

Copy to Mary A



SCOTT M. MATHESON
GOVERNOR



STATE OF UTAH
DEPARTMENT OF COMMUNITY AND
ECONOMIC DEVELOPMENT

DIVISION OF
OIL, GAS & MINING

January 7, 1981

Division of
State History
(UTAH STATE HISTORICAL SOCIETY)

MELVIN T. SMITH, DIRECTOR
307 WEST 2ND SOUTH
SALT LAKE CITY, UTAH 84101
TELEPHONE 801/533-5755

James W. Smith
Division of Oil, Gas and Mining
Department of Natural Resources
1588 West North Temple
Salt Lake City, Utah 84116

RE: Skyline Mine - Coastal State's Energy Company, Carbon
County, Utah

Dear Mr. Smith:

The staff of the Utah State Historic Preservation Officer has received your letter of October 24, 1980. The staff, having reviewed the submitted report by Archeological Environmental Research Corporation, entitled "Archeological Surface Evaluations in the Skyline Project in Carbon and Emery Counties," has determined that the report is adequate to determine mitigation of impacts of the proposed operations on historic and cultural resources. Because of the limited number of resources and the described no adverse effect upon them in the Skyline Mine project, it is felt that this report could satisfactorily be submitted as part of a mining program as outlined by the Memorandum of Agreement between the Division of State History and the Division of Oil, Gas and Mining.

The Preservation Office is aware of the December 22, 1980 letter submitted to Coastal States Energy by the Office of Surface Mining concerning the adequacy of the report for submission. Our office agrees that there are many technical errors in the report. However, since the cultural resources are not eligible and there is no adverse effect, the mine plan should be approved.

The Office of Surface Mining has pointed out some serious problems with this report and others. The Preservation Office of Utah would like to suggest to Oil Gas & Mining and the Office of Surface Mining that a meeting be set up to determine some specific guidelines that can be dealt with on a systems basis rather than individual cases.

Should you need assistance or clarification, please call or write James L. Dykman, Cultural Resource Advisor, or Wilson G. Martin, Preservation Development Coordinator, Utah State Historical Society, Preservation Development, 300 Rio Grande, Salt Lake City, Utah 84101.

Sincerely,



Melvin T. Smith
Director and
State Historic Preservation Officer

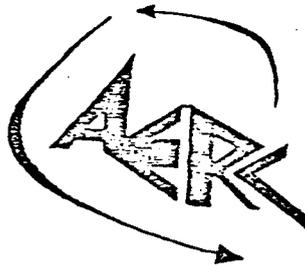
JLD:jr:C942CB

cc: Office of Surface Mining, Attn: Bill Killiam, Brooks Towers, 1020
15th Street, Denver, Colorado 80202

INTENSIVE ARCHEOLOGICAL SURFACE EVALUATIONS
IN THE
PROPOSED WHISKEY CREEK CANYON-PLEASANT VALLEY
PROJECT
IN
CARBON COUNTY, UTAH

Mine Plan Applicant:
Valley Camp of Utah, Inc.
(Coal Mine and General Service Facilities
Relative to Belina #1 and #2 and Utah #12 Mines)

F. R. Hauck, Ph.D., Principal Investigator



Report Prepared by:
F. R. Hauck, and D. G. Weder
ARCHEOLOGICAL-ENVIRONMENTAL
RESEARCH CORPORATION

PAPER NO. 21
September, 1980

Salt Lake City, Utah

ABSTRACT

In the summer of 1980, the Archeological-Environmental Research Corporation conducted an intensive cultural resource evaluation for Valley Camp Coal Company of Utah in the Pleasant Valley-Eccles Canyon locality south of Scofield, Utah. The survey consisted of a corridor evaluation extending from the proposed mine facilities in Whiskey Canyon to the Utah No. 2 Mine location.

A total of seven historic cultural resource sites is situated within, or adjacent to, the project area. These sites include four mine portal service areas, one sawmill site, and two cabin foundations. One of the seven sites is considered to meet the minimal criteria of eligibility under 36 CFR 60.6.

Table of Contents

	Page
Abstract.	ii
Table of Contents	iii
List of Figures	iv
List of Tables.	v
Chapter I - Introduction.	1
A. General Data.	1
B. Environment and Locality	5
C. Prehistory and History of the Region.	10
D. Previous Investigations	31
E. Research Design	34
Chapter II - Methodology.	36
A. Field Research.	36
B. Laboratory Research	39
C. Artifact Inventory and Analyses	39
Chapter III - Cultural Resource Descriptions.	42
A. Site Analyses	42
B. Comparative Analyses.	44
Chapter IV - Evaluations and Recommendations.	46
A. Resource Significance Evaluations	46
B. National Register Criteria of Eligibility	48
C. Discussion of Impact Potential on Cultural Resource Sites	49
D. Recommendations	51
Bibliography.	52
Appendix.	62
Site Reports.	

List of Figures

	Page
1. General Map of Project Area.	3
2. General Map of Survey Area and Land Ownership in Project Area	4
3. Map of Historic Sites in Project Area	37
4. Artifact Sketches.	40

List of Tables

	Page
1. Cultural Resource Site Summary.	43
2. Cultural Resource Site Significance	47
3. Cultural Resource Impact Potential.	50

Chapter I - INTRODUCTION

A. General Data on the Project

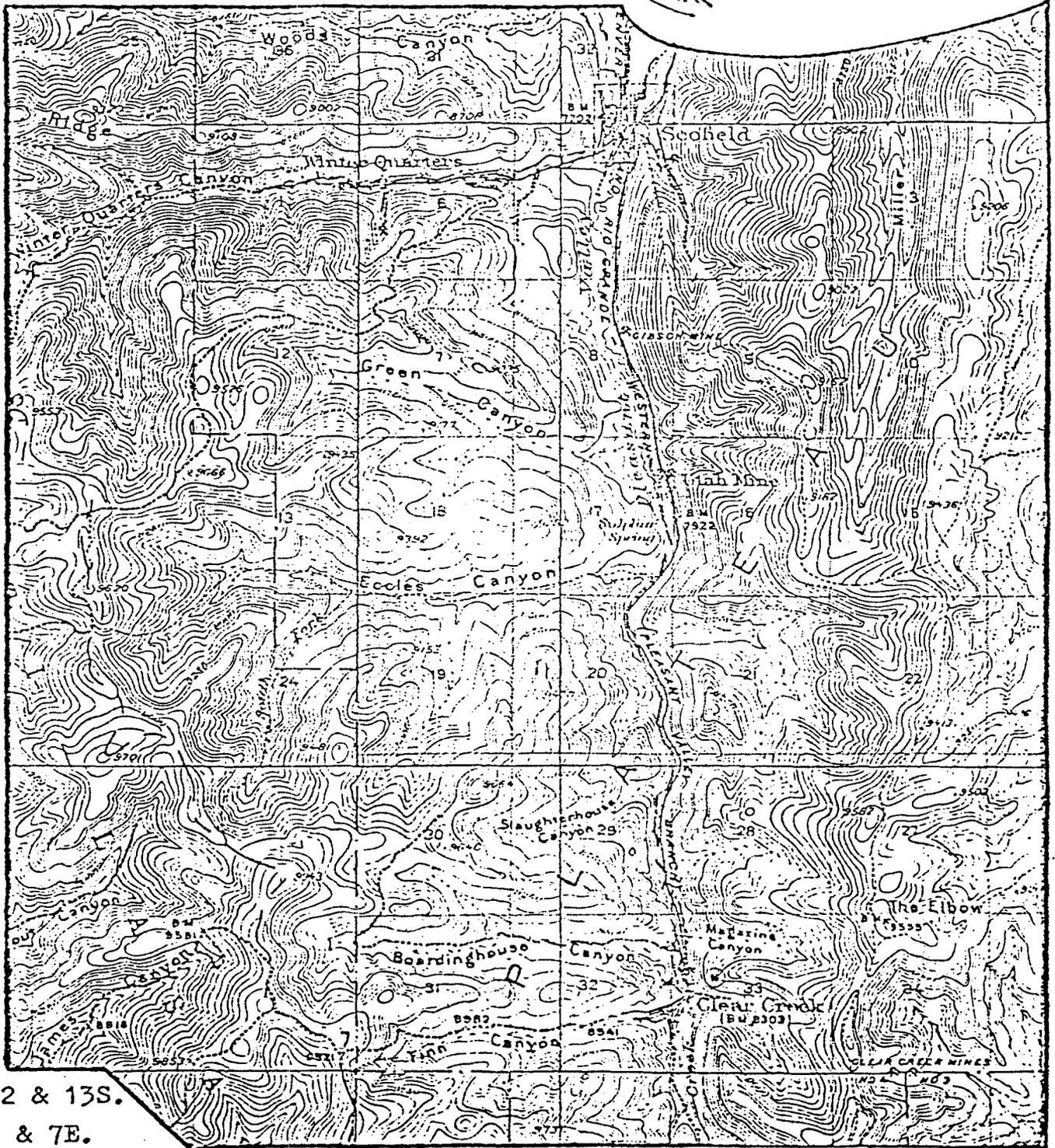
In the spring of 1980, the Archeological-Environmental Research Corporation (AERC) of Salt Lake City was contacted by Vaughn Hansen Associates, a Salt Lake City consulting firm, on behalf of Valley Camp of Utah, Inc. and contracted to perform an intensive cultural resource evaluation of mine portal areas, transportation corridors and service areas relative to the development of mine facilities in the Whiskey Canyon-Eccles Canyon-Pleasant Valley locality of Carbon County, Utah. Mine permits involved in this locality include Belina #1 and #2 and Utah #2. Vaughn Hansen Associates (VH) in conjunction with Valley Camp of Utah, Inc., desirous of preparing a mine plan application for submission to federal and state authorities, requested that cultural resource evaluations be conducted within the potential subsidence zone which would comply with pertinent government legislation, i.e., Executive Order 11593 "Protection and Enhancement of Cultural Environment" (Federal Register, Vol. 36, No. 95, May 15, 1971), and "The Archeological and Historical Data Conservation Act of 1974", which is an amendment of "The Reservoir Salvage Act of 1960" (74 Stat. 220). For additional information, please refer to the mine plan application prepared by Vaughn Hansen Associates.

AERC's field evaluations within this project area commenced in the summer of 1975 when F. R. Hauck began conducting proposed drill location evaluations for Valley Camp but in association with Sanders Associates, a consulting firm with offices in Kaysville, Utah. AERC's consulting for Sanders Associates (see report for June 13, July 17, October 13, November 28, 1975 and July 17 and August 23, 1976) featured

specific evaluations made within the general Scofield locality although no evaluations were actually conducted within the present project area.

Beginning in September, 1978, AERC began consulting for Coastal States Energy Company upon the Skyline Project which is situated on the west and adjacent to the Valley Camp project area (see Figure 1). Reports on AERC investigations in the Coastal States project area were furnished as CSEC-78-1 (10/2/78), CSEC-79-2 (7/23/79), CSEC-79-3 (8/10/79), CSEC-79-5 (9/18/79). In 1979, AERC conducted an intensive surface evaluation of the floor of Eccles Canyon extending from the mouth of that canyon on the west into the National Forest lands (see CSEC-79-2). That survey includes the entire floor of Eccles Canyon which will be included in the present mine plan permit application. During these preliminary cultural resource evaluations, only three cultural resource sites were recorded in the general locality. These sites included two historic campsites, AERC 270U/1 and 2, and one historic mine portal, service area, AERC 270N/1. All three sites are situated in Eccles Canyon; however, only the first two sites, 270U/1 and 2, need be considered in this report. Site 270N/1 is adjacent to the National Forest boundary up the canyon from the Valley Camp project area. No other cultural resources in the Eccles Canyon-Whiskey Creek locality had been recorded prior to AERC's surface evaluations being reported in this document.

From July 22-25, 1980, AERC personnel conducted intensive evaluations of the Whiskey Creek corridor and an extension of the Eccles Canyon corridor running north from the mouth of Eccles Canyon along the west bench of Pleasant Creek to the existing service area at the mouth of Green Canyon. Some four historic sites were recorded during this recent survey. Thus, a total of six historic cultural resource sites are situated within the Valley Camp mine plan permit area.



T. 12 & 13S.
R. 6 & 7E.

Meridian: Salt Lake B. & M.

