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CC: Jerriann Ernstsen; Sheila Morrison

DATA RECOVERY PLAN FOR THE LILA CANYON ROCKSHLETER (42Em2517), EMERY COUNTY, UTAH

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DATA RECOVERY PLAN FOR THE LILA CANYON ROCKSHLETER (42Em2517), EMERY COUNTY, UTAH

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TABLE OF CONTENTS

INTRODUCTION. 1

ARCHAEOLOGICAL BACKGROUND. 1
Previous Archaeological Work. 1
Cultural-Historical Overview. 2

SITE DESCRIPTION. 4

TRAJECTORIES IN FREMONT RESEARCH AND HYPOTHESES. 5
Hypothesis 1. 9
Hypothesis 2. 10
Hypothesis 3. 11

FIELD METHODS. 13

LABORATORY METHODS. 15
Lithic Artifacts. 15
Ground Stone Artifacts. 17
Ceramics Artifacts. 17
Faunal Remains. 17
Ancillary Studies. 17

ANALYSIS. 18
Determining Analytical Units. 18
Descriptive Analysis of Artifact Classes. 18

CURATION. 18

REFERENCES. 19

APPENDIX A. 24

APPENDIX B. 25

APPENDIX C. 42

LIST OF FIGURES

Figure 1: Location of 42Em2517 and IF-A. 6

Figure 2: 42Em2517 Site Map. 7

Figure 3: Proposed Excavation Locations. 14

INTRODUCTION

In the late summer of 1998, Montgomery Archaeological Consultants (MOAC) conducted an archaeological survey of a proposed mining area and various proposed access corridors (see Montgomery and Montgomery 1999). Near the main project area and adjacent to a proposed access road, the archaeologists identified and recorded a small Fremont rockshelter. The evaluation of the site, 42Em2517, was that it was eligible to the National Register of Historic Places, based on criterion D, which indicates that the site retains significant potential for data recovery that could aid in better understanding the prehistory of the general area. Earlier the same year, MOAC surveyed another area nearby for Basic Management's soil testing project (Montgomery and Montgomery 1998). In the course of this project, the archaeologists identified a single secondary chert flake. At the time, the artifact was not considered to constitute a site. However, during a recent visit to the area, BLM archaeologist Blaine Miller observed several vandal holes dug in the vicinity of the isolated flake (Personal Communication, September 2001). These rude excavations brought to the surface additional artifacts that laid buried beneath the modern ground surface. The subsurface materials likely indicate the presence of a buried site.

42Em2517, herein designated as the Lila Canyon rockshelter, and the possible buried site have potential for future adverse effect, in particular secondary impacts such as vandalism, as Utah America Energy Corporation develops its mining operation. In consultation with Blaine Miller, Utah America Energy Corporation representative Jay Marshall decided to proceed with mitigation of the Lila Canyon rockshelter and testing to determine the eligibility of the possible buried site. Mr. Marshall contacted Montgomery Archaeological Consultants requesting a data recovery plan for the mitigation and testing at the two locales.

ARCHAEOLOGICAL BACKGROUND

Previous Archaeological Work

While archaeological work in Emery County is extensive, little research has been conducted in the vicinity of Lila Canyon. In the 1950's, Gunnerson conducted archaeological surveys throughout much of eastern Utah documenting and testing Fremont archaeological sites. In his survey of Range Creek, located just five miles east of the Lila Canyon rockshelter, Gunnerson (1957) reports 11 Fremont sites, though it is uncertain if these sites are any of those reported by Leh (1936). The sites, 42Em9 through 42Em19 and 42EmCb27, include rockshelters, pit structures, and artifacts scatters. The debris from some of the rockshelters contain domesticated plant remains, while other shelters lack any evidence of cultigens. In 1981, the results of testing at 42Em1343 were published by the University of Utah Archaeology Center (Rauch 1981). The report details testing at a small rockshelter located a few miles south of 42Em2517. The excavation resulted in the identification of stone tools, both chipped and ground, faunal remains, and wild plant remains (Martin et. al. 1983). The occupants of the site included Fremont and Shoshone peoples. Martin et. al (1983) excavated Cedar Siding Shelter (42Em1533), which is roughly 12 miles south of 42Em2517. The shelter consists of multiple overhangs utilized by Archaic, Fremont, and Numic peoples over the course of several thousands of years. In 1986, Black and Metcalf reported on work they conducted in Castle Valley and adjacent areas. One of their research tracts, the Elmo tract, occurs approximately 20 miles west of the site in the vicinity of Olsen Reservoir just south of Wellington, Utah. Although Fremont sites were not definitively identified in their survey, Black and Metcalf (1986) found numerous Fremont sites farther south in Castle Valley.

Cultural-Historical Overview

Prehistoric occupation in the area spans the last 10,000-12,000 years. Cultural remains representing the Paleoindian, Archaic, Formative, Late Prehistoric, and Historic stages have been identified in the vicinity of the study area. The earliest known archaeological remains in east-central Utah are attributable to the Paleoindian stage, which emphasized the exploitation of megafauna and floral resources during the period of transition from the Pleistocene to the Holocene. Based on projectile point typologies and subsistence strategies, the Paleoindian stage is commonly divided into three cultural complexes termed the Llano (ca. 11,500-11,000 B.P.), the Folsom (ca. 11,000-10,000 B.P.) and the Plano (ca. 10,000-7500 B.P.). The Llano complex is represented by Clovis fluted projectile points, a rare find in the area. Mammoths are thought to have been the primary prey of these early big game hunters, in contrast to an apparent preference for bison exhibited by the Folsom peoples. Folsom points, among the more common Paleoindian projectile points that occur throughout the Colorado Plateau, have been found in Emery country, sometimes associated with lithic debitage (Copeland and Fike 1988; Schroedl 1991). Megafauna, represented by mammoth and short-faced bear and dating to 9440 B.P., has also been found north of the project area in upper Huntington Canyon. The remains exhibit evidence of butchering, in the form of cut marks, and are associated with a Paleoindian projectile point (Gillette 1989; Madsen 2000). The Plano complex is characterized by large, lanceolate points and reliance on large game as well as plants. Projectile points found nearby that date to this complex include Lake Mohave points, Lovell Constricted points and a Medicine Lodge point style (Black and Metcalf 1986; Hauck 1977).

