

CHAPTER 1

LEGAL, FINANCIAL, COMPLIANCE AND RELATED INFORMATION

Canyon Fuel Company, LLC
SCM/Dugout Canyon Mine

Mining and Reclamation Plan
March ~~January~~ 2004

ADDRESS:

Itochu Coal International, Inc.
555 17th Street, Suite 845
Denver, Colorado 80202

EMPLOYER IDENTIFICATION: 52-2003963

ADDRESS:

Itochu Corporation, 5-1
Kita-Aoyama 2-Chome
Minato-ku, Tokyo 107-77, Japan

EMPLOYER IDENTIFICATION: 98-0053818

The following lists describe the officers and directors of Canyon Fuel Company, LLC, Arch Western Resources, LLC, Arch Coal, Inc., Itochu Corporation, and Itochu Coal International, Inc. The addresses for the officers, directors, representatives to the management board listed are the same as those of the respective business entities as listed above, for which the individuals are officers, directors or representatives. Social Security numbers for the officers and directors are no longer required to be disclosed according to Bonnie Edens of the Office of Surface Mining (e-mail from Bonnie Edens, January 10, 2003, 6:25am).

CANYON FUEL COMPANY, LLC:

Directors:

Robert W. Shanks Chairman
Effective: 06/01/1998

Masayoshi Araya
Effective: 06/01/2001

Yuzo Hirono
Effective: 12/14/1999

Steven F. Leer
Effective: 06/01/1998

Kenneth G. Woodring
Effective: 12/01/2000

John W. Eaves
Effective: 12/01/2000

Joe Y. Nakazawa
Effective: 06/01/2001

Tsutomu Niwa
Effective: 10/09/2001

Alternative Representative

Alternative Representative

Alternative Representative

Officers

Richard D. Pick
Effective: 06/01/1998

President, Chief Executive Officer and General Manager

Robert G. Messey
Effective: 10/09/2001

Chief Financial Officer

James E. Florczak
Effective: 05/25/1999

Vice President, Finance

John W. Eaves
Effective: 06/23/1998

Vice President, Marketing

Robert G. Jones
Effective: 03/08/2000

Vice President, General Counsel and Assistant Secretary

Janet L. Horgan
Effective: 10/11/2000

Secretary

William H. Rose
Effective: 06/01/1998

Assistant Secretary

ARCH COAL, INC.:

Directors:

James R. Boyd
Effective: 07/01/1997

Chairman

Frank M. Burke
Effective: 09/07/2000

Robert G. Potter
Effective: 04/26/2001

Theodore D. Sands
Effective: 02/25/1999

Michael A. Perry
Effective: 09/28/1998

Douglas H. Hunt
Effective: 07/01/1997

Steven F. Leer
Effective: 07/1/1997

James L. Parker
Effective: 07/01/1997

Thomas A. Lockhart
Effective: 02/21/2003

Officers:

Steven F. Leer
Effective: 07/1/1997

President and Chief Executive Officer

Kenneth G. Woodring
Effective: 07/01/1997

Executive Vice President-Mining Operations

C. Henry Besten, Jr.
Effective: 07/01/1997

Vice President - Strategic Marketing

Larry R. Brown
Effective: 07/01/1997

Vice President & Chief Information Officer

John W. Eaves
Effective: 12/11/2002

Executive Vice President, Chief Operating Officer

David B. Peugh
Effective: 07/01/1997

Vice President - Business Development

Robert W. Shanks Effective: 07/01/1997	Vice President - Operations
Robert J. Messey Effective: 12/1/2000	Senior Vice President, Chief Financial Officer
Robert G. Jones Effective: 10/16/2000 and 3/01/2000	Vice President, General Counsel and Secretary
James E. Florczak Effective: 08/17/1998	Treasurer
Deck S. Slone Effective: 04/26/2001	Vice President, Investor and Public Relations
Bradley M. Allbritten Effective: 03/1/2000	Vice President, Marketing
Shiela B. Feldman Effective: 02/03/2003	Vice President, Human Resources
Janet L. Horgan Effective: 10/16/2000	Assistant Secretary and Counsel
John W. Lorson Effective: 04/9/1999	Comptroller
Charles David Steele Effective: 04/24/2003	Vice President, Tax Planning
Bennett K. Hatfield Effective: 04/24/2003	Vice President

Arch Western Resources, LLC, Representatives to the Management Board:

Name: Steven F. Leer
Effective: 06/01/98

Name: Robert W. Shanks
Effective: 06/01/98

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Alternate:

Name: Kenneth G. Woodring
Effective: 06/01/98

Itochu Coal International, Inc. Representatives to the Management Board:

Board:

Akio Shigetomi
Effective: 11/30/1996

Masayoshi Araya
Effective: 11/30/1996

Yuzo Hirono
Effective: 12/31/1999

Alternates:

Yutaka Nakazawa
Effective: 12/20/1996

Tsutomu Niwa
Effective: 6/01/2001

ARCH WESTERN RESOURCES, LLC

Directors:

Patrick A. Kriegshauser
Effective: 05/07/98

David B. Peugh
Effective: 05/07/98

Jeffry N. Quinn
Effective: 05/07/98

Thomas A. Lockhart
Effective: 02/24/2003

Officers:

Robert W. Shanks Effective: 06/28/98	President - Operations
David B. Peugh Effective: 05/17/98	Vice President
Robert G. Jones Effective: 03/01/00 and 6/2/98	Vice President and Assistant Secretary
William H. Rose	Assistant Secretary Replaced 5/23/03
Janet L. Horgan Effective: 3/17/98	Secretary
Anne W. Odonnell Effective: 05/23/2003	Assistant Secretary
James E. Florczak Effective: 05/15/98 and 9/15/98	Vice President, Finance, Treasurer
Charles David Steele Effective: 05/23/2003	Vice President, Tax Planning

ITOCHU CORPORATION

<u>Name</u>	<u>Title</u>	<u>Date of Appointment</u>
Minoru Murofushi	Chairman	April 1998
Masahisa Naitoh	Vice Chairman	April 2000
Uichiro Niwa	President, CEO	April 1998
Hiroshi Sumie	Executive Vice President	April 2000
Makoto Kato	Executive Vice President	April 2001
Yushin Okazaki	Executive Vice President	April 2001
Sumitaka Fujita	Executive Vice President	April 2001

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Mitsuaki Fukuda	Sr. Managing Director	April 2000
Akira Yokota	Sr. Managing Director	April 2001
Kiyomi Yamada	Managing Director	April 2001
Motonori Toyota	Managing Director	June 2001
Kouhei Wantanabe	Managing Director	April 2002
Hiroshi Ueda	Managing Director	April 2002

ITOCHU COAL INTERNATIONAL INC.

Masayoshi Araya	Chairman of the Board	Dec. 1999
Yuzo Hirono	President and Chief Executive Officer	Dec. 1999
Tsutomu Niwa	Chief Financial Officer	June 1996
Dietz Fry	Vice President, Finance and Administration	March 1997
Yutaka Nakazawa	Vice President Commercial and Secretary	Dec. 1996
Hiroshi Akiba	Assistant Secretary	Feb. 2000

112.400 Coal Mining and Reclamation Operation Owned or Controlled

The following list describes all permits held by Canyon Fuel Company, LLC, all pending applications for permits, and any permit recognized as necessary in the future for which no application has been filed. Identification numbers of applications or permits are contained in the following list. Many of the agencies listed, however, have review responsibility only and may not have submitted a numbered permit.

<u>Permit</u>	<u>Issuing Authority</u>	<u>Approval Status/ Identification No.</u>
Mining and Reclamation Permit C/007/039	State of Utah Department of Natural Resources	Approved

	Division of Oil, Gas and Mining	
	Department of Interior U.S. Geological Survey and Office of Surface Mining	
	Department of Agriculture U.S. Forest Service Manti La Sal National Forest	
U.P.D.E.S. Permit UTG-040020 and Utah D.E.Q.	Environmental Protection Agency	Approved
Business License	Carbon County	Approved
Mine Health and Safety Permits 42-01890 and 42-01888, 1211-UT-09-01890-01	Mine Safety and Health Administration - Utah	Approved
Radio Permits	Federal Communications Commission	Approved
Certificate of Insurance and Authorization to do Business in State	State Industrial Development Commission	Approved
Road Agreement	Carbon County	Approved
Air Quality Approval Order	State of Utah Utah Air Conservation Committee Department of Health Division of Environmental Health	Approved
Stream Channel Alteration Permit	State Engineer	Approved

The Canyon Coal Company, LLC mining permits and operations are:

SUFCO Mine	C/041/002
Skyline Mine	C/007/005
Soldier Canyon Mine	C/007/018

Banning Loadout	C/007/034
Dugout Canyon Mine	C/007/039

The issuing authority for the Canyon Fuel Company permits is the UDOGM.

Permits and Operations held by subsidiary companies of Arch Coal, Inc. are set forth on Figure 1-1 in ~~Table 1-1~~. Facility names, mailing addresses and permit numbers for these operations are provided in either Table 1-1 and/or Table 1-2.

Neither Arch Coal, Inc. nor any of its subsidiaries owns or controls any other coal mining or reclamation operation. Itochu Corporation does not own or control any interest, direct or indirect, in any other entity having coal mining operations in the United States. None of the executive officers of Itochu Corporation are directors or officers of any other entity that owns or controls an interest, direct or indirect, in any entity having coal mining operations in the United States.

The corporate structure is presented in Figure 1-1.

112.500 Legal or Equitable Owner of the Surface and Mineral Properties

The legal and equitable owners of the surface and mineral properties to be affected by this mining operation during the duration of the permit period are the State of Utah, Bureau of Land Management and Canyon Fuel Company, LLC. Refer to Refuse Pile Amendment for additional ownership information.

Canyon Fuel Company, LLC
6955 South Union Park Center
Suite 540
Salt Lake City, UT 84047
Telephone: (801)569-4700

Milton & Ardith Thayne Trust
Sunnyside Star Route
Price, Utah 84501

State of Utah
School and Institutional
Trust Lands Administration
675 East 500 South
Salt Lake City, Utah 84102-2818

George & Alice Conover Etal
2701 Georgia Way
Sandy, Utah 84092

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Dugout Canyon Mine

C/007/039

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6955 South Union Park Center
Suite 540
Salt Lake City, UT 84047
Telephone: (801)569-4700

Milton & Ardith Thayne Trust
Sunnyside Star Route
Price, Utah 84501

State of Utah
School and Institutional
Trust Lands Administration
675 East 500 South
Salt Lake City, Utah 84102-2818

George & Alice Conover Etal
2701 Georgia Way
Sandy, Utah 84092

Canyon Fuel Company, LLC
SCM/Dugout Canyon Mine

Mining and Reclamation Plan
March 2004

APPENDIX 1-2

Insurance and Proof of Publication

LEGAL NOTICE

Canyon Fuel Company, LLC, of Salt Lake City, Utah, has submitted to the Utah Division of Oil, Gas and Mining, a complete application for adding the SITLA lease to the existing mining and reclamation permitted area.

Canyon Fuel Company, LLC, operates the Dugout Canyon Mine which is located thirteen (13) miles northeast of Wellington, Utah, in Dugout Canyon within the west half of Section 23, Township 13 South, Range 12 East, Salt Lake Base Meridian. The currently approved Dugout Canyon Mine mining permit number is C/007/039. The permit area is located on the Pine Canyon and Mount Bartles, USGS 7.5 minute quadrangle maps. The description of the permit area is as follows:

Township 13 South, Range 12 East, SLBM, Utah

- Section 9: S1/2SE1/4
- Section 10: S1/2
- Section 11: S1/2
- Section 13: All except N1/2N1/2
- Section 14: All
- Section 15: All
- Section 16: All
- Section 17: E1/2SW1/4; SE1/4
- Section 20: E1/2NW1/4; SW1/4NW1/4; N1/2NE1/4
- Section 21: N1/2NW1/4; NE1/4
- Section 22: N1/2; N1/2S1/2; Portion of N1/2NE1/4SE1/4SE1/4;
Portion of SW1/4NE1/4SE1/4SE1/4;
Portion of the S1/2NW1/4SE1/4SE1/4;
Portion of SW1/4NE1/4SW1/4SE1/4;
Portion of N1/2SE1/4SW1/4SE1/4;
Portion of NE1/4SW1/4SW1/4SE1/4;
Portion of S1/2SW1/4SW1/4SE1/4
- Section 23: NW1/4; NE1/4; SE1/4; NE1/4SW1/4; NW1/4NW1/4SW1/4;
S1/2NE1/4NW1/4SW1/4; NW1/4SW1/4NW1/4SW1/4;
- Section 24: All
- Section 25: N1/2N1/2
- Section 26: N1/2NE1/4
- Section 27: Portion of W1/2NW1/4NW1/4NE1/4
Portion of SW1/4NE1/4NE1/4NW1/4
Portion of E1/2SW1/4NE1/4NW1/4
Portion of SW1/4SW1/4NE1/4NW1/4

Township 13 South, Range 13 East, SLBM, Utah

- Section 17 SW1/4; SW1/4NW1/4; SW1/4SE1/4
- Section 18 All except N1/2N1/2
- Section 19 All
- Section 20 All
- Section 21 SW1/4; SW1/4NW1/4
- Section 28 NW1/4; N1/2SW1/4; SW1/4SW1/4
- Section 29 All
- Section 30 NW1/4NW1/4; E1/2; E1/2W1/2

Township 14 South, Range 12 East, SLBM, Utah

- Section 18 Portion N1/2NE1/4

Topsoil is being stored in T14S, R12E, Section 8, a storage area permitted to Soldier Canyon Mine.

A copy of the permit will be available for inspection at the Utah Division of Oil, Gas and Mining, 1594 West North Temple, Suite 1210, Salt Lake City, Utah 84114

The address of the applicant is: Canyon Fuel Company, LLC, 6955 South Union Park Center, Suite 540, Midvale, Utah 84047, Phone: (801) 569-4700

Written comments or request for an informal conference regarding this application must be submitted within 30 days of the last publication date of this notice, to the Utah Division of Oil, Gas and Mining, Attention Coal Regulatory Program, 1594 West North Temple, Suite 1210, Salt Lake City, Utah 84114-5801.

CHAPTER 4

LAND USE AND AIR QUALITY

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4-1 Air Quality Approval Order and Information

4-2 Land Uses

4-3 Cultural and Historical Studies - SITLA Lease and Adjacent Area

Cultural and historical inventories associated with the SITLA lease tract and adjacent areas are located in Appendix 4-1 and 4-3. This information should be held confidential by the Division.

The information in Appendix 4-3 was collected starting in 1980 and the last report was completed in 2003. According to information collected from the Price office of the BLM on March 23, 2004 and conversations with Mr. David Miller, there were no sites with artifacts considered for registration found in the areas surveyed and reported in 1980 through 1991. The conclusions were the same in the surveys conducted in 2001 - 2003.

Cultural and Historic Resource Maps. Maps and photographs for the evaluated cultural and historical sites are contained in the confidential folder.

There are no cemeteries, public parks, or units of the National System of Trails or the Wild and Scenic Rivers System located within the Dugout Canyon Mine permit boundary. The National Register of Historic Places was consulted by AERC and no registered historic or prehistoric properties will be affected by the proposed mine development.

SCM agrees to notify the Division and SHPO of previously unidentified cultural resources discovered in the course of mining operations. SCM also agrees to have any such cultural resources evaluated in terms of NRHP eligibility criteria. Protection of eligible cultural resources will be in accordance with Division and SHPO requirements. SCM will also instruct its employees that it is a violation of federal and state laws to collect individual artifacts or to otherwise disturb cultural resources.

Coordination with State Historic Preservation Officer. AERC contacted SHPO concerning the Dugout Canyon Mine site and a copy of their report was forwarded to SHPO. The National Register of Historic Places was consulted by AERC and no registered historic or prehistoric properties will be affected by the proposed mine development.

411.200 Previous Mining Activity

Canyon Fuel Company, LLC
SCM/Dugout Canyon Mine

Mining and Reclamation Plan
~~March~~ January 2004

APPENDIX 4-3

Cultural and Historical Studies
SITLA Lease and Adjacent Area

Canyon Fuel Company, LLC
SCM/Dugout Canyon Mine

Mining and Reclamation Plan
March ~~January~~ 2004

INFORMATION IN APPENDIX 4-3 SHOULD BE PLACED IN A CONFIDENTIAL LOCATION

CHAPTER 4
LAND USE AND AIR QUALITY

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- 4-3 Cultural and Historical Studies - SITLA Lease and Adjacent Area

CHAPTER 4

LAND USE AND AIR QUALITY

410 LAND USE

This section of the permit application includes descriptions of the premining and proposed postmining land use(s). Additional information can be found in the following amendments: Methane Degassification Amendment (August 2003), Refuse Pile Amendment (February 2003), and the Leachfield Addendum A-1 (March 2001). The remainder of the State Lease ML-48435-OBA (SITLA Lease) was incorporated into the Dugout Canyon Mine permit area in 2004.

411 Environmental Description

A statement of the conditions and capabilities of the land to be affected by coal mining and reclamation operations follows in this section.

411.100 Premining Land Use

The permit area has been primarily utilized as rangeland for livestock and wildlife habitat. Some crops related to the livestock industry have been developed along the creek bottoms adjacent to Soldier Creek Road. However, no crops have been raised within the permit area. Recreational use of the permit area is limited due to lack of access through private property.

The predisturbed area boundary outlined on Plate 5-4 reflects disturbance prior to 1965. The boundary was compiled from a 1980 map of the pre-mining topography prepared by Eureka Energy Company. According to historical data the Dugout Canyon area was last mined in 1964.

411.110 Land Use Map

Plate 4-1 designates the prominent land uses within and adjacent to the permit boundary.

411.120 Land Capability

The area surrounding Dugout Canyon supports a variety of land uses including industrial, agricultural, and recreational. Carbon County has zoned the permit area for mining and grazing.

Energy resource development occurs throughout the region in the form of coal mining, oil and gas production and tar sands development. A methane gas recovery operation was formerly running in conjunction with the Soldier Canyon Mine which lies west of the Dugout Canyon Mine permit boundary. The Soldier Canyon Mine has been in operation since 1976.

The major plant communities in the Dugout Canyon lease area are identified in Section 321. No cultivated lands lie within the permit boundary, due to the limiting terrain and lack of water for irrigation. Refer to Section 321.100 for forage production per acre.

The permit area is used for grazing cattle, but sheep have grazed in the area previously. Valley bottoms receive little grazing due to their limited forage and narrowness except in the vicinity of water sources. Steep slopes receive limited grazing pressure from livestock because of the steep inclines and the lack of water. Flatter mesa tops and rolling terrain receive heavier pressure because of easier movement by livestock and more available forage. Grasses are preferred forage for cattle; however, cattle will eat forbs and shrub species.

The use of land for grazing is dictated by the condition of and access to the specific areas. At the land owners discretion land may be used for grazing one year and not used again for five years. However grazing should continue to be considered a potential land use for the permit and adjacent areas.

The permit area supports limited recreation due to inaccessibility to privately owned lands.

411.130 Land Use Description

The permit area lies within undeveloped lands used primarily as wildlife habitat and for livestock grazing. Five grazing allotments are located in or adjacent to the permit area (Plate 4-1). The allotments support 429 head of cattle from May through October. The grazing allotments as listed

below are administered by the U. S. Bureau of Land Management (BLM): Pine Canyon Allotment No. 24089 supports 50 head of livestock, Dugout Allotment No. 34039 supports 60 head, Pole Canyon Grazing Allotment No. 34092 supports 144 head, Cow Canyon Allotment No. 34032 supports 95 head, and Pace Canyon Allotment No. 24085 supports 80 head of livestock.

Recreation in the permit and adjacent areas includes camping, hunting, and hiking from Spring to late Fall. Recreational use is light due to restricted access to privately-owned lands. There are no developed or inventoried recreation campgrounds within the permit boundary. No impact is expected to the current recreational uses of the area. SCM will preserve these uses into the postmining period.

During deer and elk hunting seasons, the accessible lands are used extensively by the public. Fishing is limited at best, with restricted access and no known game fish populations existing in the permit area streams.

Logging operations completed in 1996 by Cascade Resources within and adjacent to the permit boundary are shown on the Sale Area Map "Exhibit A" in Appendix 4-2. Exhibit A was prepared by Cascade Resources of Wellington, Utah who estimated harvesting six million board feet from the areas designated on the exhibit. Their logging contract expired on 12/31/96.

Timber within the disturbed area is very limited and therefore not economical for recovery by the logging industry. Exhibit B included in Appendix 4-2 shows SCM's timber inventory including areas logged and areas yet to be logged.

The nearest crop production (alfalfa) is approximately 4 miles southwest of the permit boundary adjacent to the Soldier Creek Road. Cultivation occurs on a year to year basis, depending upon the water available for irrigation.

411.140 Cultural and Historic Resources Information

Cultural resource information and maps identifying cultural and historical study areas are located within the confidential folder of information pertaining to this permit. An intensive cultural resource evaluation of the permit area has been conducted by Dr. Richard Hauck, Ph.D. of Archeological-

Environmental Research Corporation (AERC). As part of this evaluation he also made a record search at the State Historic Preservation Office (SHPO) and the National Register of Historic Places (NRHP).

Cultural resource evaluations were performed on two sites within the permit boundary. Field evaluations on the historic Dugout Creek Mine (42CB 205/291) and on a prehistoric rock art site (42CB 92) were conducted by the AERC staff on November 20 - 22, 1995. Site 42CB 92, situated in the SE1/4 of Section 22, T13S, R12E, contains a series of pictograph panels first documented by Dale Berge in 1977. The historic Dugout Creek Mine locus is situated in the NW1/4 of Section 23.

The historic components of the Dugout Creek Mine (42CB 205/291) are not considered to be significant and do not need to be avoided or mitigated prior to the development of the mine site. The prehistoric rock art site (42CB 92) is a significant resource and is eligible for nomination to the NRHP. Site 42CB 92 has been reported to the NRHP and BLM offices during previous cultural and historical studies of the area in 1977, 1980, and 1995 but is not currently listed on the NRHP.

The rock art panels are unstable and could be destroyed if blasting for road expansion is done within a 600-foot radius of the panels. SCM will make every effort to protect these rock art panels without drawing unnecessary attention to their location. The panels have been preserved primarily because the general public does not know of their existence. SCM will strive to maintain this condition.

The AERC report provides descriptive and valuational information for the two sites.

Cultural and historical inventories associated with the SITLA lease tract and adjacent areas are located in Appendix 4-1 and 4-3. This information should be held confidential by the Division.

The information in Appendix 4-3 was collected starting in 1980 and the last report was completed in 2003. According to information collected from the Price office of the BLM on March 23, 2004 and conversations with Mr. David Miller, there were no sites with artifacts considered for registration found in the areas surveyed and reported in 1980 through 1991. The conclusions were the same in the surveys conducted in 2001 - 2003.

Cultural and Historic Resource Maps. Maps and photographs for the evaluated cultural and historical sites are contained in the confidential folder.

There are no cemeteries, public parks, or units of the National System of Trails or the Wild and Scenic Rivers System located within the Dugout Canyon Mine permit boundary. The National Register of Historic Places was consulted by AERC and no registered historic or prehistoric properties will be affected by the proposed mine development.

SCM agrees to notify the Division and SHPO of previously unidentified cultural resources discovered in the course of mining operations. SCM also agrees to have any such cultural resources evaluated in terms of NRHP eligibility criteria. Protection of eligible cultural resources will be in accordance with Division and SHPO requirements. SCM will also instruct its employees that it is a violation of federal and state laws to collect individual artifacts or to otherwise disturb cultural resources.

Coordination with State Historic Preservation Officer. AERC contacted SHPO concerning the Dugout Canyon Mine site and a copy of their report was forwarded to SHPO. The National Register of Historic Places was consulted by AERC and no registered historic or prehistoric properties will be affected by the proposed mine development.

411.200 Previous Mining Activity

Coal mining has occurred within Dugout Canyon since 1925. D. J. Collins prospected for and initially hand-developed the Red Glow Mine in the Gilson seam on the east side of Dugout Canyon in 1925. The west side of Dugout Canyon was first mined in 1952 by E.S.O. Coal Company when they mined the Rock Canyon seam.

The Knight Ideal Coal Company mined the Rock Canyon and Gilson coal seams located on both sides of the canyon between 1958 and 1964. Knight Ideal Coal Company extracted 1,326,000 tons of coal by conventional room and pillar method with partial pillar recovery. The area in Dugout Canyon disturbed by mining has changed hands through the years but no coal has been extracted since 1964.

Limited exploration within existing portals was conducted by Pacific Gas and Electric in 1979 and by Sunedco in 1982. Following each exploration, the portals were resealed with earthen fill. During 1995, SCM reopened four portals, two on the east and two on the west side of Dugout Canyon. The portals on the east side were resealed but the portals on the west side were left open and fenced for security and safety.

Remnants of the Fish Creek and Pace Canyon Mine which operated in the early 1900's also exist within the permit boundary. Both mine sites have been considered for preservation by SHPO but were ineligible for nomination to the National Register of Historic Places.

412 Reclamation Plan

412.100 Postmining Land Use Plan

All uses of the land prior to mining and the capability of the land to support prior alternate uses will remain available throughout the life of the mine except within the disturbed-area boundary.

SCM intends the postmining land use to be consistent with the present land use, which is livestock grazing and wildlife habitat. Final reclamation activities such as grading and seeding as detailed within this M&RP will be completed in a manner to provide lands able to parallel the premining land use. In areas where surface disturbance will result from mining operations, soil reclamation and revegetation will restore the areas to wildlife habitat and livestock grazing capabilities.

The activities associated with the mining operation will follow accepted standards or proven techniques. Erosion hazards will be minimized and, where possible, eliminated. Evidence of abandoned improvements will be removed. Reclamation will restore the land and vegetation to as near a natural and productive condition as possible.

Efforts to restore wildlife habitat are discussed in Chapter 3 of this M&RP. Specific periods of habitation by wildlife species of the disturbed and adjacent area are discussed in Appendices 3-2 and 3-3. Since the disturbed area is privately owned the timing and extent of use for grazing will be made after reclamation by the landowner.

412.200 Land Owner or Surface Manager Comments

The land surface within the permit boundary is owned by various entities, including the State of Utah and Canyon Fuel Company, LLC (CFC). The disturbed area is on surface lands owned by both CFC and the State.

The leases contained in Appendix 1-1 list responsibilities accepted by CFC in regard to the State of Utah's lands within the permit boundary. The leases contain requirements concerning use and maintenance of their administered lands. CFC is obligated by these leases to notify the Division for their determination as to whether this mining operation will be detrimental to the State of Utah's interest. By submitting this M&RP, CFC is indicating that the operation will not be detrimental to the State's interests and the obligation is being met. A letter of affirmation from the State of Utah concerning proposed land use is included in Appendix 4- 2.

The Bureau of Land Management (BLM) Right-of-Way application (UTU-76601) in Appendix 1-3 lists the responsibilities accepted by CFC concerning the BLM lands included in the permit

Canyon Fuel Company, LLC
SCM/Dugout Canyon Mine

Mining and Reclamation Plan
March 2004

APPENDIX 4-3

Cultural and Historical Studies
SITLA Lease and Adjacent Area

Canyon Fuel Company, LLC
SCM/Dugout Canyon Mine

Mining and Reclamation Plan
March 2004

INFORMATION IN APPENDIX 4-3 SHOULD BE PLACED IN A CONFIDENTIAL LOCATION



ARCHEOLOGICAL - ENVIRONMENTAL RESEARCH CORPORATION

588 West 800 South Bountiful, Utah 84010

Tel: (801) 292-7061 or 292-9668

September 18, 1980

Rec'd. SR/PR JAN 14 1981

Subject: Archeological Evaluations in the Proposed Sage
Creek-Dugout Canyon Project Area of Carbon
County, Utah

Project: Eureka Energy Company

Project No.: EREC-79-1 and 80-1

Permit: U.S. Dept. of Interior - 79-Ut-061
80-Ut-069

To: Mr. Paul B. Anderson, District Geologist,
Eureka Energy Company, 1010 Kearns Building,
136 South Main Street, Salt Lake City, Utah
84101

Mr. Robert F. Goudge, Eureka Energy Company,
P.O. Box 1506, Price, Utah 84501

Mr. Gene Day, BLM District Manager, Bureau of
Land Management, Moab Office, P.O. Box 970,
Moab, Utah 84532

Mr. Leon Berggren, BLM Area Manager, Bureau of
Land Management, Price Resource Area, P.O. Box AB,
Price, Utah 84501

Mr. Richard Fike, BLM Archeologist, Bureau of
Land Management, University Club Bldg., 136 East
South Temple, Salt Lake City, Utah 84111

Info: Dr. David Madsen, State Archeologist, Antiquities
Section, State Historical Preservation Office,
307 West 200 South, Suite 1000, Salt Lake City,
Utah 84101

Mr. Chris Slaboszewicz, Eureka Energy Company,
215 Market Street, Room 260, San Francisco,
California 94106

1
9-28

17 (cont'd.) 1. All vehicular traffic, personnel movement, and construction to be confined to the locations examined and to access roads leading into these locations.

2. All personnel refrain from collecting individual artifacts or from disturbing any cultural resources in the area.

3. A qualified archeologist be consulted should cultural remains from subsurface deposits be exposed during construction work or if the need arises to relocate or otherwise alter the construction area.

8 (cont'd.)

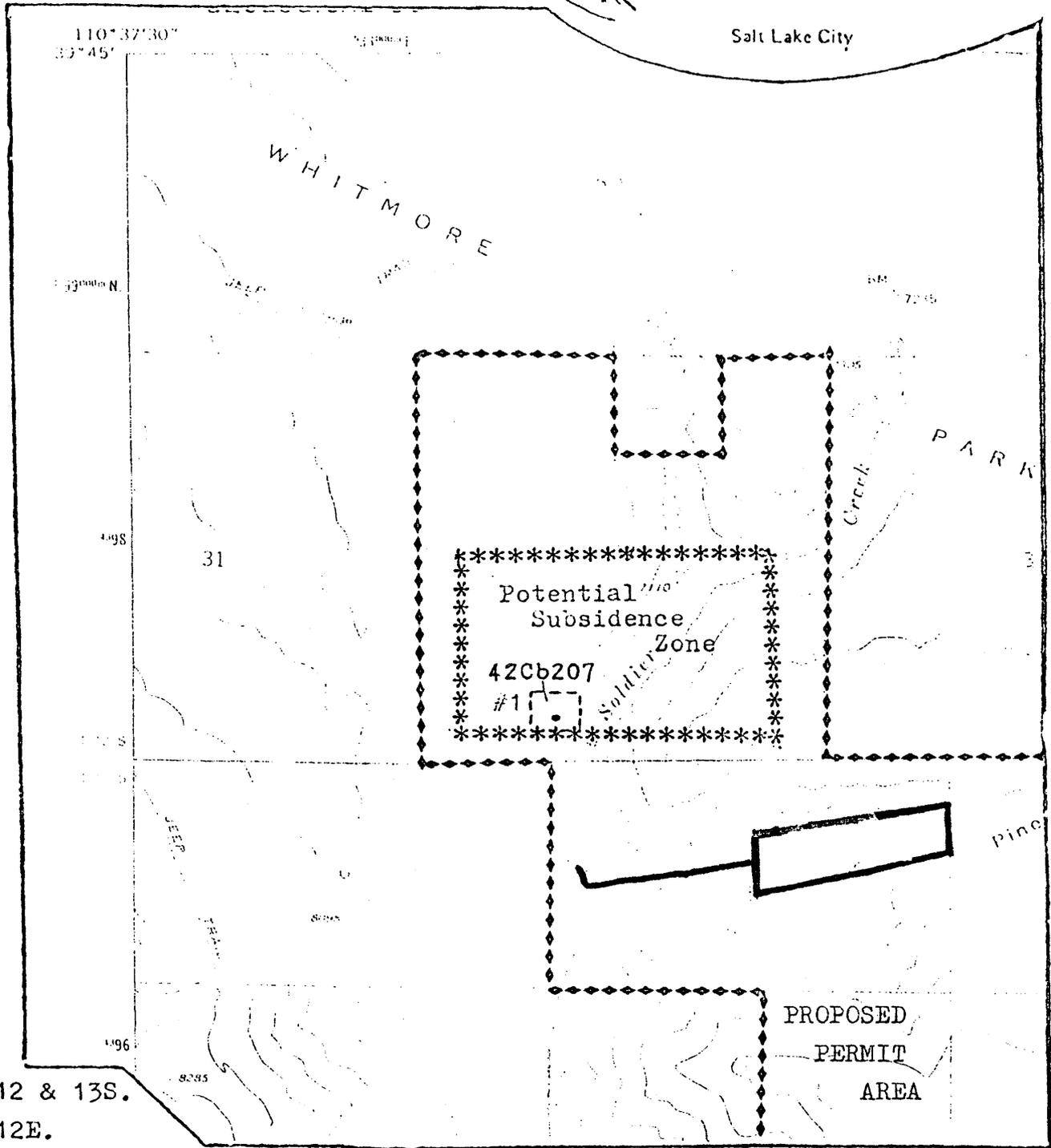
- *T. 13S., R. 12E., Sections 5, 14, 15, 16, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36;
- *T. 13S., R. 13E., Sections 19, 30;
- T. 14S., R. 11E., Sections 1*, 12, 13, 24, 26, 35;
- T. 14S., R. 12E., Sections 3*, 4*, 5*, 6*, 8, 18;
- T. 15S., R. 11E., Sections 2, 3, 8, 9 and 10.

13 (cont'd.)

Some five sites were recorded outside the mine plan permit area. These sites include 42Cb169, 182, 189, 191 and 203. Sites 42Cb169, 182 and 203 are situated on private lands while sites 42Cb189 and 191 are on Federal lands. Sites 42Cb169-191 are all prehistoric lithic scatters with Fremont gray ware (probably Emery Gray) found at 42Cb169. Site 42Cb203 is a historic cabin site. All sites except 42Cb203 were given CRRS:S-3 ratings while 42Cb203 was given a CRRS:S-2 rating of significance. Site 42Cb169 is a Fremont site (San Rafael variant) and sites 42Cb182, 189 and 191 are culturally unknown.

ARERC

Salt Lake City

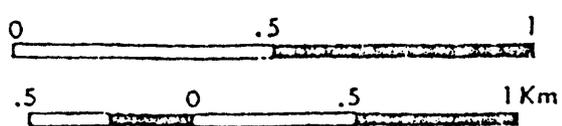


Project: EREC-80-1
 Series: Eastern Utah
 Date: 7-25-80

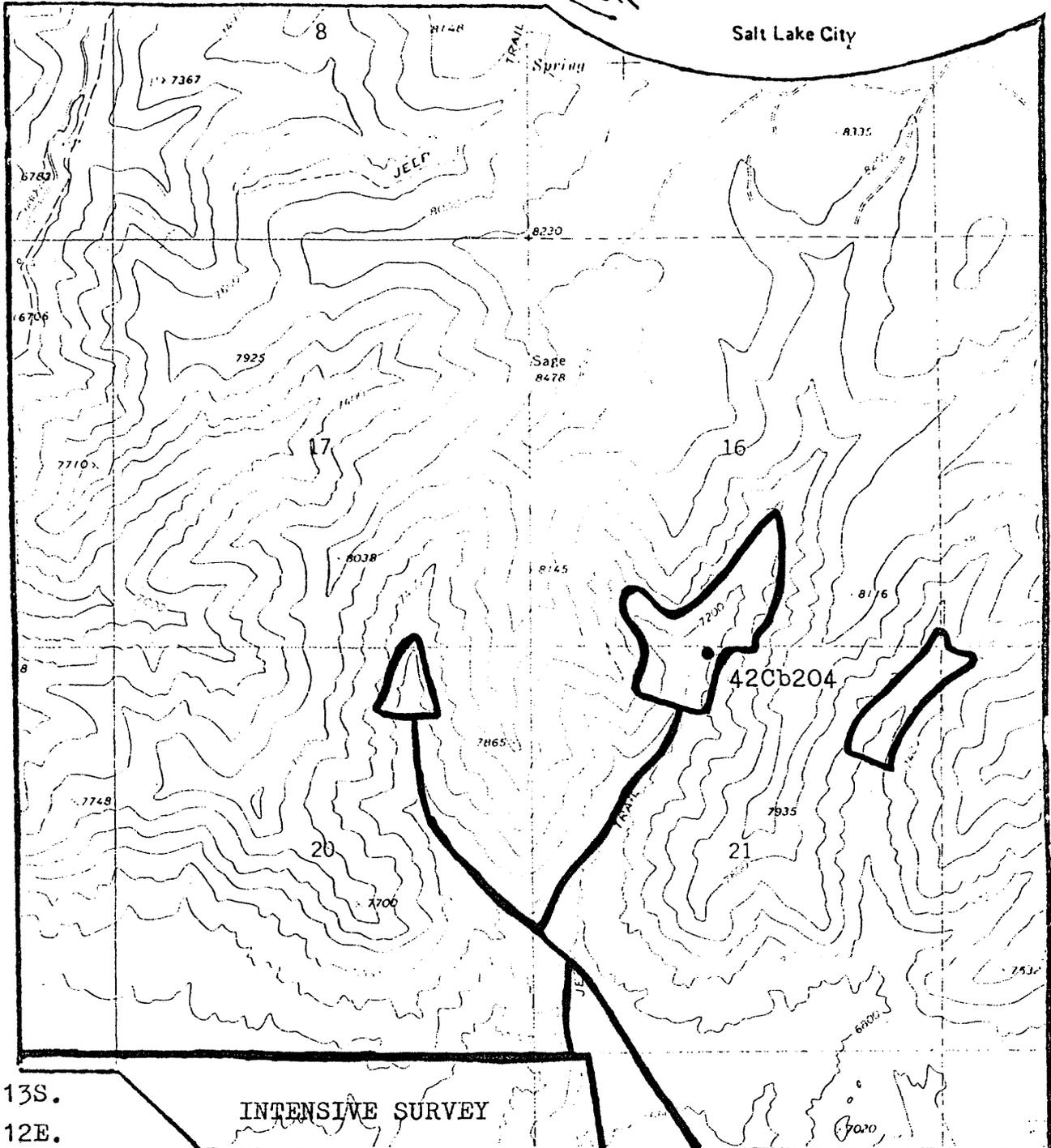
Figure 1
 SITE LOCATION
 IN
 SOLDIER CREEK LOCALITY
 OF
 CARBON COUNTY, UTAH

Pine Canyon, Utah
 7.5 Minute - USGS

Legend:
 Archeological Site •
 Sample Survey Unit
 Intensive Survey Zone



EREC



T. 13S.
R. 12E.

INTENSIVE SURVEY

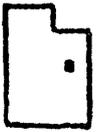
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Quad:

Project: EREC-79
Series: Eastern Utah
Date: 9-17-80

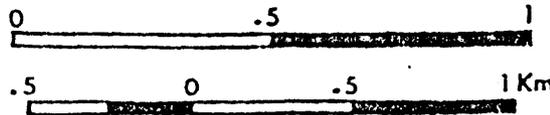
Figure 2
MINE PORTAL ZONES
IN THE
FISH CREEK CANYON LOCALITY
OF
CARBON COUNTY, UTAH

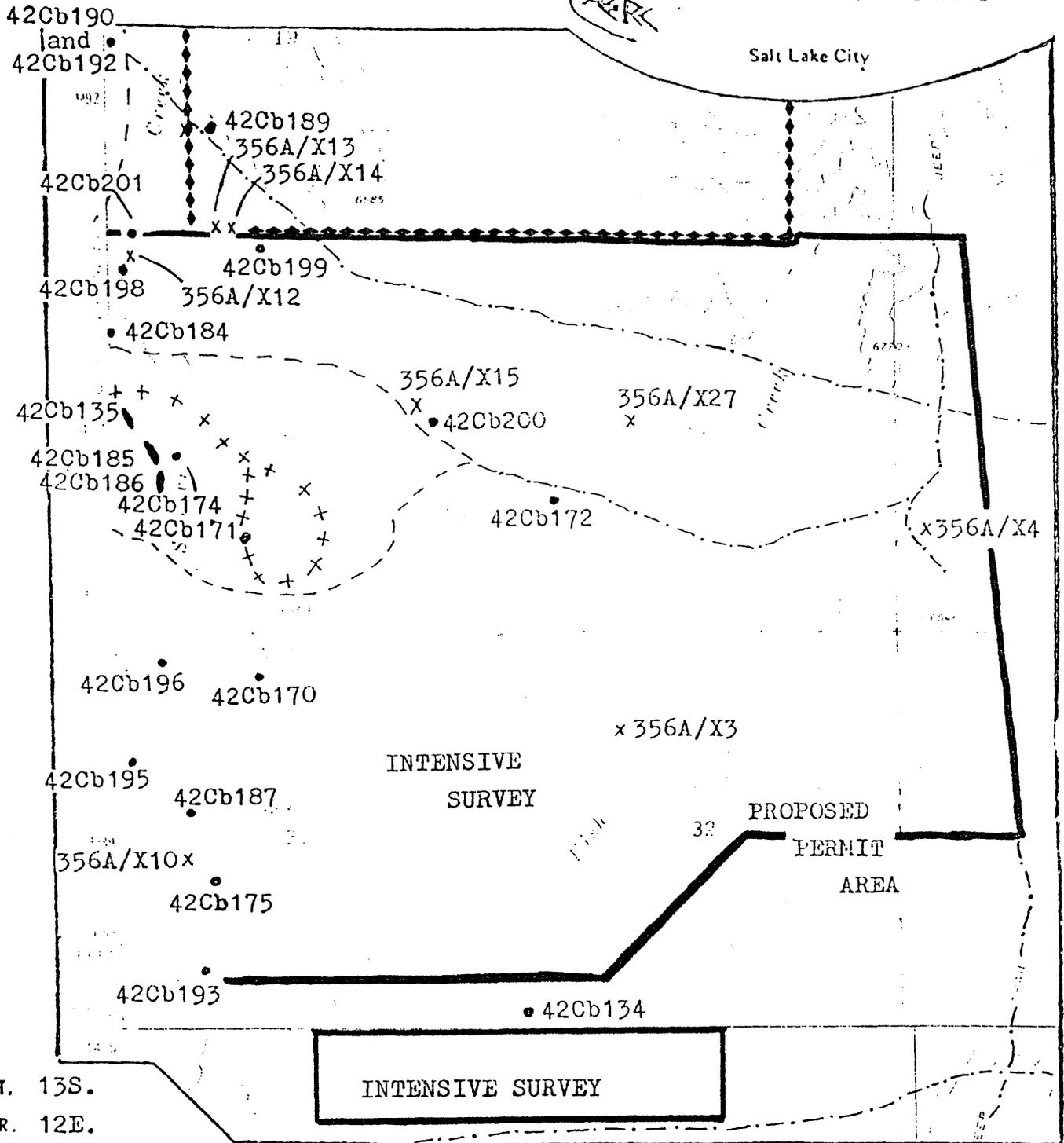
Pine Canyon, Utah
7.5 Minute USGS



Legend:

- Intensive Survey Zone
- Corridor
- Archeological Site





T. 13S.
R. 12E.

Meridian: Salt Lake B. & M.

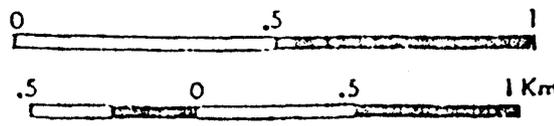
Quad:

Project: EREC-79-1
Series: Eastern Utah
Date: 7-25-80

Figure 3
SITE LOCATIONS
IN THE
SOLDIER AND FISH CREEK
LOCALITY OF
CARBON COUNTY, UTAH

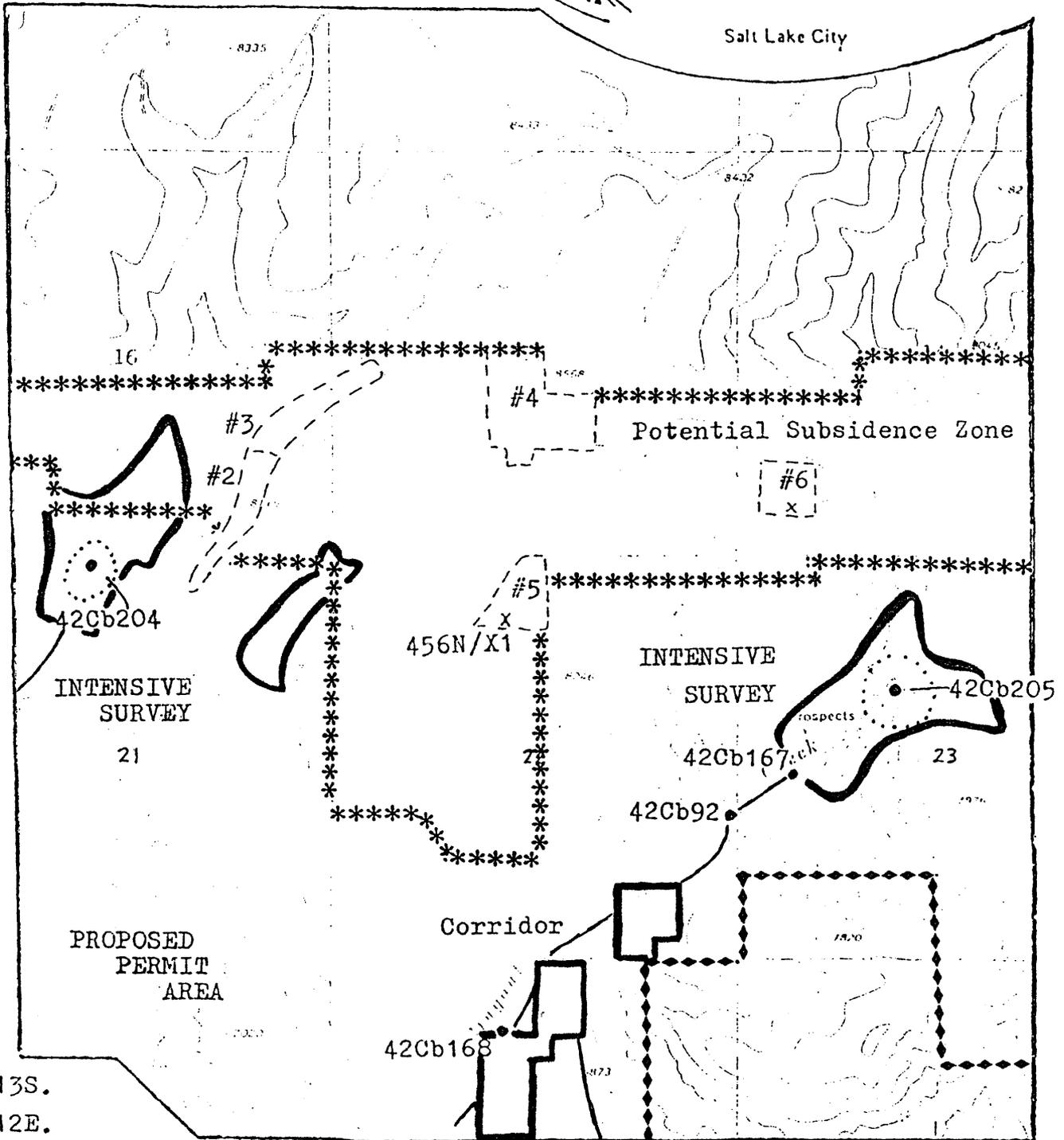
Pine Canyon, Utah
7.5 Minute USGS

- Legend:
- Archeological Site •
 - Isolated Artifact x
 - Railroad Spur ++
 - Construction Zone [dashed line]
 - Corridor [thick line]



ARERC

Salt Lake City



T. 13S.

R. 12E.

Meridian: Salt Lake B. & M.

Quad:

Project: EREC-79-1 &
80-1
Series: Eastern Utah
Date: 7-25-80

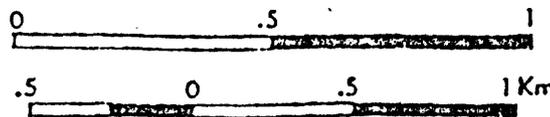
Figure 4
SITE LOCATIONS
IN THE
DUGOUT CREEK LOCALITY
OF
CARBON COUNTY, UTAH

Pine Canyon, Utah
7.5 Minute USGS



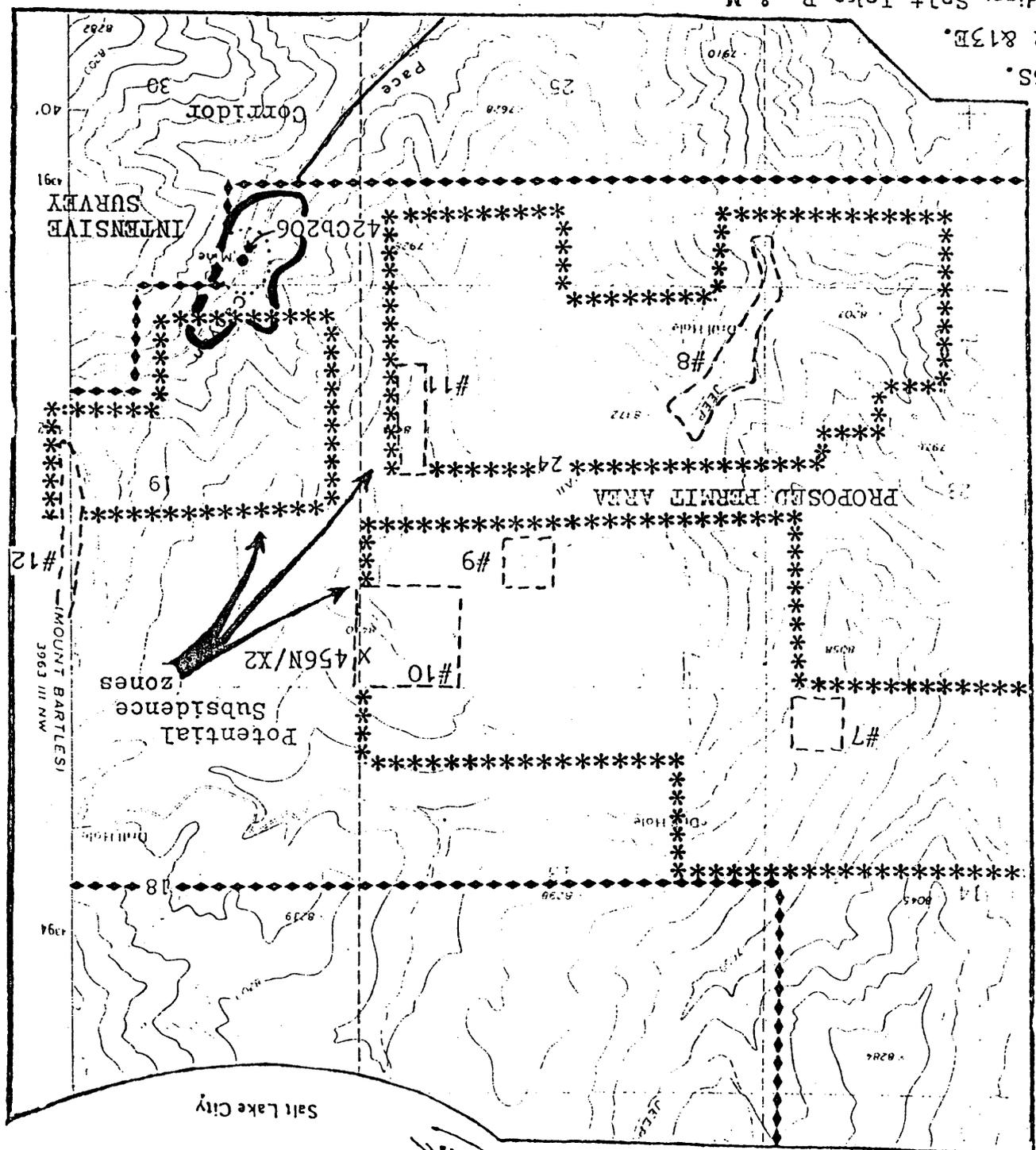
Legend:

- Archeological Site •
- Isolated Artifact x
- Sample Survey Unit ---
- Portal Zone ...