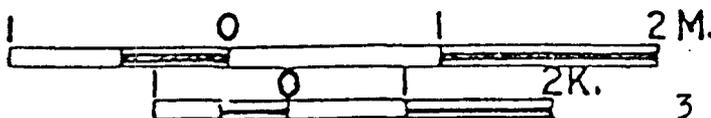
Quad:

Project: VH-80-1
Series: Central Utah
Date: 9-17-80

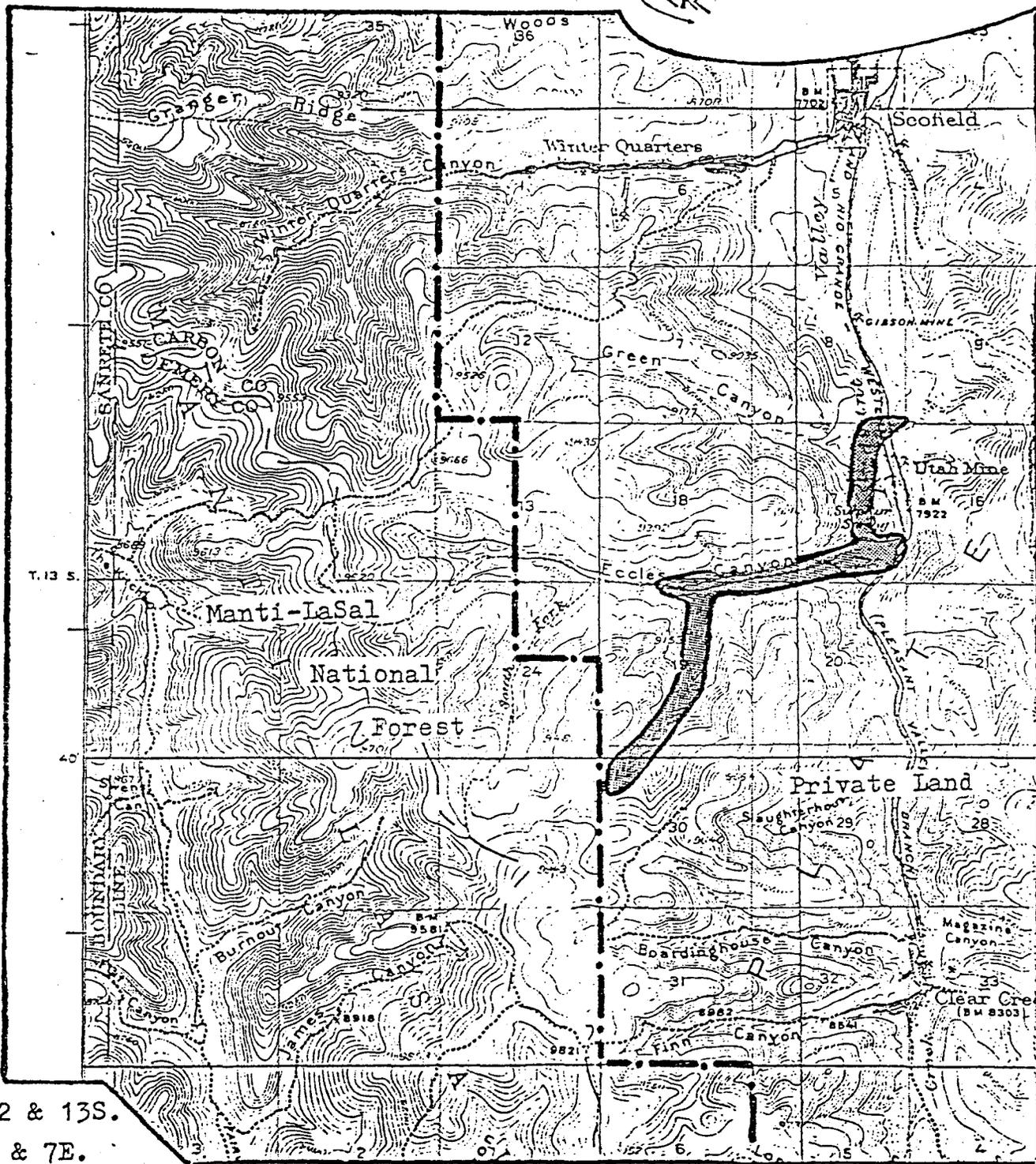
Figure 1
GENERAL MAP
OF THE PROJECT AREA
IN THE
SCOFIELD LOCALITY
OF CARBON COUNTY, UTAH

Scofield, Utah
15 Minute USGS

Legend:



Scale



T. 12 & 13 S.

R. 6 & 7 E.

Meridian: Salt Lake B. & M.

Quad:

Project: VH-80-1

Series: Central Utah

Date: 9-17-80

Figure 2

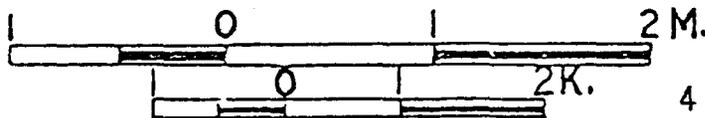
SURVEY AREA
AND
LAND OWNERSHIP
IN THE
PROJECT AREA

Scofield, Utah

15 Minute USGS

Legend:

Survey Corridor



Scale

Recommendations concerning site significance and mitigational techniques relative to those six sites are provided in this report.

All surveyed areas relative to the present mine plan permit are situated on privately owned lands and no federal antiquities permits have been procured to conduct the 1980 research.

The resource inventory area for the 1980 research involves about three miles of transmission corridor of 60 meters in width extending from the northwest quarter of Section 30 in Whiskey Creek north through the center of Section 19 into the bottom of Eccles Canyon and then east through Section 18 into Pleasant Valley and north in Section 17 to Section 8 and then east to the Utah No. 2 Mine location in the northeast quarter of Section 17, Township 13 South, Range 7 East, Salt Lake Base and Meridian. At special request from Valley Camp, AERC personnel also examined the Nicolitus Mine, the Green Canyon sawmill site and the Gibson Mine, all located in Pleasant Valley but outside the transmission corridor. This project area is situated about two miles south of Scofield, Utah, with the eastern corridor paralleling Utah State Highway No. 96 in Pleasant Valley. The Scofield, Utah, U.S.G.S. 15 Minute topographic map shows the project area.

All field notes and site data are filed at AERC headquarters in Bountiful, Utah. Site reports are being submitted to all relevant state and federal agencies as an appendix to this report. Artifacts collected during the survey are being curated at the Museum of Peoples and Cultures at Brigham Young University in Provo, Utah.

B. Environment and Locality

The project locality is situated in several narrow canyons which drain northwards into Scofield Reservoir via

Eccles Canyon Creek and Pleasant Valley Creek. The general elevation of the project area ranges between about 7750 feet at the Gibson Mine to about 9200 feet at the head of Whiskey Canyon.

The high elevations in the project area have a strong effect on the local climate. The precipitation amounts to about 30 inches annually, but most of this precipitation falls in the form of snow since the May to September precipitation is only eight inches (Utah Water and Power Board). Elevation and exposure also determine the freeze free growing period which is as low as 20 days per year at the highest elevation, but not greater than 60 days at the lowest elevations.

The surface geology of the project locality is relatively simple. The majority of the canyon's lower surfaces consists of an exposure of the Cretaceous age Star Point Sandstone, a formation of marine, deltaic and beach deposits of interbedded sandstone and shales. Above the Star Point is exposed the Black Hawk Group, a Cretaceous age deposit which consists of sandstone, mudstone, shale and coal.

The high elevation places the project locality within the Montane floral ecozone, but topographic factors create a mosaic of different plant communities. In the Montane ecozone, the following arboreal species are typically present in the project area (Johnson 1970):

Common Arboreal Species

Limber pine	<u>Pinus flexilis</u>
Engelmann spruce	<u>Picea engelmannii</u>
Blue spruce	<u>Picea pungens</u>
Subalpine fir	<u>Abies lasiocarpa</u>
White fir	<u>Abies concolor</u>
Douglas fir	<u>Pseudotsuga menziesii</u>
Rocky Mountain juniper	<u>Juniperus scopulorum</u>

Common juniper	<u>Juniperus communis</u>
Mountain mahogany	<u>Cercocarpus ledifolius</u>
Aspen	<u>Populus tremuloides</u>
Serviceberry	<u>Amelanchier spp.</u>

Due to topographic factors, the east-facing side and bottom of Whiskey Canyon are predominately aspen whereas the west-facing side is a mixture of evergreen species.

The floral community along the Pleasant Valley Creek bottom include mixtures of willow Salix spp., sagebrush Artemisia tridentata, rabbit brush Chrysothamnus nauseosus and grasslands grading into mountain shrub communities.

The project locality is situated in the Northern High Plateau Subcenter of the Middle Rocky Mountain Faunal area and is characterized by a wide variety of species. The mammal species known to exist in the general project area according to Durrant (1952) include the following:

Order Insectivora

Shrews	<u>Sorex spp.</u>
--------	-------------------

Order Lagomorpha

Pika	<u>Ochotona princeps</u>
White-tailed jack rabbit	<u>Lepus townsendii</u>
Snowshoe rabbit	<u>Lepus americanus</u>
Cottontail rabbit	<u>Sylvilagus nuttallii</u>

Order Chiroptera

	<u>Myotis spp.</u>
Silvery-haired bat	<u>Lasiorycteris spp.</u>
Big brown bat	<u>Eptesicus spp.</u>
Red bat	<u>Lasiurus spp.</u>
Long-eared bat	<u>Corynorhinus spp.</u>
Big free-tailed bat	<u>Tadarida spp.</u>

Order Rodentia

Squirrels	<u>Citellus spp.</u>
Chipmunks	<u>Eutamias spp.</u>

Northern pocket gopher	<u>Thomomys talpoides</u>
Beaver	<u>Castor canadensis</u>
Western harvest mouse	<u>Reithrodontomys megalotis</u>
Mouse	<u>Peromyscus</u>
Meadow mouse	<u>Microtus spp.</u>
Wood rat	<u>Neotoma cinerea</u>
Big jumping mouse	<u>Zapus princeps</u>
Porcupine	<u>Erethizon dorsatum</u>
Marmot	<u>Marmota flaviventer</u>
<u>Order Carnivora</u>	
Coyote	<u>Canis latrans</u>
Wolf (formerly in area)	<u>Canis lupus</u>
Red fox	<u>Vulpes fulva</u>
Gray fox	<u>Urocyon cinereoargenteus</u>
Grizzly bear (formerly in area)	<u>Ursus horribilis</u>
Black bear	<u>Ursus americanus</u>
Ring-tailed cat	<u>Bassaricus astutus</u>
Ermine	<u>Mustela erminea</u>
Long-tailed weasel	<u>Mustela frenata</u>
Marten	<u>Martes caurina</u>
Badger	<u>Taxidea taxus</u>
Striped skunk	<u>Mephitis mephitis</u>
Spotted skunk	<u>Spilogale gracilis</u>
Canada lynx	<u>Lynx canadensis</u>
Bobcat	<u>Lynx rufus</u>
Mountain lion	<u>Felis concolor</u>
<u>Order Artiodactyla</u>	
Elk	<u>Cervus canadensis</u>
Mule deer	<u>Odocoileus hemionus</u>
Mountain sheep (formerly in area)	<u>Ovis canadensis</u>

The montane ecozone also supports a wide variety of avian species, some of which are summer migrants. Some of these species, according to Hayward et al (1976) include the following:

Local Avian Species

Coniferous Niche

Red-breasted nuthatch	<u>Sitta canadensis</u> (summer)
Golden-crowned kinglet	<u>Regulus satrapa</u>
Ruby-crowned kinglet	<u>Regulus calendula</u>
Yellow-rumped warbler	<u>Dendroica coronata</u> (summer)
Western tanager	<u>Piranga ludoviciana</u> (summer)

Aspen Niche (Hole nesting)

Tree swallow	<u>Tachycineta bicolor</u>
Violet green swallow	<u>Tachycineta thalassina</u> (summer)
House wren	<u>Troglodytes aedon</u> (summer)
Black-capped chickadee	<u>Parus atricapillus</u>
Yellow-bellied sapsucker	<u>Sphyrapicus varius</u>
Downy woodpecker	<u>Picoides pubescens</u>
Common flicker	<u>Colaptes auratus</u>
Chipping sparrow	<u>Spizella passerina</u> (summer)
Cassin's finch	<u>Carpodacus cassinii</u> (summer)
Black-headed grosbeak	<u>Pheucticus melanocephalus</u> (summer)
Western wood pewee	<u>Contopus sordidulus</u> (summer)
Mountain bluebird	<u>Sialia currucoides</u> (summer)
Hermit thrush	<u>Catharus guttatus</u>

Predators

Goshawk	<u>Accipiter gentilis</u>
Cooper's hawk	<u>Accipiter cooperii</u>
Red-tailed hawk	<u>Buteo jamaicensis</u>
Golden eagle	<u>Aquila chrysaetos</u>
Great horned owl	<u>Bubo virginianus</u>

Those species which migrate into the area from out of the state are indicated as summer residents. The other species are present during the entire year but generally migrate to somewhat lower elevations during the winter months.

C. Prehistory and History of the Region

The variety of human cultures which have inhabited the project region can be examined from several perspectives. The temporal continuum extending over a range of 12,000 years involves such diverse groups as the early prehistoric big game hunters, the archaic hunter-gatherers, the semi-horticultural Fremont, the Shoshonean bands, the early historic explorers and fur trappers, the Mormon colonists, the coal and cattle barons, the final influx of farmers, small town settlers, and merchants. Man's social and technological variations mirror the complexity of economic means used to exploit the necessary resources of his changing ecological system.

The Prehistoric Period

The prehistoric period within the project region can be subdivided into four main temporal phases: Paleo Indian, Archaic, Fremont and Shoshonean.

PALEO INDIAN PHASE

The Paleo Indian phase began at approximately 12,000 B.P. and terminated by about 7000 B.P., and is generally divided into three subphases which are known as the Llano, Folsom and Plano cultures (Jennings 1974:81).

