeology of the Rose Spring Site, California. Univ. of Calif. Publi. in American Arch. and Ethnology 49:237-336.

Morrison, R. B. and John C. Frye
1965 Correlation of the Middle and Late Quaternary Successions of the Lake Lahontas, Lake Bonneville, Rock Mountain (Wasatch Range), Southern Great Plains, and Eastern Midwest Areas. Nevada Bureau of Mines, Report No. 9.

O'Connell, James
1967 Elko Eared/Elko Corner-Notched Projectile Points as Time Markers in the Great Basin. Univ. of Calif. Arch. Survey Report No. 70: 129-140.

Ragir, Sonia and Jane Lancaster
1966 Analysis of a Surface Collection from High Rock Canyon. Univ. of Calif. Arch. Survey Report No. 66:1-37.

Riddell, Francis
1960 The Archaeology of the Karlo Site (Las-7), California. Univ. of Calif. Arch. Survey Report No. 53:1-91.

Sharrock, Floyd W.
1966 Prehistoric Occupation Patterns in Southwest Wyoming and Cultural Relationships with the Great Basin and Plains Culture Areas, Univ. of Utah Anthropological Papers, No. 77.

Tuohy, Donald R.
n.d. The Coleman Site, a Black Andesite Quarry and Workshop Near Falcon Hill, Nevada. Unpublished, manuscript in the author's possession.

Warren, Claude N.
1967 The San Dieguito Complex: A Review and Hypothesis. American Antiquity 32:2, pp. 168-185.

UNMODIFIED FAUNAL REMAINS FROM NV-Pe-104.

David H. Thomas

The analysis of the faunal remains from NV-Pe-104 is based upon 708 bone fragments, 428 of which were identifiable. The identification was undertaken at Sacramento State College; I am indebted to Dr. William J. Beeson and Mr. John Beck for their generosity in permitting me the use of comparative skeletal material at Sacramento State College. The aid of Steven White and Thomas Layton is also acknowledged.

Tables I and II present the data from this analysis. As the tables indicate, during excavation the bones were segregated into lots varying in depth from six to twelve inches. Table I is as specific as the fragmentation of the bone permits. The general terms are included in the generic categories, e.g., bones identified as Ovis canadensis are not included under "Artiodactyl." "Med. Mammal" indicates animals about the size of a coyote or bobcat; "Med. Rodent" designates a rabbit-sized animal and "Small Rodent" is about squirrel or chipmunk size. No bird or reptile bones were recovered.

Before turning to the specific analysis, a word of procedural caution is in order. In the process of excavating a deposit using a 1/4" screen, some of the smaller bones tend to fall through the screen. In addition, an ordinary group of student excavators probably does not retrieve all small bones caught by the screen. Ziegler (1965:54) has noted this and has postulated that a mere numerical count of bones would be skewed in favor of the large animals, since many of the small animal bones are not recovered from the site. The larger the screen mesh, the more small bones lost and the more skewed are the results in favor of the larger animals. Thomas (1969) has tested the percentages of bone lost and recovered in 1/4", 1/8" and 1/16" meshes. The results empirically demonstrate that significant small animal bones, especially of rodents, are lost through a 1/4" mesh screen. In fact, even a gross list of species present, disregarding frequencies, would be inaccurate since some species (such as Peromyscus and Perognathus) were never recovered in the 1/4" screen used for the test sample, although the 1/8" mesh screen recovered these small rodent bones. With this in mind, the current analysis will deal exclusively with the larger mammalian remains, which we can assume were accurately recovered. No quantitative statements will be attempted in light of the above-mentioned skewing effect of a 1/4" screen.

Bighorn sheep (Ovis canadensis) comprises 96% of all of the artiodactyl remains identifiable to species (Table I). Heizer and Baumhoff (1962:216-218) have described three ethnographic hunting techniques in the Great Basin: stalking, driving past a concealed hunter, and ambushing.