The termination of the Pleistocene enacted major changes in the environment of central Utah. Overall, the climate became warmer and drier, causing expansion of xeric vegetation zones and a retreat of plant communities requiring cool and moist conditions at higher elevations (Reed 1991). The Archaic stage (7800 to 500 B.P.) is represented by subsistence patterns more labor-intensive than those practiced by Paleoindians. Large herd animals were less intensively exploited, replaced by a greater emphasis upon smaller, more dispersed fauna, in addition to plant resource processing. Archaic sites tend to cluster in areas which offer good viewsheds, proximity to outcrops of tool quality stone, as well as nearness to major topographic features (Black and Metcalf 1986; Howell 1992). Schroedl (1976) defined four phases for the Archaic stage based on technology, subsistence, and environmental change. The earliest is the Black Knoll phase (ca. 8300-6200 B.P.). Sites dating to this phase are characterized by Pinto projectile points and a contrast in subsistence between high and low elevations in which large artiodactyla are hunted in the uplands, while wild plant gathering is emphasized at lower elevations (Schroedl 1976:61-62). The Castle Valley phase (ca. 6200-4500 B.P.) is characterized by a lower aboriginal population on the Colorado Plateau, possibly attributed to a two-stage Altithermal drought (Black and Metcalf 1986:10). It was during this time period that a variety of projectile point styles were employed, including Rocker, Hawken, and Sudden Side-notched points, as well as Humboldt and McKean points. Slab-lined fire pits and an increasing reliance upon grasses and forbs as foodstuffs are also aspects of this phase (Schroedl 1976:63-64). The Green River phase (ca. 4500-3300 B.P.) is marked by the occurrence of Gypsum and San Rafael Side-notched projectile point types and split-twig figurines (Schroedl 1976). In this phase, hunting (especially for mountain sheep) becomes important and amaranths are a preferred plant resource (Black and Metcalf 1986:11). The Dirty Devil phase (ca.3000-1500 B.P.) marks the transition into the Formative stage and is characterized by increased sedentism, the introduction of corn and bow and arrow, and Gypsum projectile points (Schroedl 1976).

The Formative stage (A.D. 700-A.D. 1200) is characterized by reliance on domesticated plants (most notably corn), substantial habitation structures often organized into hamlets or villages, production of pottery, and the use of the bow and arrow. The study area is within the occupation zone of the San Rafael Fremont variant, as defined by Marwitt (1970). Sites in this area are characterized as small isolated hamlets or single dwelling units, usually found on small ridges overlooking perennial water sources and arable land (Schroedl and Hogan 1975). Three San Rafael Fremont phases have been proposed for the study area based on chronology, settlement patterns, subsistence strategies, and material culture (Black and Metcalf 1986; Greubel 1996). The earliest phase has been termed by Black and Metcalf (1986) the "Proto-Formative" phase (A.D.150 to 700), a transition stage from an Archaic to a Formative lifeway in which groups became more sedentary. During this phase corn horticulture increased in importance, although hunting and gathering continued to play a major role in the subsistence strategy. Common artifacts of this phase include Rose Springs Series arrow points and Emery Gray Ware (introduced between A.D. 650 and 700). More recently, investigations along Muddy Creek have better defined the earliest manifestations of the Fremont culture, termed as the Confluence Phase (Greubel 1996). The Confluence Phase is proposed to encompass preceramic, semi-sedentary, horticultural adaptations in the San Rafael Fremont area, beginning around A.D. 200 (Ibid: 516). Important aspects of this phase include the presence of a well-developed pattern of semi-sedentism, pithouse architecture, maize horticulture, large bell-shaped storage pits, use of the bow and arrow, and the presence of community or special function structures. During this preceramic Formative period, settlements occurred along the floodplain terraces above perennial streams. Recent excavations at the Confluence site (42Em1887), situated near the confluence of Muddy Creek and Ivie Creek, revealed five shallow pithouses and a variety of extramural features including bell-shaped pits and firehearths. Data from this site indicated that it is a horticulture-based community with the subsistence strategy based on the growing of maize dating from A.D. 540 to 630 (Ibid:348).

The Muddy Creek phase (A.D.700 to1000) is characterized by increased sedentism and greater reliance upon horticulture. The settlement strategy in the region during this time is marked by small isolated hamlets or single dwelling units, usually found on small ridges overlooking perennial water sources and arable land. Associated cultural material remains include Emery Gray Ware ceramics, some decorated by appliqué and incisions, and Rose Springs Series and Uinta Side-notched arrow points (Holmer and Weder 1980). The Bull Creek phase (A.D. 1000 to 1200) is characterized by larger habitations composed of pit houses and surface masonry structures usually used for storage of cultigens. Diagnostic artifacts of this phase include Bull Creek and Nawthis Side-notched projectile points, decorated Fremont ceramics including Ivie Creek Black-on-white, and higher frequencies of Anasazi trade wares. Black and Metcalf (1986: 157) suggest that Fremont populations aggregated during this phase most likely in response to the salubrious climatic conditions (post-A.D. 950). These favorable climatic conditions may have also enhanced the productivity of maize fields as evidenced by the increase of storage facilities in the area. Also during late Fremont times a linear settlement pattern is exhibited in areas where sites are clustered along drainage systems, such as Ferron Creek. Sometime following A.D. 1200, the Fremont appear to have abandoned east-central Utah, attributed to both environmental and subsistence-related reasons (Lindsay 1986).

Following the Fremont abandonment of the area, a largely nomadic hunting and gathering lifeway resumed. This occupation is attributed to the Numic-speaking peoples, a diverse group that was present throughout much of Utah upon the arrival of Europeans. Archaeological evidence suggests that the Numic-speaking Ute appeared in east-central Utah at approximately A.D. 1100 or shortly thereafter, migrating from the southwestern Great Basin (Horn, et. al. 1994). Numic sites

in the area predating contact are recognized by distinctive Desert Side-notched, tri-notched, and Cottonwood Triangular projectile points, a fairly crude micaceous tempered pottery, distinctive rock art, and occasional wickiups (Jennings 1978). Eighteenth and nineteenth century Ute sites may also contain varying quantities of Euroamerican artifacts, such as sheet metal cone tinklers, tin cans, weaponry, and equestrian tack. By the 1870s, Euroamericans had forced the Utes out of east-central Utah.

The earliest recorded visit by Europeans to Utah was the Dominguez-Escalante expedition, which moved through the areas north and west of Castle Valley in 1776-1777. Throughout the first half of the nineteenth century, explorers, surveyors and trappers moved in small parties through the valley, up and down the Old Spanish Trail. The main branch of the Spanish Trail veered northwest from Green River and wound through the San Rafael Swell via Cottonwood Creek and Buckhorn Flat, emerging into Castle Valley near the Red Seeps east of Castle Dale (Finken 1977). Early engineers and surveyors noted the presence of coal deposits in Emery County. The agricultural and mining potential of the area boomed as Agustus Ferron's township survey in the area spawned an inpouring of people ready to extract and exploit the valley's natural resources (Geary 1996). While agriculture and ranching remain viable economic pursuits in Emery County today, the mining boom of the late 19th century and early 20th century ended just after WW I, with a slight increase in mining activities again just prior to WWII (Hauck 1979).