The Llano culture was characterized by the hunting of mammoth during a time period between 12,000 B.P. and 10,000 B.P. Since the Llano culture has been defined primarily from the excavation of mammoth kill sites, very little is known about the overall subsistence activities of this culture.

Evidence of the Llano culture has been found over a widespread area in the Intermountain West and Southwest.

The Clovis point, a large, lanceolate, fluted spear point, is the only artifact which can be used confidently to infer the presence of the Llano hunters. Clovis points, in association with mammoth remains, have been found in New Mexico, Oklahoma, Colorado, Arizona and Wyoming.

Based on these sites, which are characterized by mammoth-Clovis point association, the core area of the Llano culture is limited to eastern Colorado, most of New Mexico and eastern Arizona. However, the Clovis point by itself has a much larger distribution. Clovis points, or very similar fluted points, have been found throughout the entire United States.

Within the project region of Utah, no characteristic Llano sites have been found, although several isolated Clovis points and one fluted point site have been reported. An isolated Clovis point was reported from Sevier County, Utah (Tripp 1966). Gunnerson (1956) performed a test excavation on a small rockshelter in Emery County (42Em8) from which a local collector had obtained a Clovis point. The test excavation did not, however, recover any additional Clovis points. An unusual fluted point very closely resembling the Cumberland fluted points commonly found east of the Mississippi River was found by an amateur collector in the San Rafael Swell and reported by Hauck in 1979 (42Em677).

The Folsom culture (ca. 11,000 B.P. to 9000 B.P.) immediately followed the Llano culture, but several differences in subsistence and artifacts allow a clear distinction to be drawn. Although the primary evidence of the Folsom culture is also from kill sites, the fauna hunted and the projectile points used are different from the Llano culture. The Folsom point is a lanceolate, fluted and usually eared projectile point generally smaller and thinner than the Clovis point. In addition, the Folsom point is associated at kill sites with the extinct Bison antiquus.

Folsom kill sites occur predominantly within the same region as the Llano core area but isolated Folsom points are not as widely distributed as Clovis points. Isolated Folsom points are almost entirely limited to the High Plains immediately east of the Rocky Mountains. A total of 11 Folsom points has been found in Utah but only one of these, found by an amateur collector somewhere in the San Rafael Swell, is known from the project region (Tripp 1967).

The Plano subphase of the Paleo Indian phase extends from ca. 9000 B.P. to 7000 B.P. The Plano culture, like the Llano and Folsom cultures before it, was economically partially dependent on large game, bison in particular. However, the Plano culture is characterized by a great diversity of projectile point types. Plano culture projectile points are typically lanceolate, precisely flaked and non-fluted.

A new hunting technique also became widespread during the Plano subphase, the jump-kill. The jump-kill hunting technique entailed the driving of a herd of bison over the edge of a cliff or arroyo in order to injure or kill the bison.

Evidence of Plano culture inhabitation is predominately limited to the High Plains east of the Rocky Mountains. The presence of Plano culture hunters in Utah is not widely acknowledged.

The presence of Paleo Indian cultures within Utah was minimal even during the Llano subphase and tended to decrease with time. The slight Paleo Indian utilization of Utah can possibly be tied to the relative scarcity of the large game species in Utah compared to the Great Plains east of the Rocky Mountains than on the eastern side and, as a result, the large herbivorous animals utilized by the Paleo Indian cultures were present on the Great Plains in considerably greater numbers.

ARCHAIC PHASE

Because of the relatively arid conditions of Utah and the Great Basin, large mammal hunting was not a viable subsistence technique in that area. The Great Basin and adjacent Colorado Plateau of eastern Utah were occupied at an early date by Indian groups who were engaged in a subsistence pattern dependent on smaller game animals and the gathering of wild plant foods.

The utilization of caves and rockshelters by Archaic cultures in Utah has resulted in good temporal sequences for the entire Archaic phase. Radiocarbon dates from Danger Cave (Jennings 1957) verify human inhabitation of the Great Basin as early as 10,000 B.P., but the artifacts retrieved from the lowest levels of Danger Cave are not diagnostic of any recognized culture group.

In addition to Danger Cave, Hogup Cave (Aikens 1970) in the Great Basin, Sudden Shelter (Jennings, Schroedl, Holmer 1980) in the southern Wasatch Mountains and Cowboy Cave (Jennings et al n.d.) in southeastern Utah, have all supplied important data pertinent to the development of a cultural sequence for the Archaic inhabitants of Utah. The Archaic has been divided into three phases based on changes in projectile point types.

The Early Archaic Period begins at approximately 8500 B.P. and continues until about 6000 B.P. Subsistence during this period was based on generalized gathering and hunting techniques. A large variety of plant, animal and insect resources was utilized. Hunting was primarily limited to deer and mountain sheep although antelope and bison were also utilized. The trapping of rabbits and small rodents was also an important source of protein.

The prevalent utilization of caves and rockshelters as habitations in conjunction with the aridity of the area has resulted in conditions suited to the preservation of normally perishable materials. Due to the excellent preservation, it

is known that the spear thrower (atlatl) was the implement used for hunting. The atlatl was used with a two or three component shaft and stone dart point throughout the Archaic phase. The Early Archaic Period was characterized by four types of dart points, the Pinto, Humboldt, Elko and the Northern-Side Notch (Holmer 1978). During this time period, the Elko point type had a limited areal extent confined primarily to the northeastern Great Basin and the northern Colorado Plateau. The Pinto and Humboldt points, generally found in close association in archeological contexts, had the same distribution as the Elko points, but are also found in sites in southern and central Idaho at this time period. The Northern Side notch point had a very wide distribution during the Early Archaic period encompassing the northern Great Basin, Columbia Plateau, Northern Colorado Plateau and Great Plains.

The Middle Archaic Period began about 6000 B.P. and ended about 4500 B.P. Subsistence techniques and the utilization of caves were the same as during the Early Archaic but dart point styles changed and also diversified. Dart points such as the Rocker Side-notched, Sudden Side-notched, McKean lanceolate and San Rafael Side-notched were characteristic of this period (Holmer 1978). The Elko point continued to be used during this period in the same areas as it had been during the Early Archaic period. Although the Rocker Side-notched and Sudden Side-notched points were limited in their distribution to central Utah, the McKean lanceolate and San Rafael Side-notched styles had wider distributions including the Great Plains at this time. Another point style made its appearance during the Middle Archaic, the Gypsum point (Holmer 1978). This point style was very common in the southern Great Basin and northern Colorado Plateau and continued to be utilized through the end of the Late Archaic period.

The Late Archaic period began about 4500 B.P. and ended at roughly 1700 B.P. Subsistence techniques were essentially unchanged from the earlier Archaic periods and the utilization of the Elko and Gypsum points styles was continued although the latter style is generally limited in its occurrence to the southern half of Utah. At the end of the Late Archaic period, two new technological developments occurred which mark a significant change in prehistoric subsistence patterns: the introduction of corn and the bow and arrow.

Evidence of corn horticulture in the latter part of the Late Archaic period has been found at several locations: Cowboy Cave (Jennings et al in preparation), Cottonwood Cave in western Colorado (Hurst 1948) and Clyde's Cavern in central Utah (Winter 1973, Winter and Wylie 1974). At all three locations, corn caches were found which dated generally between 1600 B.P. and 2000 B.P. The very late portion of the Late Archaic period also witnessed the advent of the bow and arrow. At Cowboy Cave (Jennings et al n.d.b), Rose Springs arrowheads were recovered from the uppermost level and were dated about 1700 B.P.

The entire Archaic phase is characterized by a gathering and hunting subsistence mode and a sequence of dart point styles which have been defined through the analysis of excavated cave and rockshelter sites. Transient habitation of these caves during the annual migratory round is the most widely accepted interpretation of the Archaic subsistence pattern.

The atlatl was the universal Archaic hunting implement until the very last centuries of the Late Archaic period. However, the advent of the bow and arrow around 1700 B.P. does not seem to have eliminated the utilization of the atlatl during the late Archaic. Gypsum dart points continued to be manufactured even after the appearance of Rose Spring arrowheads at Cowboy Cave (Holmer in Jennings et al n.d.).

addition, Anasazi tradewares are considerably more prevalent in the Fremont culture sites than in the Sevier culture sites.

The unnamed plains-derived culture of northern and northeastern Utah existed from about 1300 to 650 B.P. (Madsen and Lindsay 1977). This culture was dependent upon hunting of bison and the collecting of wild plants. The dwellings are normally shallow basin structures without any clear evidence of the type of superstructure utilized. Unlike the coiled pottery of the Sevier, Fremont and Anasazi cultures, the unnamed culture produced pottery by the paddle and anvil techniques. It is important to note that there is a considerable spatial overlap of the unnamed culture and the Fremont culture traits in the northern portion of the latter's distribution. There is insufficient data at the present to determine whether the spatial trait overlap is due to alternate occupation, simultaneous occupation by the two cultures or a combination of these two possibilities.

Hunting activities among the Sevier, Fremont and unnamed cultures are evident from the many varieties of small arrowheads which have been recovered from excavations. Small stemmed corner notched (Rose Spring) arrow points are present in the earlier phases of all three cultures, but after about 1100 B.P., numerous regional variants developed. Side notch arrow point styles (Bear River Side-notched and Uinta Side-notched) were common in the northern part of Utah while Parowan Basal-notched and Bull Creek arrow point styles were common in the southwestern and south central portions of Utah respectively. The Bull Creek points are of particular interest because they are found in high frequencies at both Kayenta Anasazi sites in southern Utah and Fremont sites along the east side of the Wasatch Mountains (Coombs Village, Bull Creek sites, Snake Rock Village, Old Woman and Poplar Knob) and probably indicate the reciprocal exchange of males for matrimonial purposes (Holmer and Weder 1980).

Dart points, the Elko series and Gypsum, in particular, are also found in association with Fremont sites. This association has been used by Schroedl (1976) to verify the indigenous development of the Fremont culture from Archaic antecedents. Dart points, during the Archaic, were used as both projectile points and knives (Weder in Jennings et al n.d.) but their function in the Fremont context has not yet been evaluated.

In reference to Utah, the Mesa Verde and Kayenta variants of the Anasazi culture are of particular importance. The San Juan Anasazi culture was centered around the Four Corners area where Colorado, New Mexico, Arizona and Utah meet. The Kayenta Anasazi inhabited the extreme southern periphery of Utah from the San Juan River west to central Utah. As has already been noted, Kayenta influence is particularly evident in a narrow band of sites running from Coombs Village northwards past the Henry Mountains to the Snake Rock Village site adjacent to Interstate 70 on the east side of the Wasatch Plateau.

SHOSHONEAN PHASE

The Shoshonean populations, who were the sole inhabitants of Utah at the time of Euro-American contact, have been in the northeastern Great Basin region since approximately 650 B.P. Their origin has been the subject of considerable controversy, however. Several hypotheses have been expressed.

One hypothesis maintains that the Shoshoneans came from the southwest of the Great Basin at about the time of the dispersal of the Sevier, Fremont and Anasazi agriculturalists (Madsen 1975b and Lamb 1958). Gunnerson's hypothesis (1962) states that the Fremont, Sevier and Virgin cultures were Shoshonean peoples who had taken up horticultural and ceramic techniques diffused from the Anasazi but later reverted to an Archaic subsistence style after a climatic change which made agricultural subsistence techniques unproductive.

Regardless of which hypothesis is correct, Shoshonean groups (Ute, Paiute, Shoshone and Bannock) were inhabiting the Great Basin into eastern Utah at ca. A.D. 1300 roughly coincident with the disappearance of the Fremont and Sevier cultures.

The Shoshonean subsistence pattern was quite similar to the Archaic adaptation. Small familial bands were engaged in a gathering and hunting subsistence utilizing a wide variety of nondomesticated plant, mammal, and insect species.

Very little archeological evidence is available for this time period. Two characteristic artifact types can generally be associated with the Shoshonean occupation of Utah. The bow and arrow was utilized for hunting and a type of arrowhead, the Desert Side Notch point, has been correlated with the Shoshonean occupation (Holmer and Weder 1980). The Shoshoneans also utilized ceramics to a small degree. Shoshonean ceramics are easily distinguished from Sevier, Fremont and Anasazi wares by the former's relative crudeness. Shoshonean ceramics are typically thick walled, have large temper particles, are poorly smoothed, exhibit little decoration and have been fired in an uncontrolled or oxidizing atmosphere.

The Protohistoric Period

The prehistoric Shoshonean occupation of the Intermountain West continued up to and through the period of Euro-American contact. The Indian groups inhabiting the area of eastern Utah within which the project locality is situated came to be called the Utes.

PRECONTACT

The Utes are a group belonging to the Shoshonean (Uto-Aztecan) linguistic family of which there are three branches: Ute-Chemehuevi, Shoshoni and Mono-Paviotso. The Ute-Chemehuevi branch includes those groups which came to be

known as the Utes, Southern Paiutes and Chemehuevi. Although there is little archeological evidence, the Utes probably were characterized by a social organization and subsistence mode quite similar to all of the other aboriginal groups in the Great Basin and Colorado Plateau. The Utes were pedestrian gatherers and hunters who utilized a relatively large area of western Colorado and eastern Utah (Steward 1974).