Salt Lake City

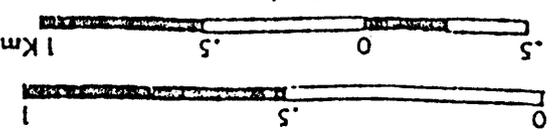


Quad: Pine Canyon, Utah

7.5 Minute USGS
 Archaeological Site
 Isolated Artifact
 Sample Survey Unit
 Portal Zone

Legend:

Figure 5
 SITE LOCATION
 IN THE
 PAGE CANYON LOCALITY
 OF
 CARBON COUNTY, UTAH



Project: ERRC-80-1
 Series: Eastern Utah
 Date: 7-25-80

Meridian: Salt Lake B. & M.

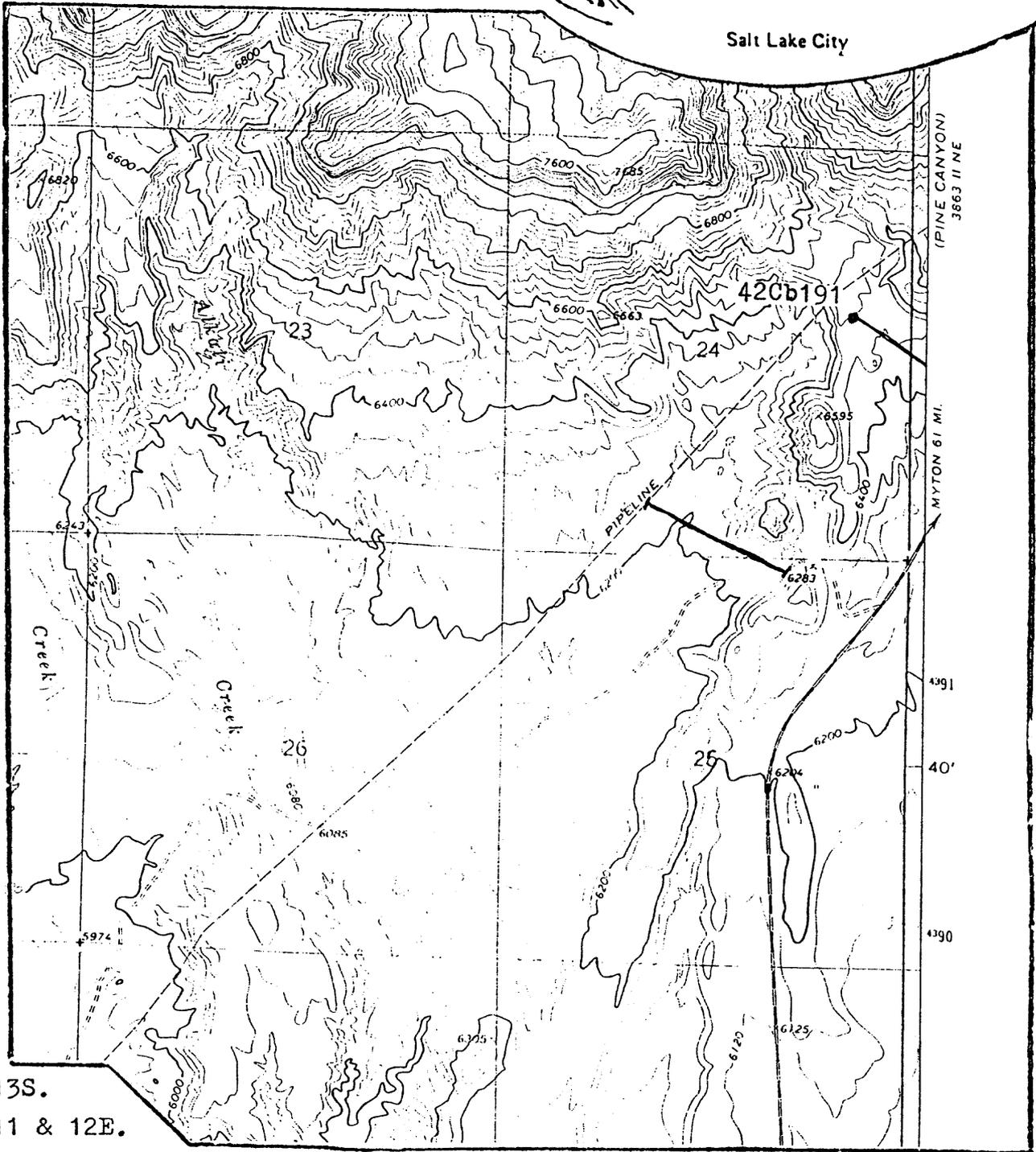
R. 12 & 13E.

T. 13S.



AERC

Salt Lake City



T. 13S.
R. 11 & 12E.

Meridian: Salt Lake B. & M.

Quad:

Project: EREC-79
Series: Eastern Utah
Date: 9-17-80

Figure 6
SITE LOCATION
IN
SOLDIER CREEK LOCALITY
OF
CARBON COUNTY, UTAH

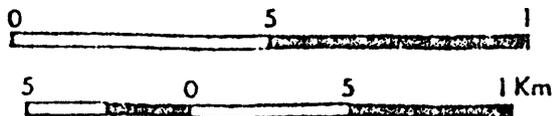
Deadman Canyon,
Utah
7.5 Minute USGS



Legend:

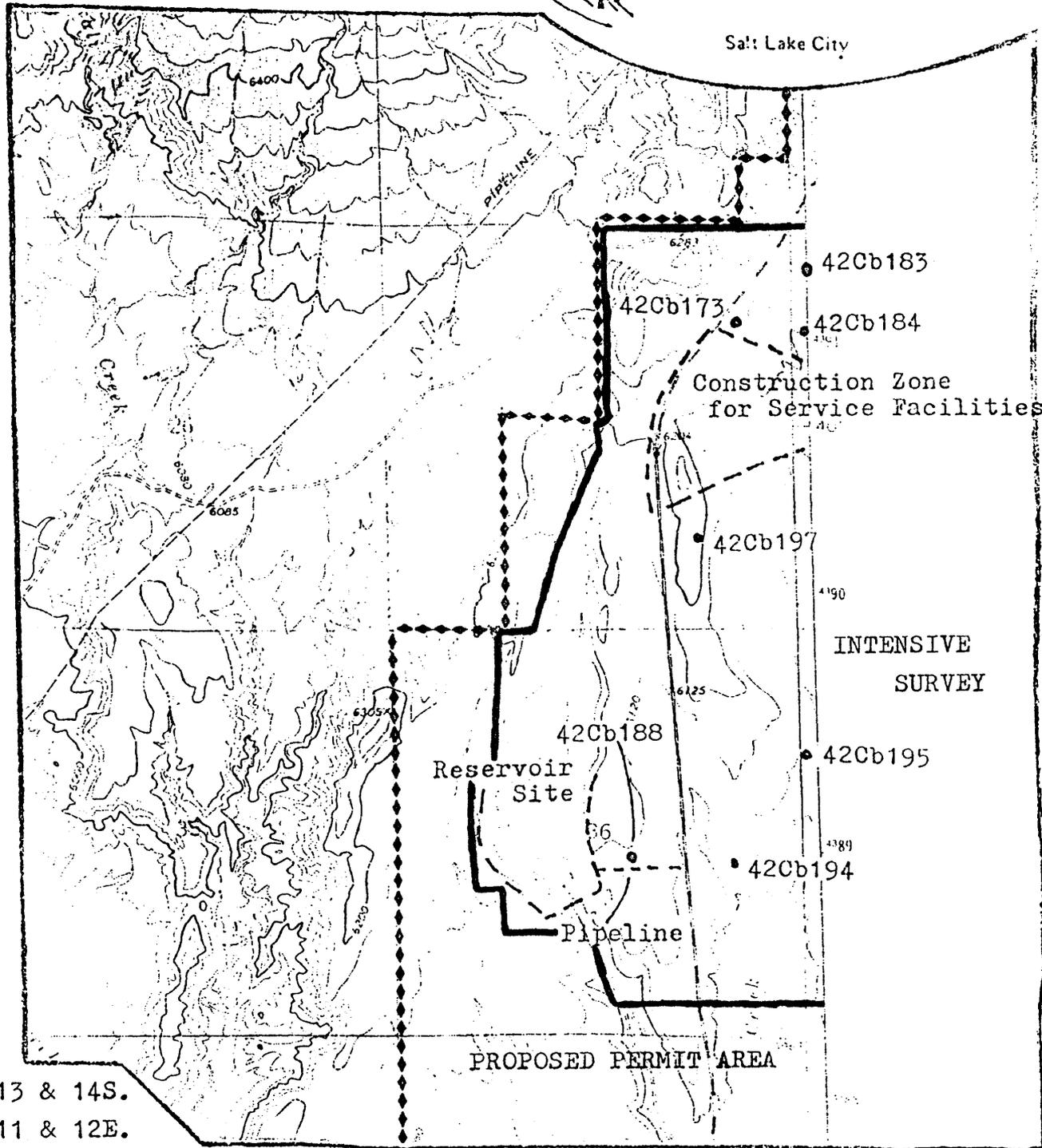
Archeological Site ●

Corridor Survey





Salt Lake City



13 & 14S.
11 & 12E.

Meridian: Salt Lake B. & M.

Quad:

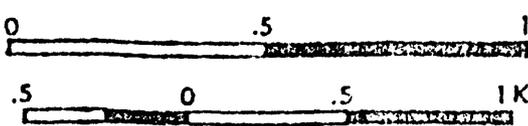
Project: EREC-79-1
Series: Eastern Utah
Date: 7/25/80

Figure 7
SITE LOCATIONS
IN THE
SOLDIER CREEK LOCALITY
OF
CARBON COUNTY, UTAH

Deadman Canyon,
Utah
7.5 Minute USGS

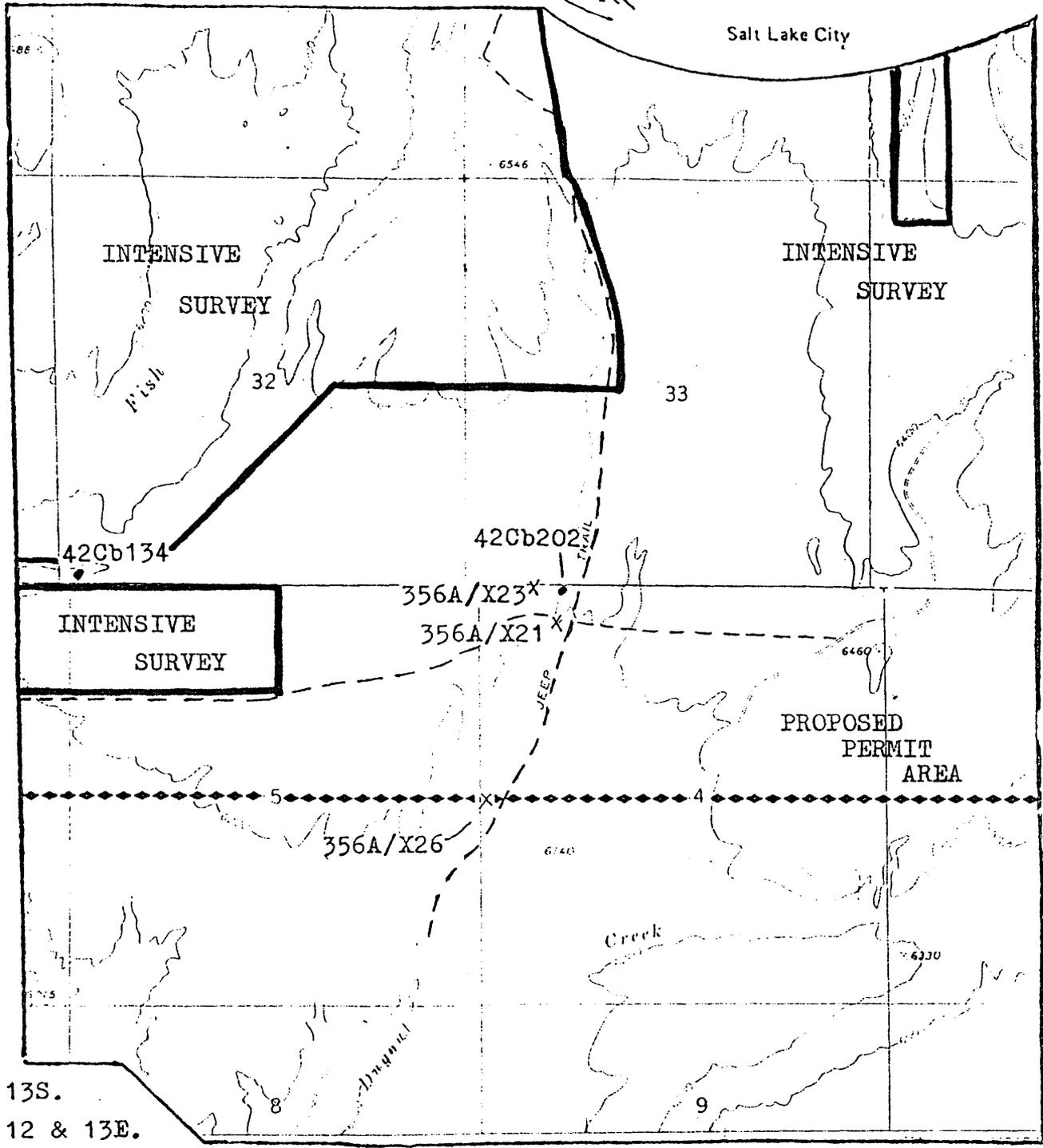


Legend:
Archeological Site •
Isolated Artifact x
Intensive Survey Zone





Salt Lake City



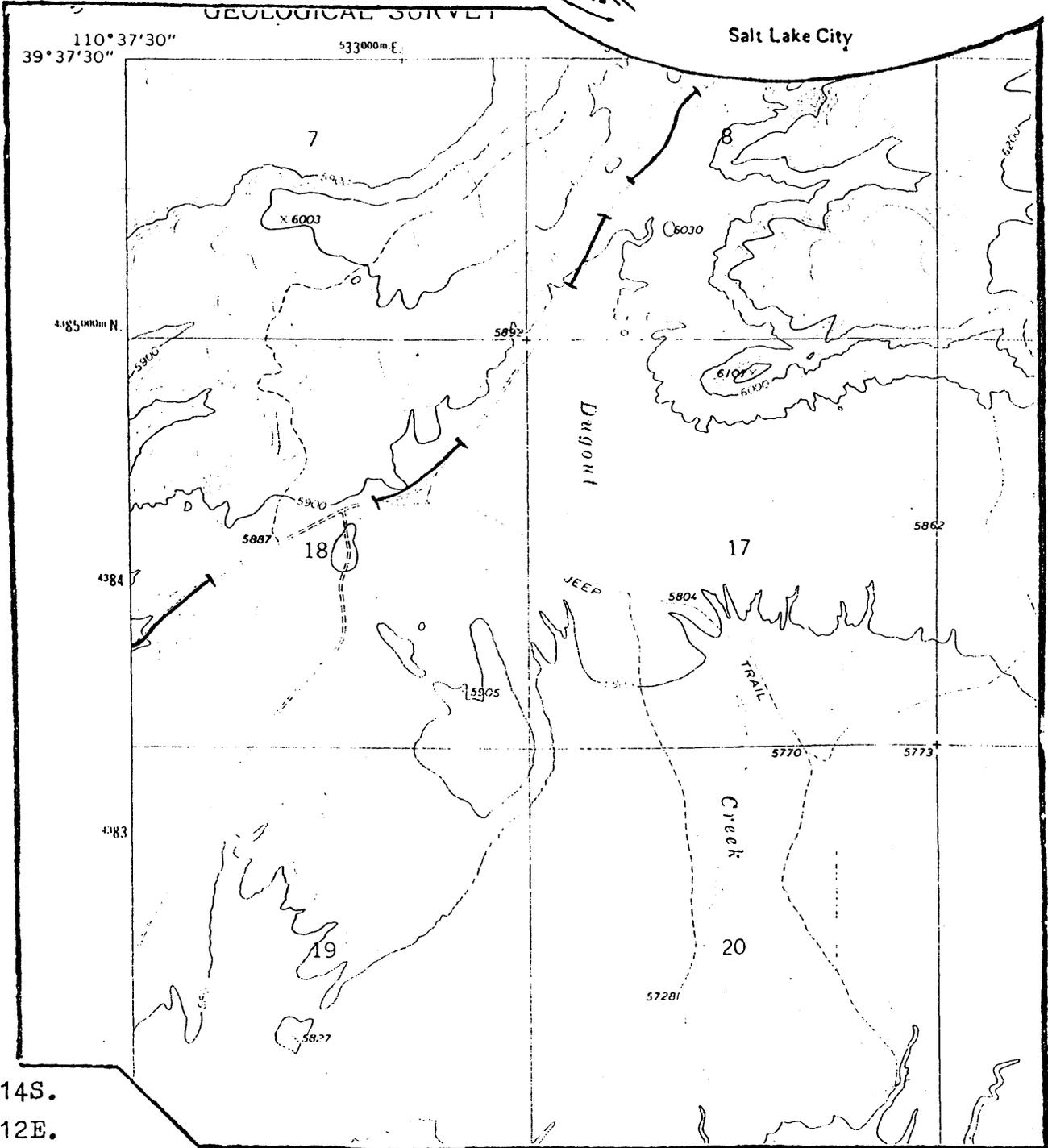
T. 13S.
R. 12 & 13E.

Meridian: Salt Lake B. & M.

Quad:

<p>Project: EREC-80-1 Series: Eastern Utah Date: 7-25-80</p>	<p>Figure 8 SITE LOCATIONS IN THE DUGOUT CREEK LOCALITY OF CARBON COUNTY, UTAH</p>	<p>Pine Canyon, Utah 7.5 Minute USGS</p> 
<p>0 .5 1 0 .5 1 Km</p>		<p>Legend: Archeological Site • Isolated Artifact x Corridor  Intensive Survey Zone </p>

ARERC



T. 14S.

R. 12E.

Meridian: Salt Lake B. & M.

Quad:

Project: EREC-79

Series: Eastern Utah

Date: 9-17-80

Figure 9

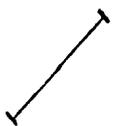
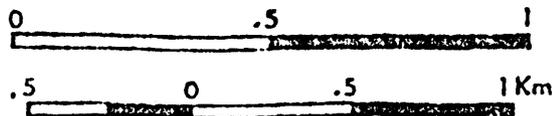
CORRIDOR EVALUATIONS
IN THE
DUGOUT CREEK LOCALITY
OF
CARBON COUNTY, UTAH

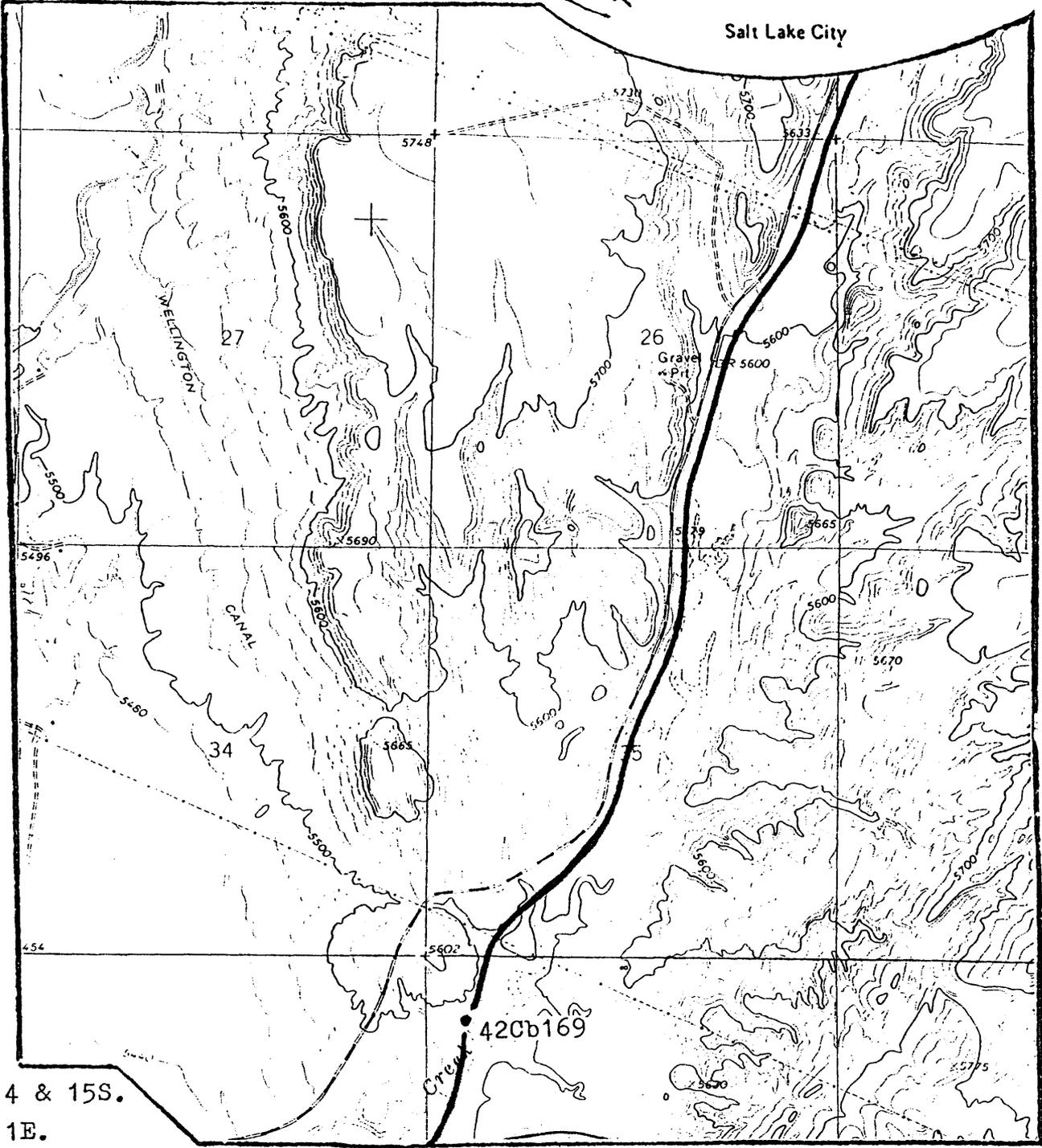
Sunnyside Junction
Utah

7.5 Minute USGS

Legend:

Corridor





T. 14 & 15S.

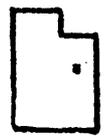
R. 11E.

Meridian: Salt Lake B. & M.

Quad:

Wellington, Utah

7.5 Minute USGS



Project: EREC-79

Series: Eastern Utah

Date: 9-17-80

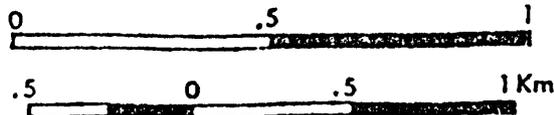
Figure 12

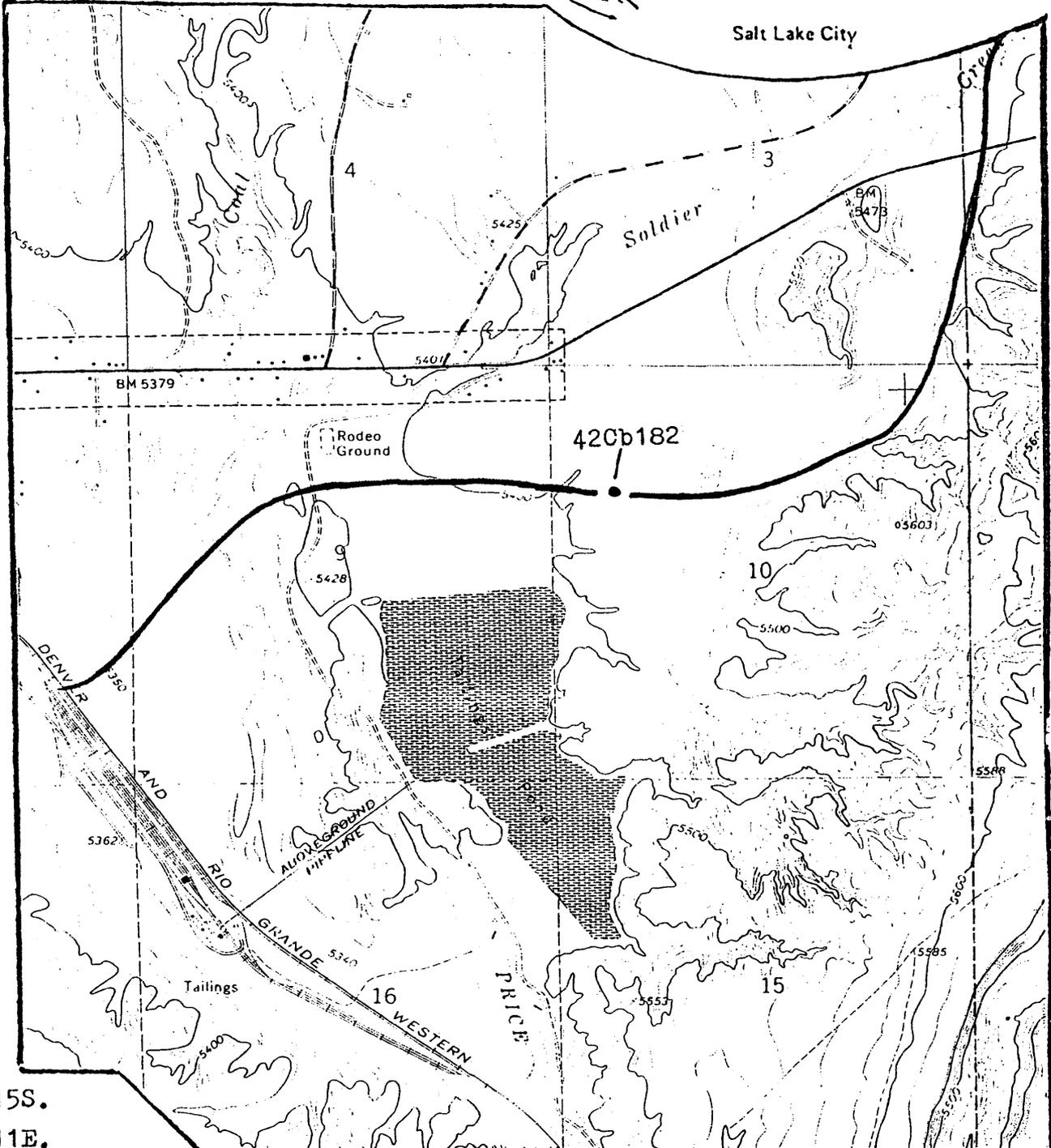
CORRIDOR EVALUATION
IN THE
WELLINGTON LOCALITY
OF
CARBON COUNTY, UTAH

Legend:

Corridor

Archeological Site





T. 15S.
R. 11E.

Meridian: Salt Lake B. & M.

Quad:

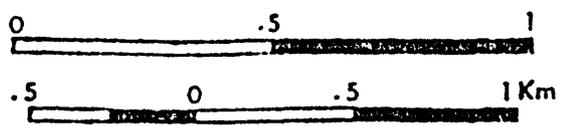
Project: EREC-79
Series: Eastern Utah
Date: 9-17-80

Figure 13
CORRIDOR EVALUATIONS
IN THE
WELLINGTON LOCALITY
OF
CARBON COUNTY, UTAH

Wellington, Utah
7:5 Minute USGS



Legend:
Corridor
Archeological Site



INTENSIVE ARCHEOLOGICAL SURFACE EVALUATIONS
OF THE
PROPOSED SAGE POINT-DUGOUT CANYON PROJECT
IN
CARBON COUNTY, UTAH

Mine Plan Applicant: Eureka Energy Company
of Salt Lake City, Utah
(Coal Mine and General Service Facilities
Development)

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



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

PAPER NO. 19
September, 1980
Salt Lake City, Utah

ABSTRACT

Between late summer, 1979 and early summer, 1980, Archeological-Environmental Research Corporation conducted a cultural resource inventory for Eureka Energy Company's proposed Sage Point-Dugout Canyon Project north of Wellington, Utah. A total of about 4.5 square miles and 30 miles of corridors for the mine portals, general service facilities and communication and transportation routes was intensively examined. In addition, a biased set of sample areas totalling 180 acres was examined in the potential subsidence zone.

A total of 38 cultural resource sites (including one previously recorded site) was located and evaluated. Of the 38 total sites, the 33 sites which are within the mine plan permit area are discussed in this report. The 33 sites include nine historic structures, 23 prehistoric sites and one combination historic and prehistoric artifact scatter. The majority of the datable prehistoric sites belong to the Post-Archaic/Fremont period with less common evidence of occupation during the Archaic and Shoshonean periods. The historic sites are primarily homesteads or mine portals. All of the cultural resource sites, regardless of age, tend to cluster along the Soldier Creek drainage within the Pinyon-Juniper vegetation community.

For the 33 sites which will be subject to direct or indirect impact during project construction, testing and mitigation plans are recommended.

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Chapter I - INTRODUCTION

A. General Data on the Project

In the fall of 1979, the Archeological-Environmental Research Corporation (AERC) of Salt Lake City was contacted by Eureka Energy Company and asked to conduct an intensive cultural resource evaluation of all mine portal areas, the service dump areas and all associated corridors relative to the development of mine facilities in the Sage Point-Dugout Canyon locality of Carbon County, Utah. Eureka Energy Company (EEC), desirous of preparing a mine plan application for submission to federal and state authorities, requested that cultural resource evaluations be conducted which would comply with pertinent governmental legislation, i.e. Executive Order 11593 "Protection and Enhancement of the 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 on this development, please refer to the mine plan application prepared by Eureka Energy Company.

AERC's field evaluations for this project actually began in the summer of 1979 under contract to the Eckhoff, Watson and Preator engineering firm of Salt Lake City. This firm was conducting road engineering studies for Eureka Energy and had AERC do intensive evaluations of undisturbed areas adjacent to existing road surfaces which were due to be upgraded during project development. Several reports on cultural resources of the area were prepared for the Eckhoff, Watson and Preator firm (see EWP-79-1 and EWP-79-2 reports issued on July 30 and October 1, 1979). The two sites reported during these preliminary evaluations are included within this report, but are differentiated from the primary project sites

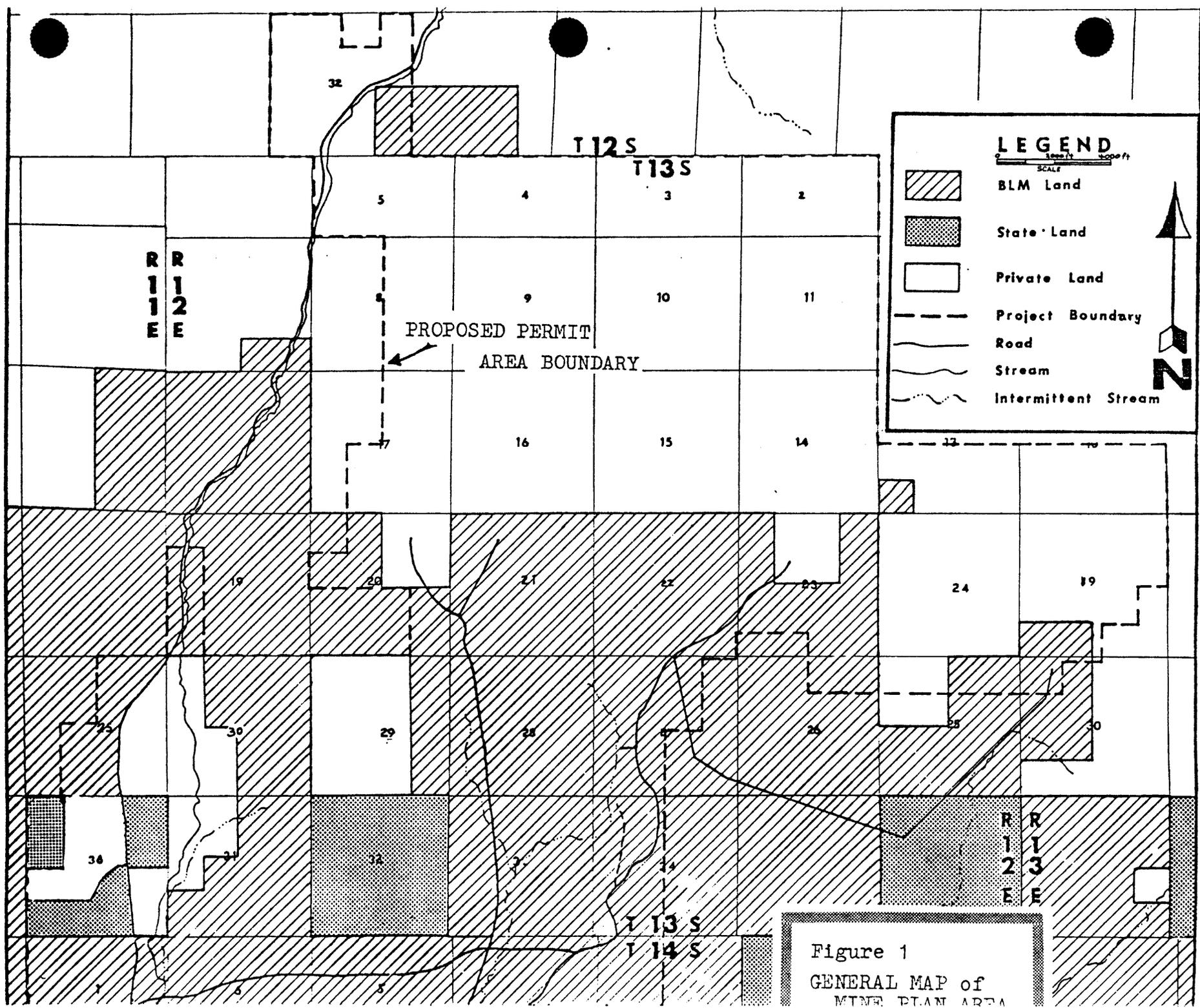


Figure 1
GENERAL MAP of
MINE PLAN AREA

recorded by AERC under direct contract with Eureka Energy Company (EEC). Counting the two sites recorded under EWP-79-1, the 35 sites recorded under contract to EEC and the one previously recorded site, (42Cb92), a total of 38 cultural resource sites were evaluated in the general project with 33 sites situated within the mine plan permit area. Recommendations concerning mitigational techniques relative to those 33 sites which will be adversely affected by the mine development are provided in this report.

AERC initiated the field work under U.S. Department of Interior Antiquities Permit No. 79-Ut-061 and has concluded this phase under Permit No. 80-Ut-069 (expires 5/8/81). Work began on the Eckhoff, Watson and Preator projects in July of 1979, while field work in consultation with Eureka Energy began in November of 1979 and was concluded on July 2, 1980.

The resource inventory included one large parcel of about 4.5 square miles surrounding the service and facility area, various portal-dump zones, an additional 30 to 40 linear miles of corridor and 12 sample survey units, totaling 180 acres. A total of 3428 acres was intensively examined exclusive of corridor routes. The surface areas surveyed are shown on Figures 1 and 2 and are all situated within various sections of Township 12 South, Range 12 East; Township 13 South, Ranges 11, 12 and 13 East; Township 14 South, Ranges 11 and 12 East of Carbon County, Utah. The project area is situated some 12 miles to the northeast of Price, Utah. U.S.G.S. 7.5 Minute topographic quads of the project area include Pine Canyon, Deadman Canyon and Wellington, Utah.

Surfaces within the mine plan project area vary in ownership from private through state lands and federal lands administered by the Bureau of Land Management. The relationship between project boundaries and various land ownership boundaries are shown in Figure 1.

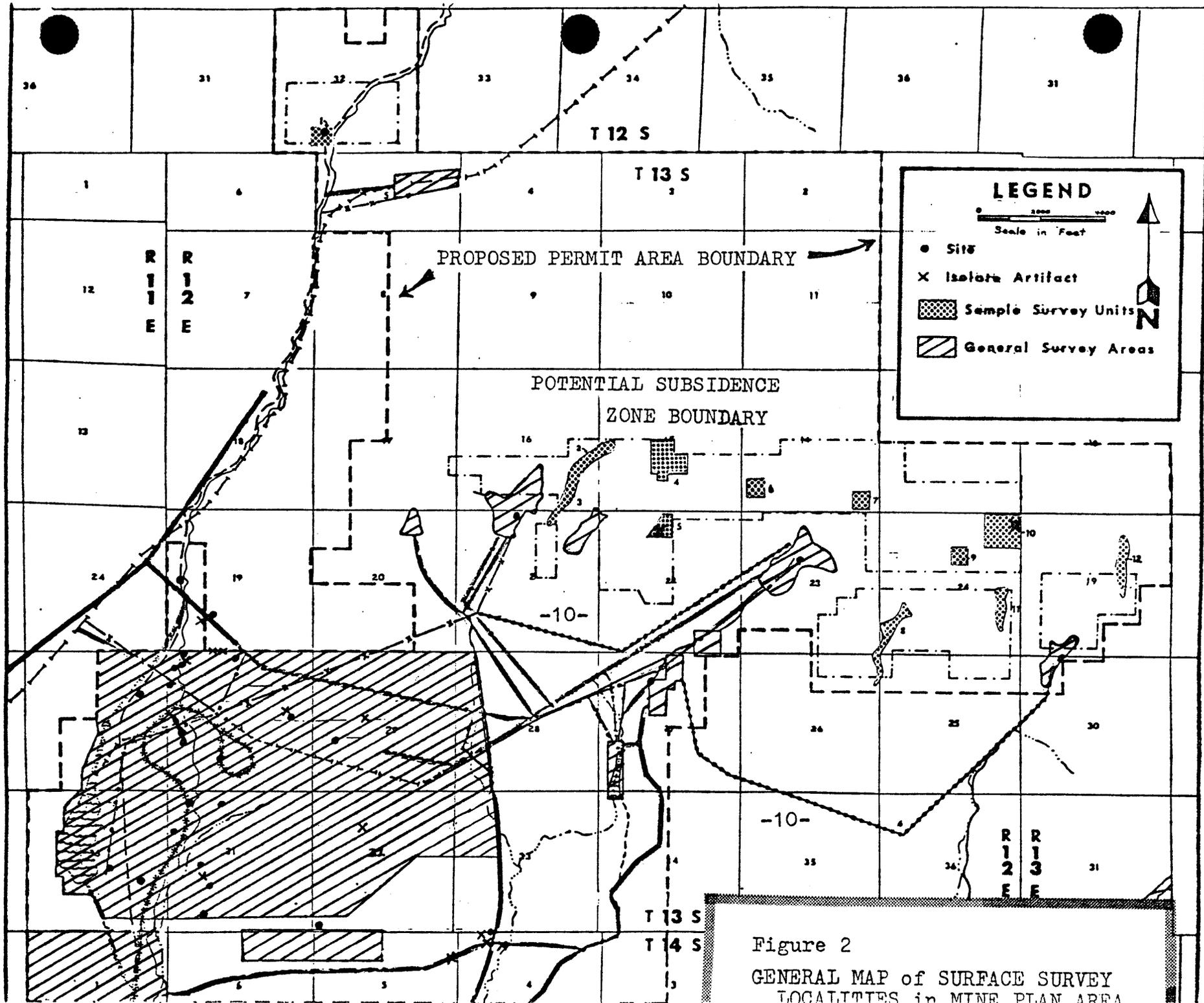


Figure 2

GENERAL MAP of SURFACE SURVEY LOCALITIES in MINE PLAN AREA

All field notes and site data are filed at AERC headquarters in Bountiful, Utah. Site reports are being submitted to the SHPO as well as to all relevant government agencies. Artifacts collected during the surveys are being curated at the Museum of Archaeology and Ethnology at Brigham Young University.

B. Environment and Locality

The main project area is located along the east side of Soldier Creek, within and below the Book Cliffs. The mine and fan portals are located in small canyons which cut through the main line of cliffs, while the sample survey units (see Figure 2) are situated upon potential subsidence surfaces in the uplands. The service facilities are all lying below the Book Cliffs in the rolling foothills.

The primary drainage of the project area is by way of Soldier Creek and one of its major tributaries, Fish Creek. Both Soldier Creek and Fish Creek are seasonal streams at the present although the former is much larger. Soldier Creek empties into the Price River east of Wellington. Two of the portal areas which lie east of the main project area are drained by Dugout Creek and Pace Creek, respectively, which join before emptying into the Price River about eight miles east of its confluence with Soldier Creek.

The general project area spans three environmental zones: the Montane, the Pinyon-Juniper and the Desert Shrub ecozones; however, the mine plan area is situated only in the Montane and Pinyon-Juniper zones. The Montane ecozone is present mainly in the higher elevations (ca. 7000 to 8000 feet) of the sheltered Book Cliff canyons. The vegetation in this zone includes limber pine Pinus flexilis, ponderosa pine Pinus ponderosa, blue spruce Picea pungens, Douglas fir Pseudotsuga menziesii, white fir Abies concolor and Rocky Mountain juniper Juniperus scopulorum (Johnson 1970).

The Pinyon-Juniper zone begins at the base of the Book Cliffs (elevation ca. 6000 to 7000 feet ASL) and is intermittently present for about four miles south of the Cliffs. The pinyon Pinus edulis and juniper Juniperus osteosperma are most dense at the base of the cliffs and on the mesas surrounding the Soldier Creek and Fish Creek valleys. As one progresses farther away from the Book Cliffs, the pinyon and juniper gradually diminish in density. At the south end of the zone, the pinyon are no longer found. The Pinyon-Juniper zone is characterized by a wide variety of vegetation including pinyon, juniper, service berry Amelanchier utahensis, plains prickly pear Opuntia polyacantha, fishhook cactus Sclerocactus whipplei, hedgehog cactus Echinocereus engelmannii, Indian rice grass Oryzopsis hymenoides, sagebrush Artemisia tridentata, Brigham tea Ephedra viridis and wild cabbage Caulanthus crassicaulis. All of the above species are found on the non-alkaline, well-drained slopes and flats. The Sclerocactus whipplei is rare in the area, however.

On the more alkaline surfaces within the Pinyon-Juniper zone adjacent to Soldier Creek and Fish Creek, the following species are found: greasewood Sarcobatus vermiculatus, rabbit brush Chrysothamnus nauseosus, and shadscale Atriplex canescens, although the shadscale is not common.

The stream banks of Soldier Creek support the growth of two cottonwood species: Populus fremontii and Populus angustifolia and occasional tamarisk Tamarix ramosissima.

South of the Pinyon-Juniper zone is the Desert Shrub zone where the vegetation becomes less complex (elevation ca. 5300 to 6000 feet). Occasional Juniperus are found on high points and occasional Populus fremontii and Tamarix ramosissima are found adjacent to Soldier Creek.

The dominant vegetation along Soldier Creek in this zone is greasewood Sarcobatus vermiculatus with smaller communities of rabbitbrush Chrysothamnus nauseosus and shadscale Atriplex confertifolia in the less alkaline areas. Widely scattered clumps of hedgehog cactus Echinocereus engelmannii are also present.

The surface geology of the general project area is relatively simple. The lower lying flat areas from the foot of the Book Cliffs to the Price River are primarily exposures of the Cretaceous age Mancos Shale. The mesas and other erosion remnants are generally Quaternary age gravel surfaces.

The Book Cliffs consist of several Cretaceous age formations topped by a Tertiary limestone. At the bottom of the Cliffs, the Blackhawk Formation, consisting of sandstone, siltstone, mudstone and coal deposits, is exposed. Above that is the cliff-forming Castlegate Sandstone member of the Price River Formation and North Horn Formation, both of which are chiefly sandstone and mudstone. The top of the Book Cliffs is capped by the Tertiary Age Flagstaff Formation.

The fauna present in the project area include numerous avian and rodent species. Mule deer Odocoileus hemionus are also numerous in the project area during the late autumn, winter and spring, but move up into the Book Cliffs during the summer. About ten mule deer, which had died during the previous winter, were noted during the inventory activities of April and May, 1980. All of these recent deaths occurred in the Pinyon-Juniper zone within about a quarter of a mile from Soldier Creek.

Coyote Canis latrans remains were also noted in unusually high frequencies. Some had died of natural causes, but some had been shot or caught in traps. A local informant also indicated that at least one mountain lion Felis concolor was active in the area.

The general project area lies between the dry Desert Shrub ecozone and the Montane zone within the elevations of 5300 and 7400 feet ASL, including the railroad route into Wellington. The actual mine plan area, however, is situated between 5800 and 7400 feet ASL. Annual precipitation within the general locality ranges between eight and sixteen inches, including between four and eight inches of precipitation falling within the May to September period. The freeze-free season for this area currently ranges between 60 and 160 days each year depending upon elevation and aspect. Snow cover in the project area precluded field research during the months of December through mid-April. Through the remainder of the year, the daytime temperatures are relatively comfortable, having a mean between 60° and 95°.

Prior to the beginning of the Holocene Epoch (ca. 10,000 years B.P.), the pluvial conditions of the Pleistocene in the eastern Great Basin and in the Wasatch Range began to decrease. The gradual heating and drying trend of the Anathermal (ca. 10,000 to 7500 B.P.) was accelerated until ca. 4000 B.P., although this occurrence varied in different localities throughout the West relative to local conditions. The ecosystems of the project area were, undoubtedly, influenced by these climatic changes from cool and wet through a period of increasing desiccation. After ca. 4000 B.P., the climate in the Intermountain West became cooler and wetter than at the present with a subsequent remigration of floral and faunal species from the upper elevations back into the lower basins. These fluctuations in climate affected prehistoric human occupation patterns in the west as shall be noted in a later section.

Land-use techniques employed in the project area have ranged from hunting-gathering activities, which began during the Pleistocene, to primitive farming technology practiced along the river bottoms by the Fremont peoples as

early as 1500 B.P. With the introduction of the Euro-American settlers in the 19th century, modern farming technology, including horticulture and livestock production, became established in the Price River Basin. During the historic period until the present, the general project area has been primarily utilized as rangeland for livestock grazing. Some horticulture related to the livestock industry has developed along the alluvial creek bottoms that extend between the cliffs and the Price River. In addition to agriculture, some coal mining has occurred during the 20th century in Dugout, Face and Soldier Canyons which are all situated in the project area.

C. The Prehistory and History of the Region

The prehistoric human activities in the Price River Basin-Book Cliffs region of east-central Utah is divided into four main phases beginning with the Paleo-Indian culture phase which was characterized by a big game hunting subsistence base, augmented by gathering activities. This phase, which existed ca. 12,000 to 7000 B.P., has been sequentially divided into the Llano, Folsom and Plano cultures based upon diagnostic projectile points recovered in the western United States. Clovis, Folsom and Plano sites have been recorded in central and western Utah but no Paleo-Indian sites or artifacts have been discovered in the project area. Isolated artifacts from the Plano subphase (ca. 9000 to 7000 B.P.) occur in a higher frequency in the Price River and Muddy Creek regions than artifacts related to the previous subspheres. This indicates that population densities were probably increasing in central Utah during the Plano which roughly corresponds with the gradual drying trend of Antev's Anathermal phase.

The reduction of the great herds in the West, possibly affected by the aridity of the Altithermal phase and the increase in population gradually shifted the subsistence base from big game exploitation to an emphasized gathering economy which characterizes the Archaic cultural phase. The Archaic cultures of this general region have been examined in the Central Coal Project of Utah as reported by AERC in 1977. Pertinent information from that report (see Hauck 1979c:66-69) can be noted:

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, in press) in the southern Wasatch Mountains and Cowboy Cave (Jennings et al in preparation) 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 four phases based on changes in both projectile point types and population densities (Schroedl 1976).

The Black Knoll subphase begins at approximately 8300 B.P. and continues until about 6200 B.P. (Schroedl 1976). 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 Black Knoll subphase of the Archaic was characterized by two types of dart points, the Pinto and the Northern Side Notch (Schroedl 1976).

The Castle Valley subphase of the Archaic began about 6200 B.P. and ended about 4500 B.P. Subsistence techniques and the utilization of caves were the same as the earlier Black Knoll subphase but dart point styles changed and also diversified. Dart points such as Rocker Base, Sudden Side Notch and Hawken Side Notch appeared early in the Castle Valley subphase and continued to be utilized until the end. During the later part of the Castle Valley subphase, Humboldt dart points appeared and quickly became the dominant style (Schroedl 1976).

The Green River subphase of the Archaic began about 4500 B.P. and ended about 3300 B.P. and has a western and eastern variant (Schroedl 1976). Both variants are characterized by subsistence techniques unchanged from earlier Archaic subphases. The two variants are distinguished by differences in dart points. Gypsum and San Rafael Side Notch dart points are associated with the eastern variant. The dart points of the eastern variant exhibit a Plains influence.

The Dirty Devil subphase of the Archaic began about 3300 B.P. and has been given an arbitrary termination date of 1500 B.P. (Schroedl 1976). Subsistence techniques were unchanged during the early portion of the subphase, but evidence of corn horticulture in the late Dirty Devil subphase 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). At all three locations, corn caches were found which dated generally between 1600 B.P. and 2000 B.P.

The dart points characteristic of the Dirty Devil subphase are the Gypsum point which continued from the Green River subphase as the predominant projectile point. The very late portion of the Dirty Devil subphase evidences the advent of the bow and arrow. At Cowboy Cave (Jennings et al in preparation), Rose Springs arrowheads were recovered from the uppermost level and were dated between 1500 and 1600 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 Archaic phase. However, the advent of the bow and arrow around 1600 to 1500 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 in preparation).