SITE DESCRIPTION

Lila Canyon Rockshelter (42Em2517)

This is a small rockshelter located on a terrace above an ephemeral drainage near the mouth of Lila Canyon. The boulder that forms a slight overhang, which the prehistoric Fremont people utilized, is but one in a series of other boulders that have spalled from the cliff walls. In the vicinity of the rockshelter are numerous other large boulders reaching heights of over two meters; the rockshelter boulder is over five meters tall. The southern side of the boulder consists of an overhang that extends out approximately 1.5 meters from the main body of the rock. Below the overhang, is a depression that resulted from pot hunting related activities; the back dirt from these excavations forms a low pile just in front of the overhang. The pot hunting endeavors resulted in the destruction of nearly 80% of the area under the overhang and immediately in from of it. The "spoils" pile contains numerous artifacts, a moderate amount of charcoal, and oxidized rocks, suggesting that at least one cultural horizon is present in undisturbed areas, including that under the back dirt pile.

Artifacts identified during the recording procedures included a Rose Springs Corner-notched projectile point, lithic debitage (n=22), and three Emery Gray sherds (2 plain body sherds and one jar rim sherd). Most of the lithic debitage and two of the sherds occurred on the surface of the back dirt pile, while the projectile point and the remaining sherd were found on the western side of the boulder.

The Emery gray ceramics typically date between A.D. 500 and A.D. 1200; the projectile point has a slightly greater temporal range dating from A.D. 100 to A.D. 1500. These relative dates, and the artifacts themselves, strongly indicate that Fremont peoples utilized the site, for yet undetermined reasons. Fremont use of the general area around Lila Canyon is well documented (see Previous Research section). Previous investigations indicate that the Fremont peoples used the area mainly for hunting, gathering, and processing wild food stuffs and other material resources.

There are limited indications that the Fremont were farming in the vicinity.

An isolated find (IF-A) occurs across the wash from 42Em2517; it consists of a secondary core reduction flake. The additional artifacts brought to the surface by recent unauthorized excavations include lithic debitage, also from core reduction (Miller, Personal Communication 2001).

TRAJECTORIES IN FREMONT RESEARCH AND HYPOTHESES

In their recent article, Madsen and Simms (1998:266-277) delineate temporal trends in Fremont research, including a descriptive-classification period, a period in which variants of the Fremont are defined, in part with interregional interaction, and most recent period concerned with understanding and explaining the variability present in the Fremont assemblages. This latest trend in research centers around ideas first proposed by Morss (1931) and others (see Rudy 1953 and Berry 1972), concerning behavioral responses to various imputes such as regional climatic variability, competition for resources, demography, and modes of interaction (e.g. competition vs. cooperation). Madsen and Simms (1998:288) see the variability in the Fremont record as being related to switching [subsistence] strategies, which they define as "...the temporary movement out of farming into foraging, and vice versa, by group fission and fusion, behavioral options which may or may not be associated with symbiosis." They continue to define symbiosis as "...a subset of matrix modifications and results after farming is established and the conflicts, interaction, and movements characteristic of adaptive diversity leads to mutual interdependence (Madsen and Simms 1998: 285). Mutualism, however,as defined in ecology, has never been documented in hunter-farmer relationships. Though archaeologists attempt to use an ecological basis for determining interaction between groups of people, there is often a confusion between mutualism and cooperation (cf. Spielmann 1991 and Gregg 1988).

A number of excavated Fremont villages and/or hamlets represent much of what is known about the San Rafael Fremont. These sites include the Turner-Look site (Wormington 1955), the Power Knoll site (Madsen 1975), the Windy Ridge site (Madsen 1975), the Crescent Ridge site (Madsen 1975), the Innocents Ridge site (Shroedl and Hogan 1975) and the Bull Creek Sites (Jennings and Sammons-Lohose 1981). In general, these sites consist of villages or hamlets with architectural features including pit structures, storage features, and fire features. The growing of