The Utes were grouped into loosely organized bands consisting of extended families. Leadership was present only for subsistence task groups. The Utes could be reliably distinguished from the other contemporary aboriginal groups only in terms of linguistic differences.

Group territoriality was developed only in a statistical sense. A particular Ute band might consider a certain area as a home, but the seasonal round of each band was highly variable from year to year. The area with which any band was most familiar was not exclusively utilized by that band. Intermarriage among the various Ute bands tended to maintain linguistic unity but blur the definition of territorial homeland for any particular band. Except for those Utes who were utilizing the aquatic resources around Utah Lake, local populations were small and mobile (Steward 1974).

EARLY CONTACT

The presence of the Spanish colony at Santa Fe by 1598 resulted in the first contact between the Utes and Euro-American groups. The relationship which developed between the Utes and the Spaniards was consistently friendly and resulted in the spread of the horse among the Ute bands. When the Utes obtained the horse, a change in their subsistence occurred. The equestrian Ute was able to travel more widely and more effectively and concentrate on bison hunting (O'Neill 1973).

The utility of the horse was strongly mitigated by environmental factors, however. The maintenance of a large

horse herd required substantial supplies of grass which generally limited the advantage of the horse to those areas where grass was plentiful such as western Colorado, the Uintah Basin and along the western slopes of the Wasatch Mountains. The supply of grass also determined the distribution of the bison. The horse was, therefore, not equally valuable to all of the Ute bands. The bands in Colorado were able to support their horses whereas those bands in Utah, eastern Utah in particular, were unable to utilize the horse effectively and were more likely to eat a horse than ride it.

Considerable trading activity with the Utes was occurring during the 17th and 18th Centuries. Of particular importance was slave trade (O'Neill 1973). The Utes were able to conduct slave raids on neighboring tribes (especially the Navajo) because of their equestrian status. They then exchanged their slaves for horses and other Spanish goods. Whether the slaves were exchanged with traders travelling into Ute territory or were driven by the Utes to Spanish settlements is unknown because of the lack of documented evidence. Until the 1770s, there was little official Spanish interest in the territory of the Utes. However, at that time, King Charles III of Spain decided that an exploration of the areas north of Santa Fe would be beneficial to Spanish control. His developing interest was a reaction to the growing influence and explorations by the British and French in the West. Charles III felt that it was important to ensure control of trade by the Spaniards since he considered the British and French traders as a threat to Spanish rule (O'Neill 1973).

The first documented Spanish exploration of the area north of Santa Fe was the Dominguez-Escalante Expedition of 1776-1777. This expedition was also the first officially

sponsored exploration, the purpose of which was to find a route between Santa Fe and the Spanish settlements in California. Although the expedition was unsuccessful in reaching its goal, it did extensively explore the territory occupied by the Utes who, in all recorded instances, welcomed the Spaniards.

A trail was eventually established between Santa Fe and California which came to be known as the Spanish Trail. The origins of the Spanish Trail are obscure; however, this trail was probably utilized in prehistoric times as evidenced by its association with archeological sites.

LATE CONTACT

Beginning in the early 1800s, the fur trade became active in Utah. The Arze-Garcia expedition traded for furs with the Utes at Utah Lake in 1813 and soon thereafter trappers began to actively exploit the area. Etienne Provost was a member of the Choteau-DeMun exploration of 1815 to 1817 and subsequently founded his own trapping company which operated primarily within Ute territory. He was subsequently killed by the Utes near the site of the city which now bears his name, Provo (O'Neill 1973).

During this time, more detailed information on the Shoshonean peoples of the area was recorded. In particular, specific Ute bands are mentioned with reference to their respective territories. Within the project region, the Weeminuche band conducted its yearly rounds (O'Neill 1973).

The Adams-Onis treaty of 1819, which gave Mexico its independence, resulted in an influx of Americans to Santa Fe. Most of the Americans came to engage in trapping. The newly arrived trappers caused a considerable increase in traffic along the Spanish Trail and an increase in competition for the available fur resources. This competition was not welcomed by the Utes, who were no longer consistently friendly with the Euro-Americans.

Although there were a large number of independent trappers operating in Utah, their activities have not been well documented. Antoine Robidoux was an important trapper who by 1824 was operating primarily in the Uintah Mountains. William Ashley and Peter Skene Ogden were trapping in the northern Ute territory during the summer of 1824 and, at about the same time, Jedediah Smith was exploring eastern Ute territories to evaluate their trapping potential (O'Neill 1973).

The growing traffic along the Spanish Trail had an important effect on the local Ute bands. Wakara, a Tumpanuwache leader, became quite powerful in the 1820s by conducting horse raids in southern California and returning to Utah by way of the Spanish Trail (Lyman and Denver 1970). He enhanced his power and wealth by exacting tribute from travelers along the trail and by the trading of stolen horses and Pahvant and Paiute slaves (O'Neill 1973). In addition, Wakara and his band actively engaged in fur trapping.

By the late 1830s, there was considerable competition for the fur resources of Utah and western Colorado. Robidoux established a permanent fort and trading center in 1837 near White rocks in the Uintah Basin to capitalize on the beaver-laden streams of the Uintah Mountains.

The prosperity of the fur trade was not destined to last very long, however. The fierce competition over trapping areas led to widespread disruptive conflicts and, most importantly, the demand for furs used to make the beaver skin hats which were fashionable in Europe and the eastern United States declined rapidly about 1840 as the fashions changed. Fort Robidoux was burned in 1844 by the Utes who apparently blamed the trappers for the declining value of their furs (O'Neill 1973; Lyman and Denver 1970).

The decline of the fur trade had a serious impact on the Ute bands of Utah. The entire economic base of the

Utes began to disintegrate after 1840. The trading activities with Santa Fe began to dwindle with the decline in the horse and slave trade. The termination of Mexican control of the area in 1846 and the subsequent loss of contact for slave trade into Mexico (Lyman and Denver 1970) were very disruptive to the relationships existing between Utah and Santa Fe.

During the declining years of the fur trade, the largest invasion of Ute territory occurred. Beginning in 1847, Mormon pioneers began to move into Utah and rapidly swelled their numbers through immigration. At first, there was little conflict with the Utes because the major Mormon settlement, Salt Lake City, was on the periphery of the Ute territory and the earliest Mormon expansion was to the north. In 1849, Fort Utah (later to become the town of Provo) was founded near Utah Lake on the traditional campsite of the Tumpanuwache band. Since the Tumpanuwache band, still under the leadership of Wakara, had been forced to revert to their earlier mode of subsistence due to the decline of the fur trade, their utilization of the resources around Utah Lake became of vital importance. The conflicting interests in the Utah Lake vicinity escalated into a series of raids and counterraids during the 1850s which became known as the Walker War. In the end, the Utes were forced to leave the valley and moved east across the Wasatch Mountains (O'Neill 1973).

The next few years were difficult for the Utes, who were being gradually forced to split up into small bands and resume a subsistence mode similar to the precontact period. Some of the bands, however, chose to raid Mormon settlements and farms to obtain cattle so that they could avoid starvation. These raids became more prevalent during the 1860s. Raids were conducted on the Mormon settlers west of the Wasatch and the Utes returned to the unsettled areas east of the Wasatch with the stolen cattle (O'Neill 1973).

Although several bands were responsible for these raids, one man by the name of Black Hawk became the focus of the blame for all the raiding.

The areas east of the Wasatch Mountains remained under Ute domination for several years. A Mormon attempt to colonize at Moab was undertaken in 1855 but the Mormon settlers were harassed by the Utes and forced to return to Salt Lake City. It was not until 1877, by which time the Utes had been removed to the Uintah Reservation, that Mormon colonists were able to safely settle east of the Wasatch Mountains (O'Neill 1973).

The Historic Period

The history of the east-central coal areas of Utah begins with the exploration and colonization efforts of the Spanish during the last quarter of the 18th Century. East-central Utah was first explored and mapped by the Dominguez-Escalante Expedition of the 1776-1777 in its efforts to establish a line of communication between the Spanish settlements of New Mexico and Monterey, California (Miller 1968).

Though the Dominguez-Escalante Expedition failed to achieve this end, subsequent attempts from the New Mexico settlements and the travelings of Spanish and American fur trappers, traders and frontiersmen resulted in a connecting route known as the Old Spanish Trail (Miller 1968:Map 20). Along this route, which came up from Santa Fe through the San Juan country, across the Colorado River at Moab, over the Green River at the present site of Green River, across the San Rafael Desert into Castle Valley, then south through Salina Canyon to southwestern Utah and southern California, passed thousands of horses and numerous trading, trapping and Indian slave trade expeditions (Miller 1968).

By the 1830s, the trail was well established, portions of its route being followed in 1853 by explorer, John C. Fremont and government surveyor, John W. Gunnison, who reported several sets of well-worn tracks near Green River where Interstate 70 presently runs. Other sections of the trail still remain near the Big Hole Wash in Emery County. The primary route of the Old Spanish Trail, plus divergent trails to Utah Lake, Fort Robidoux and Fort Kit Carson, brought the first extended contact into the project area (Miller 1968: Map 20).

Though forts and trading posts were scattered sparsely through southern and central Utah, the first attempts at organized settlement were undertaken by the Mormon Church. In 1855, the Elk Mountain Mission passed southward through Castle Valley to the area of Moab intending to establish a permanent settlement, but Indian hostility forced a quick retreat. The combination of hostile Indians, the desolate appearance of the region, the hardships involved in securing sufficient water for irrigation and doubts about the quality of the soil caused further attempts at colonization of the eastern area of what was then Sanpete County to be dropped for over 20 years (McElprang et al 1949:16).

At a priesthood meeting at Mt. Pleasant on September 22, 1877, encouragement was given to settle Castle Valley; soon after 75 men from Sanpete Stake were called with Christian G. Larsen as leader. Very few responded, however, because of the aforementioned reasons. Orange Seely was subsequently given the responsibility of superintending the founding of settlements and another call for colonizers was issued by the Church in the fall of 1878. Some of the earliest settlers of the area who dwelt in dugouts in hills or washes until log houses could be erected were Elias and John Cox, Ben Jones, William Avery and Anthony Humbel. By the fall of 1878, the crops were sufficient and the situation stable

enough for the families of these men to join them, a sure sign of an intent to remain (McElprang et al 1949).

Work progressed on the agricultural settlements of Castle Valley and roads were built through the Wasatch Mountains to the more stable areas of western Sanpete County. Additionally, in the fall of 1878, the "Star-Mail Route" was opened between Salina and Ouray, Colorado; it followed the paths of the Old Spanish Trail and the "Gunnison" Trail of years before (McElprang et al 1949:19-21). In just three years the towns of Castle Dale, Wilsonville, Ferron, Green-river (Blake), Huntington, Lawrence, Molen and Orangewill had been established and the Legislative Assembly in February, 1880, created Emery Coutny, which embraced all of present-day Carbon, Emery and Grand Counties (Lever 1898:593).

Though the project region was settled for its agricultural and grazing possibilities, it was the area that inspired active settlement and set the mining-dominated industrial base that central and eastern Utah retains to the present.

The first recorded discovery of coal in eastern Utah was by the Gunnison Expedition of 1853 (Powell 1976:13) when they located deposits of coal approximately three miles east of present-day Emery. The isolated location of the Gunnison find, coupled with the hope that the deposits already discovered at Coalville and Wales would prove sufficient for the territory's needs, caused Gunnison's discovery to be forgotten. The subsequent failure of the efforts at Wales to produce good coking coal, and the Union Pacific Railroad's monopolization and price-fixing on the deposits at Coalville, caused a re-evaluation of the potential coal producing areas east of the Sanpete settlements (Powell 1976:13).

As a result, the first effort to exploit the newly found eastern coal deposits was undertaken in 1875 at Connellsville in the upper reaches of Huntington Canyon. The

Fairview Coal Mining and Coke Company was organized by men from New York, Salt Lake City and Fairview. Eleven coke ovens were constructed and the coke was hauled by wagon into Springville. The expense involved with the hauling and the questionable quality of the coke produced caused the failure and abandonment of Connellsville by 1878 after only three years of operation (Powell 1976:13).

The next development of coal resources was begun in the Pleasant Valley area, also in 1875. The Pleasant Valley Coal Company, headed by Milan O. Packard, constructed a wagon road from Springville up Spanish Fork Canyon to Pleasant Valley coal lands in 1876; 1877 saw the opening of the Number 1 Mine in Winter Quarters Canyon (Powell 1976:14). A narrow gauge rail line was completed from Springville through Spanish Fork Canyon in October of 1879 by the Pleasant Valley Railroad Company as the haul to Springville by the wagon road occupied four days in good weather while in winter the road was impassable. This Pleasant Valley area proved to be extremely productive. The first three large scale mines in eastern Utah were established in this area when the Mud Creek Mine was reopened in 1882 followed by the 1884 opening of the Union Pacific Mine at Scofield just east of Winter Quarters (Powell 1976:15).