In addition, they have hypothesized hunting by ambush at springs, mainly because of the numerous petroglyphs often surrounding those springs frequented by bighorn. This last method is of considerable importance to the present discussion, since site NV-Pe-104 is located near a spring. Despite the skimpy evidence, it is clear that the bighorn was rather abundant in the northern Nevada region during aboriginal times: the high frequency of bighorn bones and tools in sites throughout Nevada testifies to their former importance (e.g. Shutler and Shutler 1963, Heizer and Krieger 1956, Loud and Harrington 1929, and Layton n.d.). A discussion of those factors having a bearing on aboriginal techniques for bighorn is therefore germane to the faunal remains at hand.

Recent studies by Geist (1967) on North American mountain sheep indicate that they evidenced a higher degree of gregariosness and group interaction than was previously supposed. Geist writes (1967:24):

> "My observations indicated that (mountain) sheep maintain their areas of distribution by passing on home ranges from generation to generation as a living tradition. Each generation of sheep inherits the home ranges of its elders; that is, they acquire the same habits of living in certain areas at specific seasons, and of using the same migratory routes. Exploration apparently plays a most insignificant part of establishing the home range of an individual. Moose and deer, however, extend their distribution via individual exploration."

The implication for aboriginal hunting methods is clear; if bighorn are over-hunted and the local band annihilated, the area will be extremely slowly or perhaps never repopulated. This failure to disperse has been an important factor in the extinction of the formerly ubiquitous bighorn in about 85% of Nevada. Seton (1929:535) estimated that in 1800 there were one and one half to two million bighorn continuously distributed throughout Canada, the United States and Mexico; Buechner (1960:74) estimates the current intermittent distribution of bighorn population in the United States to be only 15,000 to 18,200. This rapid historic decline of Ovis seems to indicate that aboriginally, the bighorn were rarely over-hunted.

The most obvious possibility to explain the lack of over-hunting is that Great Basin human populations were probably low and hunting techniques were relatively inefficient. By this reasoning, the small number of sheep that were killed simply did not effect the bighorn population. But a second possibility also exists, that the aboriginal hunters simply chose not to over-hunt the local sheep bands, i.e., that the hunters practiced some form of conservation. Such a statement cannot be proven and is presented only as a logical possibility. Heizer (1955:8) considered such a problem and stated "That primitive hunters know the effects of over-hunting is clear from recorded (ethnographic) evidence...instances of wasteful hunting are rarely reported and are not typical of primitive peoples". The Gosiute, for example (Steward 1938:5; also discussed by Heizer 1955:8) held an antelope drive in which an entire herd was killed. The last drive at this locality had been twelve years before "and the old [and dying] men never expected to see another [drive] at this place". The point is that the hunters knew that antelope would rapidly repopulate the locality so that another hunt would be possible in the next ten years or so. Mountain sheep, however, would not repopulate an area, and the hunters probably knew this. Since mountain sheep tend to remain rare or absent from an area in which they are exterminated, the logical method of hunting would be to harvest only a couple of individuals at one time from each local band of bighorn.

At any rate, whether the aboriginal technology was simply too inefficient or the groups truly practiced conservation and purposely did not over-hunt, the fact remains that mountain sheep were not over-hunted in aboriginal times. Buechner (1960:5, Fig. 1) for example, shows a continuous distribution of bighorn over the entire State of Nevada and much of the western United States. Steward (1938:232) characterizes Great Basin populations as primarily foraging units, following uncertain itineraries in search of plant foods with only peripheral hunting of game. He furthermore stresses the unpredictability of the environment. The importance of stable bighorn local bands could be considerable since they would form the basis of a more predictable or guaranteed food supply. Geist writes (1967:29):

> "When after a prolonged absence I returned to my Stone's sheep study area, I found known female sheep in the expected localities. They were feeding on the same slopes, resting in the same favorite beds, and entering the same caves they had frequented three years previous. In fact they behaved so much in the familiar manner that I felt I had never been away from them."