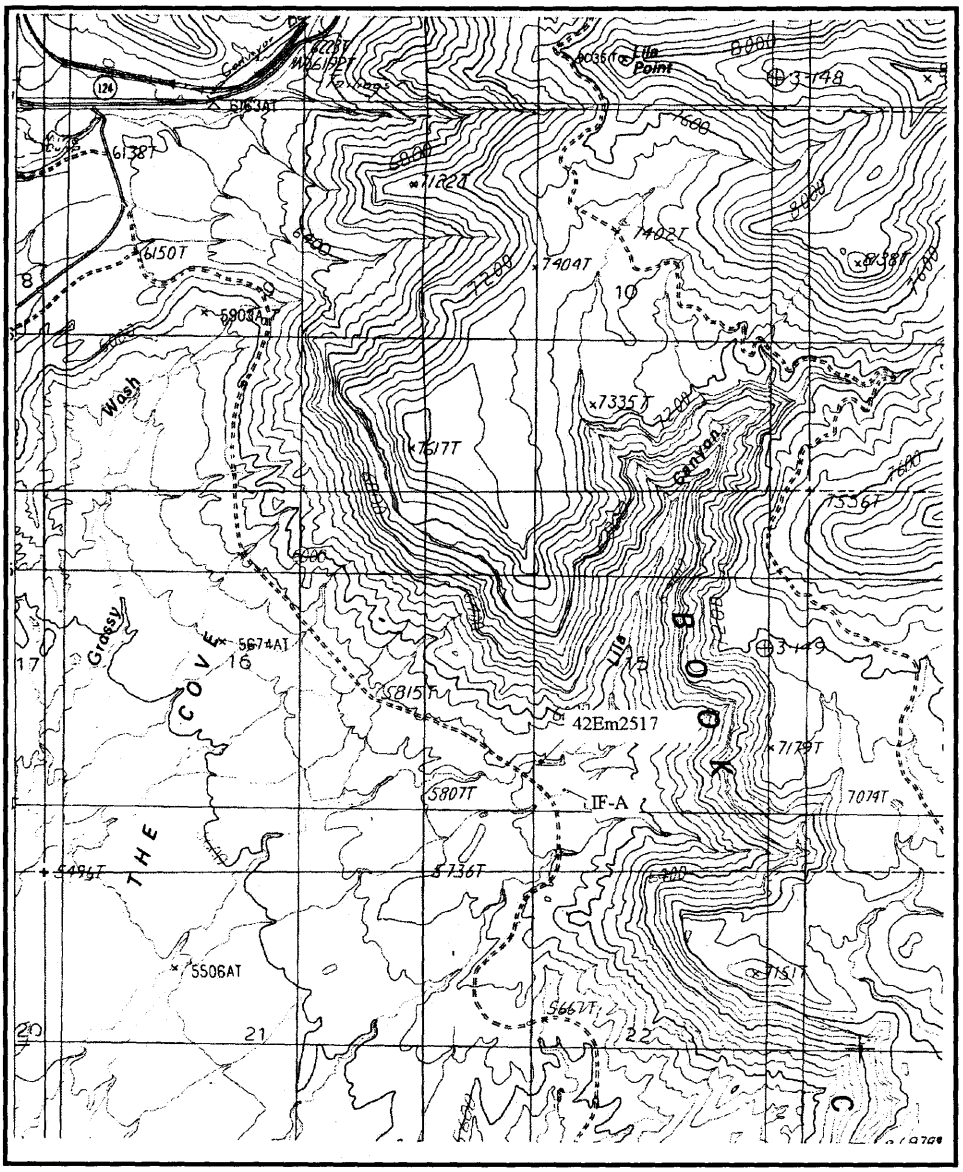

Figure 1: Location of 42Em2517 and IF-A, as defined by Montgomery Archaeological Consultants, 1998 and 1999.

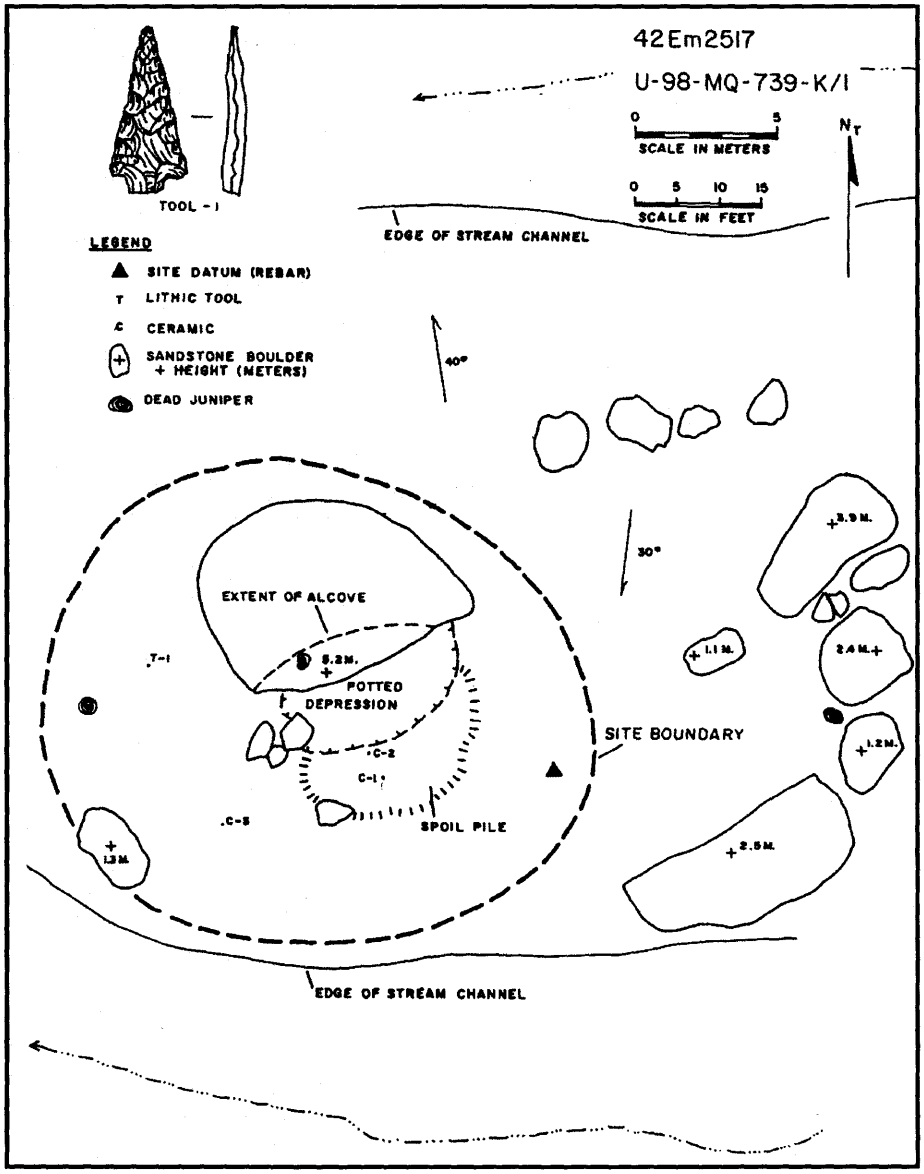

Figure 2: 42Em2517 Site Map

domesticated plants occurred at most of these sites, and many contain evidence of interaction with surrounding regions. The Turner-Look site has ties, in terms of material culture, to not only San Rafael, but Uinta (Shroedl and Hogan 1975). Ties between San Rafael and Uinta Fremont variants are also present in the Ninemile Canyon area (however, this is likely do to the canyon's proximity to what Marwitt defines as the San Rafael-Uinta Fremont boundary). If viewed as representative of the San Rafael Fremont, the sites offer a picture of small bands of horticulturists subsisting off cultivated plants, supplemented by the collection of wild food resources. However other sites, most tested or excavated as part of cultural resource inventories, offer additional data that may support a subsistence switching hypothesis.

42Em1879, a small rockshelter site tested by Alpine Archaeology in 1995, appears to represent a logistical locality utilized by the Fremont sometime between A.D. 660 and A.D. 880. According to Greubel (1996:94) when discussing the Fremont occupation at the site thinks that "...the evidence seems to favor short-term use of the shelter in support of a logistically organized, resource-procurment excursion" and that "...the occupants arrived at the site well provisioned...to accomplish specific goals (1996:94)." While no botanical samples were submitted for identification, the faunal remains in the component (n=30) represent medium and large mammals. In contrast, another rockshelter site, 42Sv1996, with a Fremont component differs in that "based on the diversity of artifact types, which likely reflects diverse site activities..[it] served as a location for foragers [and] functioned as a temporary camp (Greubel 1996:501). Other use of small sites by Fremont peoples for differing subsistence purposes were identified at Cedar Siding Shelter (42Em1533). Here, Martin et. al. (1983) defined, in essence if not in words, a residential base camp used by Fremont hunter-gathers. The presence of a handful of corn cobs suggests, according to the authors, an attempt at horticulture. Other explanations for the cobs could include trade or a temporary occupation by horticulturists. What ever the case, evidence from Cedar Siding Shelter indicates a long term use by a people subsisting almost entirely on wild food stuffs. Even closer to 42Em2517, is another small rockshelter utilized by Fremont peoples for processing plant and, to a lesser extent, faunal remains (Rauch 1981). This site, 42Em1342, contains numerous pieces of groundstone, macrobotanical remains from wild plants, a few projectile points (Rose Springs), and medium and large mammal faunal remains. Rauch interprets the site as a field camp used for logistical forays. Though not explicitly stated in the excavation report for the site, there is an inference that horticulture was practiced, elsewhere, by the shelter occupants.