The last centuries of the Archaic also witnessed the first evidence of corn horticulture.

The Fremont culture of Utah extended over the greater part of the state from the Salt Lake and Uintah Basins on the north to the Henry Mountains and the Virgin River headwaters of the south. The Fremont variants of the Uintah Basin and the San Rafael-Price River regions have been dated between 1500 and 700 B.P. This culture utilized an economic base including both hunting-gathering subsistence and horticulture. In addition to their dependence on the bow and arrow, these people maintained village settlements and developed technologies in ceramics and stone architecture, undoubtedly influenced by the Anasazi cultures of southern

Utah. Movement between the Uintah Basin and the Price River Basin was accomplished through Nine Mile Canyon where numerous Fremont sites have been recorded. Since Soldier Creek, which lies in the project area, leads east directly to the headwaters of Minnie Maud Creek in Nine Mile Canyon, there is a high probability of extensive Fremont activity along Soldier Creek.

The Shoshonean phase extended from ca. 650 B.P. into the Historic period. Their subsistence base was primarily oriented to seasonal hunting and gathering activities; however, there is ethnographic evidence of horticulture being practiced by Utes in the Fremont River valleys of southern Utah. Small Shoshonean familial bonds (Ute, Paiute and Shoshone peoples) utilized the bow and arrow for hunting and warfare, constructed brush surface shelters and manufactured distinctive gray to tan ceramic vessels. The Desert Side Notch point and thick, sand-tempered grayware are distinctive artifacts from the Shoshonean phase in central Utah.

The Historic period in east-central Utah is divided into three phases: Early Historic, Agricultural Settlement, and Mining Developments.

The Early Historic period is characterized by the introduction of Euro-American trading, exploration and fur trapping which affected the aboriginal populations in Utah beginning in the 17th century. The Dominguez-Escalante expedition of 1776-1777 brought the first known Spanish contact in central Utah; however, their expedition map is quite accurate concerning the Price River Basin, suggesting previous Spanish activity in the basin. By the early 1800s, and until 1840, the fur trade was active in Utah. Trappers, traders and explorers included the Arza-Garcian expedition of 1813, Antoine Robidoux, Jedediah Smith, William Ashley and Peter Skeen Ogden. The fur trade began its decline after 1840 as a

result of changes in European and eastern American fashions and the serious social-economic impact the fur industry had on the Ute bands in Utah (Hauck 1979c:78-80). The settlement of Utah, beginning in 1847' by Mormon pioneers, gradually brought widespread agricultural development into Utah. Mormon settlement of the Price River Basin was not initially accomplished due to hostile Ute Bands residing on the east of the Wasatch Range (O'Neill 1973). The establishment of military control over the Utes and their relocation to the Uintah Reservation in 1877 brought the first settlements in Castle Valley. By 1880, Emery County, which included all of present-day Carbon County, was created by the Territorial Legislature (Lever 1898:593). Present-day settlements in the general project locality include the towns of Price and Wellington, respectively, situated some 12 miles to the southwest of the project area.

Coal mining in the project area was first begun in 1853 with the Gunnison Expedition's discovery of coal deposits situated three miles east of the modern town of Emery. The first attempt to exploit the coal resources of the general locality occurred in 1875 at Connellsville in Huntington Canyon on the east slopes of the Wasatch. Various mining activities were initiated along the Wasatch after that date, e.g., Pleasant Valley, Winter Quarters Canyon and the Mud Creek mine (from 1875 through 1882). By 1888, the Castle Gate mine was operational and in 1899, a mine at Sunnyside, just east of the project area, had begun production (Hauck 1979c: 84-86).

Prospecting in the Sage Point-Dugout Canyon area was well advanced by that date, resulting in some coal production out of the Dugout Canyon, Fish Creek Canyon and Pace Canyon mines by 1906. Mines in these canyons were the Knight-Ideal, the Spring Canyon and the Snow mine, respectively. In 1906, their most active production periods were from 1920 until 1963

(Knight-Ideal mine) and from 1932 until 1940 (the Snow mine). The Spring Canyon mine on Fish Creek was apparently active only from 1906 until 1910. Coal production in Soldier Creek Canyon, initiated by the Premium mine in 1931, has continued up to the present time (Doelling 1972:Table 65). With the exception of the Spring Canyon mine, mining activity in the project area began in the Historic period but has been most active since 1930. Modern activity at those three mines during the intervening 50 years has resulted in extensive modification of the mines' historic structures.

D. Previous Investigations in the Project Area

Very little archeological research has been conducted within the project area prior to the AERC surveys of 1979 and 1980 for Eureka Energy Company. Previous to AERC's activities, one prehistoric site, a pictograph panel (42Cb92) located in Dugout Canyon, was recorded by Dale Berge in 1977.

Archeological reconnaissance in the Price River Basin of the region was conducted in 1935 by Reagan who reported an extensive series of rock art panels (Reagan 1935). In 1976, AERC reported a small lithic scatter (42Cb91) east of Wellington (Hauck 1976a).

More extensive surface reconnaissance and excavation have been carried out in the Nine Mile Canyon locality of the region, beginning in 1894 with Montgomery's expeditions into that canyon. Subsequent surveys in Nine Mile Canyon were conducted by Peabody Museum of Harvard University in 1928 and 1953 (Morss 1931, 1954), and by Reagan in 1933 (Reagan 1933). In 1936, John Gillin of the University of Utah, excavated five archeological sites in Nine Mile Canyon (Gillin 1938, 1941 and 1955) further defining Fremont activity in the region. In the 1950s, an additional 11 sites were recorded by the University of Utah in the Book Cliffs-Nine Mile Canyon area

(Gunnerson 1957). Surface reconnaissance conducted by AERC in the general region since 1976 has resulted in the discovery and recording of a number of prehistoric sites (see Hauck 1976b, 1977, 1978, 1979) which provide additional insight into the prehistory and history of the general region.

The National Register of Historic Places has been consulted and no registered sites will be affected by this project. No registered sites are situated within the project area; the closest sites on the National Register are situated in Nine Mile Canyon, Flat Canyon and in Price, Utah, all situated outside the general project area.

E. Research Design

AERC's research design, which was developed by the principal investigator relative to the general Sage Point-Dugout Canyon Project Area, consists of the following:

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 utilization of Soldier Creek drainage as an access route linking the Uintah and Price River basins;
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 Uintah Basin and San Rafael variants of the Fremont Culture.

AERC hypothesized that a high density of limited activity sites would cluster along Soldier Creek, thus demonstrating the use of that tributary as an access corridor linking Nine Mile Canyon with the lower Price River basin. Prehistoric limited activity sites would include small lithic scatters, hunting sites, and kill-butcherer sites (the minimal definition of a limited activity site being an association of four or more flakes and/or lithic tools and/or ceramic sherds observed within the original context of deposition).

Other prehistoric site types which could occur in the project area include rock art panels, temporary and extended campsites, rockshelters and surface quarries. These sites were expected to have a low density in the project area when compared to the more appropriate hunting and camping localities situated either in Nine Mile Canyon to the northeast or in the Price River bottoms to the southwest.

Historic period sites within the project locality were known to include mines, abandoned homesteads and isolated cabins. Such sites were recorded and evaluated for significance, date of usage and potential for disturbance or destruction during the development of the Sage Point-Dugout Canyon mining project.

Three types of survey were conducted during the course of the project. Intensive surface evaluations were carried out by AERC crews in the portal and service areas. Intensive surveys were also conducted along corridor routes which extend through, or upon, terrain features where the site potential is marginal to high (see Figure 2).

Reconnaissance surveys of ten meter wide corridors, conducted by one archeologist, were walked along several corridor areas where site and artifact potential is nil to marginal (see Corridor -10- in Figure 2).

Surface sample surveys were conducted above the 7200 foot ASL contour within the upland zone where future surface disturbance resulting from subsidence of 3+ feet could occur. This potential for subsidence disruption was identified by Eureka Energy Company personnel as lying within a 2250 acre area (see Figure 2). An eight percent surface survey of selected units in this subsidence zone, or 180 acres, was intensively surveyed by an AERC crew in late June, 1980. The selection of these sample units was made by AERC based upon an analysis of the terrain involved and the potential within the different land form features for containing significant cultural resource sites historic as well as prehistoric. As is demonstrated in Figure 2, some 12 sample units varying from ten to 40 acres each, were selected utilizing this biased strategy.

Since the basic phases of the Sage Point-Dugout Canyon Project were oriented to identifying, recording and analyzing the historic and prehistoric remains within the mine plan permit project area, only marginal artifact collection and subsurface testing was carried out. No floral, faunal, C¹⁴, pollen or flotation specimens were obtained for laboratory analysis. Collections involved only the retrieval

of valuable or diagnostic artifacts from sites or as isolated finds. A detailed collection of artifacts and ecofacts will be conducted in the future site mitigation phase.

Chapter II - METHODOLOGY

A. Field Research

Between July 23 and November 28, 1979, and between April 17 and July 3, 1980, a cultural resource inventory of various areas and corridors was conducted by AERC for Eureka Energy Company in the Sage Point-Dugout Canyon Project area of the Soldier Creek locality of Carbon County, Utah.

The AERC personnel involved in the field work varied but the following people all contributed to the performance of the inventory: Allan Carpenter, Jim Hampson, Tim McEneny, Bunny Melendez, Dan Schenck, Michael Sloan, Karen Wise and Denise Yearsley. Either Dennis Weder or V. Garth Norman was in charge of the field crew with F. R. Hauck as the principal investigator.

The cultural resource inventory included a sample survey of 180 acres in the uplands and an intensive examination of one large parcel (approximately 4.5 square miles) surrounding the coal processing and facility area, mine portals, fan portals, reservoirs, diversion canals, telephone lines, power lines, conveyor belts, access roads and a railroad spur. In all, a total of 3428 acres and 30 linear miles of corridor was examined (see Figure 2). Because of the size of the project area, the surfaces examined by AERC are under the jurisdiction of the Bureau of Land Management, the State of Utah and various private land owners. The map shown in Figure 1 defines the relationship between the mine plan permit project boundary and the various land ownership boundaries.

Locations of the sample units and their land ownership and acreage are shown on Table 1 (see maps for specific locations):

Table 1

<u>Sample Unit</u>	<u>Acreage</u>	<u>Location</u>	<u>Ownership</u>
1	10	T12S., R12E., Sec. 32	Private, State
2	10	T13S., R12E., Sec. 15	Private
		" " " 16	"
3	10	T13S., R12E., Sec. 16	Private
		" " " 21	BIM
4	30	T13S., R12E., Sec. 15	Private
5	10	T13S., R12E., Sec. 22	BIM
6	10	T13S., R12E., Sec. 14	Private
7	10	T13S., R12E., Sec. 14	Private
8	20	T13S., R12E., Sec. 23	BIM
		" " " 24	Private
		" " " 25	"
		" " " 26	BIM
9	10	T13S., R12E., Sec. 24	Private
10	40	T13S., R12E., Sec. 24	"
11	10	T13S., R12E., Sec. 24	"
12	10	T13S., R13E., Sec. 19	"

The purpose of the sample survey was to assess the nature of historic and prehistoric activity in the upland region where future subsidence potential could threaten any significant cultural resource sites. A total of 12 sample units was defined for these subsidence zones (see Figure 2). These units were situated to cover 180 acres of the surface in the subsidence zones where prehistoric or historic activities were most probably concentrated. The extremely complex nature of the upland area precluded much of the surface area from being considered in this sample survey; the majority of the zones lie on steep terrain which is inaccessible. Sample unit #1 was located at the junction of Soldier Creek and a side

canyon about one-third of a mile north of the mouth of Pine Canyon. The remaining 11 units were placed along the upland portion of the Book Cliffs.

Methodology utilized to evaluate the sample units was identical to the intensive survey techniques used in the lower elevations. All inventoried areas were examined by performing parallel transects with the survey personnel spaced approximately 15 meters (50 feet) apart. An exception to this procedure was utilized during the examination of the proposed portal areas. Because of the steepness of the terrain and the narrowness of the canyons at the portal areas, these areas were examined by checking all benches and all cliff faces for rock art or overhangs. All corridors were examined by performing parallel transects spaced approximately 15 meters apart. With the exception of the utility corridor between Pace Canyon and Dugout Creek, for which a corridor width of 15 meters was inventoried, all corridors were examined at a width of at least 30 meters, centered on the flagging. The railroad spur is another exception. Because the centerline of the proposed spur had not been flagged, a corridor width of 90 meters was examined in order to ensure that the corridor was adequately covered. Most of the railroad spur lies outside the mine plan permit area and is, therefore, not covered in this report.

A total of 38 cultural resource sites has been recorded in the general project area. Some 32 of these sites are situated in the mine plan permit area and include sites recorded under different project phases. The other five sites are outside the mine plan permit area and, although generally referenced in this report (see Table 3), are reported separately. The 33 sites, including 42Cb92 which was previously recorded by Dr. Dale Berge of BYU, are all situated in the mine plan permit area and will be discussed in further detail in Chapter III.

All cultural resource sites, regardless of surface ownership, were recorded on Bureau of Land Management site forms, photographed, sketched and their location marked on a topographic map. Site reports will be forwarded to all relevant government agencies in an appendix to this report.

B. Laboratory Research

The analyses performed in the laboratory for this project concerned the evaluation of projectile points, miscellaneous lithics and ceramic fragments.

Projectile point analyses included identification of manufacturing techniques, e.g., heat treatment, blank and preform preparation, edge grinding, edge reworking and use wear analyses. Arrow and atlatl points were catalogued according to type.

The evaluation of miscellaneous lithics involved obsidian trace element analysis and the identification of various tool styles and manufacturing techniques.

Ceramics collected during the performance of the field survey were examined to determine manufacturing technique, paste and temper composition and surface preparation. Sherds were later catalogued according to type and variety.

C. Artifact Inventory and Analysis

Chronological evaluations of prehistoric sites were accomplished through artifact correlation with established types and varieties. The various projectile point types collected from the field were generally identifiable with similar Great Basin, Eastern Great Basin, Colorado Plateau and Western Plains types. Ceramics were evaluated for type and, thus, correlated with the types and varieties of local Utah wares.

Table 2 contains a list of sites and a description of artifacts collected during the various phases of the Sage Point-Dugout Canyon project:

Table 2

<u>AERC No.</u>	<u>Permanent Site No.</u>	<u>Artifact</u>
---	42Cb92	Not collected
292N/1	42Cb134	Not collected
292N/2	42Cb135	1 knife, 1 arrow point, 2 dart points
356A/1	42Cb167	Not collected
356A/2	42Cb168	Not collected
*356A/3	42Cb169	2 sherds
*356A/4	42Cb182	Not collected
356N/1	42Cb170	1 unfinished arrow point
356N/2	42Cb171	Not collected
356N/3	42Cb172	Not collected
356N/4	42Cb173	1 tin can
356Y/5	42Cb174	1 cartridge casing - 50 caliber
356Y/6	42Cb175	1 dart point/knife, 2 sherds
*356A/1	42Cb189	Not collected
356A/2	42Cb190	Not collected
*356A/3	42Cb191	Not collected
356A/4	42Cb192	1 arrow point base
356A/5	42Cb193	Not collected
356A/6	42Cb194	1 obsidian flake
356A/7	42Cb195	Not collected
356A/8	42Cb196	Not collected
356A/9	42Cb197	1 arrow point
356A/10	42Cb198	1 dart point
356A/11	42Cb199	Not collected
356A/12	42Cb200	1 preform
356A/13	42Cb201	1 obsidian flake

Table 2 (cont'd.)

<u>AERC No.</u>	<u>Permanent Site No.</u>	<u>Artifact</u>
356A/14	42Cb202	1 arrow point
*356A/15	42Cb203	Not collected
356N/1	42Cb183	2 metal forks, 1 shell button
356N/2	42Cb184	Not collected
356N/3	42Cb185	1 arrow point, 1 eccentric, 5 sherds, 1 scraper
356N/4	42Cb186	1 sherd
356N/5	42Cb187	1 point preform, 2 arrow points
356N/6	42Cb188	1 tiger chert flake
456N/1	42Cb204	Not collected
456N/2	42Cb205	1 fragmented bottle
456N/3	42Cb206	Not collected
456N/4	42Cb207	2 projectile points

<u>AERC No.</u>	<u>Isolated Artifact</u>	<u>Artifact</u>
292N/X1	"	1 dart point
356A/X3	"	1 bottle neck
356A/X4	"	1 polished stone
356A/X10	"	1 dart point
356A/X12	"	1 dart point
356A/X13A	"	1 dart point fragment
356A/X13B	"	1 dart point
356A/X14	"	1 sherd
356A/X15	"	1 dart point fragment
356A/X21	"	1 dart point
356A/X23	"	1 scraper
356A/X26	"	1 dart point - reworked
356A/X27	"	1 metal comb

Table 2 (cont'd.)

<u>AERC No.</u>	<u>Isolated Artifact</u>	<u>Artifact</u>
356A/X28	"	1 obsidian nodule
356N/X1	"	1 projectile point
356N/X2	"	1 projectile point

*Sites situated outside the mine plan permit area

Some 54 artifacts were collected during the various surveys related to the Sage Point-Dugout Canyon Project. All collected artifacts except sherds from 42Cb169 were obtained from locations within the mine plan permit area. Of the 54 artifacts, 46 were of prehistoric origin, including 35 lithic articles and 11 ceramic sherds. Some eight artifacts are of the historic period.

Figures 3 - 5 show the majority of diagnostic artifacts collected from the project area.

All artifacts came from the portal, service area and corridor surveys (AERC 292 and 356) except for the lithics from 42Cb207 and isolates 456N/X1 and 2, which were collected during the sample survey of the potential subsidence zones upon the Book Cliffs.



a



b



c

(Actual Size)



d



e



f



g



h



i



j



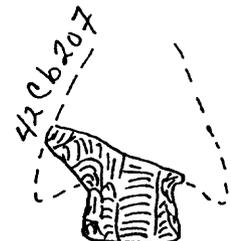
k



l

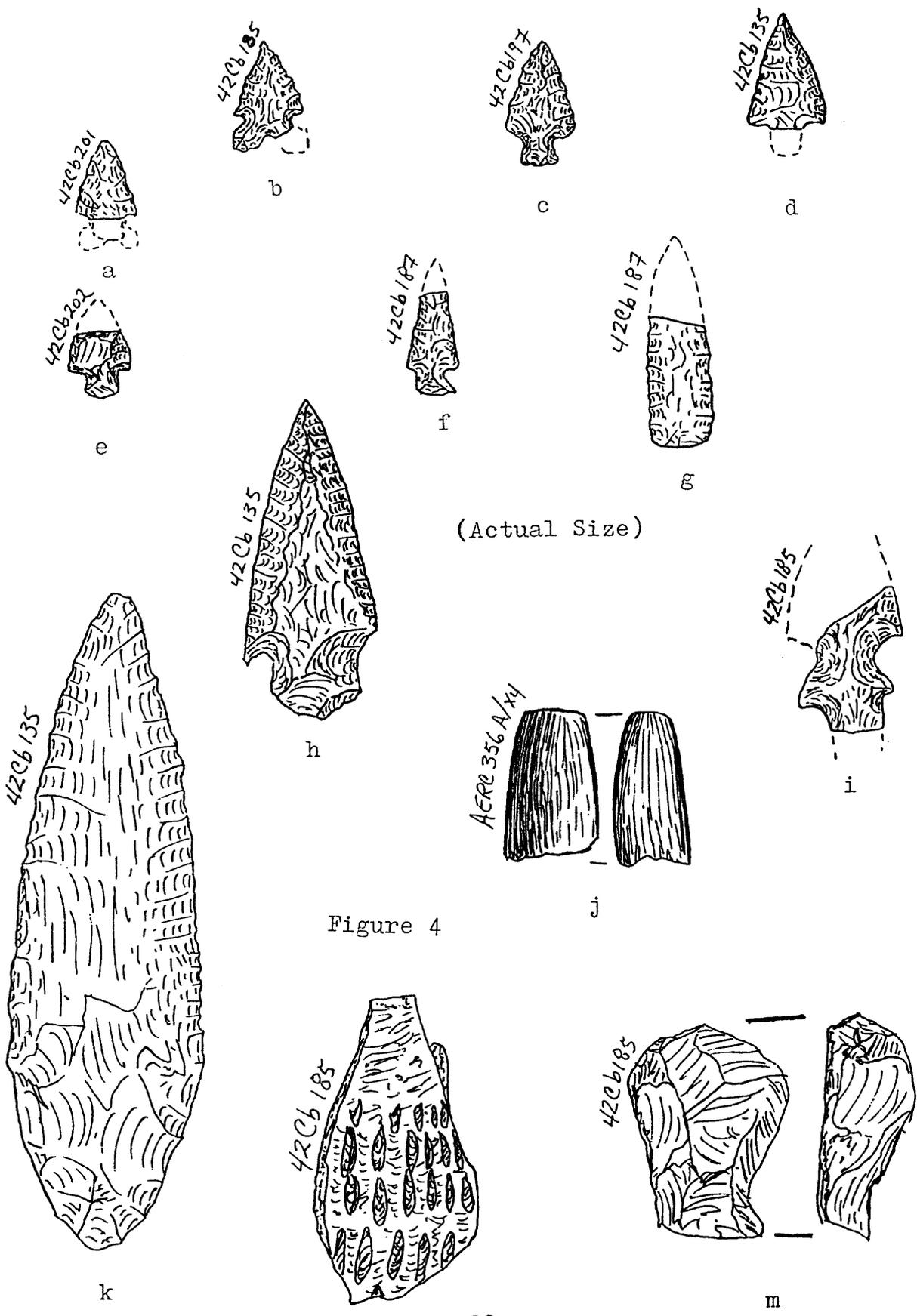


m



n

Figure 3



(Actual Size)

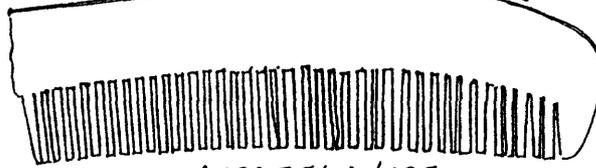
Figure 4

42C6183



a

DAWSON & MEIER Ladies' & Gentlemen
135 W. SECOND SOUTH - SALT LAKE



AERC 356A/X27

b

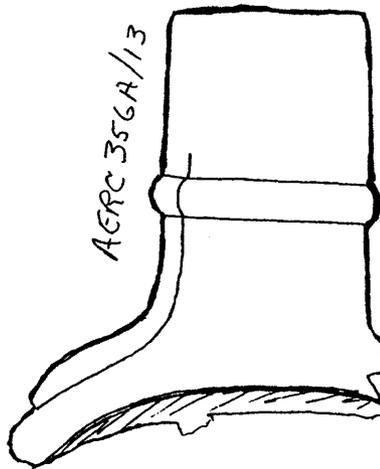
(Actual Size)

42C6183



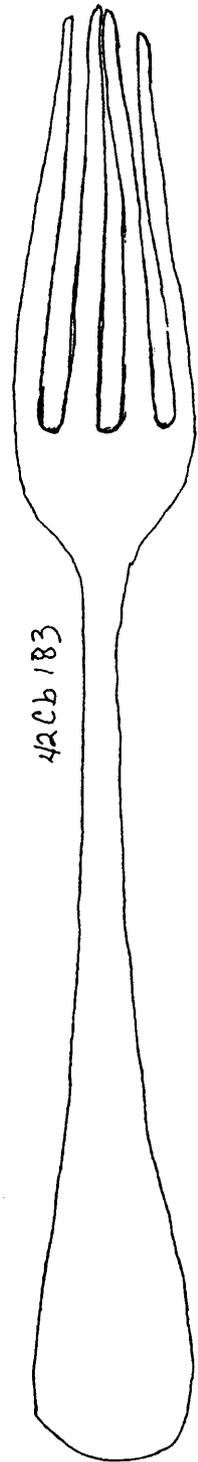
c

AERC 356A/13



d

42C6183



e

Figure 5

Chapter III - CULTURAL RESOURCE DESCRIPTIONS

A. Site Analyses

A total of 38 previously unrecorded cultural resource sites was located during the general inventory with 33 sites situated in the mine plan permit area. A brief summary of the pertinent site characteristics is shown in Table 3. Not included in Table 3 are five sites situated outside the mine plan permit area (42Cb169, 182, 189, 191, and 203). Sites 42Cb134 and 135 were recorded by AERC during the 1979 Eckhoff, Watson and Preator inventory (Norman 1979). Site 42Cb92 was recorded by Dr. Dale Berge of BYU in 1977.

Based on the definition of cultural resource significance (see Chapter IV), nine of the cultural resource sites listed in Table 3 are considered eligible for nomination to the National Register of Historic Places (see page 48). Of the nine S-2 sites, four are of prehistoric origin and five are historic structures. Significance determination of the historic sites will require additional literature research and consultation with local informants and the appropriate land administrators before nomination to the National Register should be considered. The physical condition of these sites, as evaluated by archeologists, does not warrant National Register status.

Some 23 prehistoric cultural resource sites were recorded as being of CRRS:S-3 status. The remaining site, a historic mine portal location in Fish Creek Canyon (the old

Table 3
Cultural Resource Site Summary

<u>AERC Site No.</u>	<u>Permanent Site No.</u>	<u>Site Type</u>	<u>Culture</u>	<u>Land Ownership</u>
---	42Cb92	Pictographs	Unknown Prehistoric	BLM
292N/1	42Cb134	* Dugout	Euro-American	ST
292N/2	42Cb135	* Temporary camp	Middle Archaic & Post-Archaic	PVT
356A/1	42Cb167	Petroglyphs	Euro-American	BLM
356A/2	42Cb168	Lithic scatter	Unknown	BLM
356N/1	42Cb170	Lithic scatter	Post-Archaic	PVT
356N/2	42Cb171	Temporary camp	Fremont and Euro-American	PVT
356N/3	42Cb172	* Homestead	Euro-American	PVT
356N/4	42Cb173	* Homestead	Euro-American	PVT
356Y/5	42Cb174	Lithic and historic scatter	Unknown Pre-historic and Euro-American	PVT
356Y/6	42Cb175	Lithic and ceramic scatter	Fremont	BLM
356N/1	42Cb183	* Homestead	Euro-American	PVT
356N/2	42Cb184	Lithic scatter	Unknown	PVT
356N/3	42Cb185	* Lithic and ceramic scatter	Shoshonean and Fremont	PVT
356N/4	42Cb186	* Rock shelter	Fremont	PVT
356N/5	42Cb187	Lithic scatter	Post-Archaic	PVT
356N/6	42Cb188	Lithic scatter	Unknown	PVT
356A/2	42Cb190	Lithic scatter	Unknown	BLM
356A/4	42Cb192	Lithic scatter	Post-Archaic	BLM
356A/5	42Cb193	Temporary camp	Unknown	BLM
356A/6	42Cb194	Temporary camp	Shoshonean	ST
356A/7	42Cb195	Lithic scatter	Unknown	PVT
356A/8	42Cb196	* Homestead	Euro-American	PVT

Table 3 (cont'd.)

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>
356A/9	42Cb197	Temporary camp	Fremont	PVT
356A/10	42Cb198	Lithic scatter	Post-Archaic	PVT
356A/11	42Cb199	Cist	Unknown	BLM
356A/12	42Cb200	Lithic scatter	Post-Archaic	BLM
356A/13	42Cb201	Lithic scatter	Post-Archaic	PVT
356A/14	42Cb202	Lithic scatter	Fremont	BLM
456N/1	42Cb204	Mine service & portal area	Historic- Modern	BLM
456N/2	42Cb205	Mine service & portal area	Historic- Modern	PVT
456N/3	42Cb206	Mine service & portal area	Historic- Modern	BLM
456N/4	42Cb207	*Lithic scatter	Middle-Late Archaic Shoshonean?	PVT

*CRRS:S-2 Level of Significance

Spring Canyon mine site) was active between 1906 and 1910 and presently consists only of a shallow portal. This site has no physical evidences other than the portal, and is regarded by the archeologists as having little or no archeological value, hence, its classification as CRRS:S-4. Should additional historic and archeological research on any of these sites provide information showing any site has a greater cultural value than presently assigned, the site rating will be adjusted accordingly.

Site and isolated artifact locations are shown on Figures 6 through 11 while Figure 1 shows the general relationship of all 33 sites and diagnostic isolated finds within the mine plan permit area. Additional information on these sites is contained in the site reports which are being provided to all relevant government agencies as an appendix to this report.

B. Comparative Resource Analyses

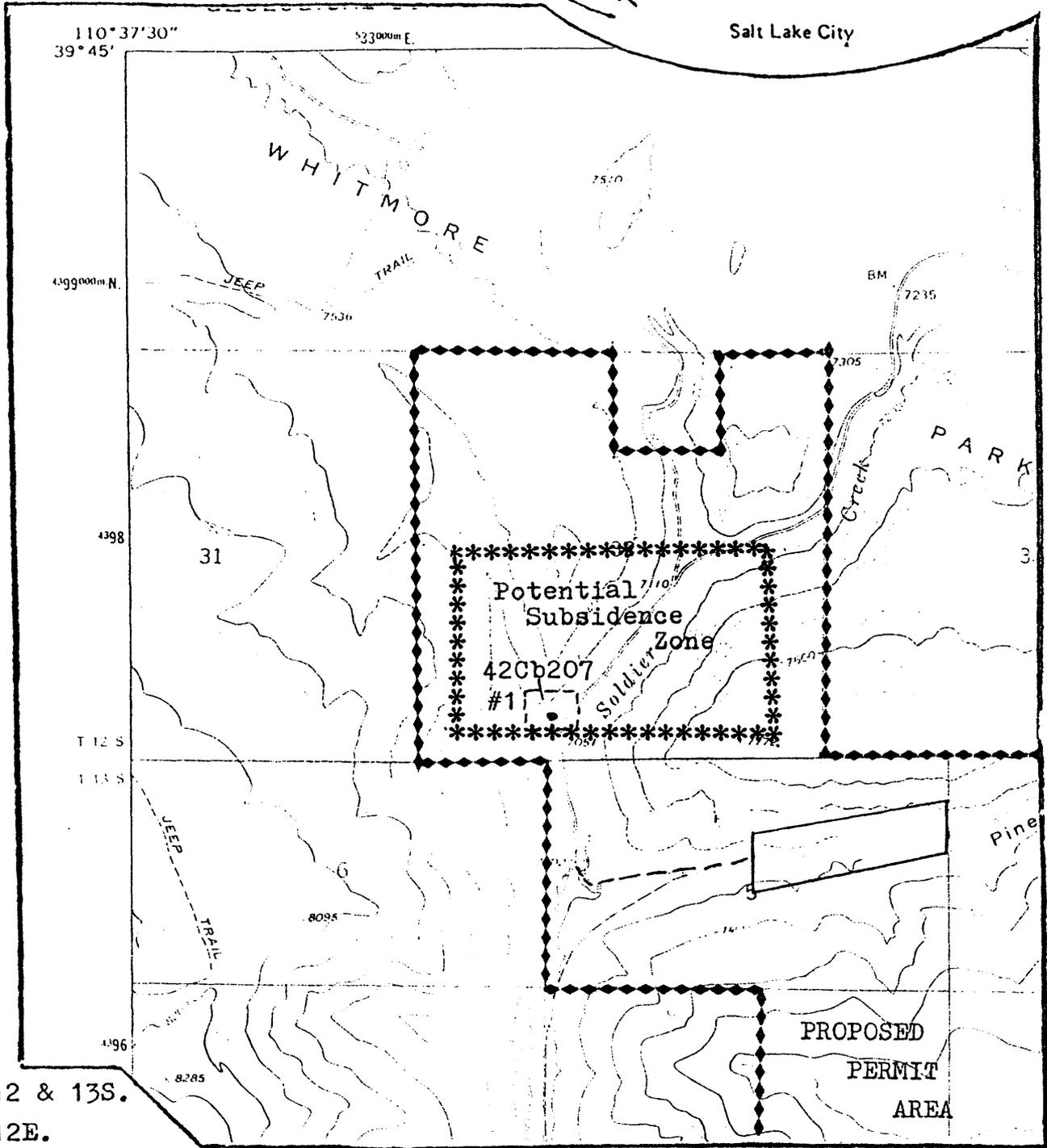
Of the 33 sites situated within the mine plan permit area, some five, or 15%, are habitation sites--all historic; some three, or 10%, are mine service portal sites, again all historic; an additional five sites, or 15%, are prehistoric temporary campsites; 13 sites, or 39% are lithic scatters; two sites, or 6%, are lithic-ceramic scatter sites; and two sites, or 6%, are petroglyph-pictograph sites with the petroglyphs on site 42Cb167 being historic. One rockshelter habitation site, one combination lithic-historic material scatter site and one storage cist complete the analysis.

Some 27% of the sites, nine, are of historic origin while 23 sites, or 69%, are of prehistoric origin. The remaining one site, or 3%, has both historic and prehistoric components.

Cultural resource site density is highest along the creeks and tributaries in the project area. Some 22, or 66%,



Salt Lake City



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

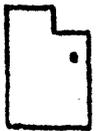
Meridian: Salt Lake B. & M.

Quad:

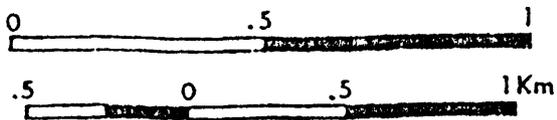
Project: EREC-80-1
Series: Eastern Utah
Date: 7-25-80

Figure 6
SITE LOCATION
IN
SOLDIER CREEK LOCALITY
OF
CARBON COUNTY, UTAH

Pine Canyon, Utah
7.5 Minute - USGS

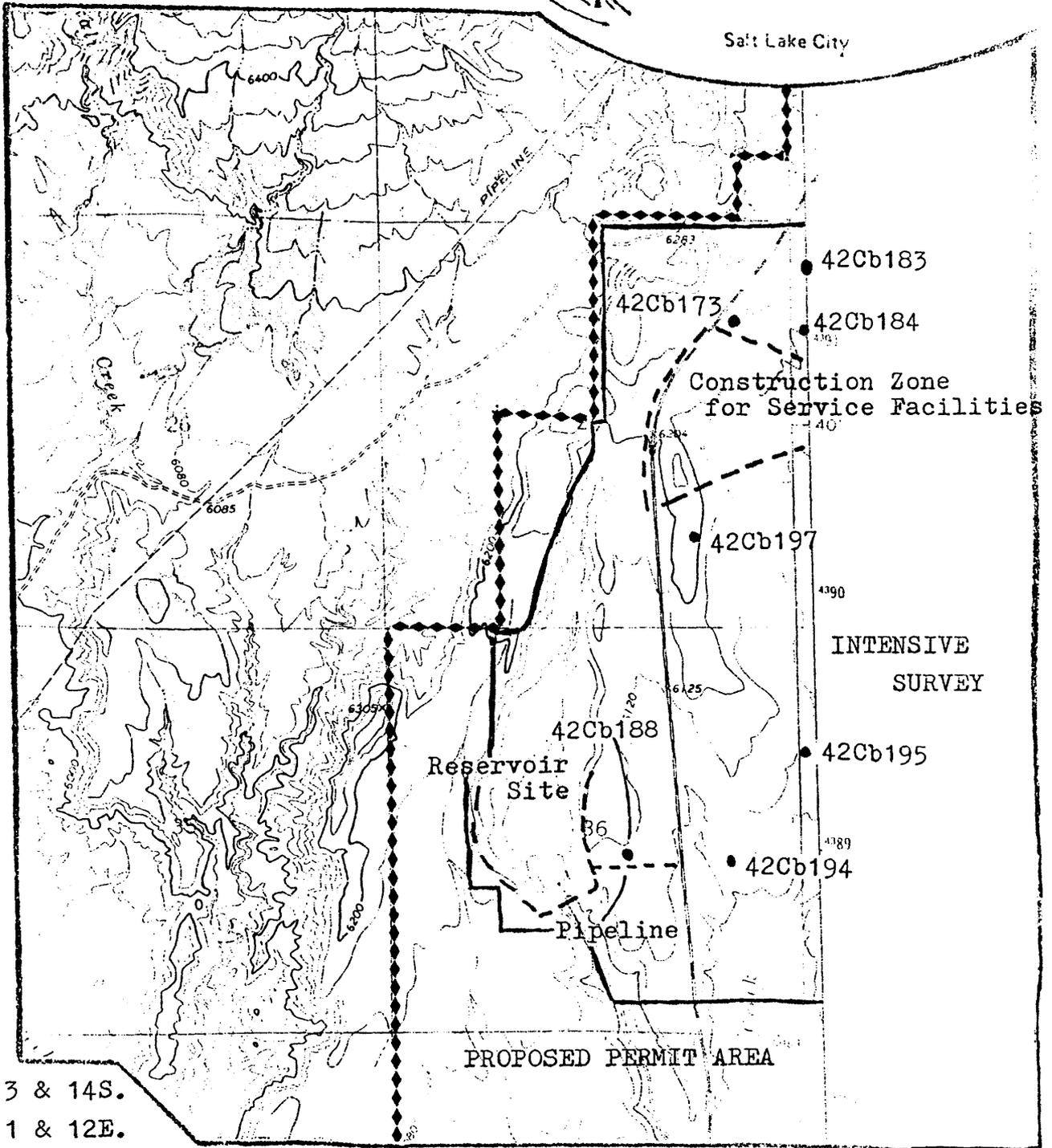


- Legend:
- Archeological Site •
 - Sample Survey Unit ---
 - Intensive Survey Zone [Dashed Box]
 - Corridor [Solid Line]





Salt Lake City



13 & 14S.

11 & 12E.

Meridian: Salt Lake B. & M.

Quad:

Project: EREC-79-1

Series: Eastern Utah

Date: 7/25/80

Figure 7

SITE LOCATIONS
IN THE
SOLDIER CREEK LOCALITY
OF
CARBON COUNTY, UTAH

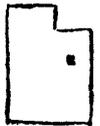
Deadman Canyon,
Utah

7.5 Minute USGS

Legend:

Archeological Site •

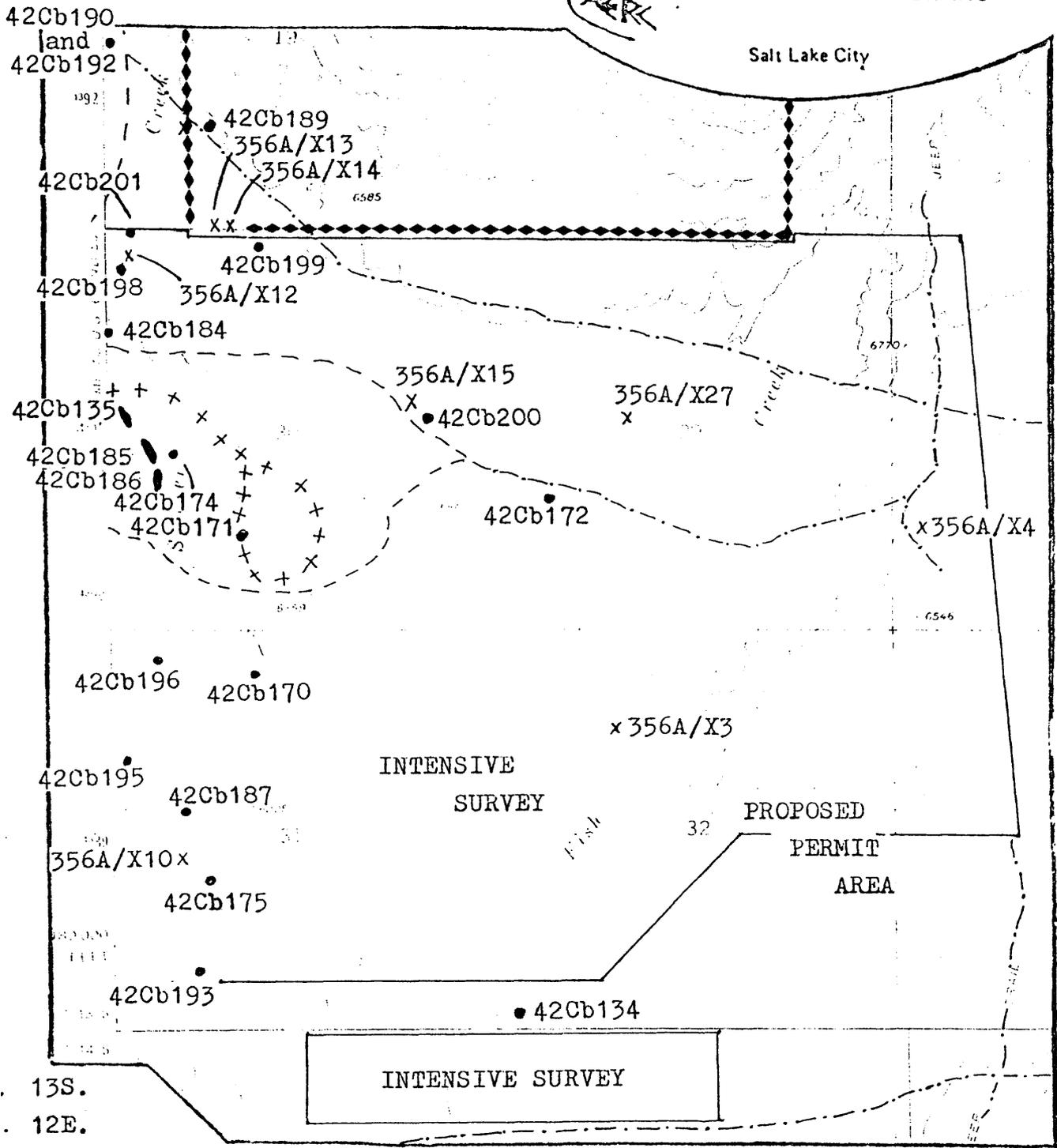
Isolated Artifact x



0 .5 1 Mi

.5 0 .5 1 Km

ARCC



T. 13S.

R. 12E.

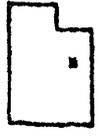
Meridian: Salt Lake B. & M.

Quad:

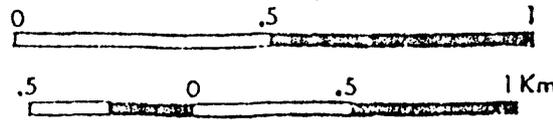
Project: EREC-79-1
Series: Eastern Utah
Date: 7-25-80

Figure 8
SITE LOCATIONS
IN THE
SOLDIER AND FISH CREEK
LOCALITY OF
CARBON COUNTY, UTAH

Pine Canyon, Utah
7.5 Minute USGS

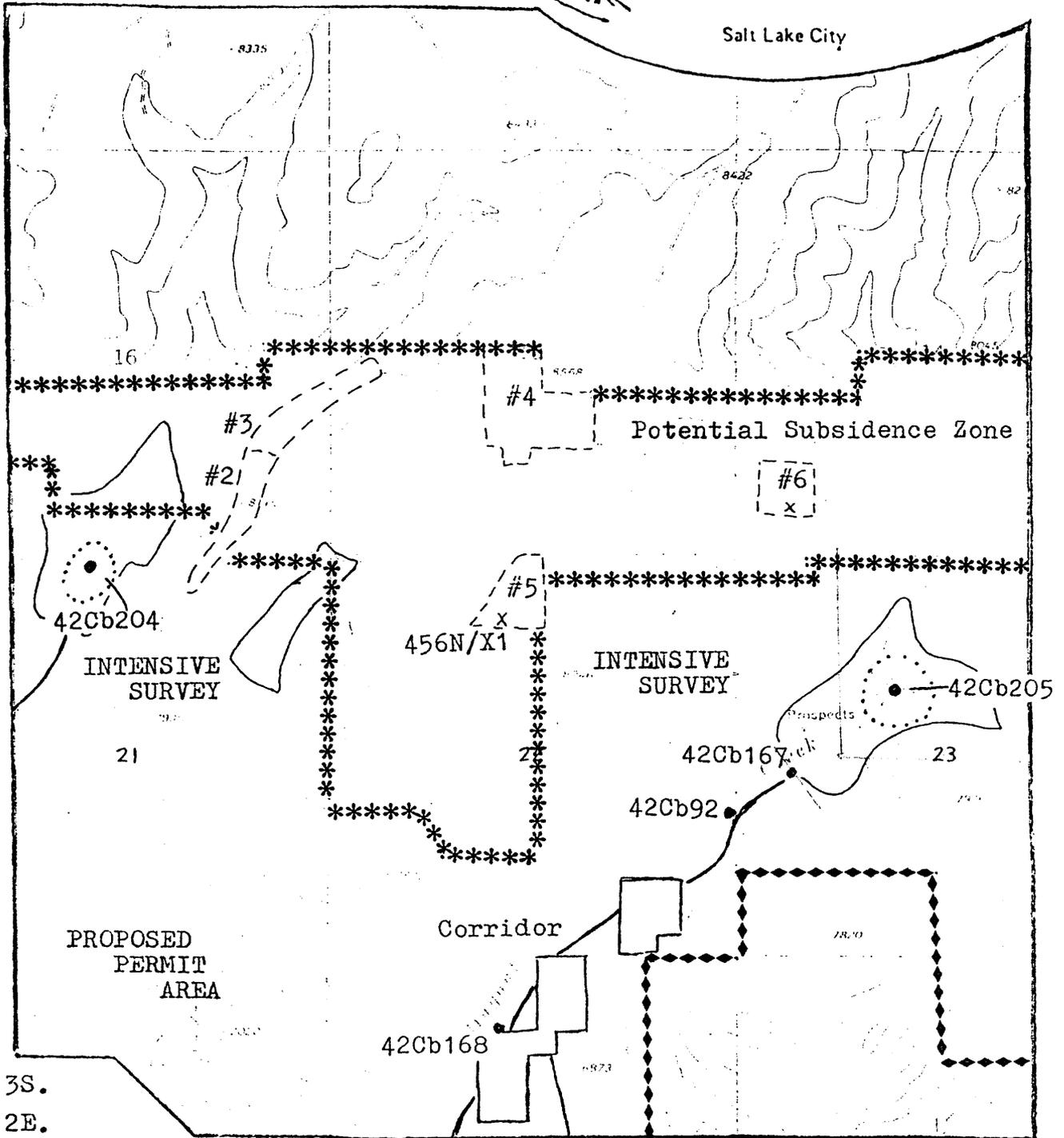


- Legend:
- Archeological Site •
 - Isolated Artifact x
 - Railroad Spur ++
 - Construction Zone (dashed line)
 - Corridor (wavy line)





Salt Lake City



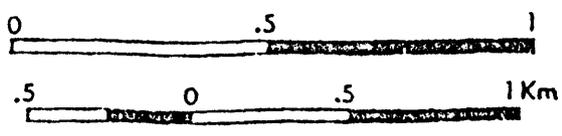
T. 13S.

R. 12E.

Meridian: Salt Lake B. & M.

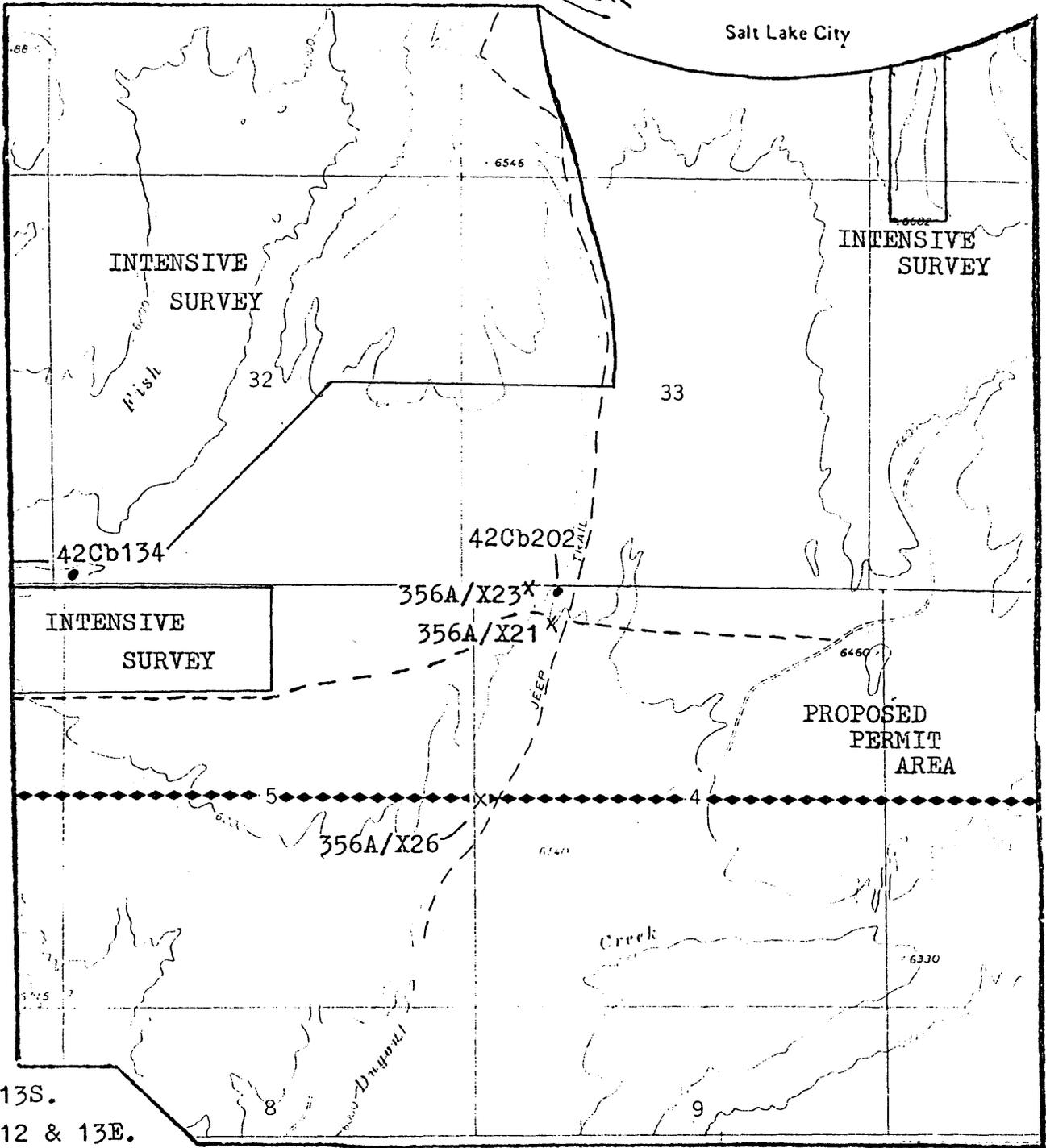
Quod:

<p>Project: EREC-79-1 & 80-1 Series: Eastern Utah Date: 7-25-80</p>	<p>Figure 9 SITE LOCATIONS IN THE DUGOUT CREEK LOCALITY OF CARBON COUNTY, UTAH</p>	<p>Pine Canyon, Utah 7.5 Minute USGS</p> 
		<p>Legend: Archeological Site • Isolated Artifact x Sample Survey Unit --- Portal Zone ...</p>





Salt Lake City



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

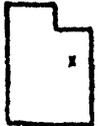
Meridian: Salt Lake B. & M.