From the earliest times, the railroads sought to control the supply of coal in the territory, e.g., the Coalville resources and Union Pacific Railroad's control over that source. During the early 1880s, the Denver and Rio Grande Railroad was extending its lines from Colorado through Utah. Though originally graded through Castle Valley and Salina Canyon, the route of the railroad was altered, going through Price and Spanish Fork Canyon and thus taking in the rich coal areas of what was to become Carbon County (McElprang et al 1949:22).

Further expressing its interest in eastern Utah coal, the Denver and Rio Grande Western (Denver and Rio Grande's Utah

holdings) purchased the independently owned Pleasant Valley Railroad Company and Pleasant Valley Coal Company in 1882. Shortly thereafter, Union Pacific Railroad Company (UPRR) penetrated the Pleasant Valley area in order to protect its threatened monopoly on Utah coal (Powell 1976:16). The UPRR formed the Utah Central Coal Company in 1882 and opened the Union Pacific Mine near Scofield in 1884. With the Denver and Rio Grande's Pleasant Valley Coal development (1882), the establishment of Utah Fuel Company in 1887 and the creation of Utah Central Coal of Union Pacific, the railroad companies almost totally dominated the ownership and production of the Utah mines until the early 1900s (Reynolds et al 1948:195).

In 1888, a mine was opened at Castle Gate on the Price River near the mouth of Price Canyon. In about 1899, a new mine began operations at Sunnyside just 24 miles east of present-day Price at the base of the Book Cliffs. The Sunnyside Number 2 Mine also began its production in 1899 with the coal obtained there, and also at Castle Gate, being utilized for coking purposes (Powell 1976:17-18).

In 1906, the first of the coal operations which would remain free from railroad control began production at Kenilworth, three miles east of Helper. This enterprise was financially backed by James Wade and F. A. Sweet and was called the Independent Coal and Coke Company because of its unique ownership status. Sweet, one of Utah's most prominent coal authorities, also opened a mine on the middle fork of Miller Creek in 1908 and named the camp Hiawatha (Reynolds et al 1948:213). This locality at the foot of Gentry Mountain, about 18 miles southeast of Price, was the scene of further coal mining development in 1911 when Black Hawk mine was opened by Brown and Eccles. Just a few miles to the south in northern Emery County, a small wagon mine was purchased by the Castle Valley Fuel Company and the town, Mohrland, named from the initials of the company's four major figures--Mays, Orem, Heiner

and Rice--was begun. Mr. W. H. Wattis undertook the last development in this area in 1916 at Wattis, several miles north of Hiawatha on the flank of Castle Valley Mountain.

The decade from 1911-1920 saw an increase in activity in the coal regions of east-central Utah with many new mines being opened in hitherto undeveloped areas within the Utah coal producing regions. In 1911, Frank Cameron prospected the region around Panther Canyon on the Price River, and in 1914, the first coal was shipped out by the Utah Fuel Company which had leased the properties to Cameron for development. Cameron also developed and opened a small camp at the base of Castle Rock, about five miles northwest of Helper. Located directly on the main line of the Denver and Rio Grande Western Railroad, the camp's name was changed many times as was its ownership. Originally known as Bear Canyon, it soon was called Cameron, for its developer, then Rolapp, and finally, Royal (Reynolds et al 1948:244).

In 1912, Jesse Knight, one of the most prominent men in Utah mining history, bought 1600 acres of coal land west of Helper to provide coal for his smelting operations in the Tintic District. His mine, at what eventually became known as Spring Canyon, began production in 1913 and was the first of many mines in the Spring Canyon District, one of the most prolific coal producing areas in eastern Utah. Soon after the establishment of Storrs (Spring Canyon), F. A. Sweet opened another mine in Spring Canyon at Standardville, so called because it was considered to be the standard for the development of future mining camps. The year 1914 saw the opening of the Latuda Mine and camp by Liberty Fuel Company while mines were opened in 1916 at Peerless and Rains. The last mining development undertaken in the Spring Canyon District was Mutual Coal Company's Mutual and Little Standard operations, begun in 1921 and 1925, respectively.

The final major coal producing area to be opened in east-central Utah was the Gordon Creek District. This region had first been prospected in 1908, but was really brought to prominence in 1920 by A. E. Gibson, the superintendent of the Spring Canyon Mine. Mines were developed in this area up until 1925 by Consumers Mutual Coal Company, National Coal Company and Sweet Coal Company. The operations of all three companies ceased by 1950 (Carr 1972:81).

After the development of the Gordon Creek area, further work on the coal regions was undertaken in areas that had been opened previously. In 1922, Columbia Steel Company opened a mine at Columbia near the location of Sunnyside in order to further exploit the excellent coking coal obtainable from that region. One very late development of the same coal veins that supported the Columbia operation was initiated in Horse Canyon in 1942 by the United States government to aid steel production at its Geneva plant (Reynolds et al 1948:252). Both mine and steel plant were taken over by U.S. Steel after WWII and continue in operation to the present.

Most of the mines in east-central Utah continued production through the heavy demand years of WWI and the years of prosperity that followed but a combination of overdevelopment, the increased use of other natural fuels, rising costs associated with expensive underground haulage and the Depression of the late 1920s and early 1930s caused several camps to be abandoned. Among the first mines to succumb were the long exploited Pleasant Valley mines. Winter Quarters, near Scofield, was closed down in 1928 while Scofield and Clearcreek experienced reductions of operations during the early 1920s and 1930s, respectively. Rains was also forced to cut back on operations in 1930. Despite these setbacks, as of

1929, there were 22 coal mines operating in Carbon, Emery and Grand counties, the production of these mines providing 98% of the state's output (Sutton 1949:852).

Economic and production difficulties continued to plague Utah's coal industry during the decade of the 1930s, forcing the closure of the Mutual and Mohrland mines in 1938. World War II brought a temporary respite to the general downward trend with many mines achieving their highest production levels during the war years and immediately thereafter.

The decade of the 1950s signalled the end for a great number of the eastern Utah coal mining operations as the adaptation of coal for new uses was insufficient to keep pace with this fuel's replacement in many of its traditional roles. The increasing use of natural gas for heating homes and heavy industry use and the railroad's switch to diesel power were among the developments which severely hurt the coal industry. This bleak picture has drastically changed with the advent of America's "energy shortage", and new technologies for coal use in the future have caused an upswing in coal production in east-central Utah. Mines which were closed, or kept running with skeleton crews, have begun to increase operations during the last decade and the possibility of a new sustained burst of coal mining activity definitely exists (Alexander 1963:244-247).

D. Previous Investigations in the Region

Archeological research in the Castle Valley locality began with the Claflin Emerson Expedition. In 1929, Noel Morss and Henry Roberts conducted explorations and limited test excavations under the auspices of this expedition along the Fremont River and as far north as the Muddy River in Emery County. Morss' work resulted in the original definition of the

Fremont cultural entity (Morss 1931, Gunnerson 1969). Morss' description of Fremont sites north of the Colorado River was an important contribution to the understanding of the prehistoric horticultural adaptation in the American Southwest.

With the exception of Reagan's description of the large petroglyph panel in Buckhorn Draw (Reagan 1935), there were no archeological investigations in the Castle Valley region for the next 15 years. Between 1952 and 1957, the University of Utah conducted a series of surveys in order to better define the nature of the Fremont occupation in Utah. A large number of Fremont sites was located along the east side of the Wasatch Plateau and several of the sites were subjected to limited test excavations, including 42Em5, the Emery Site (42Em47) and Snake Rock Village (42Sv5). Each of these three sites were Fremont habitations (Gunnerson 1957). In addition to these Fremont sites, Gunnerson also tested a shallow rock shelter on Silverhorn Wash (42Em8) as a result of a local collector's report that a fluted projectile point resembling the Clovis style had been found eroding from the shelter deposits. Little additional information was obtained by the excavation, however (Gunnerson 1956).

In the 1970s, there was a significant upsurge in archeological activity in the Castle Valley region. In 1970, three sites endangered by vandalism were excavated by the University of Utah. These sites, Windy Ridge Village (42Em73), Crescent Ridge (42Em74) and Power Pole Knoll (42Em75) all proved to be Fremont habitation sites (Madsen 1975a) dating between about 980 B.P. and 1260 B.P.

During the following year, the University of Utah conducted excavations at Clyde's Cavern (42Em177). Clyde's cavern was a locus of summer plant gathering activities during the Late Archaic period, but the majority of the cultural deposits was shown to be the result of summer maize cultivation and wild plant harvesting activities during the subsequent Fremont period (Wylie 1972, Winter and Wylie 1974).

The next site to be excavated in the study area was Joe's Valley Alcove (42Em693). During the summer of 1974, the United States Forest Service excavated this site which had cultural strata, dated by both radiocarbon and typological means, from the Early Archaic, Late Archaic and Fremont Periods (E. DeBloois, personal communication). That same summer, a University of Utah field school excavated the Innocents Ridge site, which proved to be yet another Fremont habitation locus (Schroedl and Hogan 1975).

During the early fall of 1975, the Antiquities Section, Division of State History (Utah) conducted an excavation of a small rockshelter as a part of the cultural resource mitigation program for Consolidation Coal Company of Denver, Colorado. This site, known as Pint Size Shelter (42Em625), had two main cultural strata, one dated to the Late Archaic and the other dated to the early Fremont Period. Both of these occupations were evidently the result of wild plant procurement activities (Lindsay and Lund 1976).

Other Fremont habitation sites, located farther to the south, have been excavated. These sites include Snake Rock Village (Aikens 1967), Old Woman and Poplar Knob (Taylor 1957) and the Old Road Site and Ivie Ridge Site (Wilson and Smith 1976). These five sites were all Fremont period habitations although Kayenta and Mesa Verde Anasazi ceramics were recovered at low frequencies indicating that there was contact with other cultural groups located further south.

In addition to these Fremont sites, a deeply stratified rockshelter (Sudden Shelter, 42Sv6) was found to contain occupational strata spanning the entire Archaic Period, ca. 8000 B.P. to 3000 B.P. (Jennings et al 1980). The original site report indicated that Fremont diagnostics were present on the site when it was originally documented, but these artifacts were no longer present when the excavations were begun. The

Sudden Shelter site is of particular importance to the local prehistory and the prehistory of the eastern Great Basin and northern Colorado Plateau because of its numerous well-defined occupational strata which has allowed a fine-grain correlation between certain diagnostic projectile point types and the temporal phases of the Archaic period.

A test excavation of two heavily vandalized rockshelter sites (42Em959 and 42Em960) in Cottonwood Canyon conducted by AERC in 1979 seem to mirror the results of the excavations at the nearby Joe's Valley Alcove. Radiocarbon analyses have not yet been completed, but projectile point correlations indicate that these two sites were occupied during the Early Archaic period, Late Archaic and, most heavily, during the Fremont period (Weder and Hauck, n.d.).

Since 1970, the level of survey intensity has increased drastically. The various cultural resource inventories conducted during the 1970s have generally been the result of natural resource development programs and are too numerous to summarize in the present context. Summaries of these inventories performed before 1978 can be found in Sargent (1977) and Hauck (1979). The combined inventory results as of 1977 indicate that the majority of the culturally identifiable sites in the general area are Fremont although Archaic sites are also well represented. Protohistoric Numic sites are present but rare (Hauck 1979a:110).

E. Research Design

AERC's research design which has been developed to aid in project planning and resource evaluation for the east slopes of the Wasatch Mountain Range in central Utah include the following factors:

1. The determination of presence or absence of a continual sequence of Paleo-Indian, Archaic,

Fremont and Shoshonean utilization of the project area and the local manifestations of these cultural phases when present;

2. the determination of presence or absence of cultural materials which demonstrate the prehistoric utilization of drainages as access routes across the mountain range;
3. the determination of whether any specific ecozone contained a preponderance of prehistoric cultural resource sites, thus demonstrating any diversity of preference for different ecozones;
4. the determination of which types of prehistoric cultural activity were conducted in the project area based upon patterns in artifact associations or predominance of particular types of sites;
5. the determination of presence or absence of early historic Euro-American habitation, trapping, trade or travel within the project area; and
6. the determination, on a regional level, of whether the sites in the project area contained any remains, demonstrating local interaction between the San Rafael and Sevier variants of the Fremont Culture.

Since all research conducted in the Eccles Canyon locality has been oriented to identifying, recording and analyzing the historic and prehistoric remains within the project locality, only marginal artifact collection and subsurface testing has been carried out. No floral, faunal, radiocarbon, pollen or flotation specimens have been obtained for laboratory analyses. Collections have involved only the retrieval of diagnostic historic artifacts from the vicinity of the Utah Mine.

Chapter II - METHODOLOGY

A. Field Research

During late July, 1980, an intensive cultural resource inventory of a transmission corridor was conducted by AERC for Valley Camp of Utah and the Vaughn Hansen Associates consulting firm of Salt Lake City, Utah. This corridor is associated with the Pleasant Valley-Whiskey Creek project area located near Scofield, Utah.