When the Lila Canyon rockshelter was documented in 1999, the archaeologists reported only a handful of diagnostics including a few sherds of Emery Gray pottery and a small Rose Springs series projectile point. The projectile point has a broad temporal range, but its association with Emery Gray ceramics clearly indicates a Fremont occupation of the rockshelter. No indications of an earlier or later use were observed. As such, it is assumed for the purposes of this research program that the site contains only a Fremont component. If materials collected during the excavation result in the identification of other cultural occupations, efforts concerning the determination of cultural affiliation and the site function for each cultural occupation will occur. If requisite amounts of data are generated from additional cultural occupations, additional hypotheses will be generated to address site occupation and function throughout the duration of the sites use.

Since it is likely, however, that the site represents only Fremont occupation, the following hypotheses will focus the research in order to produce data that can, when combined with other data sets, address variability in the Fremont material culture in the San Rafael Swell and surrounding areas.

Hypothesis 1:
The Lila Canyon rockshelter represents a locality used by Fremont peoples pursuing a mixed subsistence strategy based on horticulture and hunting and gathering.

Alternate Hypothesis:
The Lila Canyon rockshelter represents a locality used by Fremont peoples pursuing a subsistence strategy based entirely on hunting and gathering.

Test Implications (for the alternate hypothesis)

1. *Raw materials present in the lithic sub-assemblage consist of materials collected from a wide variety of sources including those from the immediate vicinity and from surrounding areas.* It is assumed that if hunter/gatherer Fremont used the rockshelter, then the variability in raw materials will be greater based on the assumption of a higher mobility than those Fremont peoples utilizing both horticulture and wild resources. The heterogeneous composition of raw materials, if collected from various areas, might indicate that the occupants of the rockshelter were more mobile and hence not tied to a particular area to maintain crops and protect them. The importation of nonlocal material types is a possibility; however, the types of reduction reflected by debitage at the site should illuminate if the material was imported for reduction into various tools or if the materials at the site reflect the maintenance of tools manufactured elsewhere and brought to the site.

2. *Ceramics present at the site consists of common San Rafael Fremont pottery types, but the tempering agents show a high amount of variability.* If the occupants of the site were foragers, then it is likely that the temper used in the ceramics came from local and nonlocal sources. Since the site is located in the San Rafael Fremont area as defined by Marwitt (1970), and Emery Gray sherds were found at the site, temper consisting of basalt, siltstone, and sand would reflect locally made wares. On the other hand, sherds containing tempering agents such as limestone, volcanic glass, sand, and calcite would indicate that the ceramics were transported to the site from surrounding regions. As of now, there is no notable way of distinguishing among production locals in the same region making intra-regional ceramic variability problematic. An attempt will be made, with the aid of petrographic analysis, to differentiate ceramics by their constituent mineral profiles in an attempt to account for intra-regional variation. As with lithics, trade requires consideration. Madsen and Simms (1998) suggest that in remoter regions trade between horticulturist occurred, but only infrequently. It is assumed that this infrequency would not manifest itself in the archaeological record of smaller sites, although it may be detectable at hamlet and village sites. Furthermore, this test implication assumes that because the site is located near the San Rafael-Uinta boundary that it is a remote region or frontier.

3. *There is a great diversity of plant and animal remains at the site.*

If the occupants of the rockshelter maintained a hunting and gathering mode of subsistence, then it is likely that they exploited a wider variety of wild resources than a group who relied partially upon cultivated plants. While horticulturists likely collected many different species of plants, the amount and variety is less than those expected for hunter/gatherers. Furthermore, if domesticates are found at the site, it is likely that the occupants were part-time horticulturists. An examination of the faunal remains, macro-botanical specimens, and pollen will be used to address this test implication.

4. *Processing implements, such as milling stones, are expedient and show low to moderate use.* If the site was occupied by a transient group of hunter/gathers, the various food processing tools should show limited amounts of use, similar to the types found at Archaic period sites. If the occupants of the site were horticulturists who used the site as a logistical local for obtaining specific resources, it is likely that the processing implements would show more use and possibly be better constructed.

5. *42Em2517 is located in an area that allows moderately easy access to multiple plant and animal resources.* If the occupants of the rockshelter were hunter/gatherers, then it is likely that the site is located near ecotones or various ecological patches that allow for the collection of multiple resources. If the site sits in a homogenous ecological zone that offers few resources, the prospect is likely that the site functioned as a logistical camp for procuring selected resources. This selectivity and specialization would suggest use of the site by horticulturists. Geospatial data, in the form of vegetation, faunal, and climate coverages, will allow for the determination of resources available and the efforts required to procure these resources. Comparison of this data with faunal and botanical samples collected during the excavation should illuminate the type of resource procurement that occurred at the site.

Hypothesis 2

The Lila Canyon rockshelter represents a limited occupational locality that served as a logistical base.

Alternate Hypothesis 2

The Lila Canyon rockshelter represents an extensive occupational locality that served as a residential base.

Test Implications (to test the alternate hypothesis)

1. Prepared hearths and storage features are present at the site. If prepared hearths and other secondary features are present at the site, then the occupants expended time and effort to create accommodations necessary for extended (or multiple) occupations of the locality. Unprepared hearths, those lacking any architectural manifestations,

indicate expedient preparation, which is likely, associated with a temporary use of the site.

2. *Middens or other dense concentrations of artifactual materials are present in, and/or around the rockshelter.* If the occupation of the locality was extensive (intensive?) one would expect to find accumulations of discarded items. If middens are present, a lack of stratigraphy would likely indicate one or two extended occupations, while middens showing multiple strata likely indicates multiple uses. If the site was occupied for only a limited amount of time, it is probable that refuse occurs in relatively low densities and not in middens.

3. *Hearths, if present, show signs of multiple uses in terms of an abundance of charcoal, fire-cracked and discolored hearth stones, fire-hardened earth, and ash dumps located away from the hearths.* If a fire feature was used over and over again, there should be large concentrations of charcoal in and around fire features. One would also expect to find ash dumps near the rockshelter from the maintenance of the hearth. Fire features that received limited use would not likely contain many of these attributes.

4. *Activity areas at the site reflect multiple activities including food processing and preparation, tool production, tool maintenance, etc.* If the site served as a residential base, one should find evidence of a variety of activities. On the other hand, if the site served only as a logistical location, the number of activities apparent in the archaeological record will likely be limited to two or three activities related to the resource being exploited and tool maintenance.