Quad:

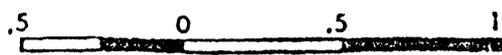
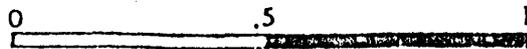
Project: EREC-80-1
Series: Eastern Utah
Date: 7-25-80

Figure 10
SITE LOCATIONS
IN THE
DUGOUT CREEK LOCALITY
OF
CARBON COUNTY, UTAH

Pine Canyon, Utah
7.5 Minute USGS



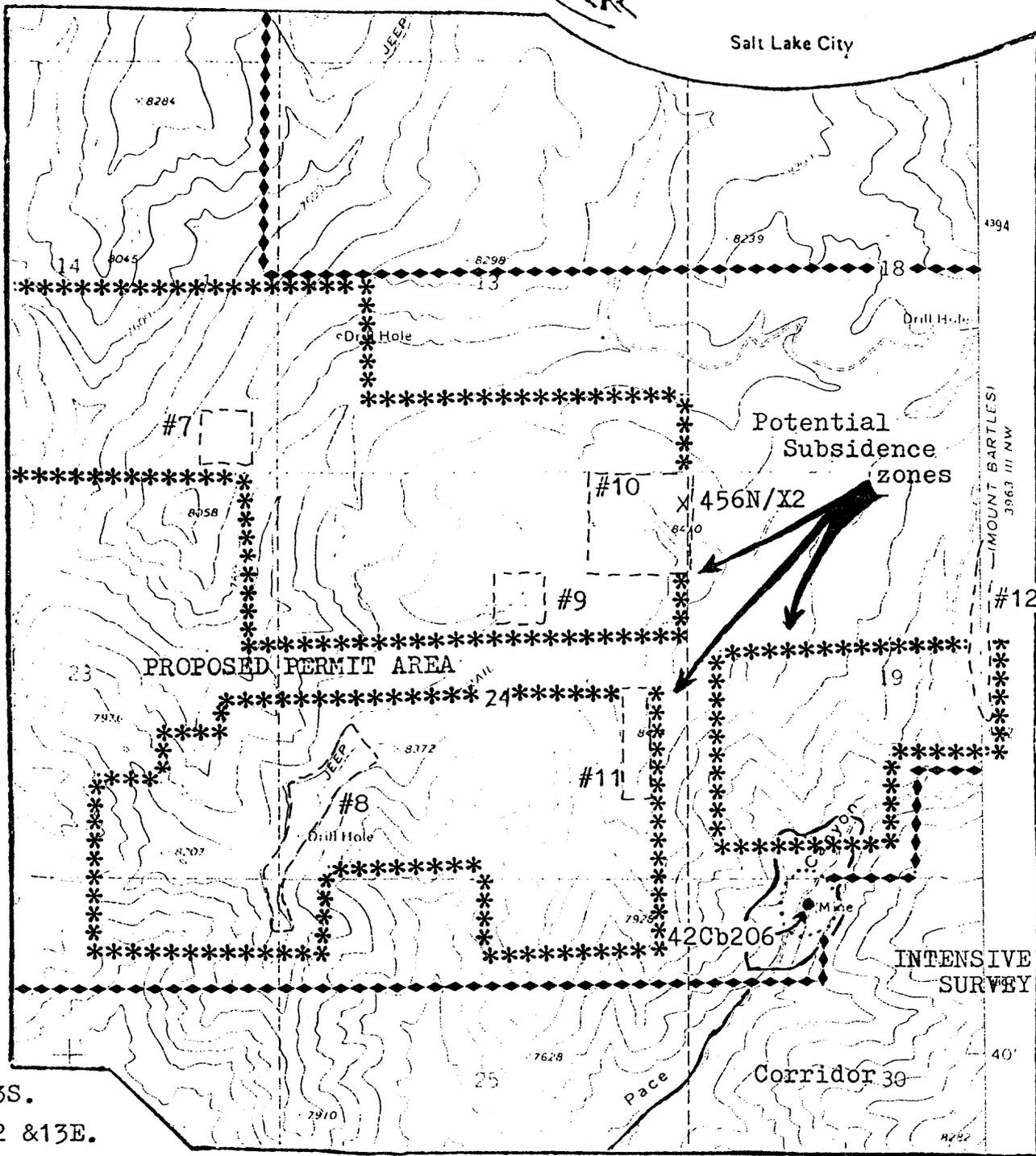
- Legend:
- Archeological Site •
 - Isolated Artifact x
 - Corridor
 - Intensive Survey Zone



1 Km Intensive Survey Zone

EREC

Salt Lake City



T. 13S.

R. 12 & 13E.

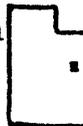
Meridian: Salt Lake B. & M.

Quad:

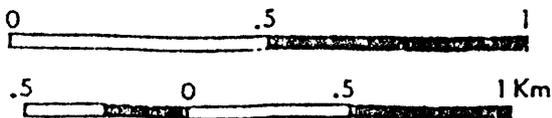
Project: EREC-80-1
Series: Eastern Utah
Date: 7-25-80

Figure 11
SITE LOCATION
IN THE
PACE CANYON LOCALITY
OF
CARBON COUNTY, UTAH

Pine Canyon, Utah
7.5 Minute USGS



- Legend:
- Archeological Site •
 - Isolated Artifact x
 - Sample Survey Unit [dashed line]
 - Portal Zone [dotted line]



of the 33 sites, are situated adjacent to various stream and intermittent creek beds with seven sites (21%) being located over .10 miles from water sources. Twelve sites (36%) are situated adjacent to Soldier Creek, with six sites (18%) on intermittent and secondary creeks, four sites, or 12%, on Dugout Creek, one site (3%) on Fish Creek and one site (3%) on Pace Creek. These statistics demonstrate that prehistoric and historic activity and land utilization were heavily concentrated adjacent to presently active water resources. The site density on Soldier Creek and its tributaries demonstrates a definite prehistoric preference for that area substantiating the earlier hypothesis that Soldier Creek served as an access corridor between the Price River Basin and Nine Mile Canyon.

There is also a definite clustering of prehistoric cultural resources within the Pinyon-Juniper ecozone of the lower foothills. Only two isolated projectile points and sites 42Cb92 and 42Cb207 were recorded in the Montane zone. The predominant clustering of sites between the 6000 and 7000 feet ASL elevations further demonstrates the primary utilization of the foothills by prehistoric peoples.

Sites demonstrating Archaic phase activity, as identified through diagnostic artifacts, numbered two. Post Archaic sites, all temporally distinguishable by surface remains, included seven sites. Fremont culture materials were recovered at six sites while Shoshonean artifacts were found in association with two sites. A total of nine prehistoric sites was classified as unknown.

The cultural resource evaluations within the general project area, and specifically within the mine plan permit area, substantiate the earlier research hypothesis that in the prehistoric period, extensive movement between Nine Mile Canyon and Price River Basin occurred along Soldier Creek. Diagnostic artifacts demonstrate an Archaic through Shoshonean

presence along this corridor. No Paleo-Indian activity has been identified to date.

Site types and densities show that prehistoric activity was of a limited, transitory nature, for no extended campsites or habitation sites were found. During the historic period, activity in the project area was centered on occupation and agricultural activities along the creek bottoms and coal mining in the major canyons along the Book Cliffs. There is no indication of early historic, e.g., fur trapping, activity in the area, although site 42Cb134, a historic dugout, could have been constructed at that time. Limited test excavations for cultural materials is necessary to identify the temporal perimeters of the dugout site.

Artifacts from various prehistoric sites demonstrate a movement of new materials through the corridor from areas as separate as Wyoming, western Utah and Colorado. Southwestern Wyoming is the source of the Tiger chert found at two sites, while western Utah materials were verified by trace element analysis of several obsidian samples. The source of a third obsidian sample could not be positively identified through trace element analysis but similarities with Colorado obsidian sources suggest an origin in that state. Translucent brown chert found at one site (42Cb201) is very similar to a chert common around Rock Springs, Wyoming.

Projectile point types from the project area also demonstrate relationships between north-central Utah with the eastern Great Basin, the Colorado Plateau and western Plains. Middle Plains Archaic Duncan points were recovered from one site, 42Cb135, and from an isolated position (356A/X25). A possible Wapiti point (292N/X1) also shows Plains influence.

Artifacts which show eastern Great Basin influence in the study area include the range of Rose Spring arrow points, the Elko styled points and the Gypsum point.

The majority of ceramic fragments collected from the project area is of the San Rafael variant of the Fremont culture, i.e., Emery Gray wares. Site 42Cb185 demonstrated the greatest range of ceramic variation, for it contains Emery Gray, Snake Valley Black-on-gray and Sevier gray materials.

Chapter IV - EVALUATIONS AND RECOMMENDATIONS

A. Resource Significance Evaluations

An evaluation of site significance for the 33 sites situated within the Sage Point-Dugout Canyon mine plan permit area is presented in Table 4. 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 BIM 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 BIM 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

Table 4

Site Significance

<u>Site</u>	<u>Quality</u>	<u>Condition</u>	<u>CRRS</u> <u>Value Rating</u>
42Cb92	a	Good	S-3
42Cb134	c-f	Good	S-2
42Cb135	a-b-c-d-g	Good	S-2
42Cb167	a-e-g	Excellent	S-3
42Cb168	d	Good	S-3
42Cb170	g	Poor	S-3
42Cb171	c-d	Good	S-3
42Cb172	c-f-g	Poor	S-2
42Cb173	c-f-g	Good	S-2
42Cb174	g	Poor	S-3
42Cb175	g	Poor	S-3
42Cb183	g	Poor	S-2
42Cb184	---	Poor	S-3
42Cb185	a-c-d-f-g	Good	S-2
42Cb186	a-c-d-f-g	Good	S-2
42Cb187	g	Good	S-3
42Cb188	b-c-g	Good	S-3
42Cb190	---	Good	S-3
42Cb192	g	Good	S-3
42Cb193	c	Good	S-3
42Cb194	a-c-g	Good	S-3
42Cb195	d	Good	S-3
42Cb196	c-g	Poor	S-2
42Cb197	c-g	Good	S-3
42Cb198	b-g	Good	S-3
42Cb199	a	Fair	S-3

Table 4 (cont'd)

<u>Site</u>	<u>Quality</u>	<u>Condition</u>	<u>CRRS</u> <u>Value Rating</u>
42Cb200	g	Good	S-3
42Cb201	g	Excellent	S-3
42Cb202	a-g	Good	S-3
42Cb204	---	Poor	S-4
42Cb205	g	Poor	S-3
42Cb206	g	Good	S-3
42Cb207	a-b-d-g	Good	S-2

Table 4 (cont'd)

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.

to solving larger problems, such as reconstruction of 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 although prehistoric sites 42Cb135, 185, and 186, all situated on the east terrace of Soldier Creek, come the closest to being accorded an S-1 rating.

Some nine sites are rated as CRRS:S-2 while 23 sites are of CRRS:S-3 value and one remaining site, 42Cb204, has been given a CRRS:S-4 rating. Sites 42Cb170, 174, 183, and 205 are marginal S-4 sites.

The majority of historic habitation structures have been given an S-2 value based on the potential for additional information through document and oral history research. Those historic habitation sites which are endangered by the project will be further researched by an historian as part of the mitigation of adverse effect on those sites. Should oral or documented history 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 33 sites that are situated in the mine plan permit area provides the following information:

- a) None of the 33 sites is associated with events that have made a significant contribution to the broad patterns of our history; or
- b) none of the 33 sites is associated with the lives of persons significant in our past; or
- c) none of the 33 sites embodies the distinctive characteristics of a type, period, or method or 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.

d) The nine CRRS:S-2 sites (42Cb134, 135, 172, 173, 183, 185, 186, 196, and 207) and the six CRRS:S-3 sites (42Cb167, 188, 194, 197, 198, and 202) have all "yielded or may be likely to yield information important in the prehistory or history" of the region. Although none of these 15 sites appears to be of such a high caliber of significance to presently warrant CRRS:S-1 status, all are applicable under criteria "d" of 36 CFR 60.6. This evaluation is based strictly upon site evaluations conducted in the field.

Some 15 CRRS:S-3 sites (42Cb92, 168, 170, 171, 174, 175, 187, 192, 193, 195, 199, 200, 201, 205, and 206) require additional field research before a determination of eligibility can be made. At the present, these sites are considered as unevaluated.

The remaining two CRRS:S-3 sites (42Cb184 and 190) and site 42Cb204 (CRRS:S-4) are not considered eligible for nomination to the National Register of Historic Places and will not yield any information important to the understanding of the prehistory and history of the region.

Site mitigation techniques proposed in a following section will provide some additional insight into the significance of the CRRS:S-2 and S-3 sites which have a high potential for direct and indirect impact. Should test excavations on prehistoric sites, or document and oral history research on historic sites, provide important information relative to the significance of any one of the 12 sites which have a high potential for disruption, the criteria of eligibility (36 CFR 60.6) will be reapplied and the site significance will be upgraded. The flexibility of utilizing

mitigational research to further define the value of threatened cultural resource sites provides the archeologist and historian with an evaluative tool which is coordinated to the development of the research program and is also highly responsive to the accumulating evidence bearing on significance. Mitigational techniques, other than avoidance, within the program are tied to impact potential and, as such, permit an ongoing adjustment of cultural resource values along the scale from highly significant (CRRS:S-1) to non-significant as a CRRS:S-4.

C. Discussion of Impact Potential on Cultural Resource Sites

Adverse impact potential can be examined on two levels. Direct impact concerns adverse affect occurring as a direct consequence of project development and operation. Indirect impact stems from adverse affect relative to activities which are not part of the project design and planning.

The probability of adverse impact on the cultural resource sites of the Sage Point-Dugout Canyon mine plan permit area is demonstrated in Table 5 (see Figures 6-11). Of the nine sites which have been accorded CRRS:S-2 status, the highest degree of relative significance in the mine plan permit area, sites 42Cb134, 172, 173, 183 and 196 are historic sites, while 42Cb135, 185, 186 and 207 are loci of prehistoric activity. Some five of these nine sites are situated in the mine service facility and corridor zones and have the potential for receiving extensive direct adverse affect during the construction period. These sites include 42Cb135, 172, 185, 186 and 196. Site 42Cb173, a historic site which is also considered to be of CRRS:S-2 value and which is situated near the periphery of the service facility area, has the potential for receiving only moderate direct impact but a high degree of indirect adverse affect from vandalism. The remaining CRRS:S-2 sites, 42Cb134, 183 and 207, have little to no potential for direct impact and a low potential for indirect adverse affect stemming from vandalism.

Table 5

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>
42Cb92	S-3	Low	Low	Road Construction	9
42Cb134	S-2	---	Low	Vandalism	8
42Cb135	S-2	High	---	Service Area Construction	8
42Cb167	S-3	Low	Low	Road Construction	9
42Cb168	S-3	Low	Low	Road Construction- Vandalism	9
42Cb170	S-3	---	Low	Vandalism	8
42Cb171	S-3	High	---	Railroad Construction	8
42Cb172	S-2	High	---	Corridor and Road Construction	8
42Cb173	S-2	Moderate	High	Service Area Construction - Vandalism	7
42Cb174	S-3	High	---	Service Area Construction	8
42Cb175	S-3	---	Low	Vandalism	8
42Cb183	S-2	---	Low	Vandalism	7
42Cb184	S-3	Low	Low	Service Area Construction - Vandalism	7
42Cb185	S-2	High	---	Service Area Construction	8
42Cb186	S-2	High	---	Service Area Construction	8
42Cb187	S-3	---	Low	Vandalism	8
42Cb188	S-3	Low	High	Vandalism	7
42Cb190	S-3	Low	Low	Road Construction	8
42Cb192	S-3	Low	Low	Road Construction	8
42Cb193	S-3	---	Low	Vandalism	8
42Cb194	S-3	---	Low	Vandalism	7
42Cb195	S-3	---	Low	Vandalism	7
42Cb196	S-2	High	---	Railroad Construction	8

Table 5 (cont'd.)

<u>Site</u>	<u>CRRS Status</u>	<u>Direct Impact</u>	<u>Indirect Impact</u>	<u>Impact Agent</u>	<u>Figure Reference*</u>
42Cb197	S-3	Low	Low	Vandalism	7
42Cb198	S-3	---	Low	Vandalism	8
42Cb199	S-3	Low	Low	Road Construction	8
42Cb200	S-3	---	Low	Vandalism	8
42Cb201	S-3	---	Low	Vandalism	8
42Cb202	S-3	High	Low	Road construction	10
42Cb204	S-4	High	---	Portal area construction	9
42Cb205	S-3	High	---	Portal area construction	9
42Cb206	S-3	High	---	Portal area construction	11
42Cb207	S-2	---	Low	Subsidence caused by mining	6

Sites 42Cb92, 167, 168, 170, 171, 174, 175, 184, 187, 188, 190, 192, 193, 194, 195, 197, 198, 199, 200, 201, 202, 205, and 206 are of lesser resource value, being rated at CRRS:S-3 level. Of these 23 sites, 14 are historic and eight are of the prehistoric period while one site, 42Cb174, has both historic and prehistoric components. Some five of these 23 sites have the potential for receiving extensive direct or indirect impact during project development. These include 42Cb171, 174, 202, 205, and 206. An additional six sites, 42Cb92, 167, 168, 184, 188, and 197, are considered to have low potential for direct, or project-related, impact but have low to high potential for indirect impact related to vandalism. The final category of S-3 sites include those 12 which have no potential for receiving indirect impact by vandals.

One site, the historic Spring Canyon Mine on Fish Creek (42Cb204) has such a limited activity area that it has been classified at the low CRRS:S-4 level of significance. This site has a high potential for direct adverse impact since it is located in the new portal zone on Fish Creek.

In summary, a total of 13 sites situated in the mine plan permit area has a high potential for receiving adverse impact, either as a result of project development and operation (direct impact) or as a result of non-project related activities, e.g., vandalism (indirect impact). These sites include three historic mine portals (42Cb204, 205, and 206); three historic habitations (42Cb172, 173, and 196); two prehistoric temporary campsites (42Cb171 and 135); three prehistoric lithic scatters (42Cb185, 188, and 202); one historic-prehistoric artifact scatter (42Cb174); and, one prehistoric rockshelter site (42Cb186).

No sites have a moderate potential for receiving adverse impact of either a direct or indirect nature. The remaining 20 sites have a low potential for receiving either direct or indirect adverse impact.

D. Recommendations

A variety of archeological and historic techniques are available for use in avoiding, protecting or mitigating potential adverse affect to significant cultural resources. Such actions proposed herein are contingent upon comments of the Department of Interior agencies and the State Historic Preservation Office.

Avoidance procedures are the most appropriate means of preserving those CRRS:S-3 and S-4 sites which will not be endangered by the development and operational phases of the Sage Point-Dugout Canyon project and have also a low potential for disturbance through vandalism. Such sites, as shown, on Table 5, include 42Cb170, 175, 187, 190, 192, 193, 194, 195, 198, 199, 200 and 201. Site 42Cb207 may only be endangered should surface subsidence occur in the locality. The lack of structural components on this site and its marginal depth potential indicate that little resource damage would occur through subsidence. Archeological mitigative techniques, including grid collection and possible spot test excavation, would be appropriate if the entire site were immediately threatened by total destruction from erosion resulting from subsidence. Recommendations for the other 12 sites (42Cb170, 175, 187, 190, 192, 193, 194, 195, 198, 199, 200 and 201) are related to the type of impact which appears most likely to occur--vandalism. Avoidance of these sites should be conducted during the project planning period prior to initiating construction activities in the area. The potential for vandalism of these sites will remain low as long as avoidance procedures are instituted as part of the engineering design. When avoidance procedures are carried into the field and discussed with construction personnel with direct reference to the site, the probability of site disruption through vandalism accelerates dramatically. Should avoidance of any one of these sites become impractical and the project cannot be

modified to protect the site without incurring extensive cost, then test excavation and collection of the site is recommended.

Some six sites (42Cb92, 167, 168, 183, 184 and 197), involving both CRRS:S-2 (1) and S-3 (6) levels of significance, have a low potential for direct or project-related impact and a low to high potential for indirect disturbance from vandalism. Avoidance of construction near these sites is recommended whenever avoidance can be practical. Should avoidance prove impractical for the preservation of these sites, the following mitigative actions are recommended:

~~Site 42Cb92:~~ A detailed photographic and sketch record of these prehistoric pictographs should be compiled prior to disturbance.

Site 42Cb167: A detailed photographic and sketch record of these historic petroglyphs should be compiled prior to disturbance. Removal of the boulder outside the construction zone is recommended with the ultimate protection of fencing the site if removal is not appropriate.

Site 42Cb168: A surface pick-up of the artifacts and flakes on this site is recommended in conjunction with placing a shallow .5 meter-wide test trench through the site to evaluate for depth.

Site 42Cb183: A photographic documentation, archival search and oral history record of this historic homestead site should be compiled prior to disturbance.

Site 42Cb184: A surface collection and placement of several shallow test pits on this prehistoric lithic scatter site should be conducted prior to disturbance.

Site 42Cb197: A surface collection and placement of several shallow test pits and/or .5 meter-wide test trenches within this site should be conducted prior to disturbance.

Two sites should receive further evaluation through test excavation during the initial salvage and test mitigation

program to be conducted in the project area. These sites include 42Cb134 and 42Cb188. Site 42Cb134, an historic dugout site situated in an isolated area, contains no surface debris to aid in the determination of the age and significance of the site. Several small test excavations should be placed in or adjacent to the dugout to test for artifacts which will aid in the documentation of this site which has a potential for being early 19th century. Site 42Cb188, a prehistoric lithic scatter, should be collected by using both vertical and horizontal controls. This site contains Tiger chert fragments which originated in Wyoming and buried artifacts on the site could provide valuable information on cultural movement between the western Plains and eastern Great Basin. The potential for vandalism on this site is high and collection through test excavation and screening should be conducted prior to field staking for construction.

The remaining 12 sites all have high potential for disturbance during project initiation. Sites 42Cb135, 171, 185 and 186 are all prehistoric habitation sites with rockshelters situated in 42Cb185 and 186. All four of these sites are associated with the service facilities area along Soldier Creek and all have potential for complete disruption either from construction or vandalism. All four sites also contain depth and could have buried artifact deposits of importance to understanding the prehistoric movement of peoples along the Soldier Creek corridor.

AERC recommends that each of these four sites (42Cb135, 171, 185 and 186) be carefully collected utilizing appropriate surface controls prior to field staking for construction. Each site should be tested for subsurface depth utilizing a permanent datum on each location and appropriate vertical and horizontal controls. Hearth areas, depressions, soil accumulations and rockshelters should all be further evaluated through careful test excavations.

Should subsurface artifact deposits or structures be uncovered, these remains should be salvaged, if possible, and if the value of the deposit or structure warrants salvage excavation.

Site 42Cb174 contains a prehistoric and an historic artifact scatter while site 42Cb202 is a prehistoric lithic scatter. Both sites have high potential for destruction during construction. AERC recommends that a collection of valuable artifacts be conducted on the surface and that several small test excavations be placed at appropriate places on these sites to assess the actuality of subsurface cultural remains. Should valuable subsurface structures or archeological deposits be uncovered, such materials will be salvaged by careful excavation.

Three historic homestead sites, 42Cb172, 173 and 196, all have moderate to high potential for disruption during the development period either from construction activities or from vandalism. All three sites should be mitigated through photographic documentation of architectural details and should be further documented by an historian through archival and oral history research prior to disturbance. Valuable historic or prehistoric artifacts on these sites should be collected for preservation.

The final three sites, 42Cb204, 205 and 206, include the historic Spring Canyon Mine, Knight-Ideal Mine and Snow Mine in Fish Creek, Dugout and Pace Canyons, respectively. All three historic mine sites will be disrupted during development of the Sage Point-Dugout Creek mining project. Each site should be documented by photographic and oral history research prior to disturbance. Some archival research should be conducted to amplify the present written history which exists on these sites.

The mitigative and avoidance statements presented above are sufficient to provide a high level of protection to

these 33 cultural resource sites which are situated within the mine plan permit area. With adherence to these recommendations, AERC recommends that Eureka Energy Company be granted a cultural resource clearance in order to proceed with the mine development.

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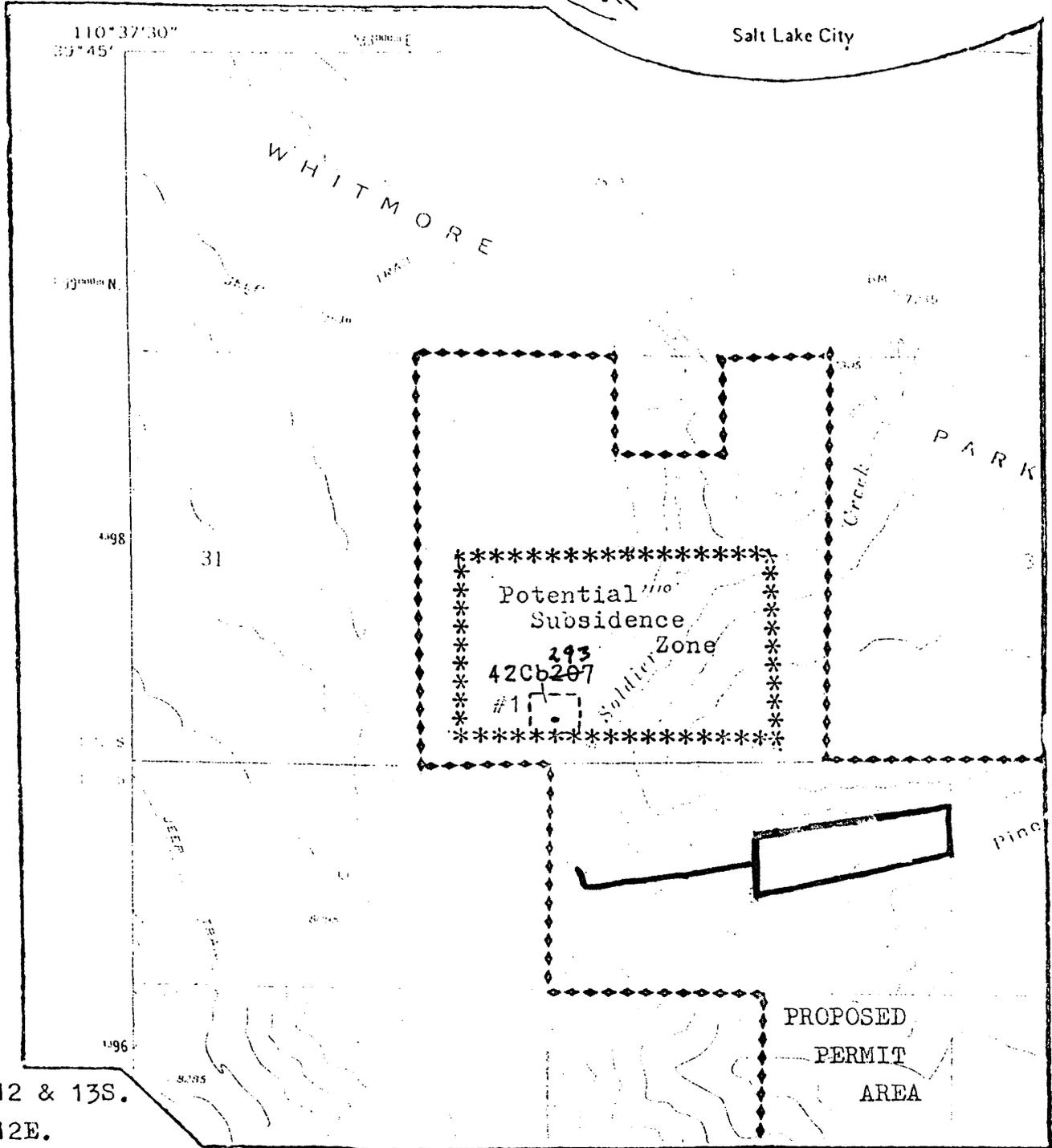
APPENDIX A

Site Reports Under Separate Cover
Provided to Relevant Agencies

APPENDIX B
General Project Maps

AKK

Salt Lake City



T. 12 & 13S.

R. 12E.

Meridian: Salt Lake B. & M.

Quad:

Project: EREC-80-1

Figure 1

Series: Eastern Utah

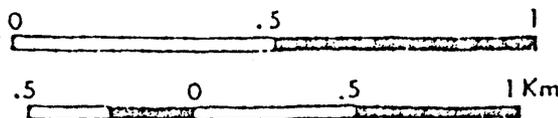
SITE LOCATION
IN
SOLDIER CREEK LOCALITY
OF
CARBON COUNTY, UTAH

Pine Canyon, Utah
7.5 Minute - USGS



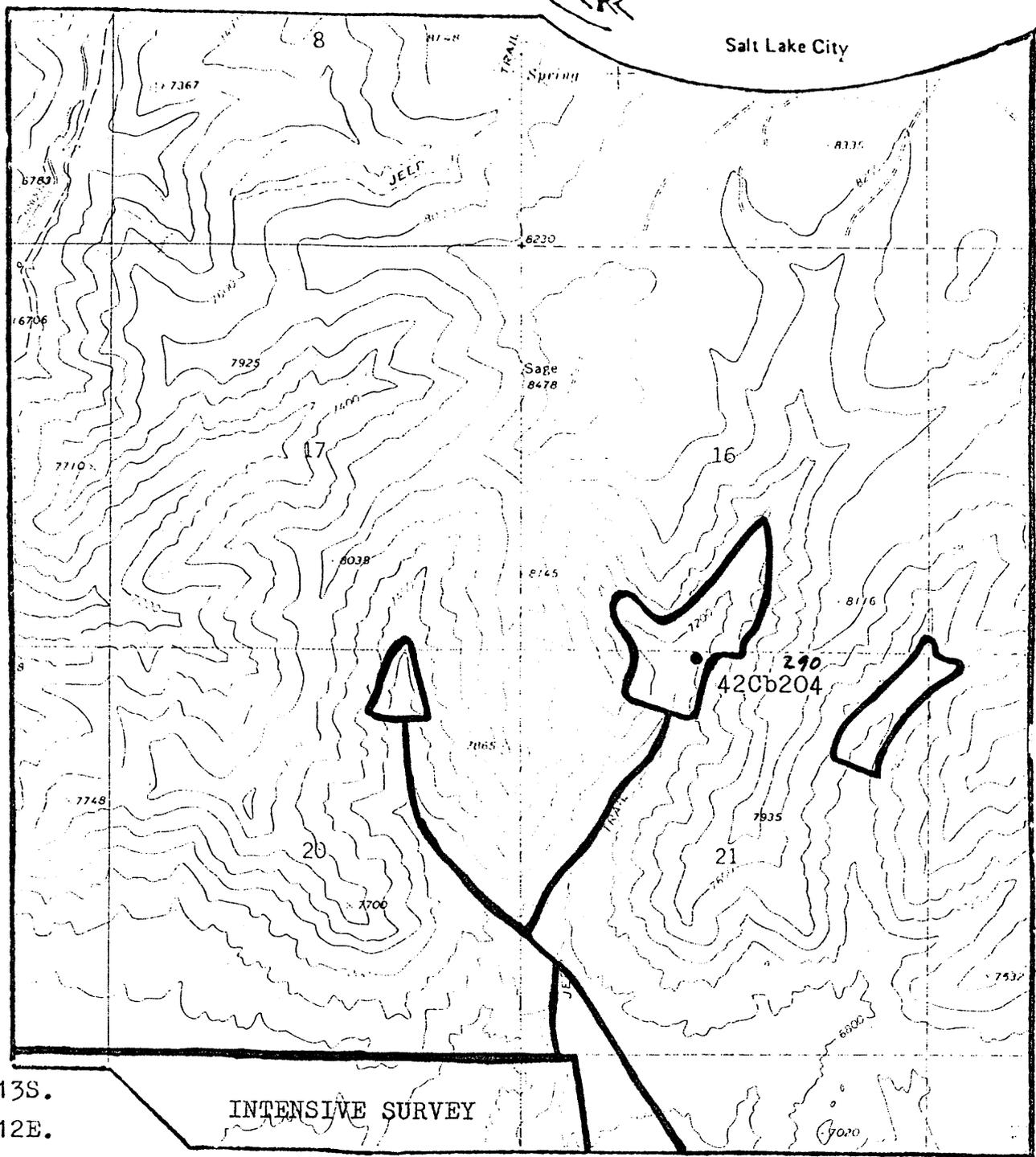
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Legend:
Archeological Site



Sample Survey Unit
Intensive Survey
Zone





T. 13S.
R. 12E.

INTENSIVE SURVEY

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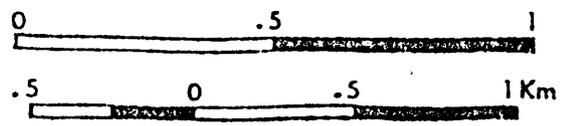
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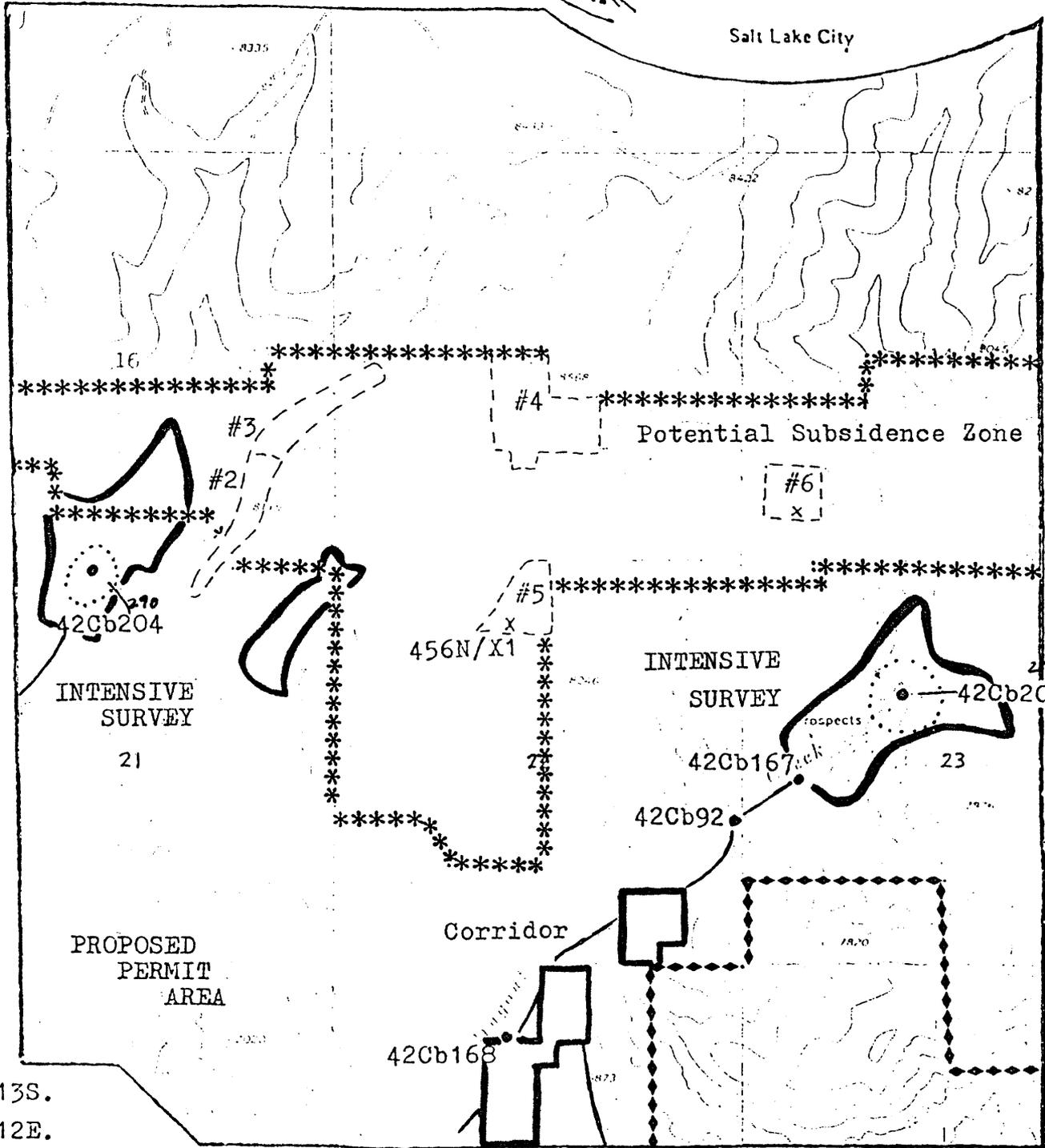
Figure 2
MINE PORTAL ZONES
IN THE
FISH CREEK CANYON LOCALITY
OF
CARBON COUNTY, UTAH

Pine Canyon, Utah
7.5 Minute USGS

Legend:
Intensive Survey Zone
Corridor
Archeological Site



Salt Lake City



T. 13S.
R. 12E.

Meridian: Salt Lake B. & M.

Quad:

Project: EREC-79-1 &
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Series: Eastern Utah
Date: 7-25-80

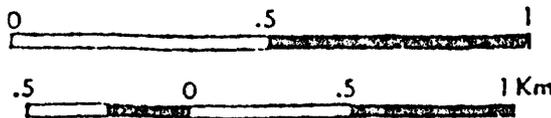
Figure 4
SITE LOCATIONS
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DUGOUT CREEK LOCALITY
OF
CARBON COUNTY, UTAH

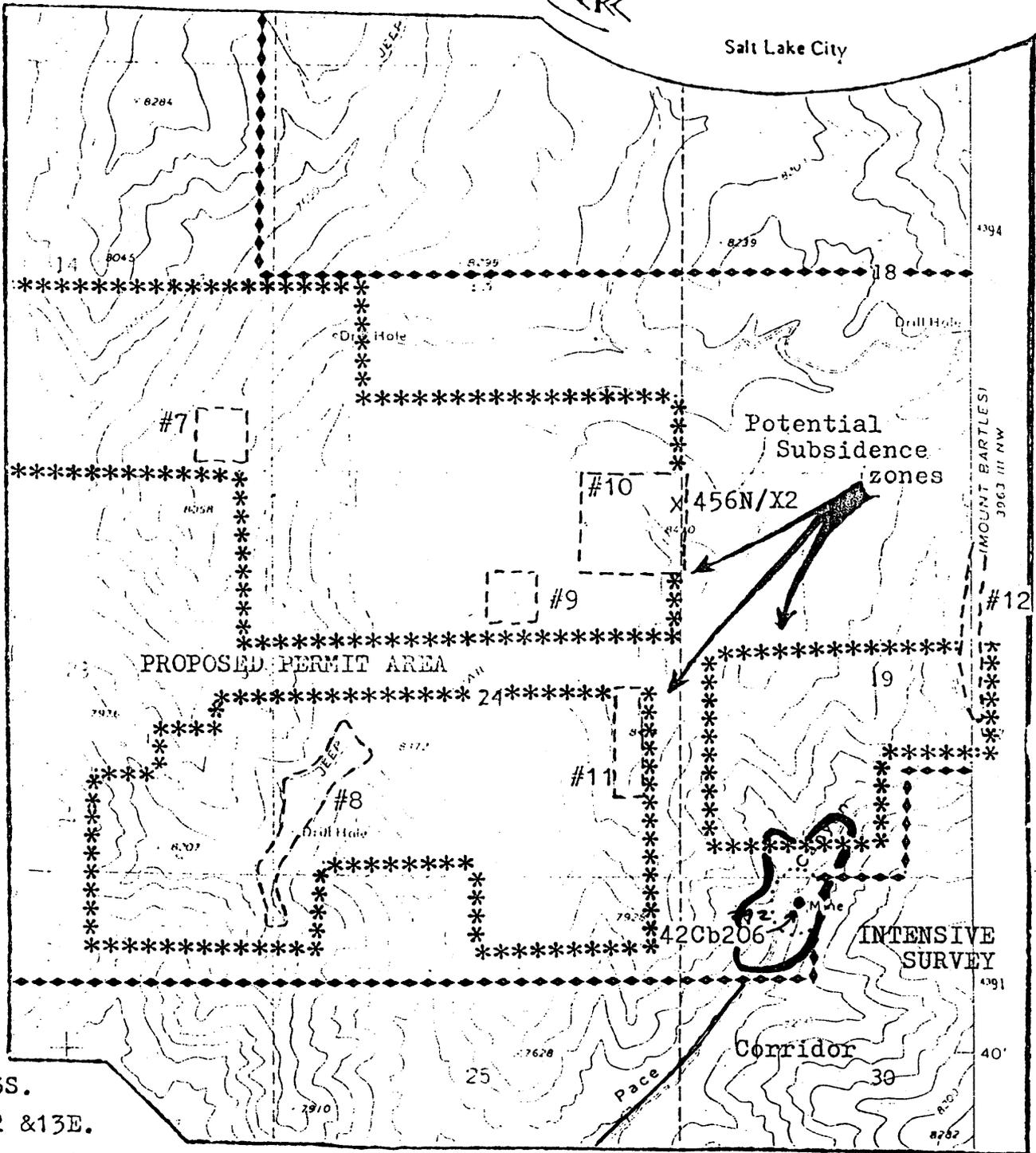
Pine Canyon, Utah
7.5 Minute USGS



Legend:

- Archeological Site •
- Isolated Artifact x
- Sample Survey Unit ---
- Portal Zone ...





T. 13S.

R. 12 & 13E.

Meridian: Salt Lake B. & M.

Quad:

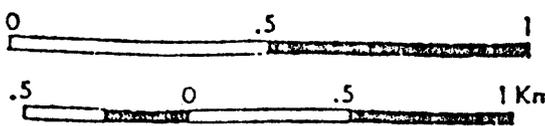
Pine Canyon, Utah
.7.5 Minute USGS



Legend:

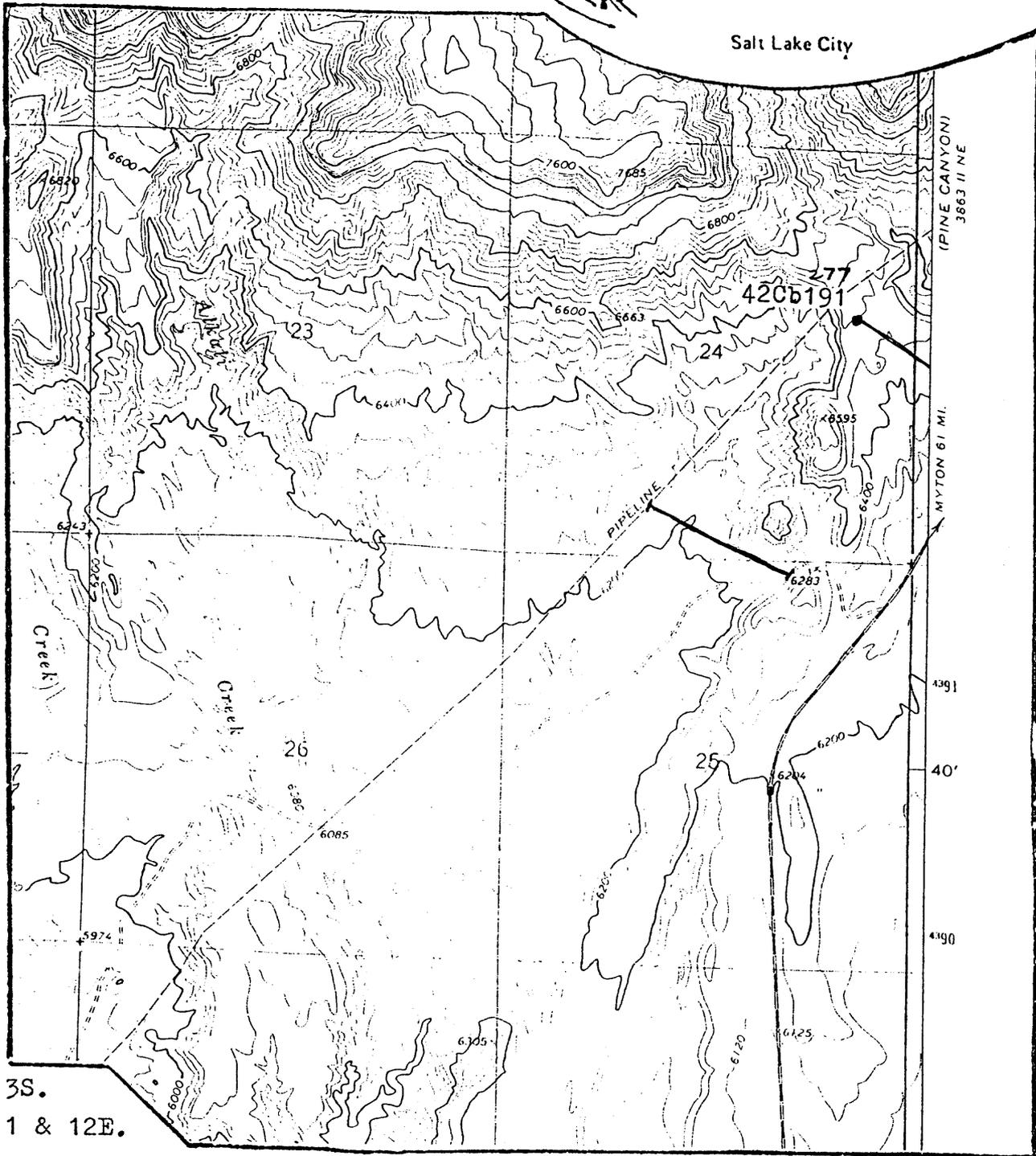
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- Isolated Artifact x
- Sample Survey Unit [dashed box]
- Portal Zone [dotted line]

Figure 5
SITE LOCATION
IN THE
PACE CANYON LOCALITY
OF
CARBON COUNTY, UTAH





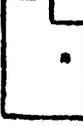
Salt Lake City

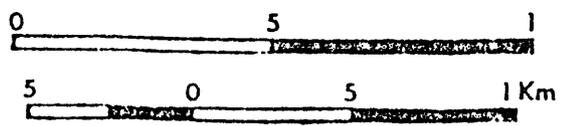


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R. 11 & 12E.

Meridian: Salt Lake B. & M.

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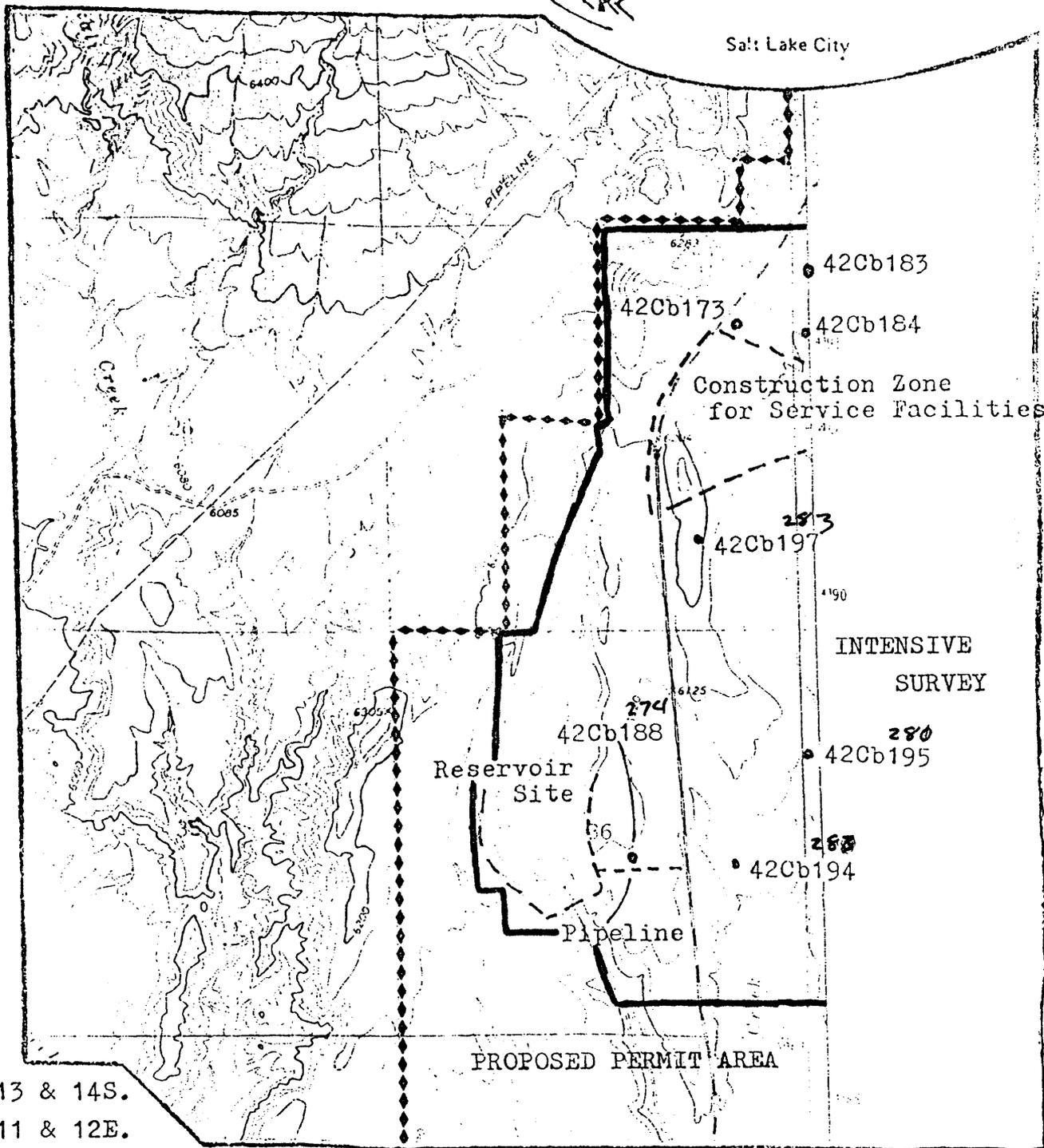
<p>Project: EREC-79 Series: Eastern Utah Date: 9-17-80</p>	<p>Figure 6 SITE LOCATION IN SOLDIER CREEK LOCALITY OF CARBON COUNTY, UTAH</p>	<p>Deadman Canyon, Utah 7.5 Minute USGS</p> 
		<p>Legend: Archeological Site ●</p>



Corridor Survey



Salt Lake City



13 & 14S.
11 & 12E.