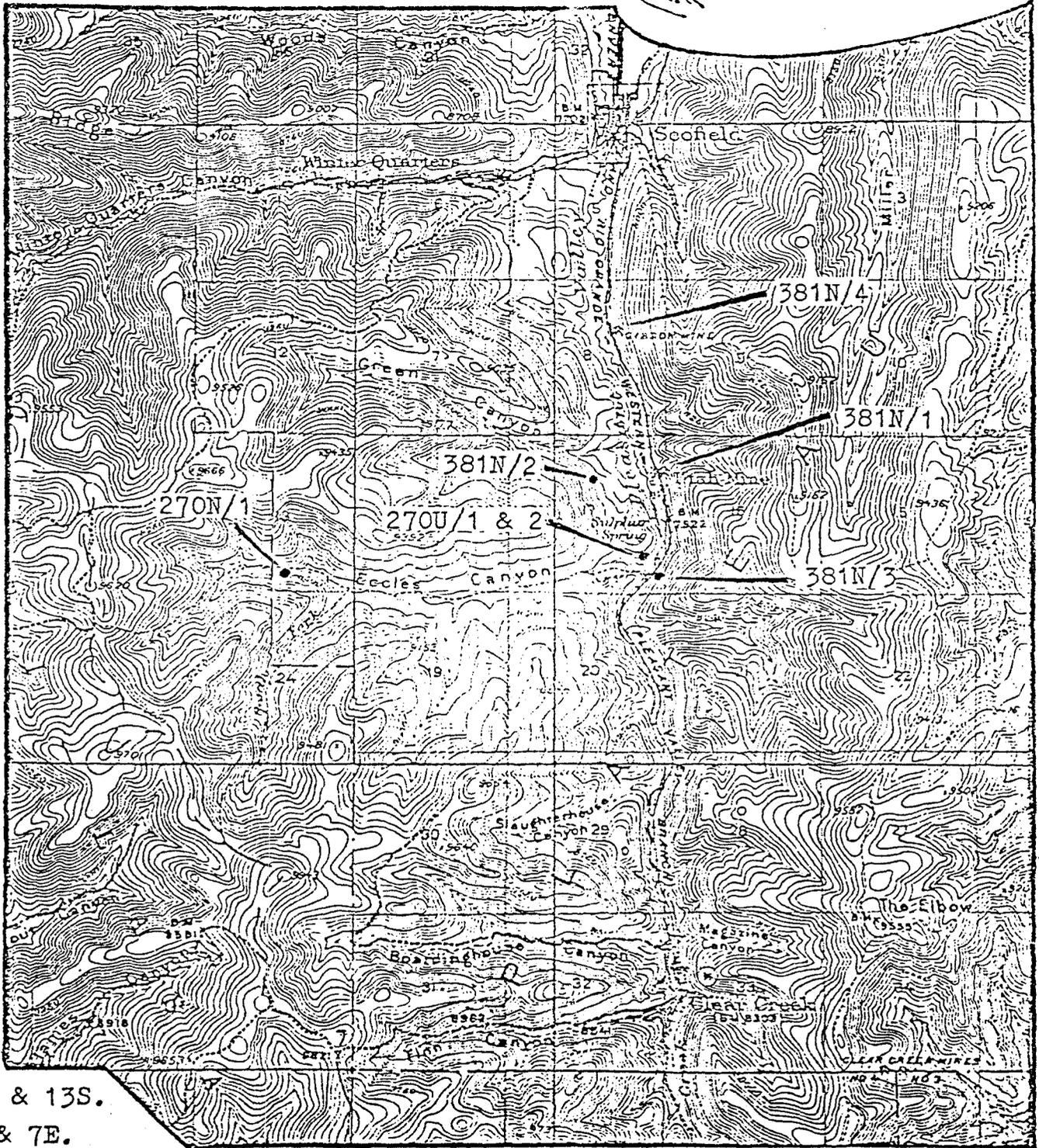
V. Garth Norman, a staff archeologist with AERC, was in charge of the field crew which included Monika Williams and Bunny Melendez. F. R. Hauck, president of AERC was principal investigator.

The survey area lies between the 7750 and 9200 foot elevations ASL within several narrow canyons where surface disturbance relative to transportation corridor development is planned. Location of the potential construction zones and the survey area is shown on Figure 3.

The purpose of the survey was twofold. An intensive evaluation of the Whiskey Canyon and Pleasant Valley corridor segments was conducted to assess the presence and significance of cultural resource sites which could be adversely affected by the development. These two corridors are linked by the eastern segment of the Eccles Canyon corridor which was evaluated by AERC in 1979 under contract to Coastal States Energy Company relative to that company's Skyline Project Mine Plan Permit application.

The second part of the survey was a surface examination and recording of three historic sites, all situated in Pleasant Valley. Although two sites, the Nicolitus Mine portals (AERC 381N/3), and the Gibson Mine (AERC 381 N/4), were evaluated by the AERC crew, they do not lie within the transmission corridor and no project-related adverse affect is planned for these sites.

AERC



T. 12 & 13S.

R. 6 & 7E.

Meridian: Salt Lake B. & M.

Quad:

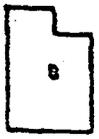
Project: VH-80-1
Series: Central Utah
Date: 9-17-80

Figure 3

HISTORIC SITES
IN THE
PROJECT AREA

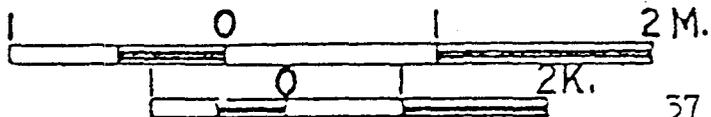
Scofield, Utah

15 Minute USGS



Legend:

Archeological Site
or Historic Site



Scale

Their evaluation was considered important in providing a complete statement on the presence of important cultural resources situated adjacent to the present project permit area.

All inventoried surfaces in Whiskey Canyon, Eccles Canyon and on the west bank of Pleasant Valley were examined by team members performing parallel transects with personnel spacing ranging between 15 and 25 meters. In this manner, a three mile long corridor of about 60 meters width was intensively evaluated. Shorter intervals and zigzag transects were utilized on specific locations judged to be of high site potential.

A total of four historic sites has been recorded in the corridor zone. These sites (AERC 270U/1 and 2) include two historic cabin foundations situated at the mouth of Eccles Canyon which were recorded by AERC in 1979 (see report for CSEC-79-2 dated 7/23/79). Site AERC 381N/1 is the historic Utah No. 1 Mine site which is situated at the northern end of the corridor zone. The Green Canyon Sawmill site (AERC 381N/2) is located near the mouth of Green Canyon.

Three other historic sites are situated in the general area but lie outside the construction corridor zone. These sites include the Eccles Canyon Coal Mine (AERC 270N/1) which is situated in the southeast quarter of Section 13, Township 13 South, Range 6 East; the Gibson Mine (AERC 381N/4) which is situated in the northeast quarter of Section 8, Township 13 South, Range 7 East; and the Nicolitus Mine portals (AERC 381N/3) which are situated in Pleasant Valley in the southeast quarter of Section 17, Township 13 South, Range 7 East. One mine portal on the Nicolitus site is situated on the west bank of Pleasant Creek and, therefore, lies within the corridor zone. The remainder of this

site is situated on the east slope of Pleasant Valley and is outside the potential construction zone.

All cultural resource sites were recorded, evaluated, photographed, sketched and their locations marked on a Scofield, Utah, 15 Minute U.S.G.S. topographic map. Site reports will be provided to all relevant agencies as an appendix to this report.

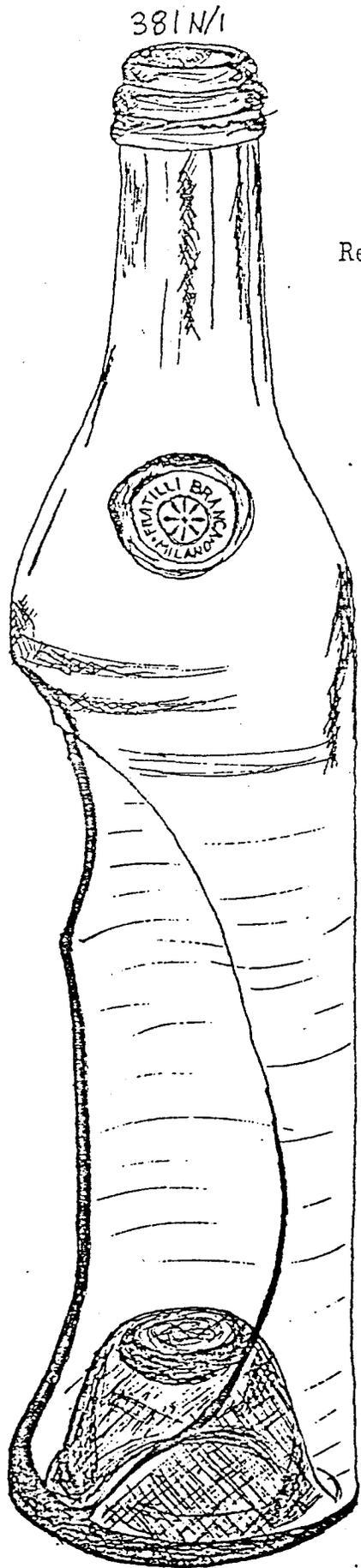
B. Laboratory Research

Laboratory analysis of artifacts was minimal since historic artifacts were minimally collected from only one site (381N/1). No other artifact or ecofact collections were made during the survey or during the 1979 survey when the Eccles Canyon segment of the corridor was evaluated.

C. Artifact Inventory and Analysis

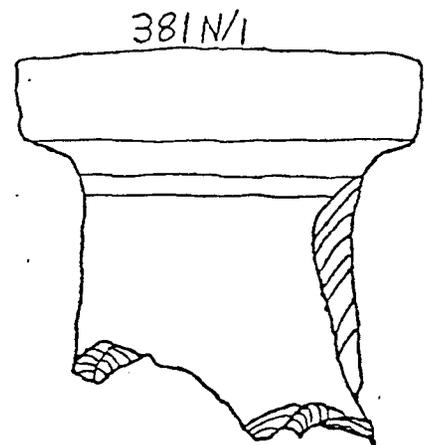
The following historic artifacts were collected at the Utah No. 1 Mine site (AERC 381N/1):

1. One green wine bottle manufactured in Milan, Italy, by the Fratilli Branca Company. This bottle was manufactured using a three piece mold, a technique used in the United States between 1809 and 1885 A.D. The striations on the body of the bottle indicate a turn mold was used for that portion. Twin molds were in use in the United States between 1880 and 1900 A.D. These factors indicate that this bottle was probably constructed between 1880 and 1915 (c.f. Vienneau 1973:45-46).
2. Two pieces of a historic ceramic were collected in which the trademark show D. MEAKIN Ltd., -----, (E)ngland.



Reduced by 30%

Figure 4



Actual Size

3. One fragment of a purple, square bottle was collected which carries the trademark --POLBON, Olive Oil.
4. One blue glass insulator was collected which shows the trademark -ingray-42.
5. One brass, portable gas lantern top was collected which has the trademark --OY'S DROPPER, Pat. 5.26.14, 1916.
6. One brown bottle rim was collected.
7. One steel spoon was collected.
8. One square bottle fragment was collected. This fragment contains the trademark --FIC SYRUP CO., _FIC, (PR)ODUCTS (INC.), --(O)R.
9. One wooden mount for an insulator was collected.

Sketches of the wine bottle and the brown bottle rim are shown on Figure 4.

Chapter III - CULTURAL RESOURCE DESCRIPTIONS

A. Site Analyses

A total of seven historic cultural resource sites is situated in the general project area. Five of these sites are either in the potential construction corridor (AERC 270U/1 and 2) or are partially within the corridor (AERC 381N/1, 2, and 3). These five endangered sites are indicated on Table 1.

Based upon the definitions of cultural resource significance (see Chapter IV), none of the seven historic sites listed in Table 1 are considered eligible for nomination to the National Register of Historic Places (NRHP) based upon an archeological evaluation. The significance of these sites is provided on Table 2. Site 381N/1, the Utah No. 1 Mine is a potential candidate for nomination to the NRHP, based upon the available historic information on the Mine. This site has been given a CRRS:S-2 rating (see Chapter IV). The other three sites are not considered as having NRHP potential. The Nicolitus Mine has been rated a CRRS:S-3 while the two cabin foundations were originally rated at the equivalent of CRRS:S-4. Should additional historic data upon these four sites provide information indicating that any site has a greater cultural value than presently assigned, the site rating will be adjusted accordingly.

Site locations are shown on Figure 3. This map can be coordinated with Figure 2 to demonstrate the spatial relationship of these sites to the corridor zone. Additional information on these sites is provided in the site reports which are being provided to all relevant government agencies as an appendix to this report.

Table 1

Cultural Resource Site Summary

<u>AERC</u> <u>Site No.</u>	<u>Permanent</u> <u>Site No.</u>	<u>Site Type</u>	<u>Culture</u>	<u>Land</u> <u>Ownership</u>
270N/1	----	Mine	Euro-American	Private
270U/1*	----	Cabin, Stone foundation	Euro-American	Private
270U/2*	----	Cabin, Stone foundation	Euro-American	Private
381N/1	----	Mine	Euro-American	Private
381N/2	----	Saw mill, corral	Euro-American	Private
381N/3	----	Mine	Euro-American	Private
381N/4	----	Mine	Euro-American	Private

*Sites situated in the corridor zone which could be directly affected by transportation corridor development.