5. *Occupation at the site occurred for many seasons, at least three, as indicated by faunal and macrobotanical remains.* If the site served as a residential base, it is likely that various indications of multiple seasonality are present in the archaeological record. If seasonal use of the area is limited, then it is more likely that the site served as a logistical camp.

Hypothesis 3:
Artifacts and other materials at the Lila Canyon Rockshelter represent aspects of both San Rafael and Uinta Fremont material culture.

Alternate Hypothesis 3
Artifacts and other materials at the Lila Canyon Rockshelter represent aspects of only San Rafael Fremont material culture.

Alternate Hypothesis 4
Artifacts and other materials at the Lila Canyon rockshelter represent aspects of only Uinta Fremont material culture.

Test Implications (to test the alternate hypotheses)

1. *Pottery at the site includes only [Emery Gray/Uinta Gray] ceramics.* If the ceramics at the site reflect only one of the regional Fremont variants, and no interaction occurred, it is unlikely that ceramics from multiple regions will be present at the site.

2. *Lithic tools/preforms consist of those commonly associated with the [San Rafael/Uinta] Fremont.* If the site was occupied by Fremont considered to be of the San Rafael variant, it is unlikely lithics such as shouldered, ovoid, and triangular blades will be present. There should also be a low frequency of side and end scrapers; serrated scrapers are much more likely.

3. *Hearths or other structural features are constructed in a manner consistent with the [San Rafael/Uinta] Fremont.* Hearths and cists in San Rafael related sites tend to be lined, while those in the Uinta basin are generally not.

Site Eligibility Determination:

Illegal excavations in the vicinity of an isolated flake recorded by Montgomery Archaeological Consultants has resulted in the identification, by Bureau of Land Management personnel, of additional artifactual materials being brought to the surface. A series of test pits, some excavated into vandal holes, will be excavated in the vicinity of the isolated find and the recently discovered artifacts to determine if additional subsurface artifacts or features are present. Because this testing is exploratory and documentary in nature, no hypotheses are presented.

FIELD METHODS

In order to collect the necessary data to address the proposed hypotheses, field and laboratory methods must be compatible with one another, as wel as wth previous work conducted in the surrounding area, if larger research questions are to be answered. As such, the following field and laboratory methods will be used throughout this project.

The first task at the site will be to produce a detailed planimetric map consisting of site boundaries, surface artifacts, features, drainages, etc. To the extent possible, the grids will be oriented to true North. The grid system will consist of a master grid datum located at or near the northwest corner of the site. Radiating from the datum will be an east and south baseline. Grid units, 2 x2 m units, are designated by the number of meters east and south of the grid datum. As such the unit designations will resemble 16S/24E or 02S/32E. Individual grid datums are designated as the NW corner of each unit, unless it is obstructed in some fashion. Excavation will consist of block excavations beginning near the back wall of the of he shelter and extending to the outside. It is hoped that cultural horizons can be found and followed using this excavation technique. It is estimated that 100% of the shelter will be excavated in this manner, this represents 20% of the site as defined by Montgomery and Montgomery (1998). Additional test units will be placed around the perimeter of the site (n=6 1 x 1 meters) (Figure 3).

Once the grid is established, the surface of the site will be surveyed and artifacts will be plotted on the planimetric map. Only those artifacts located on grids to be excavated will be collected. Upon completion of the pre-excavation survey, excavations will begin. The first few grids will be excavated in arbitrary 10 centimeter intervals until the stratigraphy of he site is understood. We will then excavate the units by natural layers using the control of arbitrary levels of 10 centimeters. Planview sketches of each level and the base of each natural stratigraphic unit will be drawn and photographed. All subsurface measurements will be made from the unit grid datum located in the NW corner and eventually plotted on the planview map. Excavations will ceaseonce bedrock is encountered or one has excavated through 10-20 cm of sterile fill. Excavation will be done by trowel , and possibly square shovels, with the material removed being screened through 1/4 and/or 1/8" mesh screen.

Artifacts recovered *in situ* will be three-point provenienced. If the artifact is not laying level, a dip angle measurement will also be taken. If an artifact is large, such as a metate, additional provenience measurements will be taken. Tools, large sherds, vessels, articulated faunal remains, artifact concentrations, etc. will be photographed and drawn *in situ*. If lithic debitage or small sherd fragments are extremely numerous it may be necessary, because of time constraints, to provenience these materials by quadrant, layer, and level rather than with three point plotting. Artifacts recovered from the screens will be provenienced by grid, layer, and level. Artifacts will be given field specimen numbers at the end of each days work.