Meridian: Salt Lake B. & M.

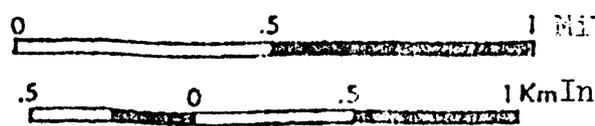
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Series: Eastern Utah
Date: 7/25/80

Figure 7
SITE LOCATIONS
IN THE
SOLDIER CREEK LOCALITY
OF
CARBON COUNTY, UTAH

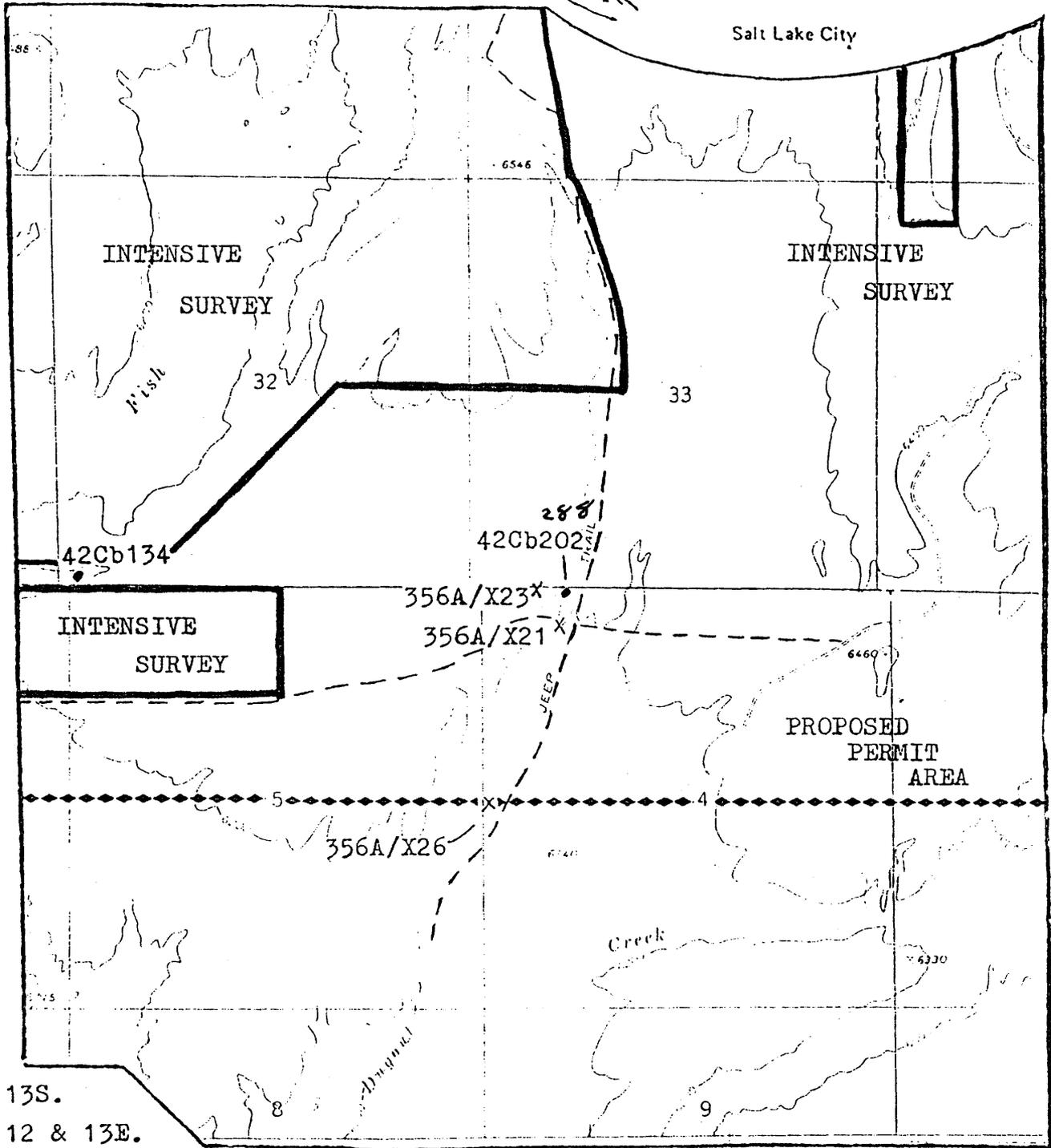
Deadman Canyon,
Utah
7.5 Minute USGS

Legend:
Archeological Site •
Isolated Artifact x
Intensive Survey Zone 7



ARER

Salt Lake City



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

Meridian: Salt Lake B. & M.

Quad:

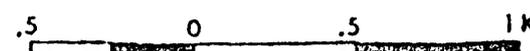
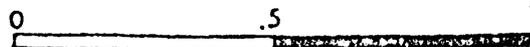
Project: EREC-80-1
Series: Eastern Utah
Date: 7-25-80

Figure 8
SITE LOCATIONS
IN THE
DUGOUT CREEK LOCALITY
OF
CARBON COUNTY, UTAH

Pine Canyon, Utah
7.5 Minute USGS



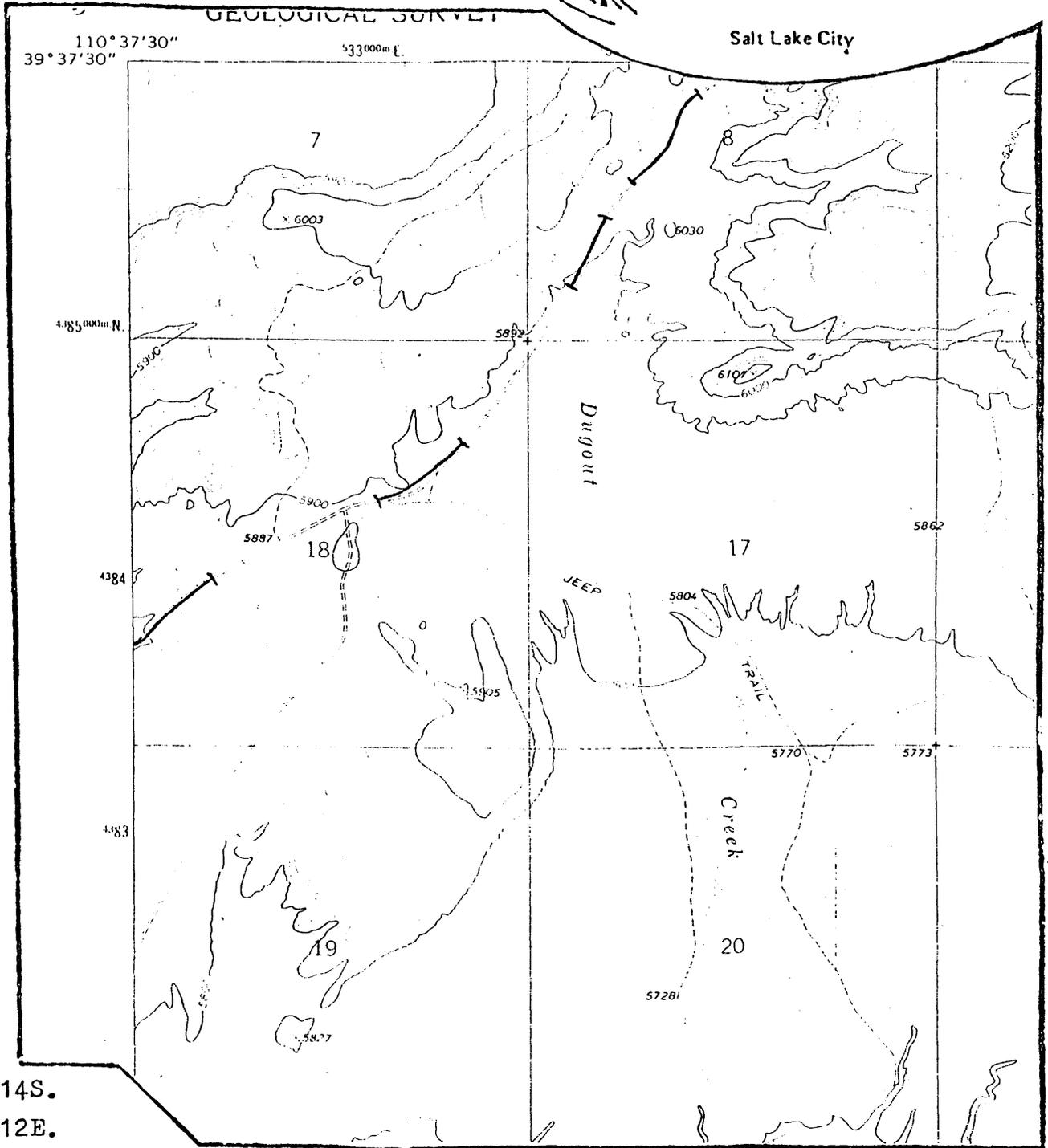
Legend:
Archeological Site •
Isolated Artifact x
Corridor



Intensive Survey



PLI
7



T. 14S.

R. 12E.

Meridian: Salt Lake B. & M.

Quad:

Project: EREC-79

Series: Eastern Utah

Date: 9-17-80

Figure 9

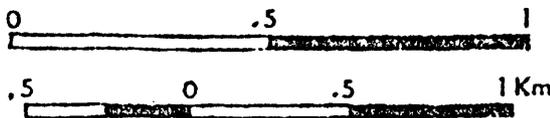
CORRIDOR EVALUATIONS
IN THE
DUGOUT CREEK LOCALITY
OF
CARBON COUNTY, UTAH

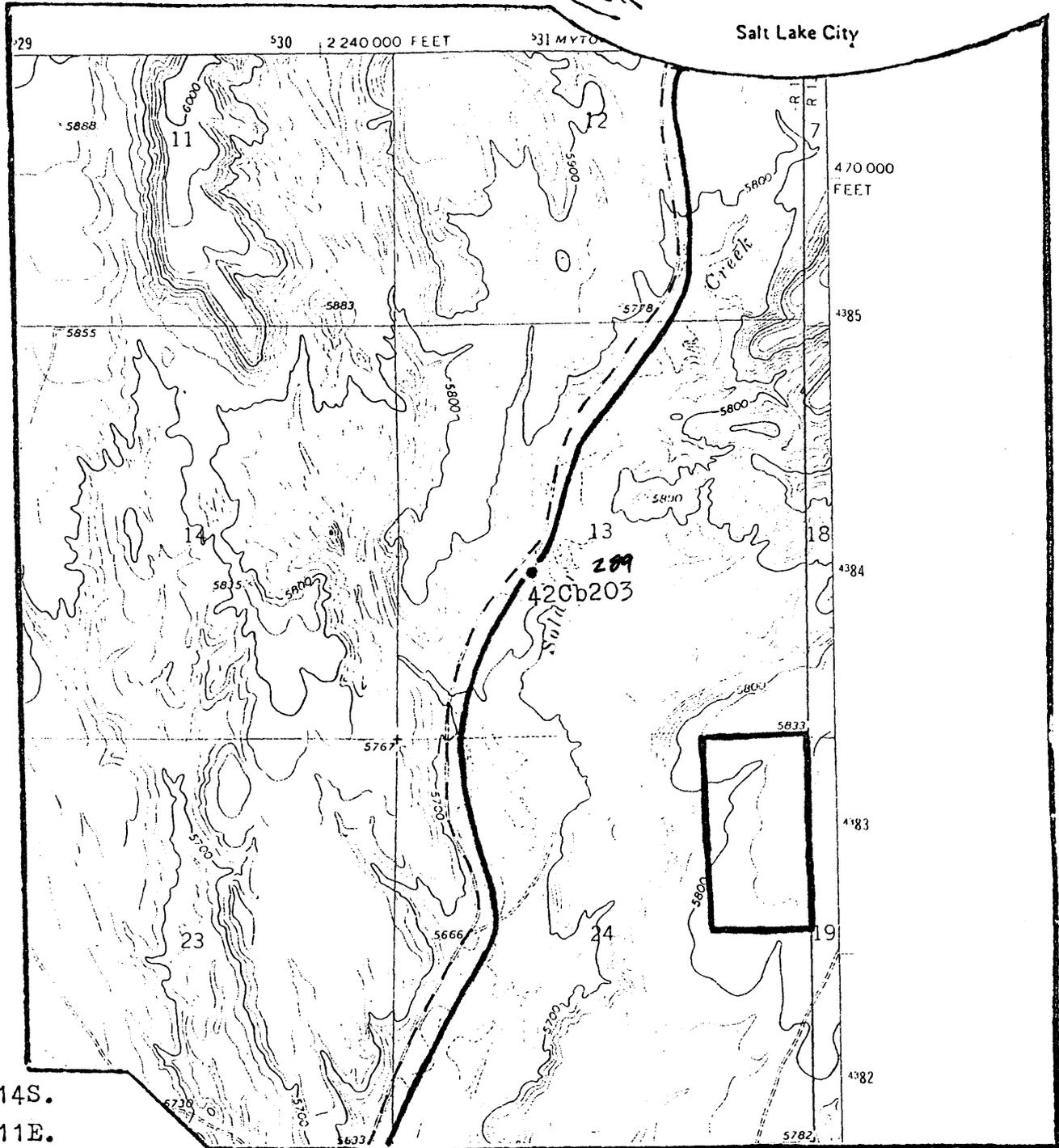
Sunnyside Junction
Utah
7.5 Minute USGS



Legend:

Corridor





T. 14S.
R. 11E.

Meridian: Salt Lake B. & M.

Quad:

Project: EREC-79
Series: Eastern Utah
Date: 9-17-80

Figure 11
CORRIDOR EVALUATIONS
IN THE
WELLINGTON LOCALITY
OF
CARBON COUNTY, UTAH

Wellington, Utah
7.5 Minute USGS

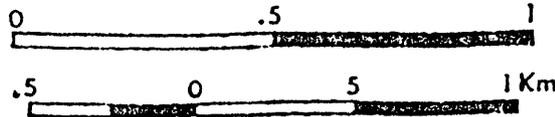


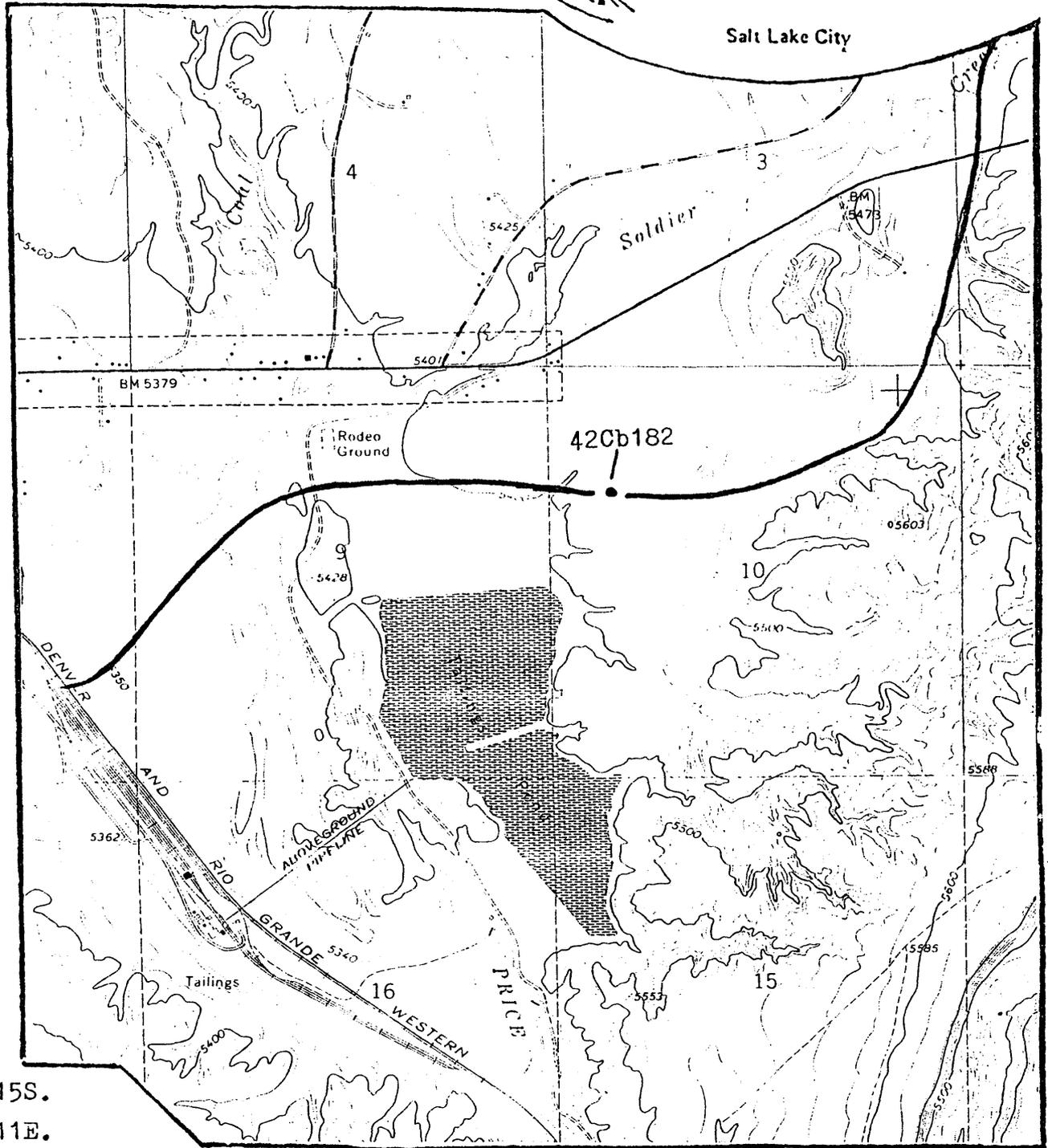
Legend:

Corridor

Archeological Site

Intensive Survey
Zone





T. 15S.

R. 11E.

Meridian: Salt Lake B. & M.

Quad:

Project: EREC-79
 Series: Eastern Utah
 Date: 9-17-80

Figure 13
 CORRIDOR EVALUATIONS
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 WELLINGTON LOCALITY
 OF
 CARBON COUNTY, UTAH

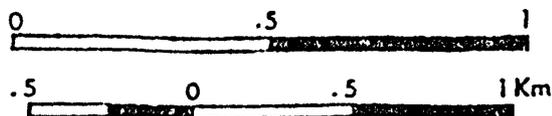
Wellington, Utah
 7.5 Minute USGS



Legend:

Corridor

Archeological Site





ARCHEOLOGICAL - ENVIRONMENTAL RESEARCH CORPORATION

588 West 800 South Bountiful, Utah 84010
Tel: (801) 292-7061 or 292-9668

June 24, 1981

rec'd. SR/PR JUL 06 1981

85-12

Subject: Cultural Resource Inventory of Three Coal
Exploration Drill Holes in the Pace Canyon
Locality of Carbon County, Utah

Project: Eureka Energy Company, Drill Holes 13-1, 18-1,
19-2

Project No.: EREC-81-1

Permit: U.S. Dept. of Interior, 81-Ut-179

To: Eureka Energy Company, ATTN: Mr. Chris
Slaboszewicz, 1010 Kearns Building,
136 South Main Street, Salt Lake City,
Utah 84101

Mr. Gene Nodine, District Manager, Moab Office,
Bureau of Land Management, P.O. Box 970, Moab,
Utah 84532

✓ Mr. Leon Berggren, Area Manager, Price Resource
Area, Bureau of Land Management, P.O. Box AB,
Price, Utah 84501

From: Mr. Richard Fike, Archeologist, Bureau of
Land Management, University Club Building,
136 East South Temple, Salt Lake City, Utah
84111

Mr. Robert F. Goudge, Eureka Energy Company,
P.O. Box 1506, Price, Utah 84501

U.S.
Department of the Interior
Bureau of Land Management
Utah State Office

Summary Report of
Inspection for Cultural Resources

For BLM Use Only

BLM Report ID No. 1111-1111111111
1 4 10

Report Acceptable Yes No

Mitigation Acceptable Yes No

Comments: _____

Report Title THREE COAL EXPLORATION DRILL HOLES 40

Development Company Eureka Energy Company

Report Date 6 22 1981
41 42 MONTH 43 YEAR 46

4. Antiquities Permit No. 81-Ut-179

Responsible Institution AERC (EREC-81-1) 61

County Carbon

Fieldwork Location: TWN 13S Range 13E Section(s) 18 19
62 65 66 69 70 71 72 73 74 75 76 77

TWN 13S Range 12E Section(s) 13
78 81 82 85 86 87 88 89 90 91 92 93

Resource Area PH TWN Range Section(s)
110 111 94 97 98 101 102 103 104 105 106 107 108 109

PO= PONY EXPRESS, BR= BEAR RIVER, PR=PRICE RIVER, WS=WARM SPRINGS
BC= BOOK CLIFFS, HR=HOUSE RANGE, SE= SEVIER RIVER
HM= HENRY MOUNTAINS, BE= BEAVER RIVER, DX= DIXIE
KA= KANAB, ES= ESCALANTE, SJ= SAN JUAN, GR= GRAND
SR= SAN RAFAEL, DM= DIAMOND MOUNTAIN,

Fill in spaces 65, 69, 81, 85, 97, 101 Only
V= Vernal Meridian
H= Half Township

Description of Examination Procedures:

Dennis G. Weder, AERC staff archeologist, examined each proposed drill location by performing parallel transects spaced no more than 15 meters (50 feet) apart so that an area 150 feet, centered on the flagged location, was evaluated.

Linear Miles Surveyed and/or 112 117

Definable Acres Surveyed and/or 118 123

* Legally Undefinable Acres Surveyed 2

(* A parcel hard to cadastrally locate i.e., center of section)

10. Inventory Type 130

R= Reconnaissance
I= Intensive
S= Statistical Sample

Description of Findings (attach appendices, if appropriate) 12. Number Sites Found: 0
No sites= 0 131

No cultural resource sites or isolated artifacts were found during the inventory.

13. Collection: Y=Yes, N=No
136

Actual/Potential National Register Properties Affected:
The National Register of Historic Places has been consulted and no National Register Properties will be affected by this project.

Conclusion/Recommendations:
AERC recommends that a cultural resource clearance be granted to Eureka Energy Company for this project, based on adherence to the following stipulations:

Signature and Title of Institutional Officer Responsible F. R. Hauck
F. R. Hauck, Ph.D.
President (Over)

Conclusions/Recommendations (cont'd.):

1. All vehicular traffic, personnel movement, and construction be confined to the locations examined and to access roads leading into these locations.

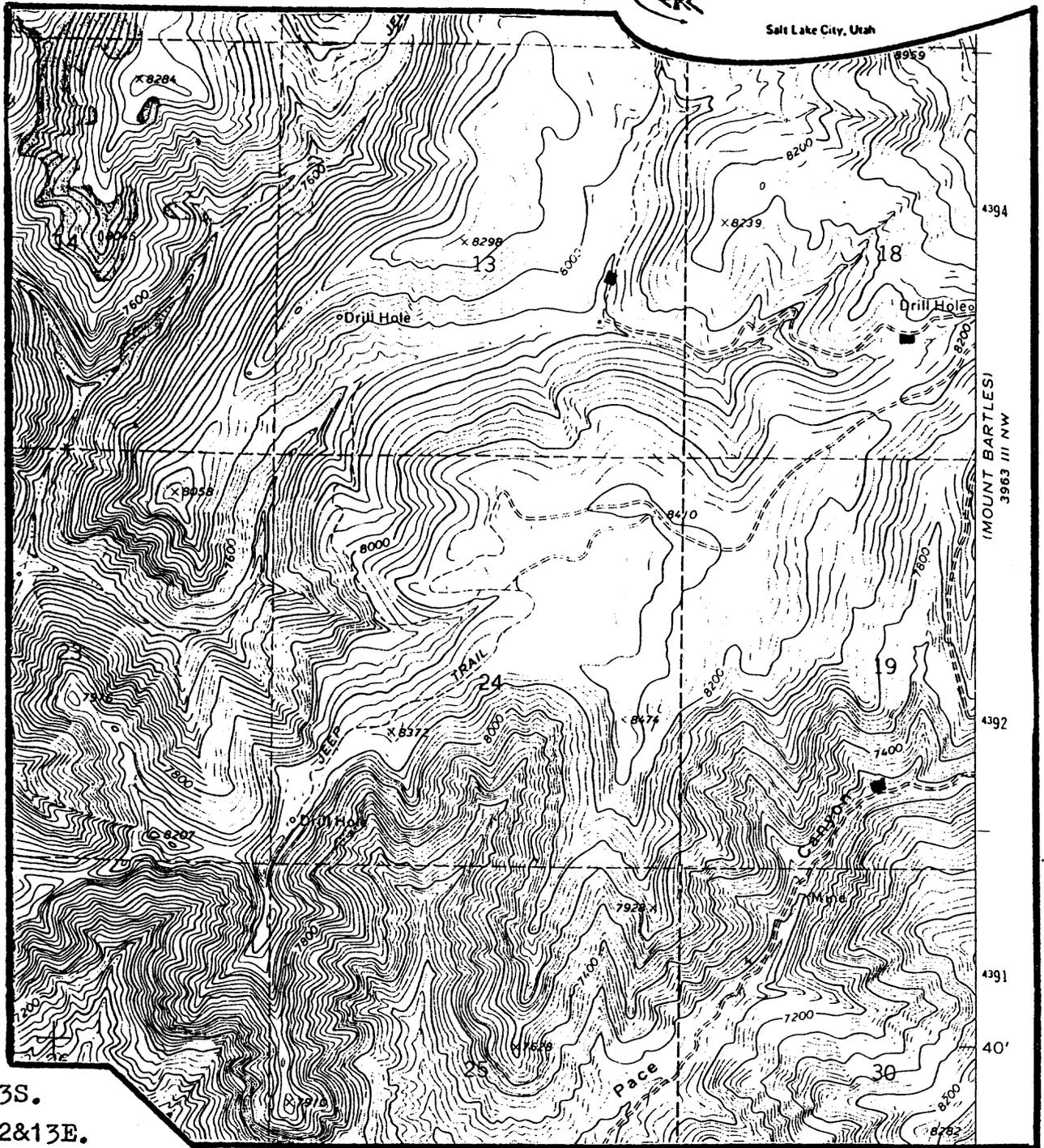
2. All personnel refrain from collecting individual artifacts or from disturbing any cultural resources in the area.

3. A qualified archeologist be consulted should cultural remains from subsurface deposits be exposed during construction work or if the need arises to relocate or otherwise alter the construction area.



ARCHIOLOGICAL - ENVIRONMENTAL
RESEARCH CORPORATION

Salt Lake City, Utah



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

Meridian: Salt Lake B. & M.

Quad:

Project: EREC-81-1
Series: Central Utah
Date: 6-22-81

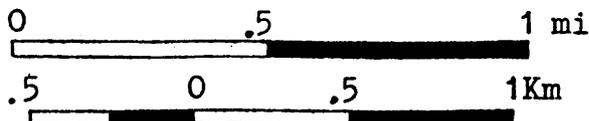
Pine Canyon, Utah
7.5 Minute
USGS



CULTURAL RESOURCE
INVENTORY OF DRILL HOLE
LOCATIONS IN THE
PACE CANYON LOCALITY
OF
CARBON COUNTY, UTAH

Legend:

Drill hole
inventory area



Scale



METCALF-ZIER ARCHAEOLOGISTS, INC.

ENERGY INDUSTRY SPECIALISTS IN
CULTURAL RESOURCE STUDIES

P.O. BOX 899
EAGLE, CO 81631
303-328-6244

27 June 1983

SR/PR Rec'd. JUN 30 1983

0007
Mr. Charles Durrett
Sunedco Coal Company
7401 West Mansfield Ave.
Suite 418, Box 35-B
Lakewood, CO 80235

Dear Charlie:

Enclosed please find our report on the Class III cultural resource inventory for Sunedco Coal Company's Sage Point-Dugout Canyon drill hole locations in Carbon County, Utah. Clearance is recommended for all the locations.

Please let me know if we can be of further help or if you have any questions with this report.

Sincerely yours,

Michael D. Metcalf
Principal Investigator

MDM/sjm

cc: BLM, State Office, Salt Lake City
Utah State Historical Preservation Office, Salt Lake City
BLM, District Office, Moab
BLM, Price River Resource Area Office, Price

Cultural Resource Inventory of 1983
Drill Hole Locations at the Sage Point-
Dugout Canyon Project, Carbon County, Utah

by
Michael D. Metcalf
Principal Investigator

Metcalf-Zier Archaeologists, Inc.
Eagle, Colorado

June 1983

Introduction

On June 13 and 14, 1983 flagging, pre-site inspection, and cultural resource inventory was conducted for nine coal exploration drill holes, and three alternate drill locations for Sunedco Coal Company. These holes are associated with the exploratory phase of the proposed Sage Point-Dugout Canyon Mine in Carbon County, Utah. Flagging of prospective drill holes was done by Project Geologist Jim Semborski of Sunedco and cultural resource survey by Michael D. Metcalf of Metcalf-Zier Archaeologists, Inc. The Bureau of Land Management was represented by Sid Vogelpohl and the Mineral Management Service by Steve Faulk. Survey was done under Antiquities Permit No. 83-UT-049.

The drill holes are located in T13S, R12E, Sections 10, 13, 14, 23, 24 and T13S, R13E, Section 19 (Figure 1). This is upland terrain in, and above, Pace and Dugout Canyons. Both canyons are south to southwest draining deeply incised features with steep canyon walls. Pace Creek and Dugout Creek both drain into Grassy Trail Creek and the Price River.

The upland terrain between and north of the canyons is gently rolling. Elevations range between 7200 ft. and 8300 ft. Vegetation is quite varied depending on elevation and exposure. The lower area touches the pinyon-juniper belt although canyon vegetation dominates and the pinyon and juniper are widely scattered. The pine-oak belt and fir-aspen belts are also represented (Upper Sonoran, Transition, and lower Canadian zones).

Previous Investigations

A number of investigations have occurred in the area, mostly for the Sage Point-Dugout Canyon Property. These are listed in detail by Hummer

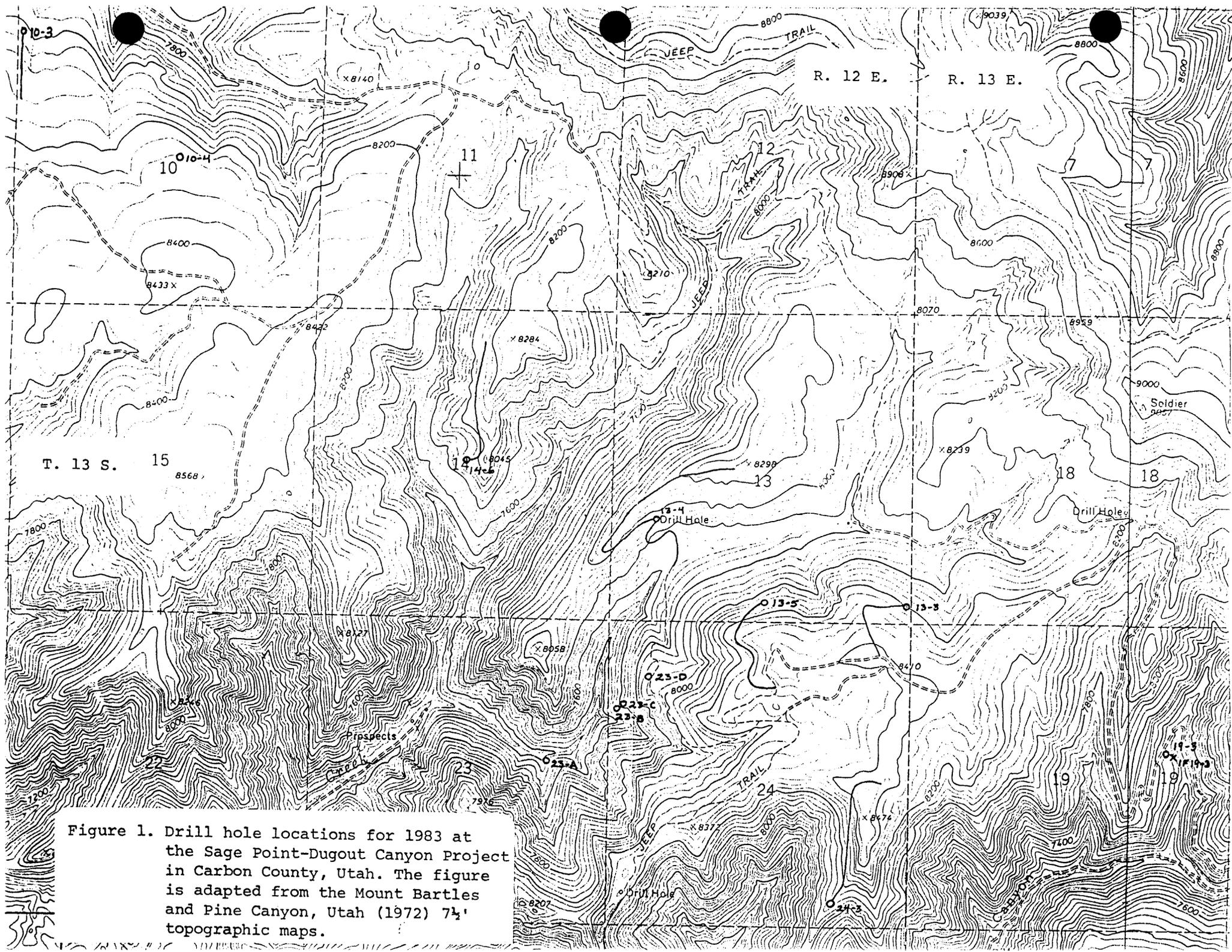


Figure 1. Drill hole locations for 1983 at the Sage Point-Dugout Canyon Project in Carbon County, Utah. The figure is adapted from the Mount Bartles and Pine Canyon, Utah (1972) 7½' topographic maps.

(1983:6). Some survey of the upper canyons and uplands has been done by Archaeological-Environmental Research Corporation (AERC) (Hauck and Weder 1980) where a 10% sample of a potential subsidence zone was surveyed, and by Utah Archaeological Research Corporation where five drill hole locations were inspected (Cook 1982). These investigations indicate a low potential for cultural resources in the upper canyons and uplands. Both montane zone sites recorded by AERC are lower in canyons than this survey covered. Several isolated projectile points were recovered from the uplands (Hauck and Weder 1980:40), but no prehistoric sites have been recorded.

A small amount of the land covered in this inventory had been covered by previous surveys. Subsidence Sample Unit #10 (Hauck and Weder 1980:39) in the NE/NE Sec. 24 covers a part of the proposed access to Hole No. 13-3, and other samples are near holes or access routes. Also, two of the now existing access routes from which proposed access will depart (access to 13-5 and one alternative access to 24-2) were surveyed in 1982 (Cook 1982).

Methodology

Cultural resource inventory took place at the same time as flagging on June 13 and 14, 1983. Each proposed drilling location was given close internal (less than 10 m.) pedestrian survey of a 100 foot radius area around the proposed location except where steepness of terrain prohibited this amount of coverage. Most portions of access roads were given a single meandering transect to cover about a 100 foot width. However, much of the proposed access is on top of narrow ridges, or else traverses steep side-hills. Specific coverage patterns for each of these areas will be discussed individually.

The single isolated find, a gray chert decortication flake, was recorded on an MZAI isolated find form after the locality had been intensively searched for additional cultural material. This artifact was not collected; the form is attached.

Survey Description and Results

Hole No. 10-3 is located in the SW/SW/NW/NW Sec. 10, T13S, R12E, on a gentle north slope overlooking Pine Canyon at an elevation of just over 8000 ft. It is to be served by about 900 ft. of access from the south. It lies in an open sagebrush-grassland-shrubland with good surface visibility. Aspen and spruce-fir occur on steeper slopes to the north. No cultural resources were observed.

Hole No. 10-4 is located in the NW/NW/NW/SE Sec. 10, T13S R12E, on a gentle north slope on existing access. Vegetation is sagebrush, grasses, serviceberry and various other shrubs. Aspen groves and spruce-fir are nearby. Surface visibility is very good. No cultural resources were observed.

Hole No. 13-3 is located in the SE/SE/SE Sec. 13, T13S R12E, on a moderately steep north slope. It is to be served by about 1500 ft. of access which winds to the location from the south. The location and final portion of access are situated in a semi-open area in a spruce-fir and aspen thicket with poor surface visibility. The upper portion of the access is in a sagebrush-dominated clearing with good surface visibility and had been previously inventoried by AERC. AERC located an isolated Archaic era projectile point east of the proposed access, but no additional cultural remains were observed.

Hole No. 13-4 is located in the NW/SE/NW/SW, Sec. 13, T13S R12E, on a very steep southeast-facing canyon wall. The location is an existing one which needs to be re-drilled. The original access is from the south but this route is extremely eroded and very steep. An alternative access was surveyed which runs across the slope to the southwest, climbing to the point of a ridge, then reversing direction and following a narrow ridgetop to existing access. This route is about 4100 ft. in length. In addition to walking the route, boulders and a short segment of cliff face in the canyon were also inspected for rock art and rock shelters. Vegetation consists of sage-brush, shrub and scattered ponderosa on the slope, and ponderosa, shrub, sagebrush and grassland on the ridgetop. Surface visibility was good to excellent. No cultural resources were observed.

Hole No. 13-5 is located in the SW/SW/SE Sec. 13, T13S R12E, on a moderately steep north slope above a fork of Dugout Creek. Access contours south around a point and is about 2200 ft. in length. Vegetation on the location and north-northwest facing access is spruce-fir and aspen thicket with poor surface visibility. The west-facing portion of the access runs through more open shrubland, sagebrush and scattered ponderosa with fair to good surface visibility. No cultural resources were observed.

Hole No. 14-6 is located in the SW/SW/SW/NE of Sec. 14, T13S, R12E, on a gently sloping bench on an otherwise steep west-facing slope. Its access comes from an overgrown existing trail, also on a steep side hill, which now terminates about 2200 ft. north of the location. Because of uncertainties in construction requirements an exact alignment was not flagged, or surveyed. Instead, all areas of moderate to gentle slope, and

all cliff exposures along the approximate alignment were inspected. There are almost no areas of moderate slope, and few possible areas for rock art to occur. Therefore, cultural resource clearance is recommended unless the route chosen diverges significantly from that depicted on Figure 1.

Hole No. 19-3 is located in the SW/SW/SE/NE Sec. 19, T13S, R13E, on a gentle east slope near the bottom of Upper Canyon, a tributary of Pace Creek. It is situated on existing access in a natural clearing in ponderosa and canyon bottom vegetation. Surface visibility is good to excellent. A single gray chert decortication flake derived from a river polished pebble was observed on the slope above the creek about 100 ft. east of the location. It was recorded as IF-19-3 but was not collected. A very intensive search which included a large area of exposed soils and a cut-bank adjacent to the locality of the flake did not reveal any additional material. There is some evidence of modern use of the clearing for small-scale lumbering, but this material does not appear to be historic in age. The immediate locality of the isolate will not be impacted by the location. In any event the isolate is not significant.

Hole No. 23-1 was intended to be located on the north side of Dugout Creek about 1/2 mile above the old Dugout Mine (42CB206). However, the terrain is too steep for an access road and four bench-like locations were inspected as alternative locations. Each would have to be drilled by a portable rig lowered by helicopter. These locations are situated as follows: 23-A SW/SW/SW/NE Sec. 23, T13S R12E, is on a small bench near the floor of the canyon. It has pinyon, chokecherry, other shrubs, sagebrush and grasses for cover and fair to good surface visibility. No cultural resources were observed.

23-B and 23-C occupy two adjacent levels of a narrow ridge projection about mid-way up the canyon wall in the NW/NW/SW/NW Sec. 24, T13S R12E with excellent surface visibility. No cultural resources were observed.

23-D is situated on the canyon rim along existing access in the W1/2 SE/NW/NW Sec. 24, T13S R12E, on a gentle slope. It is situated in a sagebrush-shrub mix on the edge of spruce-fir and aspen forest with good surface visibility. No cultural resources were recorded. If any one of locations 23 B-D are drilled it will be re-numbered as 24-(?).

Hole No. 24-3 is located on a narrow southwest ridge extension in the E1/2 SE/SW/SE Sec. 24, T13S R12E. Access is to run north along a steep west-facing side hill, then bend east on the main ridge top and terminate at an existing road and drill location. Vegetation on the location is an open ponderosa forest with good surface visibility. Vegetation on the side-hill is mixed shrub, and on the ridgetop it is sagebrush and widely scattered juniper with very good surface visibility.

Because of the steepness of the terrain on the side-hill portion of the access, no specific route was flagged or surveyed. Instead cultural resource survey focused on rock outcrops suitable for rock art or rock shelters; there is no gentle or moderately sloing terrain between the ridgetop and the location. No evidence of cultural use of the few stable rock outcrops was noted, and no cultural resources were located on the location or ridgetop portion of the access. If no significant deviations from the access route depicted on Figure 1 are made, then cultural resource clearance is recommended.

Summary and Conclusions

A single isolated chert flake was the only cultural resource located during intensive inventory of 12 potential drill hole locations and about 2.6 mi. of access route. All inventory took place between the elevations of 7200 ft. and 8300 ft., a zone variously called upland or montane. This result is consistent with the results of two previous inventories (Hauck and Weder 1980; Cook 1982). Thus far, isolated prehistoric artifacts, probably associated with transient hunting activities, are the only cultural resources recorded at elevations above 7200 ft. Fremont rock art occurs, and historic mining took place in canyon bottoms at and below the 7000 ft. level. Evidence of limited timbering activities and of livestock operations is fairly common, but physical remains of these activities are limited and appear to be less than 50 years in age.

In view of the negative results of this, and other inventories, the upland portions of the Sage Point-Dugout Canyon Project area can be characterized as having low potential for cultural resources. Cultural resource clearance is recommended for the locations and access covered by this survey.

References Cited

Cook, Clayton W.

- 1982 Archaeological Reconnaissance of Five Exploratory Drill Hole Locations in the Vicinity of Sage Point and Dugout Canyon, Carbon County, Utah. Utah Archaeological Research Corporation, Spanish Fork, Utah.

Hauck, F. R., and D. G. Weder

- 1980 Intensive Archaeological Surface Evaluations of the Proposed Sage Point-Dugout Canyon Project in Carbon County, Utah. Archaeological-Environmental Research Corporation Paper No. 19. Salt Lake City, Utah.

Hummer, Anne G.

- 1983 Results of a Class III Cultural Resource Inventory of Sunedco Coal Company's Proposed Sage Point-Dugout Canyon Coal Plant and Facilities Site, Carbon County, Utah. Metcalf-Zier Archaeologists, Inc., Eagle, Colorado.

ISOLATED FIND RECORD

Permanent # _____ Temp. # IF-19-3 County _____ Carbon _____ State UT

LOCATION: T 13S R 13E Sec. 19, SW 1/4 SW 1/4 SE 1/4 NE 1/4; _____ ' F L, _____ ' F L

UTM Zone _____; _____ mE; _____ mN

USGS Quad Mt. Bartles (19) 7.5 x 15 Other map _____

ARCHAEOLOGICAL DATA: No. of items 1 Collected? No Repository _____

Description of Artifact(s) (include dimensions) _____

1 decortication flake of gray chert derived from nine gravels.

Inferred Function lithic reduction

Cultural Affiliation Prehistoric Time Period unknown

ENVIRONMENTAL DATA: Elevation 7450 feet / 2270 meters

Soil light brown sandy loam, thin over rocky surface

Topography Small bench on canyon bottom on west side of a small creek.

Slope (degrees) and direction: IF Location 2° Vicinity varied

Vegetation: IF Location Open grassy clearing with a mix of pinyon, juniper and firs

Vegetation: Vicinity adjacent to a riparian strip--up to 60% surface visibility.

Water Sources(s) (give type, distance, direction, permanent or intermittent)

A major intermittent stream is within 30 m east.

Subject Name &/or Report Title 1983 Drill Holes-Sage Point-Dugout Canyon

Landowner private Recorder M. Metcalf Date 6/14/83

A SAMPLE-ORIENTED CULTURAL
RESOURCE INVENTORY IN CARBON,
EMERY, AND SANPETE COUNTIES, UTAH

by

Alan D. Reed and Susan M. Chandler

Under the Direction of

Paul R. Nickens, Ph.D.
Nickens and Associates
P.O. Box 727
Montrose, Colorado 81402
(303) 249-3411

Prepared for the
Bureau of Land Management

Under the Terms of
Contract No. YA-553-CT2-1080

July 1984

MANAGEMENT SUMMARY

A sample-oriented cultural resource inventory of five study tracts in central Utah was conducted by Nickens and Associates in 1982 and 1983. The study tracts, comprising approximately 113,000 acres, are being considered for coal leasing and other energy-related development by federal land-managing agencies. Ten percent of the acreage of each of the study tracts was subjected to field inspection for cultural resources. Sample units, each containing 160 acres, were randomly selected within the study tracts. A total of 70 sample units, containing 11,200 acres, was inventoried. The cultural resource inventory resulted in the discovery of 25 archaeological sites and 74 isolated finds. Of the sites, 24 were prehistoric, and one was historic. The prehistoric sites generally consisted of small, rather unremarkable scatters of chipped stone artifacts. Analyses were conducted to determine functions of the prehistoric lithic scatters; two were classified as short-term campsites, one was classified as a tool kit site, five were classified as chipping stations where the initial stages of stone reduction occurred, and the remaining 16 were classified as chipping stations where the final stages of stone reduction occurred.

Site population estimates were calculated for each tract, with site densities ranging from 0 to 9 per square mile. Site sensitivity maps were prepared for each tract, based upon distribution of sites in relation to the environmental variables of slope and vegetation zone.

The relationship between certain environmental variables and site occurrences was further studied, using both parametric and nonparametric statistical tests. Fifteen variables measuring environmental attributes of site and nonsite locations were analyzed, and the discriminant analysis statistic was used to differentiate between the site and nonsite groups. At the project's inception, sample units were randomly grouped into two sets of equal size, designated as Phase I and Phase II. The purpose of designating the two sets was to provide a means for independently testing the results of a predictive model for site and nonsite locations; Phase I data provided a 5% sample and a predictive model, which was tested with Phase II data. The efficiency of the Phase I model was first tested against itself, where it classified 93% of its nonsites correctly and 94% of its sites correctly. Since models tend to perform well on the data from which they are derived, the Phase I model was then independently tested on the sites and nonsites from Phase II. As expected, it performed less efficiently, but still classified 80% of the nonsites and 71% of the sites correctly. Next, Phase I and Phase II data were combined and a new, more powerful model was produced. Its increase in power results from doubling the sample fraction. The combined model classified 84% of the nonsites and 100% of the sites correctly, for an overall efficiency of 86%. Several independent tests of the combined model were then performed. In one, 140 points were randomly located in the surveyed sample units, and discriminant scores and associated probabilities were generated from USGS map and sample unit record data. All of these points proved to be nonsites, and the model properly classified 82%. In another test, 54 randomly selected points within previously surveyed areas in the project area were analyzed. The model correctly identified 70% of these points as nonsites. Finally, the combined model was tested on five previously recorded lithic scatters in the project area. The model performed poorly on this data set, misclassifying three of the five sites.

CHAPTER I

INTRODUCTION

General

In the fall of 1982, the Bureau of Land Management (BLM) contracted with Nickens and Associates of Montrose, Colorado, to conduct a sample-oriented cultural resource inventory of approximately 113,000 acres in central Utah. The lands comprise five non-contiguous tracts in the vicinity of Price, Utah, and are owned or administered by private parties, the Bureau of Land Management, or the U.S. Forest Service's Manti-La Sal National Forest. Private lands are included in the study area when mineral rights are publicly-owned. The cultural resource inventory was requested by the BLM in order to generate cultural resource data in anticipation of coal leasing and other energy-related developments within the project area. Determination of the nature and the significance of the cultural resources within the project area is the responsibility of the federal government, as mandated by various historic preservation laws and executive orders. It is the intent of these laws to insure that historic and prehistoric cultural resources important to our national heritage are not inadvertently harmed or destroyed by federally initiated or authorized actions.

Towards the goal of discerning the nature and the significance of the cultural resources within the project area, the BLM defined the following objectives to guide this project's research:

- 1) Development of projections of expected density, and diversity of cultural resources;
- 2) Development of a predictive model for site location;
- 3) Recognition of patterns of past human land use; and
- 4) Identification of appropriate research directions for future archaeological investigations within this project area.

The cultural resource inventory herein described represents an attempt to extrapolate or predict the distribution and nature of archaeological sites characterizing the entire project area from data collected on a small portion of the project area. While a 100% field reconnaissance of the entire 113,000 acre project area would provide the most accurate information on the cultural resources within the project area, such an approach would be extremely costly. A properly selected sample, derived in accordance with sound statistical theory, can permit reliable estimations of population parameters and the calculation of associated confidence intervals. In this case, a sampling fraction of 10% was employed, resulting in the inventory of 11,200 acres. Each sample unit or quadrat was square, located with reference to a cadastral survey, and covered 160 acres.

Theoretical Background

This cultural resource inventory is the latest in a series of sample-oriented cultural resource surveys sponsored by the BLM in Utah that have been aimed at the prediction of site locations. It represents a refinement of earlier techniques, and it is hoped that it will aid in further development of predictive modeling efforts. This and previous investigations have focused primarily upon the relationship of man and his physical environment. This approach is valid because the influence of the physical environment on site locations is universal, regardless of the level of social organization, time period or region (Kvamme 1983). Simply put, man selects for habitation or use locations perceived as appropriate based on factors such as the gentleness of slope, the distribution of water, food, and fuel resources, and quality of shelter. Site locations are not randomly scattered across the landscape. The physical attributes of site locations can be easily defined and measured, often at an interval level, permitting easy comparisons to zones or points without sites. Another approach that may be considered involves man's relationship with his social environment, for site locations may reflect distance from other social groups or central places of religion or commerce. This approach has not been utilized in predictive modeling efforts conducted in eastern Utah to date, however, due to the relatively simple level of social organization characterizing the prehistoric aboriginal groups in the region and difficulties in establishing contemporaneity of prehistoric sites.