B. Comparative Resource Analysis

Of the five sites situated in the transmission corridor zone, and therefore susceptible to adverse affect during the construction period, site 381N/1, the Utah No. 1 Mine, is the most important. The Utah No. 1 Mine was originally begun between 1875 and 1880 when it was known as the Mud Creek Mine. This mine "opened on the Castlegate 'A' coal bed. The south of the mine is at tipple height above the railroad, and in 1923 the coal, which was then being mined for railroad use, was dumped from the mine cars without screening into railroad cars. This mine was idle for many years after it was opened and the workings are less extensive than those of the other old mines of the district" (Spieker 1931:96). Extensive surface modification in the site area conducted during the past 100 years has altered much of the historic nature of the site. Some historic foundation rubble and depressions are presently discernable as are limited trash and rubble accumulations situated between the railroad track and the paved highway.

The Green Canyon Sawmill site (AERC 381N/2) includes a cement foundation and wooden rails for the log track. A corral and an abandoned roadbed are associated with this site which lies behind the Valley Camp of Utah offices.

The Nicolitus Mine site (381N/3) includes two portals situated on both the east and west slopes of Pleasant Valley. This site is situated at the mouth of Eccles Canyon and is visible from the highway. The mine portals were opened in the early 1920s by John Nicolitus and were worked for about five years. Joe Williams obtained the lease from Nicolitus and worked the portals in 1931 and 1932 but without success. Williams subsequently sold the lease to John Stone for \$1100,

who unsuccessfully solicited John Staley and Joe Podbevsek to reopen the mine. The mine was never again worked because the veins were too thin to be profitable. No coal was ever sold from the mine (personal interviews conducted with Tom Biggs and John Staley in Scofield on August 29, 1980 by V. Garth Norman).

Sites AERC 27OU/1 and 2 include two historic cabin foundations situated on the north ridge at the mouth of Eccles Canyon. These sites were originally recorded in 1979 by AERC while consulting for Coastal States Energy Company (CSEC-79-2). Both sites are limited, consisting of stone alignments and minimal construction materials. No trash area was discernible. Both sites may have been temporary campsites utilized during the construction of the west portal of the Nicolitus Mine (381N/3).

No prehistoric cultural resource sites or isolated artifacts have been observed or recorded in the general project locality.

Chapter IV - EVALUATIONS AND RECOMMENDATIONS

A. Resource Significance Evaluations:

An evaluation of site significance for the four sites situated within the mine plan permit area is presented in Table 2. Here the site quality indicators are presented with a statement on site condition. The field assessment of significance utilizing the CRRS system is provided in the fourth column. The CRRS system is best explained by quoting from the BLM definition sheet:

Cultural Resource Rating System

The following criteria are established as guidelines. The Bureau recognizes that the assignment of a particular rating is a professional judgment; however, the rationale of these judgments will be explicitly documented as part of the evaluation process.

Assign an evaluation rating (S1, S2, S3, S4) to each site according to the following guidelines and record on the BLM form 6400-3:

S1. S1 sites are those sites which are worthy of preservation in situ. In general, they are sites in relatively good condition with integrity (both internal and external); and are unique or representative; and/or have associations with important events or personages; and/or have yielded, or have a clear potential for yielding, highly significant scientific or educational information.

S2. S2 sites are those sites which contain important scientific or educational data but yet are not worthy of preservation in situ. They are generally not particularly unique, representative, nor do they have important associations. Many contemporary sites may be S2 sites because, although they cannot be clearly and immediately assessed as such, they may become highly significant when evaluated from a future historical perspective.

S3. S3 sites are those sites whose main worth are their potential for contributing data in regards to solving larger problems, such as reconstruction of

Table 2
Site Significance

<u>Site</u>	<u>Quality</u>	<u>Condition</u>	<u>CRRS Value Rating</u>
270N/1	a, g	Poor	3
270U/1*	----	Poor	4
270U/2*	----	Poor	4
381N/1 (First mine in area)	a, c, g, h	Poor	2
381N/2 (Saw mill for 381N/1)	g, h	Poor	3
381N/3	g	Poor	3
381N/4	g	Poor	3

*Sites situated in the corridor zone which could be directly affected by transportation corridor development.

AERC Quality indicators are:

- a) size or layout is unique;
- b) quantity and/or quality of artifacts is unique;
- c) indication of depth;
- d) environmental location is unique;
- e) existence of unique artifacts, architecture, art or structure;
- f) condition is excellent for preservation of materials or data;
- g) site contains specific cultural data relevant to temporal and spatial identifications;
- h) site is scene of an important event; and
- i) site is associated with an important person.

paleo-environments and human use patterns. These kinds of sites generally show little concentration of artifacts, few features, no important associations, and little or no uniqueness or representativeness.

S4. S4 sites are those sites which have minimal information retrieval possibilities, or which have no integrity, uniqueness, representativeness, or no important associations.

No sites were accorded CRRS:S-1 significance.

Only one site is rated as CRRS:S-2 while one site is of CRRS:S-3 value. The remaining two sites have been given a CRRS:S-4 rating.

The site (AERC 381N/1) has been given an S-2 value based on the potential for additional information through archeological excavation. Should future research on any one of these sites provide new data relative to significance, the CRRS rating will be appropriately upgraded.

B. National Register Criteria of Eligibility:

Application of the National Register Criteria of Eligibility, defined under 36 CFR 60.6, to each of the four sites that are situated in the mine plan permit area provides the following information:

- a) None of the four sites is associated with events that have made a significant contribution to the broad patterns of our history; or
- b) none of the four sites is associated with the lives of persons significant in our past; or
- c) none of the four sites embodies the distinctive characteristics of a type, period, or method of construction, or represents the work of a master, or possesses high artistic values, or represents a significant and distinguishable entity whose components may lack individual distinction; and,
- d) site 381N/1 could yield information of value to the history of the region. Extensive surface modification of this site, however, precludes the Utah mine from consideration as an important and

intact historic site. Any information of value to the history of the region would have to be obtained through oral history research and through archeological excavation. This site should, therefore, be considered as meeting the standards of criteria "d" of 36 CFR 60.6. The other three sites (270U/1, 2, and 381N/3) are not eligible under the criteria outlined above.

C. Discussion of Impact Potential on Cultural Resource Sites

Direct impact, i.e., project-related disturbance of the four cultural resource sites located adjacent to the potential disturbance zone could result during surface modification for road and conveyor belt line development. The cabin foundations (270U/1 and 2), the Utah No. 1 Mine site (381N/1), and the sawmill site (381N/2) can be easily avoided during the construction period. The endangered west portal of the Nicolitus Mine (381N/3) is of marginal historic value and disturbance could occur without causing a loss of valuable information or historic materials.

Indirect impact of these four sites through vandalism can be considered a minimal threat to their historic value. Any valuable or useful lumber or construction materials which provide an identity to these sites has already been removed, discarded or destroyed on site.

Table 3 provides a summary of the basic adverse affect potential for all seven historic sites situated in the general project area.

Table 3

Cultural Resource Impact Potential

<u>Site</u>	<u>CRRS Status</u>	<u>Direct Impact</u>	<u>Indirect Impact</u>	<u>Impact Agent</u>	<u>Figure Reference</u>
270N/1	3	No	No	-----	2
270U/1*	4	Not probable	Possible	Vandalism	2
270U/2*	4	Not probable	Possible	Vandalism	2
381N/1	2	Not probable	No	Coal Mine Development	2
381N/2	3	No	Possible	Vandalism	2
381N/3	3	Not probable	Possible	Transmission Corridor Development & Vandalism	2
381N/4	3	No	No	Vandalism	2

*sites situated in the corridor zone

D. Recommendations

AERC recommends that whenever possible, site avoidance procedures be implemented as a means of preserving the historic resources of the general area (see Table 3). Should total destruction of any one of these sites become necessary, a complete photographic documentation of the site should be conducted prior to disturbance.

AERC would also recommend that an archeologist be present to monitor the disturbance of any large trash areas or midden accumulations since such localities could contain historically diagnostic artifacts.

BIBLIOGRAPHY

Aikens, C. Melvin

1967 Excavations at Snake Rock Village and the Bear River No. 2 Site. University of Utah Anthropological Papers, No. 87, Salt Lake City.

1970 Hogup Cave. University of Utah Anthropological Papers, No. 93, Salt Lake City.

Alexander, Thomas G.

1963 From Dearth to Deluge: Utah's Coal Industry. Utah Historical Quarterly, Vol. 31, No. 3, Salt Lake City.

Ashcroft, Gaylen L. and E. Arlo Richardson

Map of Freeze-Free Season, State of Utah. Utah Agricultural Experiment Station, Utah State University and Department of Commerce, ESSA, Environmental Data Services.

Beckwith, E. G.

1855 Report of Exploration for a Route for the Pacific Railroad by Captain J. W. Gunnison, Topographical Engineer, near the 38th and 39th Parallels of North Latitude. Reports of Explorations and Surveys, Vol. 2, Washington.

Berge, Dale L.

1973 "An Archeological Survey in the Castle Valley Area, Central Utah." Museum of Archeology & Ethnology, Brigham Young University, Provo. (Manuscript on file)

1974 An Archaeological Survey in the Castle Valley Area, Central Utah. Publications in Archaeology, Department of Anthropology and Archaeology, New Series No. 1, Brigham Young University Press, Provo.

1976 "Cultural Resource Evaluation of the Clear Creek Substation - Helper - Blackhawk 46 K.V. Transmission Line, Swisher Mine." Department of Archeology and Anthropology, Brigham Young University, Provo. (Manuscript submitted to the Utah Power & Light Co.)

1977b "Cultural Resource Evaluation of the Emery Substation - Dog Valley Mine Distribution Line." Department of Anthropology and Archeology, Brigham Young University, Provo. (Manuscript submitted to the Utah Power & Light Co.)

- Berge, Dale L. and Michael P. Benson
 1977 "A Cultural Resource Evaluation of the Emery Plant to Emery City Transmission Line." Department of Anthropology and Archeology, Brigham Young University, Provo. (Manuscript submitted to the Utah Power & Light Co.)
- Berry, Michael S.
 1974 The Evans Mound: Cultural Adaptation in S.W. Utah.
 1975 Archeological, Historical and Paleontological Survey for Consolidation Coal Company and Kemmerer Coal Company in Emery County, Utah. A Special Report, Division of State History, Salt Lake City.
- Carr, Stephen L.
 1972 The Historical Guide to Utah Ghost Towns. Western Epics, Salt Lake City.
- DeBloois, Evan
 n.d. Joe's Valley Alcove. (Unpublished manuscript)
- Doelling, H. H.
 1972 Central Utah Coal Fields Monograph #3. Utah Geological and Minerological Survey, Salt Lake City.
- Durrant, Stephen
 1952 Mammals of Utah. University of Kansas Publications, Museum of Natural History, No. 6, Lawrence.
- Dykman, James L. and Richard A. Thompson
 1976 "The Dog Valley Strip Mine Survey." A Special Report by the Southern Utah State College, Cedar City.
- Earle, B. J.
 1975 "An Archaeological Summary of the Wasatch Plateau, Central Utah." Museum of Archeology and Ethnology, Brigham Young University, Provo. (Manuscript of file)
- Gillin, John
 1941 Archeological Investigations in Central Utah. Papers of the Peabody Museum of American Archaeology and Ethnology, Vol. 17, No. 2, Cambridge.
- Gillio, David A.
 1975 "Archeological Survey of Trail Mountain Timber Sale." U. S. Forest Service, Richfield. (Manuscript on file)

Gunnerson, James H.

- 1956 A Fluted Point Site in Utah. American Antiquity, Vol. 21, No. 4, Salt Lake City.
- 1957 An Archeological Survey of the Fremont Area. University of Utah Anthropological Papers, No. 28, Salt Lake City.
- 1962a Unusual Artifacts from Castle Valley, Central Utah. Miscellaneous Collected Papers, University of Utah Anthropological Papers, No. 60, Salt Lake City.
- 1962b Plateau Shoshonean Prehistory: A Suggested Reconstruction. American Antiquity 28 (1):41-45, Salt Lake City.
- 1969 The Fremont Culture: A Study in Culture Dynamics on the Northern Anasazi Frontier. Papers of the Peabody Museum of Archaeology and Ethnology, Vol. 59, No. 2, Cambridge.

Hauck, F. R.