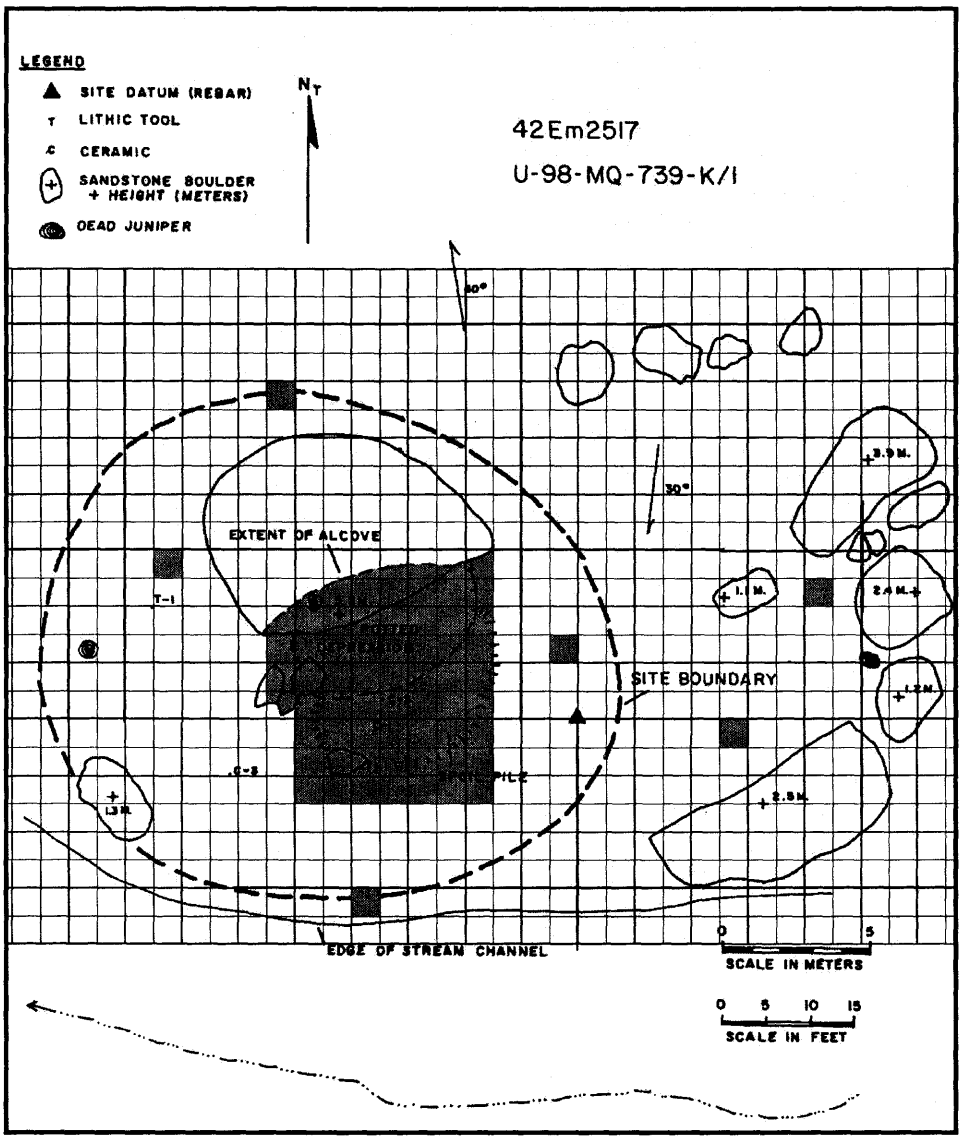

Figure 3: Location of Proposed Excavation Units.

Any features uncovered during excavations will be examined, described, drawn, and photographed following recording procedures established by Montgomery Archaeological Consultants. Samples of soils, charcoal, bulk matrix, etc. will be taken where appropriate. If it is necessary to trace out a feature that extends into an adjacent unit; excavation of the unit, or a portion thereof, will begin immediately, following the standard excavation techniques described above, to reveal the full extent of the feature. The newly opened unit will be excavated in tandem with the original unit until sterile fill or bedrock is encountered. If a feature extends below the current level or layer being excavated, it will be pedestaled until the base of the feature is reached.

Upon the complete excavation of a given block, at least one contiguous wall will be profiled. The wall to be profiled will be determined by a number of considerations including, but not limited to, unique characteristics of the profile, clearly discernable stratigraphy, evidence of post-depositional processes, and cross-sections of cultural strata. The soil profile will consist of soil descriptions, Munsell color designations, information concerning the depositional environment, and the structure of the matrix.

In the event that human bone is encountered during excavation, all digging activity in that grid will cease immediately. The BLM archaeologist responsible for the project will be contacted for information on how to proceed. No other work will be done near the human remains without explicit instructions from BLM supervisory personnel.

LABORATORY METHODS

It is anticipated that ceramic and lithic artifacts will make up the bulk of the materials recovered during excavations; however, it is probable that faunal remains and other organics will also be encountered.

Lithic Artifacts

In order to address the hypotheses, it is necessary to collect both qualitative and quantitative data on the lithic debitage and tools. General debitage analysis will consist of collecting the following variable characteristics for each artifact: material type and color, percent of dorsal cortex and type, platform type, artifact condition, the presence or absence of thermal alteration, the presence or absence of usewear, the technological artifact type, dorsal scar count, and size class.

The analysis design provides the means to collect the necessary information for determining principle reduction strategies represented at the two sites under investigation. Specifically, the lithic analysis will incorporate the following aspects:

1. Composition of the lithic assemblages with respect to raw materials;
2. Frequency of artifact categories including core reduction debitage, both pressure and percussion biface thinning debitage, other specialized debitage (i.e., projectile points, notching flakes, fluting or channel flakes, etc.), undiagnostic debitage and angular debris, cores and core tools, and expedient and formal tools, including tool-producing tools (i.e., hammerstones, anvils, etc.)
3. Morphological and metric attributes of formal and informal chipped-stone tools for classification, typology, and function determination.

Where applicable, individual concentrations, or spatially discrete units, will serve as the basic units of analysis (See Analysis section). Analysis of artifacts from 42Em2517 will center on identifying specific flake types based on studies and debitage typologies devised by Ahler (1989) and Flenniken (1978 and 1981). The modified typology includes the following classification scheme.

Debitage: Core reduction includes three distinct levels including primary, secondary, and tertiary reduction. Primary flakes are defined based on a percentage of 90% or higher dorsal surface cortex cover and either a cortical or single faceted platform. Secondary core reduction flakes are defined as those flakes exhibiting cortex covering between 5 and 90% of the dorsal surface and having at least one flake scar. Cortical and single faceted platforms are common and in some instances multifaceted platforms occur. Finally tertiary reduction flakes lack any cortex, have single and multifaceted platforms, but more obtuse platform angles, and a dorsal surface with several flake removal scars (two or more); generally running parallel with the long axis of the flake. The flake curvature becomes more pronounced at this stage. In all three stages of core reduction there is generally little evidence of platform preparation.

Biface thinning debitage breaks down into three categories: edge preparation, percussion biface thinning flakes, and pressure biface thinning flakes. Edge preparation flakes typically exhibit a triangular outline relative to the platform location, making them wider than they are long. Removal of these flakes generally occurs as a preliminary step in preparing the edge of a flake blank (i.e. tertiary core reduction flake) or biface blank for additional biface reduction. Characteristics of percussion biface thinning flakes include multifaceted platforms generally with some abrasion, acute platform angles, and a definite dorsal curvature. In some instances, platforms may show signs of crushing and collapsing. Pressure biface thinning flakes exhibit irregular dorsal topography, steep platform angles with lipping, pronounced dorsal curvature, and are thin and small relative to percussion biface thinning flakes. All non-diagnostic flaking debris (flake fragments, angular debris, etc.) will be grouped into a single category.

Cores: Artifacts exhibiting one or more negative bulb scars and that do not appear to have come from another material are classified as cores. Cores include three subcategories: tested nodules or cobbles, unprepared cores, and prepared cores, which display a prepared platform from which flakes are removed.

Flaked Stone Tools: For the purposes of this analysis, a lithic tool is any artifact exhibiting use-wear. As such, it is necessary to group tools into two major groups: formal and informal, or expedient, tools. The formal category includes tools formed through biface reduction, or other reduction techniques, that dramatically alter the appearance of the original flake blank. Expedient tools include used flakes and retouched flakes where neither the use nor the retouch significantly alters the shape of the blank. As used here, use-wear includes microflaking, polish, striations, battering, edge rounding, abrasion, and edge frosting. Microflaking is generally the most evident form of use-wear and one of the only forms of attrition visible to the unaided eye. Identification of striations generally requires the aid of stereo microscopes (>200 x magnification), or even scanning electron microscopes.