One of the first predictive modeling efforts in the region was conducted by the Archeological-Environmental Research Corporation (AERC) in 1977 (Hauck 1979). This project employed a 1% sample of approximately 4,769,000 acres in east-central Utah. The resulting site data were analyzed in terms of site frequencies within certain vegetation zones, geologic formation zones, landforms, and rainfall zones. In 1978, AERC conducted a 10% stratified random sample of the Natural Buttes area of the Uinta Basin. Site frequencies per sample unit were used to construct cultural resource sensitivity maps for the study area (Hauck et al. 1979). Between 1978 and 1980 Nickens and Associates completed two sample-oriented surveys in Utah (Larralde and Nickens 1980; Reed and Nickens 1980). The Cisco project, located in the Mancos Shale lowlands west of Grand Junction, Colorado, and the Red Wash project located in the Uinta Basin were 10% samples, stratified by vegetation zones and drainage features. Chi-square statistics were used to show that sites were non-randomly distributed among strata, and site frequencies within strata were used to construct site density estimates and site sensitivity maps for the entire project areas. More powerful statistics were utilized for the same general goals on the Split Mountain project. This project, conducted in 1978 by the University of Utah Archeological Center, performed discriminant analysis of data generated from a 25% stratified random sample to distinguish quadrats yielding sites from quadrats devoid of sites. This permitted the construction of sensitivity maps for the entire project area (Holmer 1979).

Substantial theoretical gains were made in site location predictive modeling in 1979 with the completion of a 3% sample-oriented survey in the Glenwood Springs Resource Area in west-central Colorado (Burgess et

al. 1980). This project, conducted by Nickens and Associates, also employed the discriminant analysis statistic, but used point locations, rather than entire quadrat locations, as the unit of study. Data on a wide range of environmental variables were collected for site locations and for locations where sites did not occur (nonsites). Discriminant analysis was then used to distinguish the site group from the nonsite group on the basis of certain environmental variables. The method, developed by Kenneth L. Kvamme, was highly accurate, correctly classifying 91% of the sites. Its efficiency was further established by an independent test using data derived from a previous sample-oriented survey within the Glenwood Springs Resource Area (see Lutz et al. 1979). Kvamme's model correctly classified 85% of the comparative group's sites and 76% of its nonsites. Further testing of the model with data collected along a transmission line survey in the Glenwood Springs Resource Area by Reed (1981) has provided additional support for Kvamme's model. Put quite simply, the model works well within its sample universe.

A model similar to Kvamme's but utilizing some different environmental variables was employed in Utah by Nickens and Associates in 1980, on the Seep Ridge Project in the Uinta Basin. Once again, the multivariate statistical technique was able to correctly distinguish a high percentage of sites and nonsites within the sample universe (Larralde and Chandler 1981). Larralde and Chandler's Seep Ridge model was tested in an environmentally and geographically distinct project area within the Uinta Basin between 1981 and 1983 by ESCA-Tech and by Chambers Consultants and Planners (Reynolds et al. 1983). Their 5% sample yielded dubious results, perhaps due to a small sample of site locations, consistent mismeasurement of a vertical relief variable, and differing environmental characteristics demanding different human adaptations. Between 1979 and 1981, New World Research, Inc. conducted a 10% sample inventory of three large tracts near the Castle Valley in central Utah. The investigators analyzed site frequency distributions according to vegetation zone, elevation, and slope (Thomas et al. 1981).

In general, the trend in predictive modeling in Utah has been towards greater statistical sophistication, allowing for more reliable results. Multivariate analyses, such as the discriminant analysis statistic, have the advantage over more simple forms of analyses since they reflect the fact that multiple factors affect site location, and further, that the critical variables are differentially important. Discriminant analysis also has the advantages of being able to handle interval level data, and is designed to predict information, rather than to merely detect relationships in the data (Kvamme 1983).

Project Implementation

Nickens and Associates selected field and analytic techniques designed to meet the requirements of a predictive model of site location based on discriminant analysis as well as to meet the general project goals established by the BLM. The fieldwork was conducted between October 25, 1982, and August 23, 1983. Field operations were interrupted by snowfall during the winter months, and were delayed by road damage resultant from extraordinary spring snowmelt and runoff. A total of 33 field days was expended. The survey was conducted under the general

direction of Dr. Paul R. Nickens, Principal Investigator for the project. Alan D. Reed served as Co-Principal Investigator, and also served as Field Director during the 1982 field season. In 1983, Diana Christensen was the Field Director. Crew chiefs were Susan Eininger and Joan Gaunt. Crew members employed during the course of the fieldwork were Scott Billat, Jane Day, Daniel Deslauriers, Peter Finney, Tim Hovezak, Cindy Kenoyer, Earl Mead, Todd Metzger, Anna Marie Rago, Lane Richens, Igor Steel, and Phyllis Wolf.

CHAPTER II

ENVIRONMENTAL AND CULTURAL BACKGROUND

Environment

Location

The five tracts constituting the study area are located within a 40 mile (64 km) radius of Price, Utah (Figure 1). The Nine Mile Tract, the largest of the tracts, is located in eastern Carbon County, less than 5 miles (8 km) northeast of East Carbon City. The tract contains privately-owned lands as well as lands administered by the Bureau of Land Management and the State of Utah. Nine Mile Canyon, well known for its Fremont culture rock art and habitations, is approximately 3 miles (5 km) north of the tract. Westward and partially adjacent to the Nine Mile tract is the Soldier Creek tract. This tract is located in the central portion of Carbon County, approximately 10 miles (16 km) north and north-east of Wellington. The tract is bisected by Soldier Creek, along which is situated an all-season county road providing passage from the Price area into the Uinta Basin and Duchesne, Utah. Lands within the Soldier Creek tract are privately-owned or administered by the Bureau of Land Management or the State of Utah. The Woodside tract is located approximately 12 miles (19 km) south of the Nine Mile tract in Emery County. The small community of Woodside, located at the intersection of U.S. Highway 6 and the Price River, is approximately 2 miles (3 km) west of the Woodside tract. The Price River is within a few hundred feet of the southern boundary of the Woodside tract. All lands within the Woodside tract are administered by the Bureau of Land Management. The Scofield tract is situated approximately 16 miles (26 km) west of Price and 6 miles (10 km) south of the town of Scofield, Utah. The tract consists of two parcels, separated by a distance of 1.5 miles (2 km). Both parcels straddle the Carbon and Emery County line. Lands within the Scofield tract are either privately-owned or are administered by the Manti-La Sal National Forest. The final tract, termed the Sanpete tract, is located adjacent to the Sanpete and Emery County line, entirely in Sanpete County. Castle Dale, one of the large communities in the Castle Valley, is 16 miles (26 km) east of the Sanpete tract. All lands within the tract are administered by the Manti-La Sal National Forest.

Topography and Geology

The five study tracts are located in the High Plateaus section of the Colorado Plateau physiographic province (Hunt 1967). The topography of the project area is characteristic of the Colorado Plateau, with extensive areas of nearly horizontal sedimentary formations, structural upwarps that form prominent topographic features, relatively high altitudes, and deeply-entrenched drainages, forming canyons along with mesas or ridges (Hunt 1967). The study tracts are situated in upland areas encircling the head of the Castle Valley, a broad structural feature consisting of slightly undulating, sparsely vegetated Mancos Shale lowlands. The eastern Soldier Creek, Nine Mile and Woodside tracts are within the Book Cliffs - Roan Plateau subdivision of the Colorado Plateau, as defined by Stokes (1977). This area represents a significant

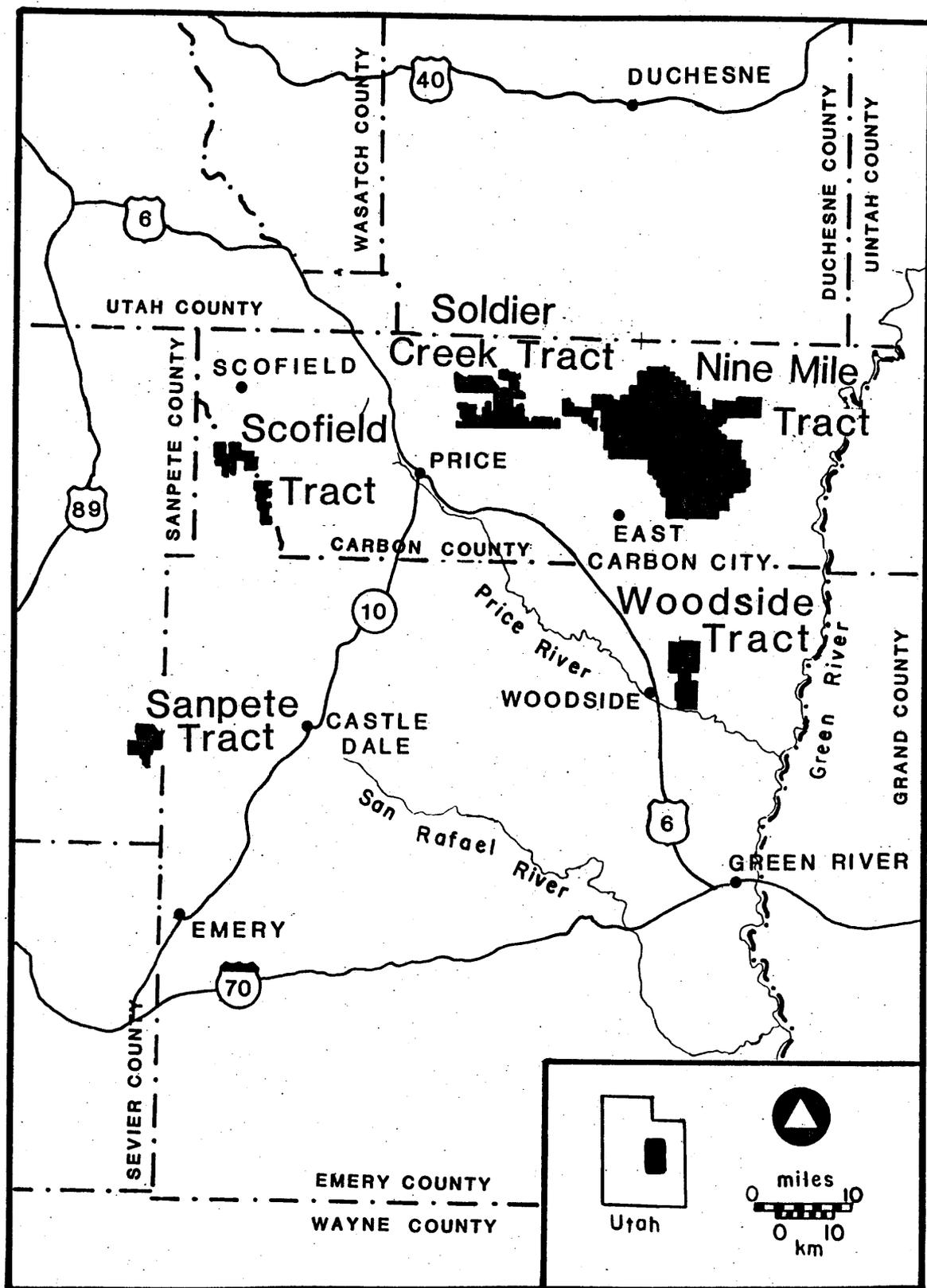


Figure 1. General location map of the study area.

topographic break between the easily eroded Mancos Shale exposed in the lowlands and the more resistant overlying Cretaceous and Tertiary Age Formations exposed in the dramatic cliffs of the Book Cliffs and Roan Cliffs. Differences in elevations range up to 5000 feet (1524 m). Elevations in these tracts consequently range between approximately 4600 feet (1402 m) at the base of the Book Cliffs in the southwestern corner of the Woodside tract to 10,131 feet (3088 m) at Bruin Point in the Nine Mile tract.

The Sanpete and Scofield tracts are located west of the Castle Valley, on the Wasatch Plateau. This area also represents a structural uplift of sedimentary strata, but is not characterized by dramatic, extensive cliffs. Elevations of the Sanpete and Scofield tracts range from approximately 7000 feet (2134 m) in the Sanpete tract to 10,452 feet (3186 m) atop Monument Peak in the Scofield tract.

The geological formations underlying the five study tracts are similar. The oldest formation, which occurs as outcrops in the lowest portions of the Nine Mile, Soldier Creek, and Woodside tracts, is the Cretaceous Mancos Shale. Overlying it in the Scofield tract is the Cretaceous Star Point Sandstone. The slightly younger Blackhawk and Castlegate Formations are evident in all tracts, forming the Book Cliffs and Roan Cliffs in the Nine Mile, Soldier Creek, and Woodside tracts, and exposed in eroded areas of the Scofield and Sanpete tracts (Hintze and Stokes 1964; Department of the Interior 1978a). Overlying these units is the Cretaceous Price River Formation. The undifferentiated Tertiary/Cretaceous North Horn Formation is present in the Sanpete and Soldier Creek tracts. The Nine Mile tract has the most recent formations; Eocene (Tertiary) deposits such as the Parachute Creek member of the Green River Formation and the Wasatch Formation are present in the higher elevations.

Climate

The climate of the five study units varies considerably, due to differing elevations and topographic situations. The lower elevations are generally warmer than the higher elevations, but receive less precipitation. The Woodside tract and the lower portions of the Nine Mile and Soldier Creek tracts receive an average of 12 inches to 16 inches (305 mm to 406 mm) of precipitation per year, and have a growing season of approximately 140 days. The climate of the higher elevations is probably comparable to that indicated by data obtained near the Scofield tract (Department of the Interior 1978b), where an annual precipitation rate of 25 inches to 30 inches (635 mm to 762 mm) was recorded, approximately one-third occurring as rain. Snow generally falls between October and May, usually accumulating to approximately 4.5 feet total thickness (1372 mm). Average monthly temperatures range from 60° (F) in July to 15° (F) in January.

Soils

Soil types vary between the five study tracts, as a result of several environmental factors. According to the Department of the Interior (1978a), three broad soil types can be identified in the Woodside tract.

One type, termed Soil Type P, includes Typic Fluvaquents and Typic Salorthids, and is characteristic of valley bottoms between 4500 feet to 5500 feet (1372 m to 1676 m) in elevation. This type occurs below the Book Cliffs in the southwestern portion of the Woodside tract. In the central portion of the tract, along the Little Park Wash, Soil Type Q occurs, which is characteristic of barren rocklands. Farther to the northeast is Soil Type K which is common to arid 3600 feet to 7000 feet (1097 m to 2134 m) elevations. This type is made up of Ustollic Calciorthiss, Ustollic Haplargids, Lithic Ustollic Calciorthiss, and Lithic Ustic Torriorthents soil associations. The Soldier Creek tract is characterized by Soil Type Q in the lower elevations, and Soil Type B in much of the higher elevations. Soil Type B is common to areas between 6000 feet and 8400 feet (1829 m and 2560 m) elevation. It includes Lithic Argiborolls, Rock Outcrop, Typic Agriborolls, Typic Haploborolls, and Typic Calciborolls. The eastern portion of the Soldier Creek tract is characterized by Soil Type A. This type generally occurs between elevations of 8000 feet and 12,000 feet (2438 m and 3658 m) and includes Argic Cryoborolls, Pachic Cryoborolls, Cryic Paleborolls, Lithic Cryoborolls, Mollic Cryoborolls, and Rock Outcrop soil associations. Soil Type A also covers the higher elevations in the Nine Mile tract. Soil Type B is common in the lower elevations of the Nine Mile tract, in the northeastern portion of the tract. The Sanpete tract is almost entirely covered by Soil Type B soils. The Scofield tract is characterized by Soil Type A soil associations.

Hydrology

The study area is primarily drained by the tributaries of the Green River, a major tributary to the Colorado River. Important tributaries to the Green River that flow year-round in the general vicinity of the study tracts include the San Rafael River, the Price River, and Nine Mile Creek. Perennial streams are generally rare within the study units, and include Range Creek and streams in Cow Canyon and the Left and Right Forks of Whitmore Canyon in the Nine Mile tract, Soldier and Coal Creeks in the Soldier Creek tract, Ferron Creek in the Sanpete tract, and Valentines Gulch and Mud Creek in the Scofield tract. Intermittent streams are numerous in all tracts. Springs are numerous within the project area, but appear to be intermittent.

Vegetation

Floral communities present within the project area are diverse, due to varying elevation and nuances of exposure and availability of water. Important floral communities include pinyon-juniper woodlands, mountain brush, aspen forests, conifer-aspen forests, and mountain meadows. The entire Woodside tract, most of the Sanpete tract, the southern portion of the Soldier Creek tract, and the northeastern portion of the Nine Mile tract are covered by pinyon-juniper woodlands, often interspersed with big sagebrush parks (Figures 2, 3, and 4). Flora common to this zone include Utah juniper, pinyon pine, big sagebrush, Mormon tea, rabbit-brush, curlleaf mountain mahogany, prickly pear, Indian ricegrass, and wheatgrass. The remainder of the Soldier Creek, Nine Mile, and Sanpete tracts, as well as all of the Scofield tract, are characterized by flora adapted to higher elevations (Figures 5 and 6). The pinyon-juniper wood-

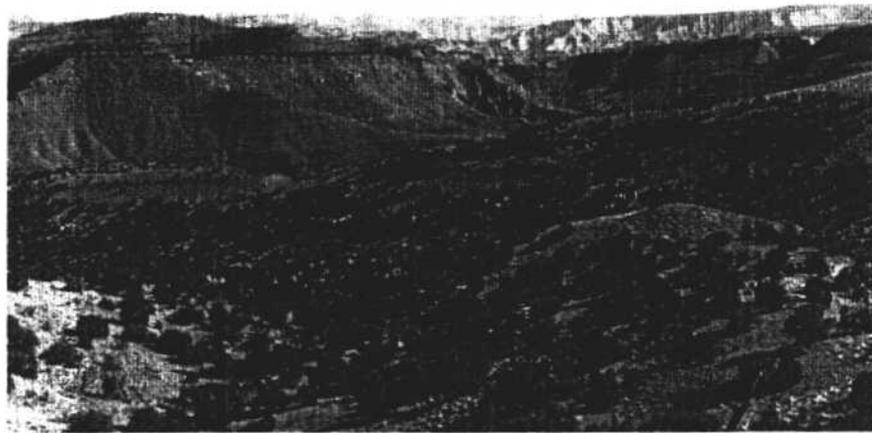


Figure 2. Photograph of the Woodside tract, showing typical vegetation and topography.



Figure 3. Photograph of the Soldier Creek tract showing typical vegetation and topography

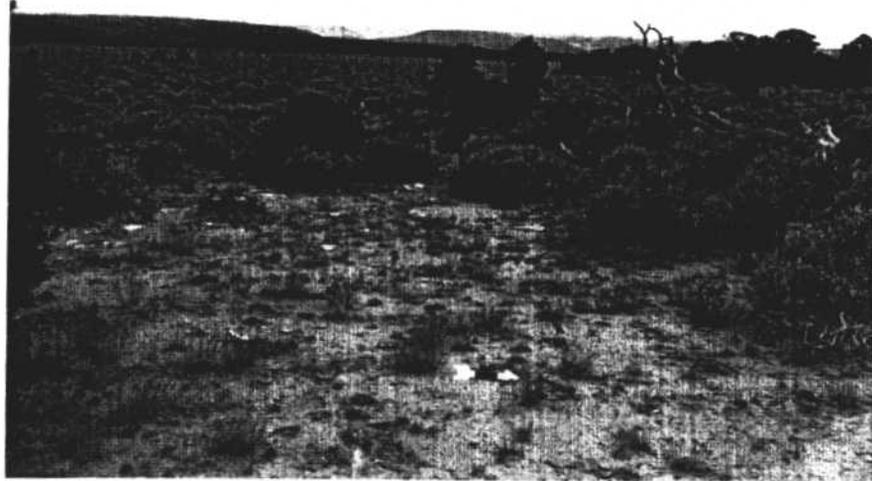


Figure 4. Photograph showing pinyon and juniper woodlands and sagebrush parks characterizing the lower elevations of the Nine Mile tract.



Figure 5. Photograph of the Sanpete tract showing typical vegetation and topography.

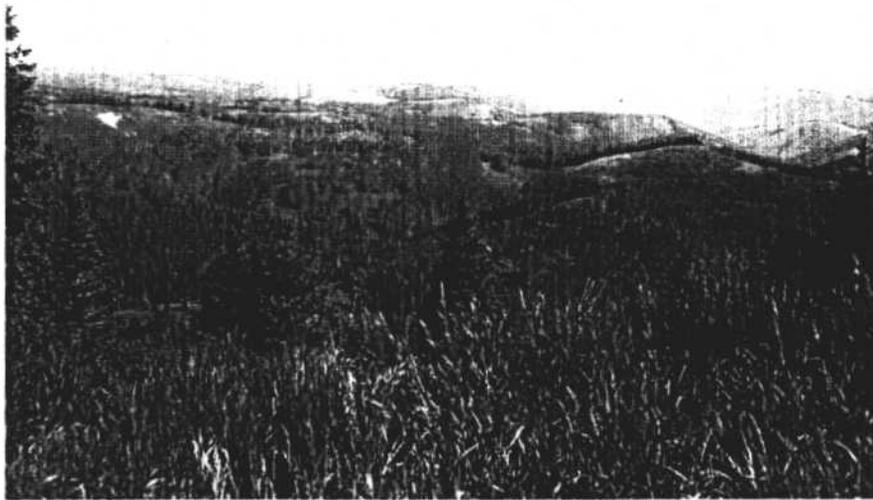


Figure 6. Photograph of the Scofield tract showing typical vegetation and topography.

lands give way to Gambel oak, snowberry and other brush species, and finally to aspen or conifer forests. The aspen forests tend to have a heavy understory of big sagebrush, Gambel oak, bitterbrush, lupine, dandelion, snowberry, wheatgrass, brome, fescue, sedge, and yarrow (Department of the Interior 1978b). The mature conifer forests comprise Douglas fir, Englemann spruce, alpine fir, currant, possibly aspen, and few understory species. Mountain meadow communities include slender wheatgrass, bluegrass, needlegrass, yarrow, larkspur, cinquefoil, sedges, sagebrush, and rabbitbrush.

Fauna

An abundance of fauna are present in the study area. Mule deer, coyote, red fox, gray fox, kit fox, bobcat, raptors, blue and ruffed grouse, and rabbits are common in the pinyon and juniper woodlands. Cougar and black bear are less frequent occupants. In the higher elevations, these species and beaver, river otter, snowshoe hare, elk, and moose are common. The moose population may be confined to the western portion of the study area, on the Wasatch Plateau. Pinyon-juniper woodlands and the slightly higher transitional vegetation communities provide important winter habitat for deer and elk (Department of the Interior 1978b).

Previous Archaeological Investigations

In spite of the large amount of acreage encompassed by the project area, there have been relatively few archaeological investigations within project boundaries. Previous work has been exclusively archaeological inventory and evaluation; no excavations have been conducted. A site file search conducted at the Utah State Historical Society, Antiquities Section, revealed that only 18 cultural resources had been previously recorded within the study area. All of that total are located in either the Nine Mile or the Soldier Creek tracts, primarily in major canyons near the base of the Book Cliffs. The surveys that recorded these sites were conducted primarily in response to planned coal mine developments; over half of the sites recorded reflected historic coal mining activities. Only six previously recorded sites represent prehistoric activities; one is a rock art panel and five are scatters of lithic artifacts.

Two major archaeological surveys have been previously conducted in the Nine Mile tract. In 1977, the Archaeological-Environmental Research Corporation (AERC) inventoried six 160-acre quadrats in the tract, which was part of the Central Coal Project I Range Creek tract. The quadrats were part of a statistical sample of a large portion of central Utah (Hauck 1979). No sites were recorded in the six quadrats. The Consulting Services Branch of the Antiquities Section, Division of State History, conducted a cultural resource inventory in the southwestern portion of the Nine Mile tract in 1981 (Nielson et al. 1981). The work, conducted for the Kaiser Steel Corporation on a tract near Sunnyside and East Carbon City, consisted of intensive and sample-oriented inventory techniques. Five Euro-American, mining-related sites were recorded within the boundaries of the Nine Mile tract.

The Antiquities Section has also conducted work in the Soldier Creek

tract. Hawkins and Seward (1980) surveyed in several canyons in the southern portion of the tract; and recorded five Euro-American sites within the study tract. In 1979 and 1980, AERC surveyed a small portion of the southeastern extreme of the Soldier Creek tract, and an adjacent area (Hauck and Weder 1980). This work was conducted to aid the preparation of a coal mine plan application.

No major archaeological investigations have been previously conducted within the Woodside or Sanpete tracts. Previous work in the Scofield tract has been limited to the inventory of three 160-acre quadrats in the Forest North tract of the Central Coal Project I (Hauck 1979). No cultural resources were recorded in these quadrats.

While there may be few previous archaeological investigations within the study areas, there have been numerous investigations in the region. Nine Mile Canyon, just north of the Soldier Creek and the Nine Mile tracts, has perhaps received the most attention. Elaborate rock art panels and Fremont habitation structures were first reported there in 1894 by Henry Montgomery (Gillin 1955), and have been subsequently investigated by Morss (1931), Reagan (1931a; 1931b), Gillin (1955), Gunnerson (1957), and Hurst and Louthan (1979). The archaeology in the vicinity of the Sanpete Tract has also been well documented. North of the study tract at Joe's Valley Alcove the Forest Service excavated Archaic and Fremont occupations in 1974. Numerous excavations have been conducted by the University of Utah and the Antiquities Section in the region, some as part of salvage work and others as part of the University of Utah's statewide archaeological program. Excavated sites include Snake Rock Village (Gunnerson 1957; Aikens 1967), Old Road Site, Ivie Ridge Site, Fallen Woman Site (Wilson and Smith 1976), Sudden Shelter (Jennings, Schroedl and Holmer 1980), Pint Size Shelter (Lindsay and Lund 1976), Clyde's Cavern (Winter and Wylie 1974), Nawthis Village, Windy Ridge Village, Crescent Ridge, Power Pole Knoll (Madsen 1975a), and Innocents Ridge (Schroedl and Hogan 1975). Surveys have also been conducted near the study tract and include the survey of Castle Valley (Berge 1974), Crandall Canyon (Gillio 1975), Gooseberry Valley (Smith 1975), Huntington-Sigurd Transmission Line (Louthan and Berge 1975), Sigurd-Emery Transmission Line (Nielsen and Berge 1977), Dog Valley (Hauck 1976), and numerous other surveys conducted by private contractors for energy and power companies. Four BLM sample-oriented surveys have been conducted in the vicinity of the Sanpete tract; these include the Central Coal Project I by AERC (Hauck 1979), the Central Coal Project II (Thomas et al. 1981), the Trough Hollow project (Copeland and Webster 1983), and one in progress by Metcalf-Zier Archaeologists, Inc. One of the study tracts of the Central Coal Project II is located just west of the Soldier Creek tract and east of the Scofield tract.

Culture History

Data resulting from the above archaeological investigations and others allow for the construction of a generalized cultural sequence for the region. The earliest inhabitants of the northern Colorado Plateau can probably be ascribed to the Paleo-Indian Stage, which dates between approximately 11,000 B.C. and 5500 B.C. People of the Paleo-Indian Tradition efficiently exploited terminal Pleistocene megafauna and

CHAPTER III

SAMPLING AND FIELD METHODOLOGIES

Selection of Sample Units

The scope-of-work required that the 113,000 acres constituting the five study tracts be sampled with a 10% sampling fraction. The sampling was to be conducted in two phases of 5% each. Data from the Phase I sample were to be analyzed with the aim of producing a predictive model of site location that could be independently tested by the second 5% sample in Phase II of the project. To facilitate comparisons with other sample-oriented inventories in the region, the BLM required that the sample units for both phases consist of 160 acre quadrats, located in reference to cadastral monuments. These quarter-section units were advantageous from a logistical standpoint because a crew of three persons could usually traverse difficult roads and locate and inventory one such unit in a single day. The 160 acre units are easily plotted on maps, described in terms of legal location, and relocated. While the use of smaller, more dispersed sample units might have provided slightly better results, they would have required greater expenditures of time for travelling to and locating them.

A simple random sample of quadrats was chosen from each study tract, with the sampling fraction reflecting total tract acreage. Stratification on the basis of environmental characteristics of the project area was not done for several reasons (see also Reynolds et al. 1983:12). Foremost among these was the desire to avoid bias in the sample created by using the same variables to stratify the area that would later be used to develop a predictive model of site location. Furthermore, prior Class II inventories based on stratified samples (Reed and Nickens 1980; Larralde and Nickens 1980) have encountered numerous difficulties due to the defined environmental strata not reflecting the actual environmental situation. In addition, simple random samples are required if the assumptions of most statistical tests are to be met.

The sample frame for the Class II inventory comprises all quarter-sections (i.e., 160 acre quadrats) within the project area. Because of uneven project boundary configurations, some areas could not be included in the sample frame. The sampled population of quadrats is thus smaller than the target population of all BLM land in the project area (Table 1). Although the areas so excluded from the sample are environmentally similar to the sample, extrapolation of survey results to these areas technically outside of the sample universe should be done with caution.

Selection of 70 quadrats, a total of 11,200 acres, was required at the specified 10% sampling fraction. It should be noted that the calculated acreages per tract, as presented in Table 1, do not total the 113,000 acre figure provided by the BLM, but 5675 acres less. Because the sample was drawn using the larger target population figure rather than the smaller sample population, the inventory of the project area was actually an 11.8% sample.

TABLE 1
SAMPLE SIZE

Study Tract	Acreage	No. of Possible 160 acre Quadrats	Percent of Tract in Sample	No. of Surveyed Quadrats
Nine Mile	63,000	366	93%	39
Soldier Creek	20,600	98	76%	14
Woodside	10,500	64	98%	7
Scofield	7,655	35	73%	6
Sanpete	5,570	30	86%	4
TOTALS	107,325	593	88%	70

Five separate sample draws were performed, one per study tract. Within each tract, all quarter-sections were sequentially numbered and a table of random numbers was used to select the sample units to be surveyed. The order of the draw determined whether the sample units were considered as Phase I or Phase II, with the first 5% selected being designated Phase I units and the second 5% being designated Phase II units. Once again it should be noted that the acreage (and thus the number of quadrats) selected for survey within each tract was 10% of the total acreage within that tract, rather than 10% of the quadrats within the more narrowly defined sample population. A list of the selected sample units and their legal locations is presented in Table 2, and their locations within each tract are illustrated in Figures 7 through 11.

Field Methodologies

The methods employed in the field were designed to locate, in an efficient manner, all visible cultural resources within the sample units and to provide specific site and environmental data for use in predictive modeling. Three field crews, each consisting of a crew leader and two crew members, were employed. The first task faced by a field crew was to accurately locate a sample unit. This was done by reference to map data and topographic features, and when possible, the location of a cadastral monument marking one corner of the sample unit. The sample units were then systematically traversed, with crew members spaced at 15 m intervals. Exceptions to the 15 m spacing between crew members occurred when slopes in excess of 40% grade were encountered. These extremely steep areas were less systematically surveyed; crews made at least one broad sweep across the slopes in search of more level areas, outcrops where rock art or rockshelters might be located, and historic mining structures. The surveyors inspected the ground surface and erosional features for cultural materials. When an artifact was encountered, the sweep stopped and the area was carefully inspected for additional cultural materials. If less than five artifacts were found, the location was plotted on a USGS topographic map and recorded as an isolated find. When cultural features or artifacts indicated a locus of

TABLE 2
LOCATION OF SAMPLE UNITS

Nine Mile Tract

Quadrat Number	Legal Description	U.S.G.S. Map	Phase	No. of Sites Recorded
5	SW $\frac{1}{4}$, Sec. 5, T13S, R16E	Flat Canyon	I	1
9	NW $\frac{1}{4}$, Sec. 11, T13S, R15E	Flat Canyon	II	0
14	NE $\frac{1}{4}$, Sec. 7, T13S, R16E	Flat Canyon	I	6
21	SW $\frac{1}{4}$, Sec. 12, T13S, R15E	Flat Canyon	II	0
37	NW $\frac{1}{4}$, Sec. 21, T13S, R15E	Flat Canyon	I	1
42	NW $\frac{1}{4}$, Sec. 28, T13S, R15E	Flat Canyon	I	0
53	NW $\frac{1}{4}$, Sec. 35, T13S, R15E	Flat Canyon	II	0
63	SW $\frac{1}{4}$, Sec. 2, T14S, R15E	Flat Canyon	II	1
68	SW $\frac{1}{4}$, Sec. 16, T14S, R15E	Flat Canyon	I	0
83	NE $\frac{1}{4}$, Sec. 34, T14S, R15E	Flat Canyon	II	0
88	SE $\frac{1}{4}$, Sec. 4, T15S, R15E	Flat Canyon	I	0
102	NE $\frac{1}{4}$, Sec. 15, T14S, R14E	Patmos Head	I	0
108	SE $\frac{1}{4}$, Sec. 15, T14S, R14E	Patmos Head	II	0
112	SE $\frac{1}{4}$, Sec. 13, T14S, R14E	Patmos Head	II	0
116	NE $\frac{1}{4}$, Sec. 32, T14S, R15E	Patmos Head	II	0
135	SE $\frac{1}{4}$, Sec. 29, T12S, R14E	Bruin Point	I	0
139	NW $\frac{1}{4}$, Sec. 34, T12S, R14E	Bruin Point	II	1
165	NW $\frac{1}{4}$, Sec. 11, T13S, R14E	Bruin Point	II	0
172	SE $\frac{1}{4}$, Sec. 9, T13S, R14E	Bruin Point	I	0
180	SE $\frac{1}{4}$, Sec. 7, T13S, R15E	Bruin Point	II	0
186	NE $\frac{1}{4}$, Sec. 14, T13S, R14E	Bruin Point	II	0
190	NW $\frac{1}{4}$, Sec. 17, T13S, R15E	Bruin Point	II	0
193	SE $\frac{1}{4}$, Sec. 15, T13S, R14E	Bruin Point	I	0
196	SE $\frac{1}{4}$, Sec. 13, T13S, R14E	Bruin Point	I	0
202	NW $\frac{1}{4}$, Sec. 21, T13S, R14E	Bruin Point	I	0
205	NE $\frac{1}{4}$, Sec. 22, T13S, R14E	Bruin Point	II	0
207	NE $\frac{1}{4}$, Sec. 23, T13S, R14E	Bruin Point	I	0
225	NW $\frac{1}{4}$, Sec. 28, T13S, R14E	Bruin Point	I	0
228	NE $\frac{1}{4}$, Sec. 27, T13S, R14E	Bruin Point	II	0
253	NW $\frac{1}{4}$, Sec. 36, T13S, R14E	Bruin Point	I	0
265	NW $\frac{1}{4}$, Sec. 1, T14S, R14E	Bruin Point	II	0
274	SE $\frac{1}{4}$, Sec. 20, T12S, R14E	Currant Canyon	II	0
319	SW $\frac{1}{4}$, Sec. 15, T13S, R13E	Mt. Bartles	I	0
326	SE $\frac{1}{4}$, Sec. 18, T13S, R14E	Mt. Bartles	I	1
333	SW $\frac{1}{4}$, Sec. 22, T13S, R13E	Mt. Bartles	II	0
342	NW $\frac{1}{2}$, Sec. 25, T13S, R13E	Mt. Bartles	I	0
352	NE $\frac{1}{4}$, Sec. 34, T13S, R13E	Mt. Bartles	II	0
353	NW $\frac{1}{4}$, Sec. 35, T13S, R13E	Mt. Bartles	II	0
354	NE $\frac{1}{4}$, Sec. 35, T13S, R13E	Mt. Bartles	I	0

Sanpete Tract

Quadrat Number	Legal Description	U.S.G.S. Map	Phase	No. of Sites Recorded
7	NW $\frac{1}{4}$, Sec. 1, T19S, R5E	Ferron Canyon	II	1
11	SW $\frac{1}{4}$, Sec. 1, T19S, R5E	Ferron Canyon	I	1
15	NW $\frac{1}{4}$, Sec. 12, T19S, R5E	Ferron Canyon	II	4
16	NE $\frac{1}{4}$, Sec. 12, T19S, R5E	Ferron Canyon	I	3

TABLE 2
(Continued)

Soldier Creek Tract

Quadrat Number	Legal Description	U.S.G.S. Map	Phase	No. of Sites Recorded
2	SE $\frac{1}{4}$, Sec. 29, T12S, R11E	Deadman Canyon	I	0
9	SW $\frac{1}{4}$, Sec. 30, T12S, R12E	Deadman Canyon	II	1
19	SW $\frac{1}{4}$, Sec. 32, T12S, R11E	Deadman Canyon	II	0
21	SW $\frac{1}{4}$, Sec. 33, T12S, R11E	Deadman Canyon	I	0
23	SW $\frac{1}{4}$, Sec. 34, T12S, R11E	Deadman Canyon	I	0
29	E $\frac{1}{2}$, Sec. 1, T13S, R11E	Deadman Canyon	I	0
31	NW $\frac{1}{4}$, Sec. 11, T13S, R11E	Deadman Canyon	II	0
57	NE $\frac{1}{4}$, Sec. 22, T13S, R11E	Deadman Canyon	II	0
70	SE $\frac{1}{4}$, Sec. 23, T13S, R11E	Deadman Canyon	I	1
72	SE $\frac{1}{4}$, Sec. 24, T13S, R11E	Deadman Canyon	II	0
74	W $\frac{1}{2}$, Sec. 6, T13S, R12E	Pine Canyon	I	0
87	NW $\frac{1}{4}$, Sec. 22, T13S, R12E	Pine Canyon	II	0
88	NE $\frac{1}{4}$, Sec. 22, T13S, R12E	Pine Canyon	II	0
95	SW $\frac{1}{4}$, Sec. 22, T13S, R12E	Pine Canyon	I	0

Woodside Tract

Quadrat Number	Legal Description	U.S.G.S. Map	Phase	No. of Sites Recorded
6	NE $\frac{1}{4}$, Sec. 24, T17S, R14E	Woodside	I	0
12	SE $\frac{1}{4}$, Sec. 25, T17S, R14E	Woodside	II	0
15	NW $\frac{1}{4}$, Sec. 17, T17S, R15E	Woodside	I	3
16	NE $\frac{1}{4}$, Sec. 17, T17S, R15E	Woodside	I	0
29	NW $\frac{1}{4}$, Sec. 30, T17S, R15E	Woodside	II	0
35	SW $\frac{1}{4}$, Sec. 29, T17S, R15E	Woodside	II	0
46	SE $\frac{1}{4}$, Sec. 6, T18S, R15E	Woodside	I	0

Scotfield Tract

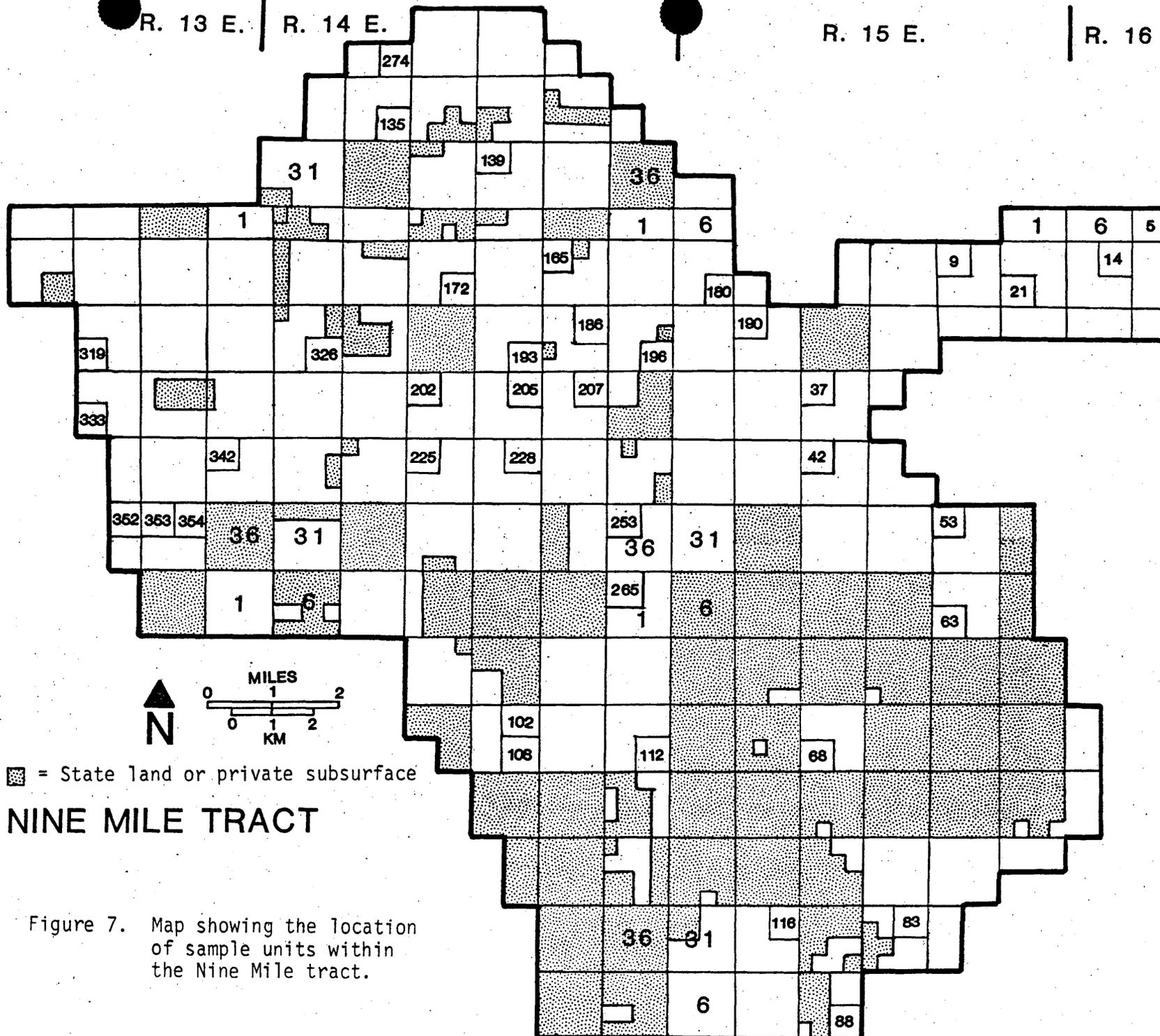
Quadrat Number	Legal Description	U.S.G.S. Map	Phase	No. of Sites Recorded
3	SW $\frac{1}{4}$, Sec. 1, T14S, R6E	Scotfield	I	0
9	SW $\frac{1}{4}$, Sec. 8, T14S, R7E	Candland Mtn.	II	0
17	NE $\frac{1}{4}$, Sec. 16, T14S, R7E	Candland Mtn.	II	0
18	SW $\frac{1}{4}$, Sec. 16, T14S, R7E	Candland Mtn.	I	0
32	NW $\frac{1}{4}$, Sec. 11, T15S, R7E	Wattis	I	0
33	SW $\frac{1}{4}$, Sec. 11, T15S, R7E	Wattis	II	0

R. 13 E.

R. 14 E.

R. 15 E.

R. 16 E.

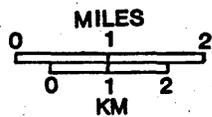


T. 12 S.

T. 13 S.

T. 14 S.

T. 15 S.



■ = State land or private subsurface

NINE MILE TRACT

Figure 7. Map showing the location of sample units within the Nine Mile tract.

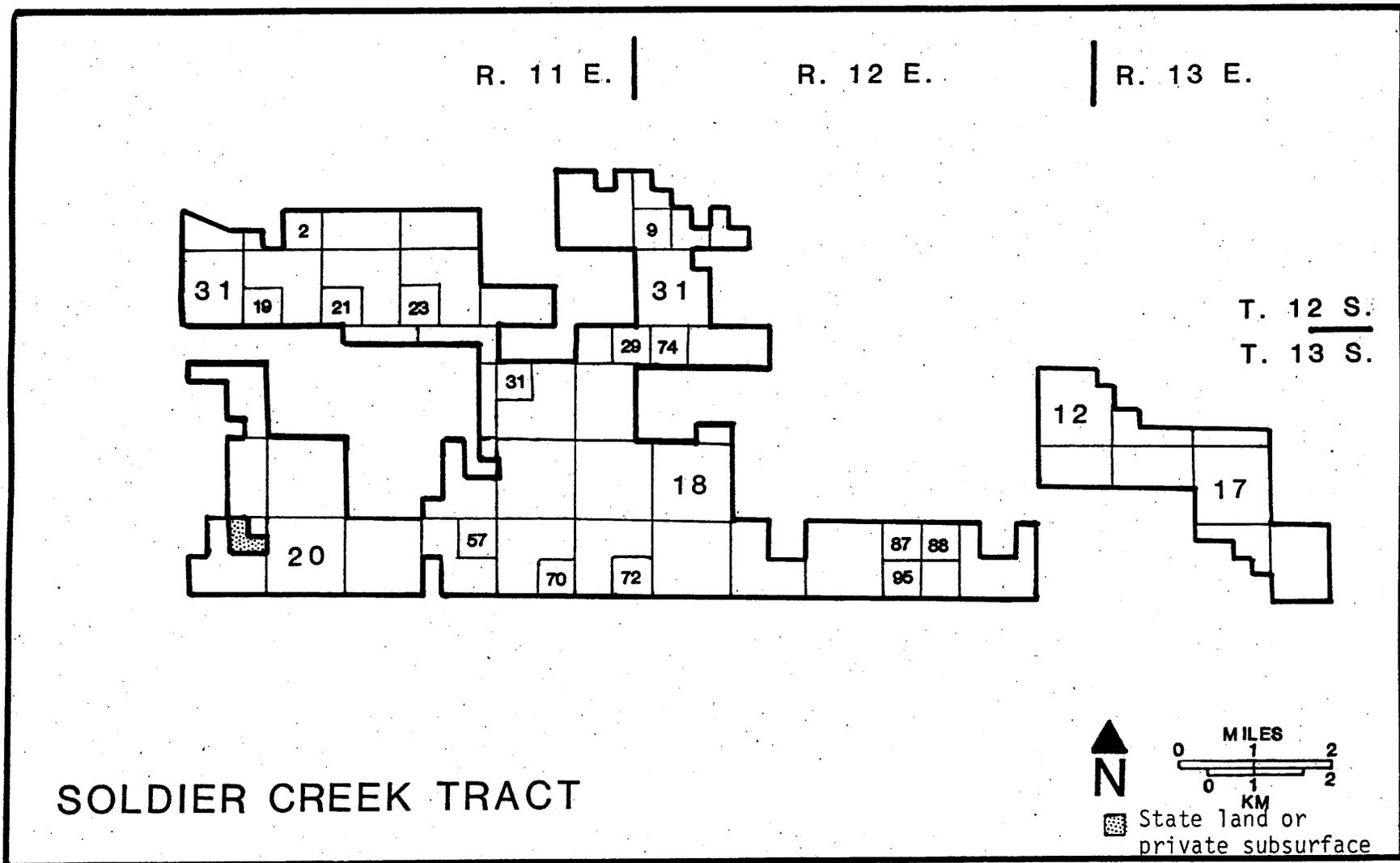


Figure 8. Map showing the location of sample units within the Soldier Creek tract.

patterned human activity of greater than 50 years antiquity, then the location was recorded as a site. Sites were plotted on topographic maps and photographed. Data were recorded on the Intermountain Archaeological Computer System (IMACS) site forms and on auxiliary site forms designed to provide additional environmental data for predictive modeling purposes. An example of the latter form is included in Appendix A. Sketch maps were drawn and trowel tests were sometimes dug to provide information on site depth. In addition, data were recorded on the nature and distribution of surface artifacts. When fewer than approximately 35 surface artifacts were found on a site, all were pin-flagged and mapped with a compass and measuring tape. All artifacts were analyzed in situ on these small sites. Prepared tools were drawn, and attributes on debitage, including material type, length, and stage of reduction, were recorded. On sites with more numerous surface artifacts, all prepared tools were located and analyzed, and sampling techniques were employed to study the debitage.

Debitage was analyzed using the radial transect technique. With this method, a circle 2 m in diameter was defined near the center of the site, and all artifacts within it were analyzed. Then, eight transects radiating outward from the central unit and oriented to the cardinal directions were defined. Two meter diameter circles were located at specific intervals along these transects, the interval being dependent upon site size and surface artifact density. Artifacts within the study units were analyzed and replaced. Artifact collection was limited to diagnostic projectile points and small samples of ceramics.

Environmental data concerning the sample units were also recorded by field crews. Sample Unit Record forms, an example of which is included in Appendix A, were filled out for each quadrat. Environmental data for two nonsite locations per quadrat were also recorded on special forms. The nonsite locations were designated in two opposing corners of each quadrat prior to field inventory. Other nonsite locations would have been selected in the event of encountering a cultural resource at one of the designated quadrat corners; field crews did not encounter this situation, however.

Field crews dropped from the sample any quadrat that required more than four hours to reach due to locked gates, blocked roads or great distance from roads. Replacement sample units were randomly selected by the same techniques used to select the original sample. A total of 10 quadrats was replaced.

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TABLE 1
SAMPLE SIZE

Study Tract	Acreage	No. of Possible 160 acre Quadrats	Percent of Tract in Sample	No. of Surveyed Quadrats
Nine Mile	63,000	366	93%	39
Soldier Creek	20,600	98	76%	14
Woodside	10,500	64	98%	7
Scotfield	7,655	35	73%	6
Sanpete	5,570	30	86%	4
TOTALS	107,325	593	88%	70

Five separate sample draws were performed, one per study tract. Within each tract, all quarter-sections were sequentially numbered and a table of random numbers was used to select the sample units to be surveyed. The order of the draw determined whether the sample units were considered as Phase I or Phase II, with the first 5% selected being designated Phase I units and the second 5% being designated Phase II units. Once again it should be noted that the acreage (and thus the number of quadrats) selected for survey within each tract was 10% of the total acreage within that tract, rather than 10% of the quadrats within the more narrowly defined sample population. A list of the selected sample units and their legal locations is presented in Table 2, and their locations within each tract are illustrated in Figures 7 through 11.