Perhaps a partial rationale for the utilization of the Barrel Springs site, as opposed to rhyolite outcrops at other nearby springs was the presence of a local bighorn band which watered at Barrel Springs. Such an explanation would argue for a seasonal occupation of NV-Pe-104 during whichever season the bighorn were present. Such predictable behavior for the particular local band of bighorn could have been noted by the Indians and thus the quarrying expedition would have had a more reliable food supply.

TABLE 1

Identifiable Faunal Remains by Level (Depth in inches)

Fragments from losts representing more than 6 inches of depth
have been entered at the midpoint of the distance spanned

	0-6		6-12	12-18		18-24		24-30		30-36	36-42	42-48	48-54	54-60	60-66	66-72	72-78	78-84	Total
Mountain Sheep Ovis Canadensis	4	1	4	3	3		4		4									1	24
Elk (Waphi) Cervus canadensis						1													1
Coyote Canis latrans	1				1														2
Kit Fox Vulpes macrotis				3					1										4
Jack Rabbit Lepus sp.	3		4	3															10
Cottontail Rabbit Sylvilagus nuttallii	1		2	4															7
Chipmonk Eutamias sp.	5		1	1															7
Meadow Mouse Microtus sp.			1																1
Artiodactyl	40	3	52	64	35	6	40	16	10					2		3			271
Med. Mammal	1		17		3		16	7	5										49
Med. Rodent	14		6	9			2		2										33
Small Rodent	12																		12
Total fragments per level	81	4	87	87	42	7	62	23	22					2		3		1	421

TABLE 2

Identifiable Faunal Remains by Body Part

	Juvenile	Maxillae	Mandible	Right	Left	Scapula	Right	Left	Humerus	Right	Left	Ulna	Right	Left	Femur	Right	Left	Tibia	Right	Left	Phalange	Vertebra	Astragulus	Teeth	Skull	Tarsal	Rib	Long Bone	Cannon Bone	Pelvis
Mountain Sheep *Ovis canadensis*	1				1		3	2			1		2		1					1	1	1	1	5			1		2	
Elk (Wapiti) *Cervus canadensis*	1																													
Coyote *Canis latrans*							1																							
Kit Fox *Vulpes macrotis*				1			1																	2						
Jack Rabbit *Lepus* sp.	1	1		1				2		2										1					1	2				
Cottontail Rabbit *Sylvilagus nuttallii*				2	2			1	1									1												
Chipmonk *Eutamias* sp.		1		2	3					2	1					1			1	2										1
Meadow Mouse *Microtus* sp.										1																				
Large Artiodactyl																											2			
Med. Artiodactyl			1			5	1															4					16	231		
Med. Mammal																								1			7	44		
Med. Rodent																												15		
Small Rodent																					1							12		
Total Fragments per level	3	2	1	6 13	6	5	6 16	5	1	5 8	2	0	2 2	0	1	1 2	0	1	1 6	4	2	5	1	8	1	2	26	302	2	1

Table I indicates that most body parts of the mountain sheep (and of the unidentified artiodactyls-- probably also Ovis canadensis) are represented in the assemblage of bones recovered from NV-Pe-104. This reflects a situation similar to that at Wagon Jack Shelter (Heizer and Baumhoff 1961) in which the intact carcass was brought back to the site at least some of the time. The preponderance of "artiodactyl" long bone, however, indicates that the animals were sometimes disarticulated at the kill site and many unimportant items (vertebra, pelvis, skull, etc.) were not brought back to the quarry site.

An unusual occurence is the tibia (left distal portion) of a young elk, Cervus canadensis. Two rib fragments recorded as "artiodactyl" are probably also elk. Since this elk tibia fragment is in no way modified into a tool, it is possibly indigenous to the area. There is, of course, a possibility that the bone was traded or carried into the site. Hall (1946:619) can find only two historic reports of elk in Nevada, and these were in 1876 by Captain J. H. Simpson. These two sightings were in White Pine County, over 200 miles southeast of NV-Pe-104. A brief perusual of the archaeological literature reveals furthermore that few elk bones have ever been found in Nevada sites (See Shutler and Shutler 1963 and Heizer and Baumhoff 1962). Ziegler (in Shutler and Shutler 1963:18) states "In Nevada the wapiti's (elk) zonal range was probably Transitional in the Summer and Upper Sonoran in the winter". Hall (1946:41) places the lowest distribtuion of elk in the pinion-juniper belt of the Upper Sonoran. Although one cannot generalize from a single bone, the presence of elk in a site at such a low elevation would tend to argue for its occupation at least during the winter.