- 1975a "An Archeological Survey of Drill Locations in the Scofield, Utah Area." Report prepared for the Valley Camp Coal Company by the Archeological-Environmental Research Corporation, Salt Lake City (SA-75-1).
- 1975b "An Archeological Survey of Drill Locations in the Scofield, Utah Area." Report prepared for the Valley Camp Coal Company by the Archeological-Environmental Research Corporation, Salt Lake City (SA-75-2).
- 1975c "An Archeological Survey of Drill Locations and an Access Road in the Scofield, Utah Area." Report prepared for the Valley Camp Coal Company by the Archeological-Environmental Research Corporation, Salt Lake City (SA-75-3).
- 1975d "Final Archeological Report - A Summary of Archeological Reconnaissance Carried Out During the 1975 Field Season in Scofield, Utah Locality for Sanders Associates, Inc." Report prepared for the Valley Camp Coal Company by the Archeological-Environmental Research Corporation, Salt Lake City.
- 1976a "An Archeological Survey of Access Routes and Drill Stations on Winter Quarters Ridge in Emery County, Utah." Report prepared for the Valley Camp Coal Company by the Archeological-Environmental Research Corporation, Salt Lake City (SA-76-1).
- 1976b "An Archeological Survey of Access Routes, Drill Stations and a Potential Mine Site near Scofield, Utah." Report prepared for the Valley Camp Coal Company by the Archeological-Environmental Research Corporation, Salt Lake City (SA-76-2).

- 1979a "Archeological Reconnaissance in Eccles Canyon, Carbon County, Utah." Report prepared for the Coastal States Energy Company by the Archeological-Environmental Research Corporation, Salt Lake City (CSEC-79-5).
- 1979b Cultural Resource Evaluation in Central Utah - 1977. Cultural Resource Series, No. 3, Bureau of Land Management, Utah.
- Hauck, F. R. et al
 1977 "The Central Coal Project of Utah." Volumes I, II, and III; report prepared under contract 14-08-0001-16479 for the U. S. Geological Survey by the Archeological-Environmental Research Corporation of Salt Lake City.
- Hayward, C. Lynn, Clarence Cottam, Angus M. Woodbury and Herbert H. Frost
 1976 Birds of Utah. Great Basin Naturalist Memoirs, No. 1. Brigham Young University Press, Provo.
- Helm, Claudia
 1974 "Preliminary Report of an Archaeological Survey in Sevier, Emery and Garfield Counties." Department of Anthropology, University of Utah, Salt Lake City. (Manuscript submitted to the U. S. Forest Service and the Bureau of Land Management and to the National Science Foundation.)
- Holmer, Richard N.
 1978 "A Mathematical Typology for Archaic Projectile Points of the Eastern Great Basin." Unpublished Ph.D. Dissertation, Department of Anthropology, University of Utah, Salt Lake City.
- Holmer, R. N. and D. G. Weder
 1980 Common Post-Archaic Projectile Points of the Fremont Area. Antiquities Section Selected Papers, Volume VII, No. 16, D. B. Madsen, Editor, Salt Lake City.
- Hurst, C. T.
 1948 The Cottonwood Expedition, 1947 - a Cave and a Pueblo Site. Southwestern Lore, Vol. 14, No. 1.
- Jennings, J. D.
 1957 Danger Cave. University of Utah Anthropological Papers, No. 27, Salt Lake City.
 1974 Prehistory of North America. Second edition, McGraw-Hill, Inc., New York.

- Jennings, Jesse D., Alan R. Schroedl and Richard N. Holmer
1980 Sudden Shelter. University of Utah Anthropological
Papers, Salt Lake City.
- Jennings, Jesse D., et al
n.d. Cowboy Cave. University of Utah Anthropological
Papers, Salt Lake City (Manuscript in preparation)
- Johnson, Carl M.
1970 Common Native Trees in Utah. Special Report 22,
Agricultural Experiment Station, College of Natural
Resources, Utah State University, Logan.
- Kennette, S. D. and F. R. Hauck
1978 "Archeological Reconnaissance in the Scofield
Locality of Carbon and Emery Counties, Utah." Report
prepared for the Coastal States Energy Company by the
Archeological-Environmental Research Corporation, Salt
Lake City (CSEC-78-1).
- Lamb, Sydney, M.
1958 Linguistic Prehistory in the Great Basin.
International Journal of American Linguistics, Vol. 24.
- Leach, Larry L.
1966 The Archeology of Boundary Village. University of
Utah Anthropological Papers, No. 83, Miscellaneous
Paper, No. 13, Salt Lake City.
1967 "Archeological Investigations at Deluge Shelter."
Department of Anthropology, University of Utah, Salt
Lake City. (Manuscript on file)
- Lever, W. H.
1898 History of Sanpete and Emery Counties.
- Lindsay, LaMar
1974 "Report of a Preliminary Archeological Survey of
Coal Lease Lands (U-073039, U-073040 and U-073041),
Sevier and Emery Counties, Utah. A Special Report
prepared for the Bureau of Land Management, Salt Lake
City.
- Lindsay, LaMar W. and Christine K. Lund
1976 Pint Size Shelter. Antiquities Section Selected
Papers, Vol. III, No. 10, Division of State History,
Salt Lake City.
- Lister, Robert H., and Florence C. Lister
1961 The Coombs Site, Part III: Summary and Conclusions.
University of Utah Anthropological Papers, No. 41,
Glen Canyon Series, No. 8, Salt Lake City.

- Louthan, Bruce D. and Dale L. Berge
 1975 "Archaeological Survey of the Huntington-Sigurd Transmission Line on Bureau of Land Management Lands." Department of Archeology and Anthropology, Brigham Young University. (Manuscript submitted to the Utah Power & Light Co.)
- Lyman, June and Norma Denver
 1970 Ute People, An Historical Study. Uintah School District and the Western History Center, University of Utah, Salt Lake City.
- Madsen, David B.
 1975a Three Fremont Sites in Emery County, Utah. Antiquities Section Selected Papers, Vol. I, No. 1, Division of State History, Salt Lake City.
 1975b Dating Paiute-Shoshoni Expansion in the Great Basin. American Antiquity, Vol. 40, No. 1, Washington, D. C.
- Madsen, David B. and LaMar W. Lindsay
 1977 Backhoe Village. Antiquities Section Selected Papers, Vol. IV, No. 12, Division of State History, Salt Lake City.
- Madsen, Rex
 1973 "Topography, Climate and Soil Types as Indicators of Fremont Regional." Paper presented at the Great Basin Anthropological Conference, University of Utah, Salt Lake City.
 1977 Prehistoric Ceramics of the Fremont. Museum of Northern Arizona Ceramic Series, No. 6, Flagstaff.
- Marwitt, John P.
 1968 Pharo Village. University of Utah Anthropological Papers, No. 91, Salt Lake City.
 1973 Median Village and Fremont Culture Regional Variation. University of Utah Anthropological Papers, No. 95, Salt Lake City.
- Matheny, Ray T.
 1971 "Archaeological Survey of Huntington Canyon Salvage Project, June 1971." Department of Anthropology and Archaeology, Brigham Young University, Provo. (Manuscript submitted to Utah Power & Light Co.)
- McDonald, A. J. and F. R. Hauck
 1979 "Archeological Reconnaissance in the Vicinity of Eccles Canyon, Carbon County, Utah." Report prepared for the Coastal States Energy Company by the Archeological-Environmental Research Corporation, Salt Lake City (CSEC-78-1).

- McElprang, Stella, et al
1949 Castle Valley. Daughters of the Utah Pioneers,
Emery County Chapter, Salt Lake City.
- Miller, David E., compiler
1968 Utah History Atlas, Second Edition. Smith Printing
Service, Salt Lake City.
- Morss, Noel
1931 The Ancient Culture of the Fremont River in Utah.
Papers of the Peabody Museum of American Archeology
and Ethnology, Vol. 12, No. 3, Cambridge.
1954 Clay Figurines of the American Southwest. Papers
of the Peabody Museum of American Archaeology and
Ethnology, Vol. 49, No. 1, Cambridge.
- National Archives of the United States
1973 Advisory Council on Historic Preservation, Part
800 - Procedures for the Protection of Historic and
Cultural Properties. National Register, Vol. 39,
No. 18, Washington, D. C.
- Norman, V. G. and F. R. Hauck
1977 "An Archeological Survey of a Drill Site on
Whetstone Creek in the East Mountain Locality."
Report prepared for the Utah Power and Light Company
by Archeological-Environmental Research Corporation,
Salt Lake City (UPL-77-12).
1979 "Archeological Survey in the Eccles Canyon Locality
of Carbon County, Utah." Report prepared for the
Coastal States Energy Company by the Archeological-
Environmental Research Corporation, Salt Lake City
(CSEC-78-1).
1980 "Archeological Evaluation of a Proposed PCB
Transformer Structure Site at the Emery Deep Mine in
Emery County, Utah." Report prepared for Consolidation
Coal Company by the Archeological-Environmental Research
Corporation, Salt Lake City (CCC-80-2)
- O'Neill, Floyd A.
1973 "A History of the Ute Indians of Utah Until 1890."
Doctoral dissertation submitted to the University of
Utah, Salt Lake City.
- Powell, Allan Kent
1976 A History of Labor Union Activity in the Eastern
Utah Coal Fields: 1900-1934. University of Utah, Salt
Lake City.

- Ranch, Rebecca
1980 "A Cultural Resource Evaluation of the Soldier Creek Coal Mine Property in Emery County, Utah." A report prepared for the Soldier Creek Coal Company by the Archeological Center at the University of Utah, Salt Lake City.
- Reagan, Albert B.
1935a An Archaeological Trip to Buck Horn Draw - Indians Worshipping the Sun. Utah Academy of Sciences, Arts, and Letters, Vol. XII, Salt Lake City.
1935b Trip to Bull Hollow Wash, May 3-4, 1935. Utah Academy of Sciences, Arts, and Letters, Vol. XII, Salt Lake City.
- Reynolds, Thursey, J., et al
1948 Centennial Echoes from Carbon County. Daughters of the Utah Pioneers of Carbon County, Salt Lake City.
- Sargent, Kay
1977 "Emery County: An Archeological Summary." Division of State History, Salt Lake City.
- Schroedl, Alan R.
1976 "The Archaic of the Northern Colorado Plateau." Unpublished dissertation, Department of Anthropology, University of Utah, Salt Lake City.
- Schroedl, Alan R. and Patrick F. Hogan
1975 Innocents Ridge and the San Rafael Fremont. Antiquities Section Selected Papers, Vol. I, No. 2, Division of State History, Salt Lake City.
- Smith, T. M. and F. R. Hauck
1979a "An Intensive Inventory of Drill Sites and Access Roads in the East Mountain Locality of Emery County, Utah." Report prepared for the Utah Power and Light Company by the Archeological-Environmental Research Corporation, Salt Lake City (UPL-79-10).
1979b "An Intensive Inventory of the Proposed UPL Cottonwood Creek - Wilberg Mine Portal Area (UPL-79-5)." Report prepared for Utah Power and Light Company by the Archeological-Environmental Research Corporation, Salt Lake City.
- Spieker, E. M.
1931 Geological Map of the Southern Part of the Wasatch Plateau Coal Field, Utah: U.S. Geological Survey, Scale 1:62,500.

- Steward, Julian
1974 Ute Indians I. Aboriginal and Historical Groups of the Ute Indians of Utah. Garland Publishing Inc., New York and London.
- Sutton, Wain, ed.
1949 Utah Centennial History, Vol. II. Lewis Historical Publishing Company, New York.
- Taylor, Dee Calderwood
1957 Two Fremont Sites and Their Position in Southwestern Prehistory. University of Utah Anthropological Papers, No. 29, Salt Lake City.
- Tripp, George
1966 A Clovis Point From Central Utah. American Antiquity, Vol. 27, No. 3.
1967 Bill Mobely does it again! Utah Archeology, Vol. 13, No. 1.
- Utah Water and Power Board
Map of the Normal Annual Precipitation, 1931-1960, State of Utah.
- Vienneau, Azor
1973 The Bottle Collector. Petheric Press, Halifax, Nova Scotia.
- Walker, J. Terry
1977 "Archeological Investigations on Trough Springs Ridge and Near the Huntington Canyon-Electric Lake Dam." Department of Anthropology and Archaeology, Brigham Young University, Provo. (Manuscript on file)
- Weder, D. G. and F. R. Hauck
1977 "An Archeological Survey of Proposed Drill Stations on East Mountain, Emery County, Utah." Report prepared for the Utah Power & Light Company by the Archeological-Environmental Research Corporation, Salt Lake City (UPL-77-10).
n.d. "Test Excavation of Two Rock Shelters in Cottonwood Canyon, Emery County, Utah. AERC Manuscript in preparation.
- Wilson, Curtis J. and Howard L. Smith
1976 Interstate Highway I-70 Salvage Archeology, Antiquities Section Selected Papers, Vol. II, No. 7, Division of State History, Salt Lake City.

Winter, Joseph C.

1973 The Distribution and Development of Fremont Maize
Agriculture: Some Preliminary Interpretations.
American Antiquity, Vol. 38, No. 4.

Winter, Joseph C. and Henry G. Wylie

1974 Paleocology and Diet at Clyde's Cavern. American
Antiquity, Vol. 39(2):303-315, Washington, D. C.

Wormington, H. M.

1955 A reappraisal of the Fremont Culture. Proceedings
of the Denver Museum of Natural History, No. 1, Denver.

1964 Ancient Man in North America. The Denver Museum
of Natural History, Popular Series, No. 4, Denver.

Wylie, Henry G.

1972 "Report of Excavations at Clyde's Cavern (42Em177)
Emery County, Utah." Department of Anthropology,
University of Utah, Salt Lake City. (Manuscript on file)