The analysis of utilized and retouched tools will involve of assessments of type and extent of use-wear, material preferences, and the relationship between use-wear and core or biface reduction stage. Following Frison and Bradley (1980), biface production stages will be determined. Briefly, the stage reduction sequence includes biface production starting from a blank (Stage I),

moving through general stages of shaping and thinning (Stages II and III) to systematic thinning and shaping (Stage IV) to the final retouching and shaping into the desired form (Stages V and VI). Bifaces need not necessarily pass through all six stages before becoming a tool. In some cases it may be necessary to repeat particular stages if the blank or preform breaks during manufacture and some stages may be omitted altogether. Classified as either blanks (Stages I-IV) or performs (Stages V and VI), these bifaces show no evidence of use. Only those bifaces exhibiting some form of attrition are classified as tools.

Ground Stone Artifacts

Ground stone encountered will be collected and bagged. Once in the laboratory, the ground stone artifacts will be examined and their attributes recorded. Because of the possibilities of obtaining pollen and traces of various residues (proteins, stable isotopes, etc.) the artifacts, particularly the use surfaces, will not be cleaned. Attributes that will be recorded for each piece of ground stone will include material type, color, manufacturing technique (if any), condition, number of use surfaces, size of use surfaces (length, width, and where applicable, depth), attrition of use surfaces (polish, pecking, battering, striations), general cross-section, function, and size (length, width, and thickness).

Ceramics Artifacts

Information collected from ceramic artifacts includes a variety of data that, with additional statistical manipulation, should allow for the hypotheses proposed herein to be addressed. Data collected from sherds will include pottery type, temper, vessel construction, finishing technique, surface manipulation, colors, vessel form, rim diameter (for rim sherds), hardness, firing atmosphere, and weight of all ceramics of a particular type per grid unit.

Faunal Remains

Although faunal remains were not encountered at the site when it was first recorded, it is assumed that these remains will be found. This assumption is based mostly on other excavations and subsurface testing that has occurred near the site; these investigations (see Rauch 1981 and Martin 1983) produced numerous faunal remains from similar contexts. The following outline the procedures that will be used in the laboratory concerning faunal remains.

First, the bone materials will be lightly cleaned by brush to remove detritus that may obscure potentially diagnostic characteristics that may aid in the determination of genus or species or attrition. After cleaning, all bone elements will be examined and recorded by laboratory personnel. More specifically, attributes that will be recorded for each element include the most specific taxon possible, the element present, the side of the element, the portion of the element present, it's apparent age, evidence of cultural and natural impacts to the element, and any additional comments deemed necessary.

Ancillary Studies

Various samples of artifacts, soils, and organic materials, will be sent to outside labs for analysis. Samples of charred wood will be sent to Beta Analytical for ^{14}C dating. Soil samples will be sent to Paleo Research Institute for pollen identification and counts and macrofossil analysis.

A selection of stone tools will also be sent to Paleo Research Institute for protein residue analysis. If needed, pollen washes from groundstone will also be sent there. Obsidian will be sent to Fred Nelson at BYU for sourcing using X-ray diffraction. Ceramic samples will be sent to Animas Ceramic Consulting for petrographic analysis. If feasible, samples of mammalian teeth will be sent away for thin-sectioning to aid in the determination of seasonality.

ANALYSIS

Determining Analytical Units

Because the basic unit of analysis is not the artifact or site in this investigation, and for determination of site functions and subsistence strategies, it is necessary to construct appropriate units for analysis. The best units available for addressing many of the concerns contained within this research design are activity areas. In many cases, however, qualitative assessments of where activity areas begin and end can be problematic, even when block excavations are used. Furthermore, such qualitative definitions of activity areas are generally not reproducible by other studies, making such unit construction unfavorable for scientific endeavors. However, with the use of the grid generalization variant of trend surface analysis (see Hodder and Orton 1976), it is possible to objectively delineate spatial patterning at various scales, including those of activity areas. Artifact density data will be plotted on a planimetric map and digitized. The digitized map will be imported and geo-referenced into a Geographic Information System (GIS) computer database. Grid cells, representing a to be determined minimal mapping unit (MMU), will be imposed over the surface map. The artifact density for each MMU will be generated. MMUs containing features will be given an arbitrary density calculated from an average of all surrounding cells. Isopleths will then be generated based on MMU values for each cell. Significant artifact density drops will be used to delineate activity areas.

Descriptive Analysis of Artifact Classes

Data collected from each artifact sub-assemblage (lithics, ceramics, faunal materials, etc.) will be subjected to a descriptive statistical analysis to define its basic parameters. The descriptive analysis will consist of determining counts and percentages of various artifact types, among type variability, and general descriptions. Of course, each class of artifacts has unique characteristics that require additional analysis. The results of the descriptive analysis will be examined in regard to the hypotheses proposed in this research design, as well as any other patterning evident.

CURATION

All archival and cultural materials collected or produced during the project's data recovery program will be submitted to the Museum of the College of Eastern Utah in Price for curation.

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APPENDIX C
Level and Artifact Recording Forms

MONTGOMERY ARCHAEOLOGICAL CONSULTANTS TESTING FORM

Page 1 of

PROJECT: SITE:
EXCAVATORS: DATE:
TEST UNIT NUMBER: Screen mesh size:
Unit Size: Unit Orientation: Datum Corner:

Unit Description: _____

_____

_____

General Surface Planview:

. . .

. . . North

. . .

Is the depth below datum or MGS?

Level Number (Depth)/Description: _____

_____

_____

Level Number (Depth)/Description: _____

_____

_____

Lithic Analysis Form

Site:_____ AU#_____ Analyst:_____ Date:_____ Page___of___

Cat.	Grid Sec	Layer	Level	Mat.	Color	% Cortex	Cortex Type	Platform	Cond.	HT	Use	mm of Use	# Dors. Scars	Tech. Type	Func. Type	Size Class

Ground Stone Analysis Form

Site:_____ AU#:_____ Analyst:_____ Date:_____ Page__ of__

Cat#	Prov.	Mat.	Color	Manufacture	# Use Surface	Size of surface	Attrition	X-section	Function	Size

Ceramic Analysis Form

Site:_____ AU#:_____ Analyst:_____ Date:_____ Page__ of__

Cat #	Prov.	Type	Color	Finish	Hardness	Form	Rim Dia.	# of Sherds	Weight	Comments

Faunal Analysis Form

Site:_____ AU#:_____ Analyst:_____ Date:_____ Page_ of__

Cat#	Prov.	Taxon	Element	Side	Portion	Sex	Age	C-Forms	N-Forms	Comment