Field Methodologies

The methods employed in the field were designed to locate, in an efficient manner, all visible cultural resources within the sample units and to provide specific site and environmental data for use in predictive modeling. Three field crews, each consisting of a crew leader and two crew members, were employed. The first task faced by a field crew was to accurately locate a sample unit. This was done by reference to map data and topographic features, and when possible, the location of a cadastral monument marking one corner of the sample unit. The sample units were then systematically traversed, with crew members spaced at 15 m intervals. Exceptions to the 15 m spacing between crew members occurred when slopes in excess of 40% grade were encountered. These extremely steep areas were less systematically surveyed; crews made at least one broad sweep across the slopes in search of more level areas, outcrops where rock art or rockshelters might be located, and historic mining structures. The surveyors inspected the ground surface and erosional features for cultural materials. When an artifact was encountered, the sweep stopped and the area was carefully inspected for additional cultural materials. If less than five artifacts were found, the location was plotted on a USGS topographic map and recorded as an isolated find. When cultural features or artifacts indicated a locus of

TABLE 2
LOCATION OF SAMPLE UNITS

Nine Mile Tract

Quadrat Number	Legal Description	U.S.G.S. Map	Phase	No. of Sites Recorded
5	SW $\frac{1}{4}$, Sec. 5, T13S, R16E	Flat Canyon	I	1
9	NW $\frac{1}{4}$, Sec. 11, T13S, R15E	Flat Canyon	II	0
14	NE $\frac{1}{4}$, Sec. 7, T13S, R16E	Flat Canyon	I	6
21	SW $\frac{1}{4}$, Sec. 12, T13S, R15E	Flat Canyon	II	0
37	NW $\frac{1}{4}$, Sec. 21, T13S, R15E	Flat Canyon	I	1
42	NW $\frac{1}{4}$, Sec. 28, T13S, R15E	Flat Canyon	I	0
53	NW $\frac{1}{4}$, Sec. 35, T13S, R15E	Flat Canyon	II	0
63	SW $\frac{1}{4}$, Sec. 2, T14S, R15E	Flat Canyon	II	1
68	SW $\frac{1}{4}$, Sec. 16, T14S, R15E	Flat Canyon	I	0
83	NE $\frac{1}{4}$, Sec. 34, T14S, R15E	Flat Canyon	II	0
88	SE $\frac{1}{4}$, Sec. 4, T15S, R15E	Flat Canyon	I	0
102	NE $\frac{1}{4}$, Sec. 15, T14S, R14E	Patmos Head	I	0
108	SE $\frac{1}{4}$, Sec. 15, T14S, R14E	Patmos Head	II	0
112	SE $\frac{1}{4}$, Sec. 13, T14S, R14E	Patmos Head	II	0
116	NE $\frac{1}{4}$, Sec. 32, T14S, R15E	Patmos Head	II	0
135	SE $\frac{1}{4}$, Sec. 29, T12S, R14E	Bruin Point	I	0
139	NW $\frac{1}{4}$, Sec. 34, T12S, R14E	Bruin Point	II	1
165	NW $\frac{1}{4}$, Sec. 11, T13S, R14E	Bruin Point	II	0
172	SE $\frac{1}{4}$, Sec. 9, T13S, R14E	Bruin Point	I	0
180	SE $\frac{1}{4}$, Sec. 7, T13S, R15E	Bruin Point	II	0
186	NE $\frac{1}{4}$, Sec. 14, T13S, R14E	Bruin Point	II	0
190	NW $\frac{1}{4}$, Sec. 17, T13S, R15E	Bruin Point	II	0
193	SE $\frac{1}{4}$, Sec. 15, T13S, R14E	Bruin Point	I	0
196	SE $\frac{1}{4}$, Sec. 13, T13S, R14E	Bruin Point	I	0
202	NW $\frac{1}{4}$, Sec. 21, T13S, R14E	Bruin Point	I	0
205	NE $\frac{1}{4}$, Sec. 22, T13S, R14E	Bruin Point	II	0
207	NE $\frac{1}{4}$, Sec. 23, T13S, R14E	Bruin Point	I	0
225	NW $\frac{1}{4}$, Sec. 28, T13S, R14E	Bruin Point	I	0
228	NE $\frac{1}{4}$, Sec. 27, T13S, R14E	Bruin Point	II	0
253	NW $\frac{1}{4}$, Sec. 36, T13S, R14E	Bruin Point	I	0
265	NW $\frac{1}{4}$, Sec. 1, T14S, R14E	Bruin Point	II	0
274	SE $\frac{1}{4}$, Sec. 20, T12S, R14E	Currant Canyon	II	0
319	SW $\frac{1}{4}$, Sec. 15, T13S, R13E	Mt. Bartles	I	0
326	SE $\frac{1}{4}$, Sec. 18, T13S, R14E	Mt. Bartles	I	1
333	SW $\frac{1}{4}$, Sec. 22, T13S, R13E	Mt. Bartles	II	0
342	NW $\frac{1}{4}$, Sec. 25, T13S, R13E	Mt. Bartles	I	0
352	NE $\frac{1}{4}$, Sec. 34, T13S, R13E	Mt. Bartles	II	0
353	NW $\frac{1}{4}$, Sec. 35, T13S, R13E	Mt. Bartles	II	0
354	NE $\frac{1}{4}$, Sec. 35, T13S, R13E	Mt. Bartles	I	0

Sanpete Tract

Quadrat Number	Legal Description	U.S.G.S. Map	Phase	No. of Sites Recorded
7	NW $\frac{1}{4}$, Sec. 1, T19S, R5E	Ferron Canyon	II	1
11	SW $\frac{1}{4}$, Sec. 1, T19S, R5E	Ferron Canyon	I	1
15	NW $\frac{1}{4}$, Sec. 12, T19S, R5E	Ferron Canyon	II	4
16	NE $\frac{1}{4}$, Sec. 12, T19S, R5E	Ferron Canyon	I	3

TABLE 2
(Continued)

Soldier Creek Tract

Quadrat Number	Legal Description	U.S.G.S. Map	Phase	No. of Sites Recorded
2	SE $\frac{1}{4}$, Sec. 29, T12S, R11E	Deadman Canyon	I	0
9	SW $\frac{1}{4}$, Sec. 30, T12S, R12E	Deadman Canyon	II	1
19	SW $\frac{1}{4}$, Sec. 32, T12S, R11E	Deadman Canyon	II	0
21	SW $\frac{1}{4}$, Sec. 33, T12S, R11E	Deadman Canyon	I	0
23	SW $\frac{1}{4}$, Sec. 34, T12S, R11E	Deadman Canyon	I	0
29	E $\frac{1}{2}$, Sec. 1, T13S, R11E	Deadman Canyon	I	0
31	NW $\frac{1}{4}$, Sec. 11, T13S, R11E	Deadman Canyon	II	0
57	NE $\frac{1}{4}$, Sec. 22, T13S, R11E	Deadman Canyon	II	0
70	SE $\frac{1}{4}$, Sec. 23, T13S, R11E	Deadman Canyon	I	1
72	SE $\frac{1}{4}$, Sec. 24, T13S, R11E	Deadman Canyon	II	0
74	W $\frac{1}{2}$, Sec. 6, T13S, R12E	Pine Canyon	I	0
87	NW $\frac{1}{4}$, Sec. 22, T13S, R12E	Pine Canyon	II	0
88	NE $\frac{1}{4}$, Sec. 22, T13S, R12E	Pine Canyon	II	0
95	SW $\frac{1}{4}$, Sec. 22, T13S, R12E	Pine Canyon	I	0

Woodside Tract

Quadrat Number	Legal Description	U.S.G.S. Map	Phase	No. of Sites Recorded
6	NE $\frac{1}{4}$, Sec. 24, T17S, R14E	Woodside	I	0
12	SE $\frac{1}{4}$, Sec. 25, T17S, R14E	Woodside	II	0
15	NW $\frac{1}{4}$, Sec. 17, T17S, R15E	Woodside	I	3
16	NE $\frac{1}{4}$, Sec. 17, T17S, R15E	Woodside	I	0
29	NW $\frac{1}{4}$, Sec. 30, T17S, R15E	Woodside	II	0
35	SW $\frac{1}{4}$, Sec. 29, T17S, R15E	Woodside	II	0
46	SE $\frac{1}{4}$, Sec. 6, T18S, R15E	Woodside	I	0

Scofield Tract

Quadrat Number	Legal Description	U.S.G.S. Map	Phase	No. of Sites Recorded
3	SW $\frac{1}{4}$, Sec. 1, T14S, R6E	Scofield	I	0
9	SW $\frac{1}{4}$, Sec. 8, T14S, R7E	Candland Mtn.	II	0
17	NE $\frac{1}{4}$, Sec. 16, T14S, R7E	Candland Mtn.	II	0
18	SW $\frac{1}{4}$, Sec. 16, T14S, R7E	Candland Mtn.	I	0
32	NW $\frac{1}{4}$, Sec. 11, T15S, R7E	Wattis	I	0
33	SW $\frac{1}{4}$, Sec. 11, T15S, R7E	Wattis	II	0

TABLE 3
SITE FUNCTION VALUES FOR PREHISTORIC SITES

Site No.	Tool Diversity Index	Rescaled Value	No. of Flakes	Rescaled Value	Site Area (m ²)	Rescaled Value	No. of Cores	Rescaled Value	Average Flake Length (cm)	Rescaled Value	% Cortex Cover	Rescaled Value
42EM1759	8	.09	8	.01	824	.13	0	0	3.8	.95	.063	.18
42EM1760	6	.07	19	.02	1908	.29	0	0	2.8	.70	1.5	.27
42EM1761	0	0	7	.01	233	.04	0	0	2.1	.53	0	0
42LB391	6	.07	16	.02	480	.07	0	0	1.7	.43	.038	.11
42CB392	2	.02	18	.02	1082	.17	0	0	1.9	.48	.536	1.0*
42CB393	0	0	22	.02	130	.02	0	0	1.5	.38	0	0
42CB394	0	0	15	.02	162	.02	0	0	1.7	.43	0	0
42LB395	1	.01	33	.03	2732	.42	0	0	1.7	.43	.047	.14
42CB396	2	.02	6	.01	1456	.22	0	0	5.8	1.0*	.188	.55
42CB397	1	.01	20	.02	176	.03	0	0	2.0	.50	.092	.27
42CB398	1	.01	4	.00	90	.01	1	.20	1.4	.35	0	0
42CB401	15	.18	30	.03	2140	.33	0	0	1.5	.38	.19	.56
42CB403	24	.28	9	.01	30	.00	0	0	2.6	.65	0	0
42CB404	0	0	300	.30	5000	.77	0	0	3.7	.93	.135	.39
42CB405	21	.25	29	.03	14000	1.0*	0	0	2.5	.63	.034	.10
42SP135	2	.02	100	.10	989	.15	0	0	1.5	.38	.05	.15
42SP136	0	0	11	.01	350	.05	0	0	3.5	.88	.25	.73
42SP137	1	.01	100	.10	360	.06	0	0	1.7	.43	.029	.08
42SP138	1	.01	4	.00	123	.02	1	.20	1.5	.38	0	0
42SP139	0	0	18	.02	6	.00	0	0	1.3	.33	.014	.04
42SP140	1	.01	28	.03	1055	.16	1	.20	1.3	.33	.019	.05
42SP141	2	.02	100	.10	3770	.58	0	0	1.6	.40	.068	.20
42SP142	6	.07	44	.04	4005	.62	1	.20	2.6	.65	.156	.46
42SP143	2	.02	54	.05	300	.05	0	0	2.5	.63	.072	.21

* Number exceeds 1.0, and so is given maximum value.

sites are illustrated in Figure 14. A single site was classified as a tool kit site because of a relatively high tool diversity index and large flake length, but extremely small site area, very few flakes, no cores, and no primary or secondary flakes (Figure 14). The tool kit site was evidently the locus of a limited activity where a specific tool assemblage was utilized. The presence of two projectile points, four bifaces, and two scrapers, along with a single flake suggests butchering activities. Two varieties of chipping stations were recognized. Kvamme and Black (1981) define chipping stations as a form of limited activity site characterized by an assemblage consisting almost exclusively of flaking debitage, with very few or no tools. Chipping stations are small, and represent small-scale flintknapping activities. As shown in Figures 15 through 18, the chipping stations recorded by this project have very low values along all axes. Some, however, have comparatively higher values of flake length and cortex cover than others. These sites (Figures 15 and 16) were classified as chipping stations representing initial stages of lithic reduction. Sites with lower values of flake length and cortex cover were classified as chipping stations representing the final stages of lithic reduction (Figures 17 and 18). Sites are listed by site type in Table 4.

TABLE 4
SITES LISTED BY FUNCTIONAL TYPE

Short-term Campsite	Tool Kit Site	Chipping Station, Final Stage		Chipping Station Initial Stage
42CB401	42CB403	42EM1760	42SP135	42EM1759
42CB405		42EM1761	42SP137	42CB392
		42CB391	42SP138	42CB396
		42CB393	42SP139	42CB404
		42CB394	42SP140	42SP136
		42CB395	42SP141	
		42CB397	42SP142	
		42CB398	42SP143	

While the four functional site types discussed here can be differentiated on the basis of polygon shape, difficulties can sometimes arise when classifying with this method. There are, however, independent methods that can be utilized to substantiate initial classifications. One simple method consists of superimposing a grid with "X" and "Y" axes atop a polygon under consideration. The "X" and "Y" coordinates for each polygon axis value is determined, using any scale as long as the scale used for all measurements is consistent. For all sites under consideration, all values of "X" are summed, then all values of "Y" are summed. The resulting coordinates can then be plotted on a two-axis graph, such as that presented in Figure 19. Sites with similar shaped polygons will tend to yield similar "X" and "Y" coordinates, and so should cluster on the graph. It should be noted that polygons of dramatically differing shapes may produce similar "X" and "Y" coordinates, in some cases. For the data herein considered, however, sites of similar function tend to cluster on the graph, supporting the functional classifications. The site function classifications were also tested with the discriminant analysis statistic. The multi-group discriminant analysis supported the functional classifications discussed above. It should be noted that discriminant analysis was performed with both the rescaled values for each polygon axis (0 to 1) and original field data. The former data performed best, probably due to the more normal distribution inherent in the rescaling technique.

Site Density

The data presented in Table 5 showing number of sites per quadrat was used to calculate sample means and variances, confidence intervals, and site density figures per project phase for each of the five study tracts. The two 5% samples produced quite different results, especially in the Nine Mile and Woodside tracts, as is evident in Table 5.

Projections of the total number of sites per tract can be made by multiplying the total number of quadrats of that tract by the number of sites per quadrat estimated by the confidence interval figures (Table 6). These totals apply only to the sample populations as defined in Chapter III, above.

TABLE 5
SUMMARY STATISTICS FROM THE
CLASS II INVENTORY

	Nine Mile Tract		
	Phase I	Phase II	Combined
Number of quadrats	19	20	39
Number of sites	9	2	11
Site density (sites/sq. mile)	1.89	0.4	1.13
Sample mean	0.47	0.1	0.28
Sample variance	1.929	0.094	0.997
Sampling fraction	5.2%	5.5%	10.7%
Variance of the mean	0.096	0.004	0.022
95% Confidence interval (Sites per quadrat)	0 to 1.08	0 to 0.23	0 to 0.58

	Sanpete Tract		
	Phase I	Phase II	Combined
Number of quadrats	2	2	4
Number of sites	4	5	9
Site density	8.0	10.0	9.0
Sample mean	2.0	2.5	2.25
Sample variance	2.0	4.5	2.25
Sampling fraction	6.7%	6.7%	13.3%
Variance of the mean	0.933	2.099	0.487
95% Confidence interval	0.11 to 3.89	0 to 5.34	0.89 to 3.62

	Scofield Tract		
	Phase I	Phase II	Combined
Number of quadrats	3	3	6
Number of sites	0	0	0
Sampling fraction	8.6%	8.6%	17.1%

	Soldier Creek Tract		
	Phase I	Phase II	Combined
Number of quadrats	7	7	14
Number of sites	1	1	2
Site density	0.57	0.57	0.57
Sample mean	0.14	0.14	0.14
Sample variance	0.142	0.142	0.132
Sampling fraction	7.1%	7.1%	14.3%
Variance of the mean	0.018	0.018	0.008
95% Confidence interval	0 to 0.41	0 to 0.41	0 to 0.32

	Woodside Tract		
	Phase I	Phase II	Combined
Number of quadrats	4	3	7
Number of sites	3	0	3
Site density	3.0	0	1.71
Sample mean	0.75	0	0.43
Sample variance	2.25	0	1.286
Sampling fraction	6.3%	4.7%	10.9%
Variance of the mean	0.527	0	0.163
95% Confidence interval	0 to 2.17	0	0 to 1.22

Explanation of summary statistics (see also Thomas 1975:66)

Site density = number of sites ÷ square miles surveyed
 Sample mean (\bar{x}) = number of sites ÷ number of quadrats
 Sample variance (S^2 ; i.e., the variance of the sample elements) =

$$S^2 = \frac{1}{n-1} \sum (x - \bar{x})^2$$

where: n is the number of quadrats in the sample
 x is the number of sites in one quadrat
 \bar{x} is the mean number of sites in the sample
 Variance of the mean (var) involves a finite population correction (1 - the sampling fraction) which lowers the variance of a simple random sample when the sampling fraction is low

$$\text{var} = (1 - \frac{n}{N}) \frac{S^2}{n}$$

Confidence interval = $\bar{x} - 1.96 \sqrt{\text{var}}$ to $\bar{x} + 1.96 \sqrt{\text{var}}$

TABLE 6
PROJECTED NUMBER OF SITES BASED ON SAMPLE

<u>Tract</u>	<u>Estimate of Site Population</u>
Nine Mile	0 - 212
Sanpete	26 - 109
Scotfield	0
Soldier Creek	0 - 31
Woodside	0 - 78

An estimate of the total number of sites per tract based on average site density of the surveyed quadrats is presented in Table 7. It is stressed that since these projections are extended beyond the sample population to cover the entire acreage of the project area, they are not statistically valid. For all practical purposes, however, the environmental homogeneity within tracts leads us to believe that site densities would not differ greatly from those found within our samples.

TABLE 7
PROJECTED NUMBER OF SITES BASED ON SITE DENSITY

<u>Tract</u>	<u>Total Area (square miles)</u>	<u>Site Density (sites/sq. mi.)</u>	<u>Projected n of sites</u>
Nine Mile	98.44	1.13	111
Sanpete	32.19	9.0	290
Scotfield	16.41	0	0
Soldier Creek	11.96	0.57	7
Woodside	8.7	1.71	15

The density of cultural resources recorded by this project is similar to that recorded by other researchers working in or very near the study tracts. Based upon the distribution of previously recorded sites and sample-oriented survey data collected a broad portion of central Utah, Hauck (1979) developed general site density maps for his study area, which can be overlaid upon some of the study tracts herein described. Hauck (1979) suggests that northeastern quarter of the Nine Mile tract may yield between 0.3 and 1.4 sites per square mile, and that site density should drop off to between 0.03 to 0.3 or lower towards the southwestern, higher elevation portions of the tract. As mentioned above, the Nine Mile tract yielded a density of 1.13 sites per square mile, with a disproportionate number of sites found in the northeastern portion of the tract. It is probable that the actual density of sites per square mile in the northeastern portion of the Nine Mile tract exceeds Hauck's (1979) projections, however. Hauck (1979) suggests a

TABLE 8
CRITERIA FOR NATIONAL REGISTER SIGNIFICANCE EVALUATION

Variable	Categories	Weighting Factor
1. Site size (square meters)	(1) 0-1000 (2) 1001-5000 (3) 5001-50,000 (4) More than 50,000	1
2. Total Number of Artifacts	(1) 0-100 (2) 100-500 (3) 500-1000	1
3. Number of Artifactual Classes	(1) one (2) two-four	1
4. Lithic Material Type Varieties	(0) none (1) one (2) two-four (3) More than 4	1
5. Site Condition	(0) substantially impacted (50% or more) (1) partly impacted (1%-50%) (2) pristine	2
6. Ceramics	(0) absent (1) present	2
7. Groundstone	(0) absent (1) present	2
8. Datable Materials	(0) absent (1) present	3
9. Features or Structures	(0) absent (1) present (2) present-substantial	3
10. Macrofloral and/or Macrofaunal Materials	(0) absent (1) present	3
11. Subsurface Materials	(0) absent (1) unknown (2) present	4
12. Distinctive Site Type, Period, Affiliation or Construction Method	(0) no (1) unknown (2) yes	3
13. Affiliation	(0) unknown (1) Euroamerican (1) Fremont (1) Archaic (2) Numic (3) Paleo-Indian	3
14. Association with Significant Event or Person	(0) unknown (1) known	10

cance. A more explicit approach with reproducible results is needed. Use of a ranking scheme, such as that discussed here, on a project-specific and on a regional basis, may be a step in the right direction.

Data collected at the sites recorded by this project were subjected to the ranking scheme discussed above. Of the 25 sites recorded by this project, nine are considered to be significant (Table 9). The remaining 16 sites are considered ineligible for nomination to the National Register of Historic Places. The scores ranged from 10 to 32 (Table 10). The highest score was obtained at 42CB302, a structural historic site. That the nature of this site is radically different from the prehistoric sites in the sample suggests that in future projects, historic site scores should be compared to those of other historic sites, and not to prehistoric sites. The highest score obtained for a prehistoric site was 28. This site, 42CB398, had a high score, partially because it was the only site to yield ceramics, and so received high values for possessing ceramics, having datable materials, and for being a unique site type. Those sites with a score of 16 or more were considered to be significant. This value was utilized because sites with values equal to or greater than it appear to have rather unique attributes, such as groundstone, or could be placed into specific cultures or stages.

TABLE 9
ASSESSMENTS OF SITE SIGNIFICANCE

<u>SIGNIFICANT SITES</u>			
Site No.	Score	Site No.	Score
42EM1760	18	42CB402	32
42CB392	20	42CB404	16
42CB396	23	42CB405	18
42CB398	28	42SP142	21
42CB401	17		
<u>INSIGNIFICANT SITES</u>			
Site No.	Score	Site No.	Score
42EM1759	13	42SP135	11
42EM1761	15	42SP136	10
42CB391	13	42SP137	12
42CB393	13	42SP138	11
42CB394	12	42SP139	10
42CB395	15	42SP140	15
42CB397	14	42SP141	12
42CB403	13	42SP143	12

TABLE 10
SITE SIGNIFICANCE SCORESHEET

Site No.	Weighting Factors				1										2										3										4										5										10									
	Categories	SIZE	# OF ARTIFACTS	# OF ARTIFACT CLASSES	LITHIC VARIETIES	substant. impact.	SITE CONDITION	CERAMICS	GROUNDSTONE	DATABLE MATERIALS	FEATURES OR SUBSTANTIAL STRUCTURES	BIOLOGICAL MATERIALS	SUBSURFACE MATERIALS	DISTINCTIVE	CULTURAL AFFILIATION	SIG. EVENT PERSON	SCORE	SIGNIFICANCE RECOMMENDATION																																														
42EM1759	1	1	2	1	4	0	0	0	0	0	4	0	0	4	0	0	0	13	N																																													
42EM1760	2	1	2	2	4	0	0	0	0	0	4	0	0	3	0	0	18	Y																																														
42EM1761	1	1	1	1	4	0	0	3	0	0	4	0	0	0	0	0	15	N																																														
42CB391	1	1	2	1	4	0	0	0	0	0	4	0	0	0	0	0	13	N																																														
42CB392	2	1	2	1	4	0	0	3	0	0	4	0	0	3	0	0	20	Y																																														
42CB393	1	1	1	2	4	0	0	0	0	0	4	0	0	0	0	0	13	N																																														
42CB394	1	1	1	1	4	0	0	0	0	0	4	0	0	0	0	0	12	N																																														
42CB395	2	1	2	2	4	0	0	0	0	0	4	0	0	0	0	0	15	N																																														
42CB396	2	1	2	1	4	0	0	3	0	0	4	0	0	6	0	0	23	Y																																														
42CB397	1	1	2	2	4	0	0	0	0	0	4	0	0	0	0	0	14	N																																														
42CB398	1	1	2	2	4	0	2	0	3	0	4	0	6	3	0	0	28	Y																																														
42CB401	2	1	2	2	4	0	2	0	0	0	4	0	0	0	0	0	17	Y																																														
42CB402	2	1	2	0	4	0	0	3	6	3	8	0	3	0	0	0	32	Y																																														
42CB403	1	1	2	1	4	0	0	0	0	0	4	0	0	0	0	0	13	N																																														
42CB404	2	2	2	2	4	0	0	0	0	0	4	0	0	0	0	0	16	Y																																														
42CB405	3	1	2	2	4	0	2	0	0	0	4	0	0	0	0	0	18	Y																																														
42SP135	1	1	2	1	4	0	0	0	0	0	4	0	0	0	0	0	11	N																																														
42SP136	1	1	1	1	4	0	0	0	0	0	4	0	0	0	0	0	10	N																																														
42SP137	1	1	2	2	4	0	0	0	0	0	4	0	0	0	0	0	12	N																																														
42SP138	1	1	2	1	4	0	0	0	0	0	4	0	0	0	0	0	11	N																																														
42SP139	1	1	1	1	4	0	0	0	0	0	4	0	0	0	0	0	10	N																																														
42SP140	2	1	2	2	4	0	0	0	0	0	4	0	0	0	0	0	15	N																																														
42SP141	2	1	2	1	4	0	0	0	0	0	4	0	0	0	0	0	12	N																																														
42SP142	2	1	2	2	4	0	0	3	0	0	4	0	0	3	0	0	21	Y																																														
42SP143	1	1	2	2	4	0	0	0	0	0	4	0	0	0	0	0	12	N																																														

rather than the quadrat data itself relegates the resulting statistics to the "quasi-statistical" level, the data are still representative of site distribution in the project area.

Environmental Variables

A total of 16 environmental variables was used in our analyses of factors influencing site location. The variables measured were selected on the basis of their ability to measure the relationship of a geographic point to factors influencing hunter-gatherer site placement, as discussed above. They can be grouped into categories of topography, view, shelter, water, and vegetation (Table 11). However, variables do not always restrict themselves to measuring only the characteristic for which they were selected, and care should be taken when interpreting key variables. For example, elevation can serve as a "proxy" variable indicating site location with respect to differences in vegetation zone. Likewise, location within a wooded area could be interpreted as either proximity to food and fuel (as vegetal resources and habitat for game) or as a location selected for its shelter qualities, or both.

TABLE 11
ENVIRONMENTAL VARIABLES USED IN ANALYSES

<u>Variable Name</u>	<u>Definition</u>	<u>Scale</u>
ELEV	elevation in feet above sea level	Interval
SLOPE	percent grade	Interval
RELIEF	vertical relief within 500 m radius (feet)	Interval
RELIEF1	vertical relief within 100 m radius (feet)	Interval
LANDFORM	topographic feature on which site is located	Nominal*
VIEW	degrees of downhill viewspread	Interval
VANTAGE	distance (meters) to vantage point	Interval
SHELTER	ranked (1-12) shelter quality	Ordinal
EXPOSURE	site aspect (1° to 360°)	Interval
EXP180	site orientation on N-S axis (0° to 180°)	Interval
PERMH20	distance (meters) to nearest permanent water	Dichotomous
SOURCE	type of permanent water (river/stream or spring)	Interval
BLUEH20	distance (meters) to nearest intermittent stream	Interval
WATER	vertical distance (feet) above nearest int. stream	Interval
WOOD	distance (meters) to forested area	Interval
VEG	vegetation zone (P-J or montane)	Dichotomous

*not used in statistical analyses

The range, mean, and standard deviation were calculated for sites and nonsites for each variable measured in interval scale. Site and nonsite distributions with regard to each variable were compared by constructing histograms. The nonparametric Kolmogorov-Smirnov (K-S) two-sample test (Siegel 1956:127-136) was performed on the site and nonsite groups for each interval and ordinal level variable to test the null hypothesis that they

belonged to populations with the same distribution. The differences between the two groups with regard to dichotomous variables were tested by means of the chi-square (χ^2) test for two independent samples (Siegel 1956:104-111).

Topography

Variables measuring attributes of topography include elevation above sea level, slope (percent grade), vertical relief within 100 m and 500 m, and landform. Each of these variables were measured on USGS topographic maps. The vertical relief variables measured the difference in elevation between the highest and lowest points within a given radius of the point of interest, and are an indication of the ruggedness of the local terrain.

Landform was the only variable measured on a nominal scale. Because of the level of measurement and the difficulty presented in trying to calculate expected frequencies for χ^2 tests, this variable was not used except in a descriptive sense (Table 12). Sites were found exclusively on landforms which tend to be level and which provide a good view, whereas the majority of nonsites were located on slopes above or below these topographic features.

TABLE 12
LANDFORM

	Sites		Nonsites	
	n	%	n	%
Flats	0	-	4	3.0
Mesa	6	25.0	4	3.0
Ridge	10	41.7	15	11.2
Saddle	2	8.3	1	0.7
Bench	5	20.8	8	6.0
Slope	0	-	93	69.4
Canyon	0	-	1	0.7
Valley floor	0	-	4	3.0
Knoll or hilltop	1	4.2	4	3.0
TOTALS	24	100.0	134	100.0

Elevation (ELEV): No hypotheses were formed regarding the direction of the difference between site and nonsite elevations. Sites were found to occupy a narrower range of elevations than nonsites, with the latter being located at both higher and lower elevations than sites. The mean elevation of sites is some 377 feet lower than the mean elevation of nonsites. The null hypothesis (H_0) of no significant difference between the two groups could be rejected at $\alpha = .05$ (Figure 21; Table 13).

Slope (SLOPE): It was expected that sites would be located on gentler slopes than nonsites. The H_0 of no difference between groups could be rejected at $\alpha = .001$, with the difference occurring in the direction

TABLE 13
SUMMARY STATISTICS FOR ENVIRONMENTAL VARIABLES

Variable	Group	Range	Mean	Standard Deviation	Statistical Significance
ELEV (feet)	Sites Nonsites	6250-9920 5400-10080	7676.75 8056.19	880.325 1069.686	K-S z = 1.431 2-tailed p = .033
SLOPE (% grade)	Sites Nonsites	0-5 0-80	1.875 32.172	1.597 22.940	K-S z = 4.007 2-tailed p = .000
RELIEF1 (feet)	Sites Nonsites	0-160 0-800	59.67 216.63	45.357 147.538	K-S z = 2.924 2-tailed p = .000
RELIEF (feet)	Sites Nonsites	140-600 0-1800	354.04 732.075	136.819 334.446	K-S z = 2.668 2-tailed p = .000
VIEW (degrees)	Sites Nonsites	40-360 0-360	279.50 187.16	89.483 78.476	K-S z = 2.643 2-tailed p = .000
VANTAGE (meters)	Sites Nonsites	0-783 0-976	263.58 359.28	245.917 239.860	K-S z = 1.285 2-tailed p = .074
SHELTER (rank)	Sites Nonsites	1-8 1-11	median 5.5 median 7.8	- -	K-S z = 0.962 2-tailed p = .313
EXPOSURE (degrees)	Sites Nonsites	45-360 10-360	227.29 187.69	81.579 110.148	K-S z = 1.422 2-tailed p = .035
EXP180 (degrees)	Sites Nonsites	0-180 0-180	105.208 83.448	56.141 51.547	K-S z = 1.422 2-tailed p = .035
PERMH20 (meters)	Sites Nonsites	944-6706 46-13600	3270.92 2342.89	1779.635 2188.145	K-S z = 1.563 2-tailed p = .015
BLUEH20 (meters)	Sites Nonsites	15-1219 0-1829	358.75 300.60	366.196 277.489	K-S z = 0.671 2-tailed p = .76
WATER (feet)	Sites Nonsites	-40-400 -90-1120	163.42 244.88	132.044 213.633	K-S z = 1.058 2-tailed p = .213
WOOD (meters)	Sites Nonsites	0-150 0-400	22.08 46.55	39.862 96.708	K-S z = 1.03 2-tailed p = .24

TABLE 14
PERMANENT WATER SOURCE

Source \ Group	River or Stream	Spring	
Sites	10	14	24
Nonsites	63	71	134
	73	85	158

$\chi^2 = 0.068$
d.f. = 1
not significant at $\alpha = .05$

Distance to nearest intermittent stream (BLUEH20): Although proximity to water is important, it is also important to locate far enough away to avoid impacts from flooding. Nonsites were found both closest to and furthest from blue-line drainages, and were an average 58 m closer to these water sources than were sites. The H_0 of no difference between groups could not be rejected at $\alpha = .05$ (Figure 23; Table 13).

Vertical distance above nearest intermittent stream (WATER): Site elevations above intermittent streams were expected to be lower than nonsite elevations above their nearest drainage. Although the difference between groups did occur in the predicted direction, it was not significant at $\alpha = .05$ (Figure 23; Table 13).

Vegetation

The distance to a forested area as indicated by green shading on USGS topographic maps was measured, and the broad vegetation zone in which the point was located was recorded. In this project area, locales are either in pinyon-juniper or montane (i.e., aspen, spruce, fir) forests.

Distance to forested area (WOOD): Sites were found, as expected, to be located in close proximity to forested areas, with no site being farther than 150 m from woods. The average distance for nonsites, although greater than for sites, was not great either, due to the forested nature of the project area. The H_0 of no difference between groups could not be rejected at $\alpha = .05$ (Figure 24; Table 13).

Vegetation Zone (VEG): The lower elevation pinyon-juniper zone was considered to be the most favorable for site location because of a greater supply of food resources and warmer climate. Only 2 of 24 sites were found in the montane zone, whereas 55% of the nonsites were located in that zone. The H_0 of no difference between groups could be rejected at $\alpha = .001$ (Figure 24; Table 13).

TABLE 15
VEGETATION ZONE

Source Group	Pinyon- Juniper	Montane	
Sites	22	2	24
Nonsites	60	74	134
	82	76	158

$\chi^2 = 16.098$
d.f. = 1
Significant at $\alpha = .001$

Site Sensitivity Zones

While the predictive model of site location presented in the following chapter can yield reliable probabilities regarding the presence or absence of cultural resources for any point in the sample universe, large-scale site sensitivity maps are sometimes useful for general management and planning purposes. There are several ways that such maps may be generated from sample survey data, but generally they are prepared through the plotting of one or two easily mapped environmental variables that are related to site distributions. The efficiency of maps produced this way is dependent upon the degree of association of cultural resource distributions with the defined environmental variables; in some areas characterized by environmental heterogeneity, such sensitivity maps can be highly accurate (e.g., Reed and Nickens 1980). In areas of environmental homogeneity, however, the efficiency of these sensitivity maps may be reduced. Perhaps the best way to produce highly accurate sensitivity maps is to utilize a multivariate predictive model based on discriminant analysis or logistic regression to produce probability statements concerning site location for numerous locations within the sample universe. The model herein described uses points rather than sample units as the unit of analysis, however, necessitating the measurement of multiple environmental variables and the computation of scores for a large number of points to ensure adequate coverage. In terms of manual labor, this would be a most burdensome and repetitive task, which would probably not be cost-effective. This problem can be circumvented, however, by having a computer digitize and process map data (Kvamme 1983). Such an approach, however, is beyond the scope of this project.

Sensitivity maps for the five project tracts were developed, utilizing the slope and vegetation zone variables. The maps are not highly accurate due to their small scale, and are intended only for general planning purposes. If the site sensitivity of a specific point is desired, one should refer to 7.5' topographic maps and vegetation maps.

greater distance to permanent water, and lower values for exposure which contribute to discriminant scores indicative of sites. Some of these trends, namely higher elevation, low shelter quality, and greater distances to a vantage point and to permanent water are not what would have intuitively been expected to be characteristic of site locales. However, these variables must be evaluated in light of the environmental setting of the entire project area and in the context of their relative contribution when combined with the other discriminating variables. For example, not only are vantage points found throughout the project area, but many are also associated with terrain too steep for sites. As mentioned in Chapter VI, other attributes that a discriminating variable might be measuring should also be considered when interpreting these results.

The Phase I sites and nonsites were independently classified by the discriminant function, with 65 of the 70 nonsites correctly assigned (92.9%) and 16 of the 17 sites correctly assigned (94.1%). The overall accuracy of the model when tested upon the cases upon which it was derived is thus 93.1%.

The model was then used to classify the Phase II data. Discriminant scores were computed for each of the "ungrouped" sites and nonsites recorded in the second 5.9% sample, and the probability of membership in the site or nonsite group was calculated. The case was assigned to the group for which it had the highest probability of membership. As was expected, the classification accuracy was less when tested upon the independent sample than when the model was tested against the training sample. However, 51 of the 64 nonsites (80%) and 5 of the 7 sites (71%) were correctly classified - an accuracy rate of 78.9%. This classification, as determined by the calculation of tau (Klecka 1980:51), is 57.7% greater than what would be expected by chance alone, assuming each case had a 50-50 chance of belonging to either the site or nonsite group (see Appendix F for the computer printout of this analysis).

By lowering the cutoff point for site classification from 0.5 to 0.4, the number of locations "predicted" to contain sites increases (Table 16). Correspondingly, the number of nonsite points incorrectly classified into the site group increases. This trade-off of misclassified nonsites for correctly classified sites is considered to be beneficial, since our concern is for the protection of cultural resources. It is certainly preferable to "predict" sites in locations where none are present than to miss a site.

TABLE 16
CLASSIFICATION ACCURACY USING 0.4 CUTOFF

Actual Group	Phase	Predicted Group	
		Nonsites	Sites
Nonsites	I	64 (91.4%)	6
Nonsites	II	51 (80%)	13
Sites	I	0	17 (100%)
Sites	II	1	6 (85.7%)

It is enlightening to examine the model's classification results when site and nonsite group a priori probabilities are taken into account (Figure 30; cf. Kvamme 1983). The surveyed area contained in our sample can be considered to contain 112,000 locations of one acre each. Sites were found at 24 of these locations. The a priori probability of site occurrence in the area, based on an average site size of one acre, is thus only 0.002. Nonsites occur in the other 99.8% of the area, or at the remaining 11176 locations. Because of the rare nature of sites in the project area, a model based solely on chance would predict 2 sites in every 1000 locations. In contrast, the model derived from the Phase I survey data and using the 0.4 cutoff point would "predict" sites at 1588 of the locations. Sites would actually be present at only 23 of these (Table 17). The probability of a site being present at the locations identified by our model as site favorable ($p = .014$) is thus seven times greater than the a priori probability ($p = .002$) of site occurrence in the project area. Further, 86% of the project area (9611 locations) can be characterized as unfavorable for sites; 99.99% of these locations (9611/9612) do not contain sites. Looking at the results in another way, 1 in every 71 locations in the site favorable area contain sites, as opposed to only 1 in every 9612 locations in the site unfavorable area. The chance of a site occurring in the favorable area is thus 135 times greater (Table 17) than in the large area designated "site unfavorable".

TABLE 17
PROBABILITY OF SITE OCCURRENCE

A priori probability	24/11200 = .002 = 1 in 500
Site favorable area	23/(1565+23) = .014 = 1 in 71
Site unfavorable area	1/(1+9611) = .0001 = 1 in 9612

Predictive Model Using Combined Data

In order to strengthen the model of site location for the project area, a discriminant analysis was performed on the combined data from Phases I and II. This model was subsequently tested on an independent set of 140 loci selected randomly from the surveyed sample units. A second independent test was performed on 54 randomly selected points located in quadrats earlier surveyed by the Archeological-Environmental Research Corporation (Hauck 1979).

The same 15 variables were input into the discriminant analysis, and the same statistical procedures as used on the Phase I data were performed. The data set consisted of the 24 prehistoric sites and 134 nonsites (see Appendix G for the computer printout for this analysis).

The stepwise procedure eliminated six variables. Those incorporated into the discriminant function are ranked by their standardized discriminant function coefficients as follows:

and D is the discriminant score for case i. (Appendix H contains the home computer program for making these computations as well as step by step instructions for performing the calculations with a hand calculator). Points were classified as sites if they had associated probabilities of 0.5 or greater.

Because the randomly-selected points for our independent test had been surveyed as part of the intensive survey of the sample quadrats, it was known that none of these points contained sites. In the Sanpete tract, however, one was located near a site and two isolated finds, one was near an isolated find, and the location of a third coincided with the locus of an isolated find. These three points and 18 others were misclassified as sites. The remaining 119 (85.0%) were correctly classified into the nonsite group. The tau for this classification indicates that the accuracy is 70.0% better than what would be expected by chance. (Appendix I).

The effects of spatial autocorrelation (Kvamme 1983:125) become apparent when examining the nonsites misclassified by the model. A total of 43 of 174 non-sites in 25 of the 70 survey quadrats were classified as sites. Twenty-seven (62.8%) of these points were in the 12 quadrats containing sites, and 38 (88.4%) were in the 20 quadrats containing either prehistoric sites or isolated finds, or both. Only five quadrats with sites predicted were devoid of prehistoric cultural resources. Table 18 summarizes the classification results of the model.

TABLE 18
CLASSIFICATION ACCURACY BY TRACT

Study Tract	Sites	Nonsites	Independent Nonsites
Woodside	3 of 3 (100%)	9 of 14 (64.3%)	12 of 14 (85.7%)
Nine Mile	10 of 10 (100%)	67 of 72 (93.1%)	69 of 78 (88.5%)
Soldier Creek	2 of 2 (100%)	23 of 28 (82.1%)	23 of 28 (82.1%)
Scotfield	-	10 of 12 (83.3%)	12 of 12 (100%)
Sanpete	9 of 9 (100%)	3 of 8 (37.5%)	3 of 8 (37.5%)
TOTALS	24 of 24 (100%)	112 of 134 (83.6%)	119 of 140 (85.0%)

Independent Test on Points in Previously Surveyed Areas

Six quadrats in the Range Creek (our Nine Mile) Planning Unit Class II survey and three quadrats in the Forest North (our Scotfield) Planning Unit Class II survey conducted in 1977 by the Archeological-Environmental Research Corporation (Hauck 1979) are located within the project area boundaries. No sites were recorded within any of these nine 160-acre quadrats. In order to provide a truly independent test of our predictive model of site location, six geographical points from each of Hauck's survey units were chosen through a random selection of UTM coordinates. Again, the nine environmental variables were measured at each of these

points, and the discriminant score and probability of site occurrence were calculated with the formulas given above (Appendix J).

Assuming the no sites were missed by the Class II survey, 15 of the 54 points were misclassified as sites by our model (Table 19). This accuracy rate of 70.4% is 40.7% better than what would be expected by chance, but less than the efficacy demonstrated on data from our own sample universe.

TABLE 19
INDEPENDENT CLASSIFICATION OF
NONSITE POINTS FROM THE CENTRAL UTAH AREA

Quadrat	Predicted Group		% Accurate
	Nonsite	Site	
Forest North 8	3	3	50%
Forest North 9	4	2	66.7%
Forest North 13	6	0	100%
Range Creek 521	6	0	100%
Range Creek 522	4	2	66.7%
Range Creek 524	4	2	66.7%
Range Creek 1285	4	2	66.7%
Range Creek 1437	5	1	83.3%
Range Creek 1561	3	3	50%
	<u>39</u>	<u>15</u>	<u>72.2%</u>

Independent Test on Previously Recorded Sites

Only five prehistoric lithic scatters had previously been recorded in the project area. Environmental data from these sites was input into the discriminant function equation, and probability of group membership was calculated for each (Appendix G). Three of the five sites were incorrectly assigned to the nonsite group, possibly due to the generally lower elevations and steeper terrain of their locations as compared to those in our sample.

CHAPTER VIII

SUMMARY AND RECOMMENDATIONS

A sample-oriented cultural resource inventory of five study tracts comprising approximately 113,000 acres in central Utah was conducted by Nickens and Associates. The inspection of 11,200 acres resulted in the discovery of 25 archaeological sites and 74 isolated finds. One of the sites represents historic habitation/ranching activities, and the remainder represent prehistoric use of the area. While artifacts diagnostic to specific cultural groups were scarce, it is evident that the project area was inhabited by peoples representing the Archaic Stage, the Fremont and possibly the Ute traditions, spanning approximately six millenia. Use of the project area by prehistoric peoples appears to have been similar through time. The area was evidently exploited on a short-term basis primarily for procurement of natural resources. Most sites appear to represent a limited set of activities, where a small amount of flint-knapping occurred, probably in association with hunting and/or gathering endeavors. Habitation sites occur infrequently and are rather small and uncomplex suggesting short-term use. It is feasible that the prehistoric peoples of the region spent winter and early spring months in the lower elevations in Nine Mile Canyon and the Castle Valley, and exploited the higher elevations when clear of snow on a sporadic or non-intensive basis. When short-term forays were made into the project area, site locations were selected with regards to factors effecting the distribution of exploited resources and the degree of comfort afforded by a location. Relatively level areas with low local relief but with a high degree of viewsread, were selected for site locations. The highest elevations, characterized by montane vegetation communities, were evidently less favored than the lower pinyon/juniper woodlands.

Management Recommendations

Identification of the nature and distribution of cultural resources in the project should facilitate the management of those resources as energy-related developments occur. The predictive model for site location can provide accurate probability statements regarding the likelihood of site occurrences for points in the project area, thereby permitting assessments of potential conflicts between cultural resources and ground-disturbing activities in a project's planning stages, prior to field inspection. Early identification of adverse effects on areas likely to yield sites can lead to rerouting of construction activities or recognition of archaeological mitigation needs.

The predictive model developed from the combined Phase I and Phase II data has proven to be highly accurate at classifying locales into the site or nonsite group. It performs especially well when used within the same geographical areas covered by the Class II inventory, due to the environmental regularity within 160-acre quadrats. Although accuracy decreased to 70% when points within the project area but outside the sample units themselves were independently classified as "site favorable" or site unfavorable", the misclassification of nonsite points as sites is still much less than what would be expected by chance, particularly when a priori probabilities of site occurrence are taken into account.

Because the accuracy of the model is greater than that provided by sensitivity zones alone, calculation of discriminant scores and site group probabilities for potential impact areas is recommended on a case-by-case basis (see Appendix H for the appropriate equations). This procedure can be done in advance of small-scale projects to supplement information gleaned from literature searches. It is not recommended for use as a clearance tool in itself.

This model should by no means be considered to be the final product for the study tracts. As more data, and particularly more site data, are gathered in the project area, the model should be refined. This is not a difficult process, involving only the coding of environmental variables and the punching of additional data cards to add to the computer card deck. The SPSS subprogram DISCRIMINANT can then be run, and a new discriminant function equation for classification of points will result. This process can be repeated as often as deemed necessary, as more surveys are done and additional site and nonsite data accumulate. The current model is based only on the 24 prehistoric sites and 134 nonsites recorded in the sample survey. The five lithic scatters, 140 nonsite points within the survey area, and 54 nonsite points in previously surveyed areas used to independently test the model have not been incorporated into a model. It is anticipated that the more data are included, the better a model will perform. More precise models may also result from using data from more restricted geographical areas, rather than data combined from five discrete tracts. A separate model was developed for the Nine Mile and Soldier Creek tracts, in which 12 of the sites and 100 of the nonsites were located. This model was able to classify over 91% of the sites and nonsites correctly (Appendix K).

Any model, however, will only provide a "best guess" on whether or not a given geographic point resembles the environmental setting of the sites used to develop the model. Even if the probability of a site being present is low, there is no guarantee that there will be no site at that location, as sites are sometimes located in unusual settings. Conversely, many loci classified as site favorable will have no sites. Due to the extremely low population density of the area, many optimal settings were not occupied. It is also possible that geomorphological changes have occurred, and that the present-day landscape no longer resembles the prehistoric one. Some sites may be buried or eroded. Finally, the model presented here is concerned only with site presence and does not "predict" site size, site type, cultural affiliation, or significance.

The sampling and field methodologies herein employed were generally successful in achieving project goals. In the event that similar projects are undertaken in the future, however, it is suggested that the project area not be broken up into noncontiguous tracts unless each is large enough or is sampled extensively enough to produce a sufficiently large data base to permit the formulation of tract-specific predictive models. The incorporation of data from somewhat environmentally diverse, noncontiguous tracts by this project produced a reliable model for site prediction, but greater reliability and efficiency could undoubtedly have been achieved with a tract-specific approach. For future projects, this may entail utilizing a sampling fraction besides 10%. When site densities are very low, a 10% sampling fraction may not provide a desirable

amount of site data. The predictive model herein described may have had increased power had the site data base been larger. In areas of medium or high site density, a 10% sample may be entirely adequate.

Predictive models for site location are reliable management tools. Models based on multivariate analysis of environmental variables for site and nonsite locations have repeatedly been shown to work well. Nonetheless, there is much room for further development and refinement of predictive models. The sample-oriented inventory herein described will hopefully generate continued study of site location factors in the project area and will perhaps aid other archaeologists engaged in similar lines of research in other areas.

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K.	Discriminant Analysis of Nine Mile and Soldier Creek Data. (NOT AVAILABLE)	191

INFORMATION "NOT PROVIDED" (N/P) CAN BE RESEARCHED AT
PRICE, UTAH BLM OFFICE.