Although the negative evidence will not be labored here, we must note the conspicuous absence of deer bone, since Odocoileus hemionus hemionus is reported for this region (Hall 1946:624). A recent florescence of deer in the eastern portion of the Great Basin has been hypothesized in the archaeological and zoological literature (Durrant 1952, Taylor 1954, and Jennings 1957). The Barrel Springs data are consonant with such an hypothesis.

In summary, it must be remembered that the faunal sample from NV-Pe-104 is rather small, probably because this site was a quarry locality rather than a long-term habitation center. Nevertheless, we can tell that the primary large game animal was the bighorn sheep. Some smaller animals such as rabbits were doubtless also eaten, but the manner of bone recovery from this site does not permit quantitative statements about the smaller species. The hypothesis suggested here, based largely upon the work of Geist, is that since bighorn appear to traditionally occupy the same area each season, the aborginal inhabitants came to quarry when they knew the bighorn would be in the immediate area. These sheep were probably not over-hunted and the presence of bighorn for future seasons was possibly insured by game conservation.

REFERENCES CITED

Buechner, Helmut K.
1960 The Bighorn Sheep in the United States, its Past, Present, and Future. Wildlife Monographs, No. 4.

Durrant, S. D.
1952 Mammals of Utah. Univ. of Kansas Publ. Mus. Nat. Hist., No. 6.

Geist, Valerius
1967 A Consequence of Togetherness. Natural History, Oct., pp. 24-32.

Hall, E. Raymond
1946 Mammals of Nevada. Univ. of Calif. Press. Berkeley.

Heizer, R. F.
1955 Primitive Man as an Ecologic Factor. Kroeber Anthropological Society Papers, No. 13, pp. 1-31.

Heizer, R. F. and M. A. Baumhoff
1961 Wagon Jack Shelter. Univ. of Calif. Anthrop. Records, Vol. 20, No. 4. Berkeley.

1962 Prehistoric Rock Art of Nevada and Eastern California. Univ. of Calif. Press. Berkeley.

Heizer, R. F. and A. D. Krieger
1956 The Archaeology of Humboldt Cave, Churchill County, Nevada. Univ. of Calif. Publ. Amer. Arch. and Ethnology, Vol. 4, No. 1.

Jennings, J. D.
1957 Danger Cave. Mem. Soc. Amer. Arch., No. 14.

Layton, Thomas N.
n.d. The Archaeology of Smoky Creek Cave, Humboldt County, Nevada. Unpublished Masters Thesis, Univ. of Calif., Davis (1966).

Loud, L. L. and M. R. Harrington
1929 Lovelock Cave. Univ. of Calif. Publ. Amer. Arch. and Ethnology, Vol. 25, No. 1.

Seton, E. T.
1929 Lives of Game Animals. Doubleday Page and Co. Vol. III. New York.

Shutler, M. E. and R. Shutler, Jr.
1963 Deer Creek Cave, Elko County, Nevada. Nev. State Mus. Anthrop. Papers, No. 11.

Steward, J. H.
1938 Basin-Plateau Aboriginal Sociopolitical Groups. Bureau of Amer. Eth. Bulletin No. 120.

Taylor, D. C.
1954 The Garrison Site. Univ. of Utah Anthrop. Papers, No. 16.

Thomas, D. H.
1969 Great Basin Hunting Patterns: A Quantitative Method for Treating Faunal Remains. American Antiquity Vol. 34, No. 4:392-401.

Ziegler, A. L.
1965 The Role of Faunal Remains in Archaeological Investigations. In Symposium on Central California Archaeology, ed., Freddie Curtis, Sacramento Anthrop. Society No. 3:47-75. Sacramento State College.