INFORMATION "NOT PROVIDED" WAS NOT AVAILABLE AT
THE PRICE, UTAH BLM OFFICE

APPENDIX C
SUMMARY OF SITE DATA

APPENDIX C
SUMMARY OF SITE DATA

Site No.	Tract	Quadrat	Legal Location	UTM (Zone 12)	Site Type*	Cultural Affiliation	National Register Recommendation
42EM1759	Woodside	15	NW $\frac{1}{4}$, NW $\frac{1}{4}$, NW $\frac{1}{4}$ Sec. 17, T17S, R15E	562040mE 4356075mN	Lithic Scatter (3)	Unknown Prehistoric	No
42EM1760	Woodside	15	NW $\frac{1}{4}$, SW $\frac{1}{4}$, NW $\frac{1}{4}$ Sec. 17, T17S, R15E	562075mE 4355625mN	Lithic Scatter (3)	Archaic	Yes
43EM1761	Woodside	15	SE $\frac{1}{4}$, SW $\frac{1}{4}$, NW $\frac{1}{4}$ Sec. 17, T17S, R15E	562300mE 4355525mN	Lithic Scatter (4)	Unknown Prehistoric	No
42CB391	Nine Mile	5	SW $\frac{1}{4}$, SE $\frac{1}{4}$, SW $\frac{1}{4}$ Sec. 5, T13S, R16E	572800mE 4396400mN	Lithic Scatter (4)	Unknown Prehistoric	No
42CB392	Nine Mile	14	NW $\frac{1}{4}$, SW $\frac{1}{4}$, NE $\frac{1}{4}$ Sec. 7, T13S, R16E	571500mE 4395850mN	Lithic Scatter (3)	Archaic	Yes
42CB393	Nine Mile	14	SE $\frac{1}{4}$, SE $\frac{1}{4}$, NE $\frac{1}{4}$ Sec. 7, T13S, R16E	572150mE 4395700mN	Lithic Scatter (4)	Unknown Prehistoric	No
42CB394	Nine Mile	14	SE $\frac{1}{4}$, SE $\frac{1}{4}$, NE $\frac{1}{4}$ Sec. 7, T13S, R16E	572150mE 4395600mN	Lithic Scatter (4)	Unknown Prehistoric	No
42CB395	Nine Mile	14	SE $\frac{1}{4}$, SE $\frac{1}{4}$, NE $\frac{1}{4}$ Sec. 7, T13S, R16E	572250mE 4395750mN	Lithic Scatter (4)	Unknown Prehistoric	No
42CB396	Nine Mile	37	SW $\frac{1}{4}$, SE $\frac{1}{4}$, NW $\frac{1}{4}$ Sec. 21, T13S, R15E	564875mE 4392500mN	Lithic Scatter (3)	Fremont or Ute	Yes
42CB397	Nine Mile	14	NE $\frac{1}{4}$, NE $\frac{1}{4}$, NE $\frac{1}{4}$ Sec. 7, T13S, R16E	572250mE 4396225mN	Lithic Scatter (4)	Unknown Prehistoric	No
42CB398	Soldier Creek	70	SW $\frac{1}{4}$, SE $\frac{1}{4}$, SE $\frac{1}{4}$ Sec. 23, T13S, R11E	530140mE 4391470mN	Sherd and Lithic Scatter (4)	Fremont	Yes

APPENDIX C
(Continued)
SUMMARY OF SITE DATA

Site No.	Tract	Quadrat	Legal Location	UTM (Zone 12)	Site Type*	Cultural Affiliation	National Register Recommendation
42CB401	Nine Mile	14	NW $\frac{1}{4}$, SE $\frac{1}{4}$, NE $\frac{1}{4}$ Sec. 7, T13S, R16E	571995mE 4395850mN	Lithic Scatter (1)	Unknown Prehistoric	Yes
42CB402	Soldier Creek	9	SE $\frac{1}{4}$, SE $\frac{1}{4}$, SW $\frac{1}{4}$ Sec. 30, T12S, R12E	532425mE 4398800mN	Ranch Housing	Euro-American	Yes
42CB403	Nine Mile	63	NW $\frac{1}{4}$, SE $\frac{1}{4}$, SE $\frac{1}{4}$ Sec. 2, T14S, R15E	568000mE 4386950mN	Lithic Scatter (2)	Unknown Prehistoric	No
42CB404	Nine Mile	139	NE $\frac{1}{4}$, NE $\frac{1}{4}$, NW $\frac{1}{4}$ Sec. 34, T12S, R14E	557165mE 4398690mN	Lithic Scatter (3)	Unknown Prehistoric	Yes
42CB405	Nine Mile	326	NW $\frac{1}{4}$, NW $\frac{1}{4}$, SE $\frac{1}{4}$ Sec. 18, T13S, R14E	552410mE 4393830mN	Lithic Scatter (1)	Unknown Prehistoric	Yes
42SP135	Sanpete	7	SW $\frac{1}{4}$, NE $\frac{1}{4}$, NW $\frac{1}{4}$ Sec. 1, T19S, R5E	473175mE 4339160mN	Lithic Scatter (4)	Unknown Prehistoric	No
42SP136	Sanpete	11	NW $\frac{1}{4}$, NW $\frac{1}{4}$, SW $\frac{1}{4}$ Sec. 1, T19S, R5E	472725mE 4338520mN	Lithic Scatter (3)	Unknown Prehistoric	No
42SP137	Sanpete	15	NW $\frac{1}{4}$, SE $\frac{1}{4}$, NW $\frac{1}{4}$ Sec. 12, T19S, R5E	473035mE 4337240mN	Lithic Scatter (4)	Unknown Prehistoric	No
42SP138	Sanpete	15	NW $\frac{1}{4}$, SW $\frac{1}{4}$, NW $\frac{1}{4}$ Sec. 12, T19S, R5E	472730mE 4337275mN	Lithic Scatter (4)	Unknown Prehistoric	No
42SP139	Sanpete	15	SW $\frac{1}{4}$, NW $\frac{1}{4}$, NW $\frac{1}{4}$ Sec. 12, T19S, R5E	472610mE 4337370mN	Lithic Scatter (4)	Unknown Prehistoric	No

APPENDIX C
 (Continued)
 SUMMARY OF SITE DATA

Site No.	Tract	Quadrat	Legal Location	UTM (Zone 12)	Site Type*	Cultural Affiliation	National Register Recommendation
42SP140	Sanpete	15	SW $\frac{1}{4}$, NW $\frac{1}{4}$, NW $\frac{1}{4}$ Sec. 12, T19S, R5E	472720mE 4337500mN	Lithic Scatter (4)	Unknown Prehistoric	No
42SP141	Sanpete	16	SE $\frac{1}{4}$, SW $\frac{1}{4}$, NE $\frac{1}{4}$ Sec. 12, T19S, R5E	473290mE 4336950mN	Lithic Scatter (4)	Unknown Prehistoric	No
42SP142	Sanpete	16	SW $\frac{1}{4}$, SE $\frac{1}{4}$, NE $\frac{1}{4}$ Sec. 12, T19S, R5E	473485mE 4337000mN	Lithic Scatter (4)	Archaic	Yes
42SP143	Sanpete	16	SW $\frac{1}{4}$, SE $\frac{1}{4}$, NE $\frac{1}{4}$ Sec. 12, T29S, R5E	473560mE 4337040mN	Lithic Scatter (4)	Unknown Prehistoric	No

* The number in parenthesis refers to site function. 1) = campsite; 2) = tool kit site; 3) = chipping station with initial stage of reduction represented; and 4) = chipping station with final stages of reduction represented.

APPENDIX D

DESCRIPTION OF ISOLATED FINDS

APPENDIX D
DESCRIPTION OF ISOLATED FINDS

Nine Mile Tract

Number*	Legal Location	Item(s)	Collected
NM-9-1	NE $\frac{1}{4}$, SE $\frac{1}{4}$, NW $\frac{1}{4}$ Sec. 11, T13S, R15E	1 chert biface fragment	
NM-9-2	SW $\frac{1}{4}$, SE $\frac{1}{4}$, NW $\frac{1}{4}$ Sec. 11, T13S, R15E	1 chert Elko-Eared point	X
NM-63-1	NE $\frac{1}{4}$, SW $\frac{1}{4}$, SW $\frac{1}{4}$ Sec. 2, T13S, R15E	1 chert biface fragment	
NM-83-1	SE $\frac{1}{4}$, NW $\frac{1}{4}$, NE $\frac{1}{4}$ Sec. 34, T14S, R15E	1 quartzite core shatter fragment 1 quartzite interior flake 1 quartzite secondary, utilized flake	
NM-102-1	SW $\frac{1}{4}$, NE $\frac{1}{4}$, NE $\frac{1}{4}$ Sec. 15, T14S, R14E	1 obsidian biface fragment	
NM-135-1	NE $\frac{1}{4}$, SW $\frac{1}{4}$, SE $\frac{1}{4}$ Sec. 29, T12S, R14E	3 interior chert flakes 1 primary flake	
NM-135-2	NW $\frac{1}{4}$, NE $\frac{1}{4}$, SE $\frac{1}{4}$ Sec. 29, T12S, R14E	1 chert flake, 1 chert chunk	
NM-135-3	NE $\frac{1}{4}$, SE $\frac{1}{4}$, SE $\frac{1}{4}$ Sec. 29, T12S, R14E	1 chert interior flake	
NM-139-1	NW $\frac{1}{4}$, SW $\frac{1}{4}$, NW $\frac{1}{4}$ Sec. 34, T12S, R14E	1 chert Elko Corner- notched projectile point	X
NM-165-1	NW $\frac{1}{4}$, SE $\frac{1}{4}$, SE $\frac{1}{4}$ Sec. 11, T13S, R14E	1 hole-in-the-top tin can	
NM-172-1	SE $\frac{1}{4}$, NE $\frac{1}{4}$, SE $\frac{1}{4}$ Sec. 9, T12S, R14E	1 Aspen tree carving, 192__ date and nude woman figure	
NM-190-1	NW $\frac{1}{4}$, SE $\frac{1}{4}$, NE $\frac{1}{4}$ Sec. 17, T13S, R15E	1 chert Sudden Side- notched projectile point	X
NM-196-2	SE $\frac{1}{4}$, NE $\frac{1}{4}$, SE $\frac{1}{4}$ Sec. 13, T13S, R14E	1 broken bottle, green	
NM-196-3	NW $\frac{1}{4}$, SE $\frac{1}{4}$, SE $\frac{1}{4}$ Sec. 13, T13S, R14E	1 chert Eastgate Expanding Stem projectile point 1 utilized flake	X

APPENDIX D
(Continued)

Nine Mile Tract

Number*	Legal Location	Item(s)	Collected
NM-205-1	NW $\frac{1}{4}$, NE $\frac{1}{4}$, NE $\frac{1}{4}$ Sec. 22, T13S, R14E	1 historic earthenware sherd	
NM-207-1	SW $\frac{1}{4}$, NE $\frac{1}{4}$, NE $\frac{1}{4}$ Sec. 23, T13S, R14E	1 chert biface fragment	
NM-274-1	NW $\frac{1}{4}$, SE $\frac{1}{4}$, SE $\frac{1}{4}$ Sec. 20, T12S, R14E	1 chert interior flake	
NM-326-1	NE $\frac{1}{4}$, NW $\frac{1}{4}$, SE $\frac{1}{4}$ Sec. 18, T13S, R14E	1 quartzite retouched flake	
NM-333-1	SW $\frac{1}{4}$, NE $\frac{1}{4}$, SE $\frac{1}{4}$ Sec. 22, T13S, R13E	1 white electric insulator	
NM-342-1	NW $\frac{1}{4}$, SE $\frac{1}{4}$, NW $\frac{1}{4}$ Sec. 25, T13S, R13E	1 chert biface fragment	
NM-342-2	NW $\frac{1}{4}$, SE $\frac{1}{4}$, NW $\frac{1}{4}$ Sec. 25, T13S, R13E	1 metal trap fragment	

Soldier Creek Tract

S0-2-1	NE $\frac{1}{4}$, SW $\frac{1}{4}$, SE $\frac{1}{4}$ Sec. 29, T12S, R11E	1 chert interior flake	
S0-2-2	NE $\frac{1}{4}$, SW $\frac{1}{4}$, SE $\frac{1}{4}$ Sec. 29, T12S, R11E	35 fragments purple glass	
S0-9-1	NW $\frac{1}{4}$, NE $\frac{1}{4}$, SW $\frac{1}{4}$ Sec. 30, T12S, R12E	1 quartzite interior flake	
S0-9-2	SE $\frac{1}{4}$, SW $\frac{1}{4}$, SW $\frac{1}{4}$ Sec. 30, T12S, R12E	1 chert secondary flake	
S0-9-3	NE $\frac{1}{4}$, SE $\frac{1}{4}$, SW $\frac{1}{4}$ Sec. 30, T12S, R12E	1 chert secondary flake	
S0-9-4	SW $\frac{1}{4}$, SE $\frac{1}{4}$, SW $\frac{1}{4}$ Sec. 30, T12S, R12E	1 cab of 1920-1930 Chevy truck	

APPENDIX D
(Continued)

Soldier Creek Tract

Number*	Legal Location	Item(s)	Collected
S0-19-1	SE $\frac{1}{4}$, SE $\frac{1}{4}$, SW $\frac{1}{4}$ Sec. 32, T12S, R11E	1 Elko projectile point base	X
S0-19-2	NW $\frac{1}{4}$, SW $\frac{1}{4}$, SW $\frac{1}{4}$ Sec. 32, T12S, R11E	1 chert secondary flake	
S0-21-1	SE $\frac{1}{4}$, NE $\frac{1}{4}$, SW $\frac{1}{4}$ Sec. 33, T12S, R11E	1 purple glass sherd 1 metal shovel blade	
S0-21-2	NW $\frac{1}{4}$, SW $\frac{1}{4}$, SW $\frac{1}{4}$ Sec. 33, T12S, R11E	2 interior chert flakes 1 chert utilized flake	
S0-29-1	SW $\frac{1}{4}$, NE $\frac{1}{4}$, SE $\frac{1}{4}$ Sec. 1, T13S, R11E	1 iron stove	
S0-29-2	NE $\frac{1}{4}$, NW $\frac{1}{4}$, SE $\frac{1}{4}$ Sec. 1, T13S, R11E	1 chert secondary flake	
S0-29-3	NW $\frac{1}{4}$, NE $\frac{1}{4}$, NE $\frac{1}{4}$ Sec. 1, T13S, R11E	2 chert interior flakes 1 chert secondary flake 1 chert retouched flake	
S0-70-1	NE $\frac{1}{4}$, SW $\frac{1}{4}$, SE $\frac{1}{4}$ Sec. 23, T13S, R11E	1 projectile point fragment	
S0-72-1	NW $\frac{1}{4}$, NW $\frac{1}{4}$, SE $\frac{1}{4}$ Sec. 24, T13S, R11E	1 quartzite biface fragment	
S0-72-2	NE $\frac{1}{4}$, NE $\frac{1}{4}$, SE $\frac{1}{4}$ Sec. 24, T13S, R11E	1 chert projectile point base	X
S0-72-3	NE $\frac{1}{4}$, SE $\frac{1}{4}$, SE $\frac{1}{4}$ Sec. 24, T13S, R11E	2 quartzite interior flakes 1 chert utilized flake	
S0-74-1	NW $\frac{1}{4}$, SW $\frac{1}{4}$, SW $\frac{1}{4}$ Sec. 6, T13S, R12E	1 chert interior flake	
S0-95-1	SE $\frac{1}{4}$, SE $\frac{1}{4}$, SW $\frac{1}{4}$ Sec. 22, T13S, R12E	1 chert interior flake	

APPENDIX D
(Continued)

Woodside Tract

Number*	Legal Location	Items(s)	Collected
WO-6-1	SE $\frac{1}{4}$, SW $\frac{1}{4}$, NE $\frac{1}{4}$ Sec. 24, T17S, R15E	1 hole-in-the-top tin can	
WO-29-1	SE $\frac{1}{4}$, SE $\frac{1}{4}$, NW $\frac{1}{4}$ Sec. 30, T17S, R15E	2 chert interior flakes	
WO-29-2	SE $\frac{1}{4}$, NE $\frac{1}{4}$, NW $\frac{1}{4}$ Sec. 30, T17S, R15E	1 sandstone mano 1 chert interior flake	
WO-29-3	NE $\frac{1}{4}$, SE $\frac{1}{4}$, NW $\frac{1}{4}$ Sec. 30, T17S, R15E	1 chert interior flake	
WO-35-1	SW $\frac{1}{4}$, NW $\frac{1}{4}$, SE $\frac{1}{4}$ Sec. 29, T17S, R14E	1 chert biface	

Scotfield Tract

SC-3-1	SE $\frac{1}{4}$, SE $\frac{1}{4}$, SW $\frac{1}{4}$ Sec. 1, T14S, R6E	3 aspen trees with graffiti	
SC-9-1	NE $\frac{1}{4}$, NE $\frac{1}{4}$, SW $\frac{1}{4}$ Sec. 8, T14S, R7E	2 aspen trees with graffiti	
SC-17-1	SW $\frac{1}{4}$, SE $\frac{1}{4}$, NE $\frac{1}{4}$ Sec. 16, T14S, R7E	1 aspen graffito: "Jim Luw ___ 1926"	
SC-17-2	NW $\frac{1}{4}$, SE $\frac{1}{4}$, NE $\frac{1}{4}$ Sec. 16, T14S, R7E	1 utilized interior flake	
SC-17-3	NE $\frac{1}{4}$, NE $\frac{1}{4}$, NE $\frac{1}{4}$ Sec. 16, T14S, R7E	1 aspen graffito: "1906"	
SC-18-1	NW $\frac{1}{4}$, SE $\frac{1}{4}$, SW $\frac{1}{4}$ Sec. 16, T14S, R7E	aspen graffiti: "Aug. 17, 1909"; "Aug. 17, 1931"; "Aug. 24, 1930"	
SC-18-2	SW $\frac{1}{4}$, SE $\frac{1}{4}$, SW $\frac{1}{4}$ Sec. 16, T14S, R7E	aspen graffiti: "Jim - Aug. 4, 1927" "J.H.L. -27" "Carl A. Seela 1922"	

APPENDIX D
(Continued)

Scofield Tract

Number*	Legal Location	Item(s)	Collected
SC-18-3	NW $\frac{1}{4}$, SE $\frac{1}{4}$, SW $\frac{1}{4}$ Sec. 16, T14S, R7E	1 aspen graffito: "G. Gordon July 15, 1904"	
SC-18-4	NW $\frac{1}{4}$, SE $\frac{1}{4}$, SW $\frac{1}{4}$ Sec. 16, T14S, R7E	aspen graffiti: "1927"; "1940"	
SC-18-5	SW $\frac{1}{4}$, NE $\frac{1}{4}$, SW $\frac{1}{4}$ Sec. 16, T14S, R7E	1 aspen graffito: "1923 - Lee Leifson"	
SC-18-6	NE $\frac{1}{4}$, SE $\frac{1}{4}$, SW $\frac{1}{4}$ Sec. 16, T14S, R7E	1 aspen graffito: "1922"	
SC-32-1	SE $\frac{1}{4}$, NW $\frac{1}{4}$, NW $\frac{1}{4}$ Sec. 11, T15S, R73	aspen graffiti: "1931 D.H." "PA. 1939"; "1909"	

Sanpete Tract

SP-7-1	NE $\frac{1}{4}$, SE $\frac{1}{4}$, NW $\frac{1}{4}$ Sec. 1, T19S, R5E	2 interior quartzite flakes 1 chert secondary flake	
SP-7-2	SE $\frac{1}{4}$, NE $\frac{1}{4}$, NW $\frac{1}{4}$ Sec. 1, T19S, R5E	1 chert interior flake	
SP-7-3	NW $\frac{1}{4}$, SW $\frac{1}{4}$, NW $\frac{1}{4}$ Sec. 1, T19S, R5E	1 chert primary flake	
SP-7-4	SE $\frac{1}{4}$, SW $\frac{1}{4}$, NW $\frac{1}{4}$ Sec. 1, T19S, R5E	2 chert interior flakes	
SP-11-1	NE $\frac{1}{4}$, NW $\frac{1}{4}$, SW $\frac{1}{4}$ Sec. 1, T19S, R5E	1 chert interior flake	
SP-11-2	SE $\frac{1}{4}$, NE $\frac{1}{4}$, SW $\frac{1}{4}$ Sec. 1, T19S, R5E	1 chert interior flake	
SP-11-3	SW $\frac{1}{4}$, NE $\frac{1}{4}$, SW $\frac{1}{4}$ Sec. 1, T19S, R5E	1 possible mano	
SP-11-4	NW $\frac{1}{4}$, NW $\frac{1}{4}$, SW $\frac{1}{4}$ Sec. 1, T19S, R5E	1 chert projectile point midsection 1 chert secondary flake	

APPENDIX D
(Continued)

Sanpete Tract

Number*	Legal Location	Item(s)	Collected
SP-11-5	NW $\frac{1}{4}$, NW $\frac{1}{4}$, SW $\frac{1}{4}$ Sec. 1, T19S, R5E	1 chert biface fragment	
SP-11-6	SW $\frac{1}{4}$, SW $\frac{1}{4}$, SW $\frac{1}{4}$ Sec. 1, T19S, R5E	1 chert biface fragment 1 chert interior flake	
SP-15-1	SE $\frac{1}{4}$, SE $\frac{1}{4}$, NW $\frac{1}{4}$ Sec. 12, T19S, R5E	1 chert biface	
SP-15-2	NW $\frac{1}{4}$, SE $\frac{1}{4}$, NW $\frac{1}{4}$ Sec. 12, T19S, R5E	1 chert interior flake	
SP-15-3	SW $\frac{1}{4}$, NW $\frac{1}{4}$, NW $\frac{1}{4}$ Sec. 12, T19S, R5E	1 sherd purple glass	
SP-16-1	SW $\frac{1}{4}$, SW $\frac{1}{4}$, NE $\frac{1}{4}$ Sec. 12, T19S, R5E	1 chert primary flake	
SP-16-2	SE $\frac{1}{4}$, SW $\frac{1}{4}$, NE $\frac{1}{4}$ Sec. 12, T19S, R5E	1 chert biface	
SP-16-3	SE $\frac{1}{4}$, SW $\frac{1}{4}$, NE $\frac{1}{4}$ Sec. 12, T19S, R5E	1 chert interior flake 1 chert secondary flake	
SP-16-4	NE $\frac{1}{4}$, SW $\frac{1}{4}$, NE $\frac{1}{4}$ Sec. 12, T19S, R5E	1 chert primary flake	

* The first number refers to the quadrat designation, and the second refers to the sequence of isolated finds recorded.

UTAH SHPO

COVER SHEET

Project Name: Intensive Cultural Resource Survey and Damage Assessment of Road Construction in Cow Canyon

Cascade Mountain Resources

State #U98SC0639bp

Report Date: February 11, 1999

Principal Investigator: John A. Senulis

Field Supervisor: John A. Senulis

Acreage Surveyed: 10 acres

Intensive Acres: 8

Recon/Intuitive Acres: 2

U.S.G.S. 7.5 Quad: Mount Bartles, Utah (1972)

Sites Reported	Number	Smithsonian Site #(s):
Archeological Sites:	0	
Revisit (No IMACS update)	0	
Revisit (IMACS update attch.)	0	
New Sites (IMACS attached)	0	
Archeological Site Total:	0	
Historic Structures:		
(USHS Site Form Attached)		
Total NRHP Eligible Sites,	0	

Checklist of Required Items:

1. X 1 Copy of Final Report
2. X Copy of U.S.G.S. 7.5' map showing surveyed/excavated area
3. Completed IMACS Site Inventory Forms Including
 - _____ Parts A and B or C
 - _____ IMACS Encoding Form
 - _____ Site Sketch Map
 - _____ Photographs
 - _____ Copy of USGS 7.5' Quad with Smithsonian site Number
4. X Completed Cover Sheet



SENCO-PHENIX

**AN INTENSIVE CULTURAL RESOURCE SURVEY AND INVENTORY
OF THE DUGOUT CANYON MINE DRILL HOLES AND ACCESS ROADS**

Private/BLM Lands

Carbon County, Utah

**PERFORMED FOR
Dugout Canyon Mine of
Canyon Fuel Company, LLC**

**In Accordance with BLM and
Utah State Guidelines
Antiquities Permit #U01SC0240bp**

**SPUT-387
June 20, 2001**

John A. Senulis

Direct Charge of Fieldwork

UTAH SHPO

COVER SHEET

Project Name: AN INTENSIVE CULTURAL RESOURCE SURVEY AND INVENTORY
OF THE DUGOUT CANYON MINE DRILL HOLES AND ACCESS ROADS

Dugout Canyon Mine of Canyon Fuels LLC.

State #U01SC0240bp

Report Date: June 20, 2001

County (ies): Carbon

Principal Investigator/ Field Supervisor: John A. Senulis/John Senulis

Records Search/Location/Dates: May 17, 2001, Price River Field Office of the BLM

Acreage Surveyed: 104 acres

Intensive Acres: 85

Recon/Intuitive Acres: 19

U.S.G.S. 7.5 Quad: Pine Canyon, Utah (1972), Mount Bartles, Utah (1972)

Sites Reported	Number	Smithsonian Site #(s):
Archeological Sites:	3	
Revisit (No IMACS update)	0	
Revisit (IMACS update attch.)	1	42CB292
New Sites (IMACS attached)	2	42CB1595, 42CB1596
Archeological Site Total:	3	
Historic Structures:		
(USHS Site Form Attached)		
Total NRHP Eligible Sites,	0	

Checklist of Required Items:

1. 1 Copy of Final Report
2. Copy of U.S.G.S. 7.5' map showing surveyed/excavated area
3. Completed IMACS Site Inventory Forms Including
 - Parts A and B or C
 - IMACS Encoding Form
 - Site Sketch Map
 - Photographs
 - Copy of USGS 7.5' Quad with Smithsonian site Number
4. Completed Cover Sheet

U.S. Department of the Interior
Bureau of Land Management
Utah State Office

Summary Report of
Inspection for Cultural Resources

For BLM Use Only

BLM Report ID No.
1 4 10

Report Acceptable Yes No
Mitigation Acceptable Yes No
Comments:

Report Title: **AN INTENSIVE CULTURAL RESOURCE SURVEY AND INVENTORY OF THE
DUGOUT CANYON MINE DRILL HOLES AND ACCESS ROADS**

2. Development Company: Dugout Canyon Mine of Canyon Fuel LLC.

3. Report Date: June 20, 2001
month w year

4. Antiquities Permit: No.U01SC0240bp
BLM 01UT54633

5. Responsible Institution: SENCO-PHENIX County: Carbon County

6. Fieldwork Location:

Section 24, T13S, R12E; Sections 18, 19, 20, 30, T13S, R13E

7. Resource Area: Price River Field Office

PO=Pony Express, BR=Bear River, PR=Price River, WS=Warm Springs
BC=Book Cliffs, HR=House Range, Sevier River, HM=Henry Mountains
BE=Beaver River, DX=Dixie, KA=Kanab, ES=Escalante, SJ=San Juan
GR=Grand, SR=San Rafael, DM=Diamond Mountain

V=Vernal Meridian
H=Half Township

8. Description of Examination Procedures:

Class III walkover survey

9. Linear Miles Surveyed: 6.1 miles
and/or

Definable Acres Surveyed 31

and/or

Undefinable Acres Survey

10. Inventory Type: I

R=Reconnaissance

I=Intensive

S=Statistical Sample

11. Description of Findings (attach appendices, if appropriate) 12. Number of Sites: 3 13. Collection: N Y=Yes, N=No

42CB292, 1595, 1596

14. Actual/Potential National Register Properties Affected:

None

15. Literature Search, Location(s)/Date(s):

May 17, 2001, Price River Resource Area Office of the Bureau of Land Management.

16. Conclusions/Recommendations:

Archeological clearance is recommended.

17. Signatures

Administrator:

Field Supervisor:

John A. Xenulis

*For extra locationals use additional 8100-3 forms.

UT 8100-3 (2/85)

Abstract

SENCO-PHENIX performed an intensive cultural resource survey on eight proposed drill holes and connecting access roads for the Dugout Canyon Mine of Canyon Fuel LLC. The proposed drill holes and access roads are located on lands managed by the BLM and on private land. The purpose of the survey was to identify and evaluate cultural resources that may exist within the project area.

Cultural resources were located consisting of three archeological sites and two isolated findings:

- 42CB292 The site is the historic Snow mine first recorded by AERC in 1980. At that time there was a standing coal loadout and foundation with depth potential. The area has been heavily logged since the initial recordation and the area around the mine extensively disturbed by heavy equipment, probably dozed. The foundation has been destroyed and the coal loadout has been collapsed and pushed into the bed of Pace Creek. The rock-covered adit and adjacent stonewall are still there on the other side of Pace Creek. There are two 6 x 10 dugouts used as coal loadouts on the west side of the road. Other than recent trash no artifacts were observed. The integrity of the site has been basically destroyed. The site is not recommended for the NRHP.
- 42CB1595 The site is a wood frame and sided one room cabin adjacent to a log foundation under a pile of trash that is predominantly lumber and boards that have been removed from the cabin. The cabin is made of two by four wood framing covered by two courses of slanted cut wood with variable size boards ranging in size from one by four to one by sixteen inches. The two courses of wood were separated by tarpaper. The roof is wood boards covered by asphalt strip roofing. There is an aluminum flashing for a stovepipe in the cabin and part of a pipe in the adjacent debris. The structure measures 13' 3" x 7' 4 3/4" and stands 6' 2" tall. The interior of the cabin is 6' from floor to ceiling. The door opening is 2' 5" x 5' 10" with two windows on the east and west ends measuring 2' 9" high by 1' 2" wide. The cabin has no foundation and appears to be of the same size as the adjacent log foundation. The cabin may have been moved off the foundation. There are a few fragments of clear glass that may have been windows at one point. The adjacent trash pile is predominantly lumber from the cabin. The only datable artifact is a steel full size railroad rail embossed with "BS BO Steelton 1948." There is no domestic refuse at the site except for a metal cot and bedspring inside the cabin. The site is not recommended for the NRHP. The site has no further information potential and is probably less than 50 years old. Robert Hackney hunted this area in the early 1950s and stated that the roads at that time stopped at the mine, which would make the cabin and road post 1950s.
- 42CB1596 The site is an old deteriorating corral with some Aspen carvings and a small trash pile. The corral is a post, wire and twine structure that has been rebuilt many times. It is about 20 feet in diameter. There is a small trash scatter across the road. The trash scatter is metal fragments, one hole in top can and recent (30 years) trash, i.e. aluminum cans etc. The Aspen carvings are "JB JB JB, May 14, Martin Davin, 1933, 7-30-67, Jim Hanna, Don PavdVlton (hard to read), Jim Hanna + Kayla Merrill." Most of the Aspen carvings cannot be read. The site is not recommended for nomination to the NRHP. The site has no further information potential and parts are less than 50 years old.
 - IF #1 This is the base of a Sierran Variety of the Desert Side Notch projectile point. The gray chalcedony projectile point base measures 21 x

Project Location

The project begins at the previously surveyed Snow Mine site in the NW/NW ¼ of Section 30, T13S, R13E, Carbon County, Utah. Access to the drill holes will mostly follow existing improved dirt roads that were built to facilitate logging in the general area. A total of 6.1 miles were included in the study area. 1.3 miles were in the bottom of Pace Canyon in Sections 19, 20 and 30, T13S, R13E. 2.2 miles of road were slide slope in Sections 18, 19 and 20, T13S, R13E. 2.6 miles of road were on the bench on top. One area of a proposed steep side hill road was located in Sections 19 and 20, T13S, R13E. Seven minimal disturbance drill locations were surveyed as roughly 3 acre plots in Section 24, T13S, R12E, and Sections 18, 19 20 and 30 T13S, R13E. One ten-acre plot was surveyed for a coal methane well in Section 19, T13S, R13E. All drill locations and the well pad were flagged. The proposed project is noted on the enclosed copy of U.S.G.S. Composite 7.5' Quad: Pine Canyon, Utah (1972) and Mount Bartles, Utah (1972).

Environment

The project area begins in narrow Pace Canyon. Pace Canyon is periodically scoured by torrential rain and floodwaters leaving the canyon floor strewn with large boulders and gravels. The cliffs above the canyon reveal various layers of sandstone and shale. Vegetation falls within the Mixed Conifer Forest type with Ponderosa pine, Douglas fir, Limber pine, aspen, big sagebrush, serviceberry, and bitterbrush. Pace Creek is a perennial stream with typical riparian vegetation on its banks.

The upper bench is basically a sagebrush flat intermixed with pockets of Pinyon-Juniper and stands of Aspen. The understory consists of mountain mahogany, rabbitbrush, ephedra, galleta grass, yucca, and serviceberry.



View West over the Timbered part of the Project Area

Previous Research

A file search at the Price River Field Office of the BLM on May 17, 2001 revealed that the following projects and sites are reported for the project area:

- 1980, AERC surveyed several sample blocks in Sections 13 and 24, T13S, R12E and Sections 18, 19 and 30 T13S, R13E. They also surveyed the access road into the Snow Mine site. One archeological site was located:
 - 42CB292 The site was described as "Coal mine located in Pace Canyon consists of one known mine portal which has been closed. Site of historic Snow Mine in Pace Canyon which was active in 1906 but had its primary production period from 1932-1940." The site was relatively pristine at the time and still contained a standing coal loadout and foundation with depth potential. Avoidance was recommended pending further historic research. As noted the site has since been extensively modified.
- 1983, Metcalf-Zier Archeologists surveyed several access roads and drill locations in Sections 13 and 24, T13S, R12E and Section 19, T13S, R13E. The only cultural resource located was an isolated prehistoric waste flake.

Methodology

SENCO-PHENIX performed a Class III intensive walkover survey on June 5, 2001. John Senulis directed the field crew consisting of Jeanne Senulis, Robert Hackney and Brett and Lee Richman. Meandering transects no further spaced than 15 meters were employed for the well pad and drill holes. The drill holes, which were mostly in previously disturbed areas, were given a roughly 3 acre buffers. The site of the proposed coal methane well pad was surveyed with a ten-acre buffer. The access roads were surveyed to a right of way of 30 meters. Exceptions to this were the steep sideslope existing road, which was surveyed in areas where there was some width and possibility of containing cultural resource locations. The area of the proposed sideslope access in extremely steep terrain in Section 19 and 20, T13S, R13E was broad-brush surveyed with emphasis on rock faces for rock art or habitation rockshelters. Special attention was given to those areas of subsurface soil exposure from animal burrowing and erosion.

All field notes and digital photographs are on file at the offices of SENCO-PHENIX in Price, Utah.

Findings and Recommendations

Cultural resources were located consisting of three archeological sites and two isolated findings:

- 42CB292 The site is the historic Snow mine first recorded by AERC in 1980. At that time there was a standing coal loadout and foundation with depth potential. The area has been heavily logged since the initial recordation and the area around the mine extensively disturbed by heavy equipment, probably dozed. The foundation has been destroyed and the coal loadout has been collapsed and pushed into the bed of Pace Creek. The rock-covered adit and adjacent stonewall are still there on the other side of Pace Creek. There are two 6 x 10 dugouts used as coal loadouts on the west side of the road. Other than recent trash no artifacts were observed. The integrity of the site has been basically destroyed. The site is not recommended for the NRHP.
- 42CB1595 The site is a wood frame and sided one room cabin adjacent to a log foundation under a pile of trash that is predominantly lumber and boards that have been removed from the cabin. The cabin is made of two by four wood framing covered by two courses of slanted cut wood with variable size boards

ranging in size from one by four to one by sixteen inches. The two courses of wood were separated by tarpaper. The roof is wood boards covered by asphalt strip roofing. There is an aluminum flashing for a stovepipe in the cabin and part of a pipe in the adjacent debris. The structure measures 13' 3" x 7' 4 3/4" and stands 6' 2" tall. The interior of the cabin is 6' from floor to ceiling. The door opening is 2' 5" x 5' 10" with two windows on the east and west ends measuring 2' 9" high by 1' 2" wide. The cabin has no foundation and appears to be of the same size as the adjacent log foundation. The cabin may have been moved off the foundation. There are a few fragments of clear glass that may have been windows at one point. The adjacent trash pile is predominantly lumber from the cabin. The only datable artifact is a steel full size railroad rail embossed with "BS BO Steelton 1948." There is no domestic refuse at the site except for a metal cot and bedspring inside the cabin. The site is not recommended for the NRHP. The site has no further information potential and is probably less than 50 years old. Robert Hackney hunted this area in the early 1950s and stated that the roads at that time stopped at the mine, which would make the cabin and road post 1950s.

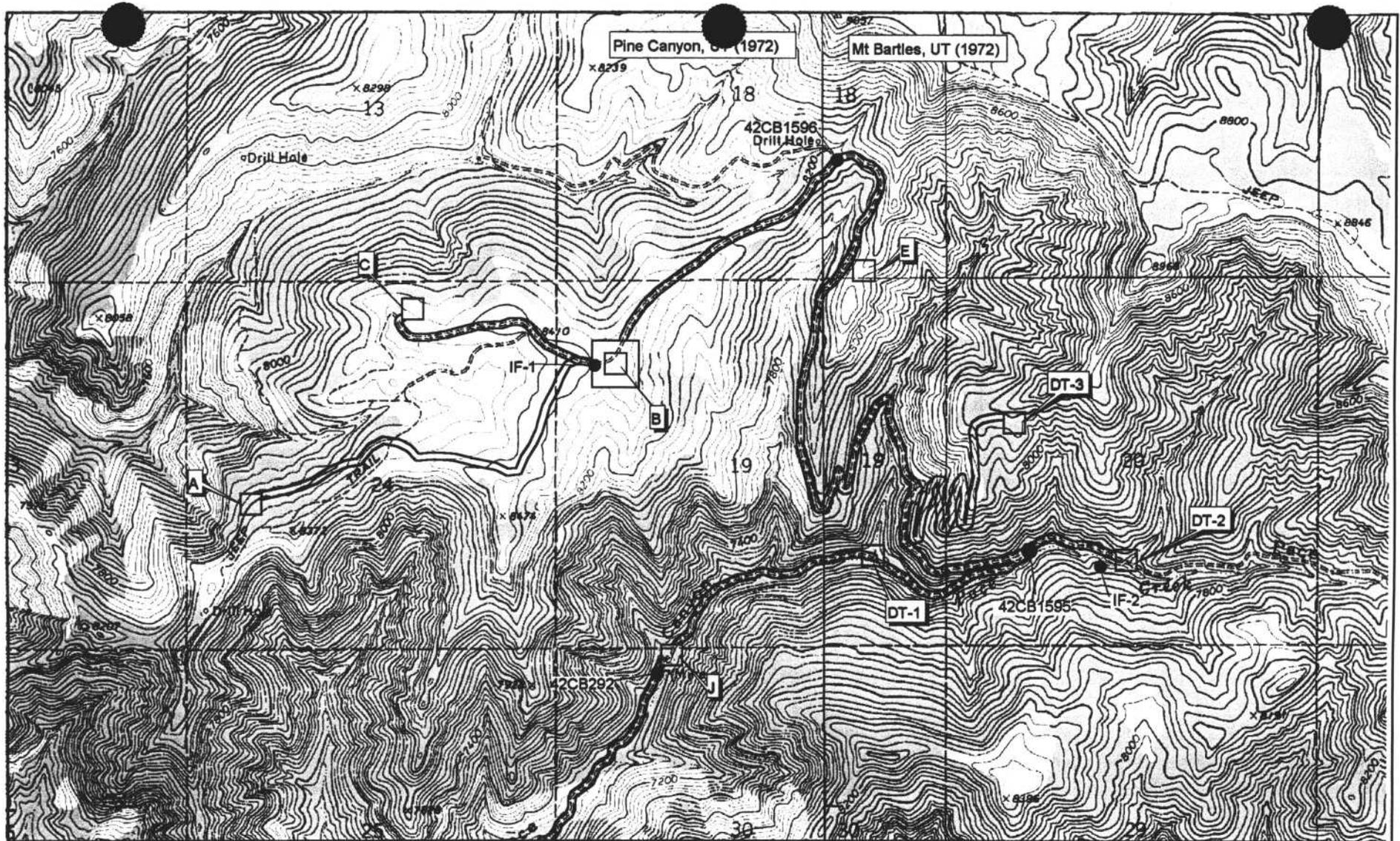
- 42CB1596 The site is an old deteriorating corral with some Aspen carvings and a small trash pile. The corral is a post, wire and twine structure that has been rebuilt many times. It is about 20 feet in diameter. There is a small trash scatter across the road. The trash scatter is metal fragments, one hole in top can and recent (30 years) trash, i.e. aluminum cans etc. The Aspen carvings are "JB JB JB, May 14, Martin Davin, 1933, 7-30-67, Jim Hanna, Don PavdVlton (hard to read), Jim Hanna + Kayla Merrill." Most of the Aspen carvings cannot be read. The site is not recommended for nomination to the NRHP. The site has no further information potential and parts are less than 50 years old.
 - IF #1 This is the base of a Sierran Variety of the Desert Side Notch projectile point. The gray chalcedony projectile point base measures 21 x 18 x 4 mms. The notched base is a Sierran characteristic although all DSN varieties date to the periods A.D. 800-1200 (Early) or A.D. 1200-1700 (Late). The point was found in the SE/SW/NW/NW 1/4 of Section 19, T13S, R13E, (541898 e, 4392590 n).
 - IF #2 This is the site of an old sawmill located well beyond the survey area in the NW/NE/SE/SW 1/4 of Section 20, T13S, R13 E (544078 e, 4391792 n). The site is on the south side of Pace Creek and was noted by the observation of a discard pile on a bench above the creek. The sawmill is noted for future reference.

No other cultural resources were located and the potential for undetected remains is remote. A finding of no effect is appropriate and archeological clearance without stipulations is recommended.

These recommendations are subject to modification and review by the BLM Field Office Manager and the Utah SHPO.



IF #2 Sawmill Remains view South



SENCO-PHENIX



Scale 1:24000
1"=2,000'

- | | |
|---|------------------|
|  | Previous Survey |
|  | Current Survey |
|  | Eligible Sites |
|  | Ineligible Sites |

Drill Holes and Access Roads
Dugout Mine of Canyon Fuel Company, LLC
Sections 18, 19, 20, 30, T13S, R13E
Section 24, T13S, R12E
June 2001
SPUT- 387

IMACS SITE FORM

Part A - Administrative Data

INTERMOUNTAIN ANTIQUITIES COMPUTER SYSTEM

Form approved for use by:

BLM - Utah, Idaho, Wyoming, Nevada

Division of State History - Utah, Wyoming

USFS - Intermountain Region

NPS - Utah, Wyoming

*1. State No. 42CB292 (Revised from AERC 1980)

*2. Agency No.

*3. Temp. No.

County Carbon

4. State: Utah

5. Project: Dugout Drill Hole Series

*6. Report No: U01SC240bp

7. Site Name / Property Name:

8. Class Prehistoric Historic Paleontologic Ethnographic

9. Site Type: Historic Snow Mine

*10. Elevation: 7020 ft..

*11. UTM Grid Zone: 12 542170 m E 4391244 m N

*12. SE 1/4 of NE 1/4 of NW 1/4 of NW 1/4 of Section: 30 T.13S R.13E

*13. Meridian: SLC

*14. Map Reference: Pine Canyon, Utah (1972)

15. Aerial Photo:

16. Location and Access: From Wellington, Utah travel east on Highway 6 for ca. 7 miles. Turn left onto Pace Canyon road. Follow the improved dirt road northerly ca. 4.5 miles to northwesterly tending dirt road. Follow that road northwesterly ca. 1.2 miles to mine site. Locked gate at 1 mile on last road.

*17. Land Owner: Private

*18. Federal Administrative Units:

*19. Location of Curated Materials:

20. Site Description: The site is the historic Snow mine first recorded by AERC in 1980. At that time there was a standing coal loadout and foundation with depth potential. The area has been heavily logged since the initial recordation and the area around the mine extensively disturbed by heavy equipment, probably dozed. The foundation has been destroyed and the coal loadout has been collapsed and pushed into the bed of Pace Creek. The rock-covered adit and adjacent stonewall are still there on the other side of Pace Creek. There are two 6 x 10 dugouts used as coal loadouts on the west side of the road. Other than recent trash no artifacts were observed. The integrity of the site has been basically destroyed. The site is not recommended for the NRHP.

*21. Site Condition Excellent (A) Good (B) Fair (C) Poor (D)

*22. Impact Agent(s): Construction, grazing

*23. National Register Status Significant (C) Non-Significant (D) Unevaluated (Z)

Justify: The integrity of the site has been destroyed. The site is not recommended for the NRHP.

24. Photos: 00CB292: 1-4

25. Recorded by: John Senulis

*26. Survey Organization: SENCO-PHENIX

28. Survey Date: 6-5-2001

27. Assisting Crew Members: Jeanne Senulis, Brett & Lee Richman, Robert Hackney

List of Attachments: Part B Topo Map Photos Continuation Sheets
 Part C Site Sketch Artifact/Feature Sketch
 Part E Other

*Encoded data items

Part A - Environmental Data

*29. Slope: 03 (Degrees) 175 Aspect: (Degrees) Site No: 42CB292
 *30. Distance to Permanent Water 0 x 100 meters
 Type of Water Source Spring/Seep (A) Stream/River (B) Lake (C) Other (D)
 Name of Water Source: Pace Creek

*31. Geographic Unit: CAC Mancos Shale Lowlands

*32. Topographic Location

PRIMARY LANDFORM

SECONDARY LANDFORM

- | | | | | |
|--|---|--|---|---|
| <input type="checkbox"/> Mountain Spine (A) | <input type="checkbox"/> Alluvial Fan (A) | <input type="checkbox"/> Dune (I) | <input type="checkbox"/> Slope (Q) | <input type="checkbox"/> Riser (Y) |
| <input type="checkbox"/> Hill (B) | <input type="checkbox"/> Alcove/Rockshelter (B) | <input checked="" type="checkbox"/> Floodplain (J) | <input type="checkbox"/> Terrace/Bench (R) | <input type="checkbox"/> Multiple Landforms (1) |
| <input type="checkbox"/> Tableland/Mesa (C) | <input type="checkbox"/> Arroyo (C) | <input type="checkbox"/> Ledge (K) | <input type="checkbox"/> Talus Slope (S) | <input type="checkbox"/> Bar (2) |
| <input type="checkbox"/> Ridge (D) | <input type="checkbox"/> Basin (D) | <input type="checkbox"/> Mesa/Butte (L) | <input type="checkbox"/> Island (T) | <input type="checkbox"/> Lagoon (3) |
| <input checked="" type="checkbox"/> Valley (E) | <input type="checkbox"/> Cave (E) | <input type="checkbox"/> Playa (M) | <input type="checkbox"/> Outcrop (U) | <input type="checkbox"/> Ephemeral Wash (4) |
| <input type="checkbox"/> Plain (F) | <input type="checkbox"/> Cliff (F) | <input type="checkbox"/> Port. Geo. (N) | <input type="checkbox"/> Spring Mound/Bog (V) | <input type="checkbox"/> Kipuka (5) |
| <input type="checkbox"/> Canyon (G) | <input type="checkbox"/> Delta (G) | <input type="checkbox"/> Plain (O) | <input type="checkbox"/> Valley (W) | <input type="checkbox"/> Saddle/Pass (6) |
| <input type="checkbox"/> Island (H) | <input type="checkbox"/> Detached Monolith (H) | <input type="checkbox"/> Ridge/Knoll (P) | <input type="checkbox"/> Cutbank (X) | <input type="checkbox"/> Graben (7) |

Describe: The site is located within the floodplain of Pace Creek drainage

*33. Onsite Depositional Context

- | | | | |
|---|---|---|--|
| <input type="checkbox"/> Fan (A) | <input type="checkbox"/> Outcrop (Q) | <input type="checkbox"/> Moraine (J) | <input type="checkbox"/> Desert Pavement (P) |
| <input type="checkbox"/> Talus (B) | <input type="checkbox"/> Extinct Lake (F) | <input checked="" type="checkbox"/> Flood Plain (K) | <input type="checkbox"/> Stream Bed (R) |
| <input type="checkbox"/> Dune (C) | <input type="checkbox"/> Extant Lake (G) | <input type="checkbox"/> Marsh (L) | <input type="checkbox"/> Aeolian (S) |
| <input type="checkbox"/> Stream Terrace (D) | <input type="checkbox"/> Alluvial Plain (H) | <input type="checkbox"/> Landslide/Slump (M) | <input type="checkbox"/> None (T) |
| <input type="checkbox"/> Playa (E) | <input type="checkbox"/> Colluvium (I) | <input type="checkbox"/> Delta (N) | <input type="checkbox"/> Residual (U) |

Description of Soil: Tan sandy loams

34. Vegetation

a. Life Zone

- Arctic-Alpine(A) Hudsonian(B) Canadian(C) Transitional(D) Upper Sonoran(E) Lower Sonoran(F)

b. Community

Primary Onsite: Q

Secondary Onsite: H

Surrounding Site: G

- | | | | |
|--------------------|-----------------------------|-------------------------|--------------------|
| Aspen (A) | Other/Mixed Conifer (G) | Grassland/Steppe(M) | Marsh/Swamp(S) |
| Spruce/Fir (B) | Pinyon-Juniper Woodland (H) | Desert Lake Shore (N) | Lake/Reservoir (T) |
| Douglas Fir (C) | Wet Meadow (I) | Shadscale Community (O) | Agricultural (U) |
| Alpine Tundra (D) | Dry Meadow (J) | Tall Sagebrush (P) | Blackbrush (V) |
| Ponderosa Pine (E) | Oak-Maple Shrub (K) | Low Sagebrush (Q) | Creosote Brush (Y) |
| Lodgepole Pine (F) | Riparian (L) | Barren (R) | |

Describe: Regrowth grasses and sagebrush surrounded by PJ & Pine

*35. Miscellaneous Text:

36. Comments/Continuations:

Part C - Historic Sites

Site No: 42CB292

Temp No:

1. Site Type: Snow Mine site

2. Historic Theme(s): Mining

CULTURAL AFFILIATION	DATING METHOD	CULTURAL AFFILIATION	DATING METHOD
3. Culture: Euro-American	Cross Dating		

Describe: Historic Research

4. Oldest Date: 1900's

Recent Date: 1940s

How Determined: Original site form

5. Site Dimensions: 30 m X 50 m Area: 1,500 sq m

6. Surface Collections Method None (A) Designed Sample (C)
 Grab Sample (B) Complete Collection (D)

Sampling Method:

7. Estimated Depth of Cultural Fill Surface (A) 20-100 cm (C) Fill noted but unknown (E)
 0-20 cm (B) 100 cm + (D) Depth suspected, but not tested (F)

How Estimated:

(If tested, show location of site map)

8. Excavation Status Excavated (A) Tested (B) Unexcavated (C)

Testing Method:

9. Summary of Artifacts and Debris

<input type="checkbox"/> Glass (GL)	<input type="checkbox"/> Bone (BO)	<input type="checkbox"/> Leather (LE)	<input type="checkbox"/> Ammunition (AM)	<input type="checkbox"/> Domestic Items (DI)
<input type="checkbox"/> Metal (ME)	<input type="checkbox"/> Ceramics(CS)	<input type="checkbox"/> Wire (WI)	<input checked="" type="checkbox"/> Wood (WD)	<input type="checkbox"/> Kitchen Utensils (KU)
<input type="checkbox"/> Nails (NC,NW)	<input type="checkbox"/> Fabric (FA)	<input type="checkbox"/> Tin Cans	<input type="checkbox"/> Rubber (RB)	<input type="checkbox"/> Car/Car Parts (CR)

Describe: There is a closed mine portal, retaining wall, destroyed coal loadout and two dugout coal loaders. Other than recent trash no artifacts were observed.

10. Ceramic Artifacts: Paste Glaze/Slip Decoration Pattern Vessel Form(s) #

a. Estimated Number of Ceramic Trademarks: 0

Describe:

Part C - Historic Sites

Site No. 42CB292

Temp No.

11. Glass: # Manufacture Color Function Trademarks Decoration

Describe:

12. Maximum Density - #/sq m (glass and ceramics):

13. Tin Cans

Type	Opening	Size	Modified	Label/Mark	Function
------	---------	------	----------	------------	----------

Describe:

14. Landscape and Constructed Features (locate on site map)

- | | | | |
|---|---|--|---|
| <input type="checkbox"/> Trail/Road (TR) | <input type="checkbox"/> Dump (DU) | <input type="checkbox"/> Dam, Earthen (DA) | <input type="checkbox"/> Hearth/Campfire (HE) |
| <input checked="" type="checkbox"/> Tailings (MT, ML) | <input type="checkbox"/> Depression (DE) | <input type="checkbox"/> Ditch (DI) | <input type="checkbox"/> Quarry (QU) |
| <input type="checkbox"/> Rock Alignment (RA) | <input type="checkbox"/> Cemetery/Burial (CB) | <input type="checkbox"/> Inscriptions (IN) | <input type="checkbox"/> Other (OT) |

Describe: Mine tailings spread throughout site

15. Buildings and Structures (locate on site map)

#	Material	Type	#	Material	Type
2	Earthen/subterranean (I)	Dugouts (AK)	1	Wooden	Coal Loadout (BE)
1	Dry laid stone	Wall (BG)	1	Stone	Adit

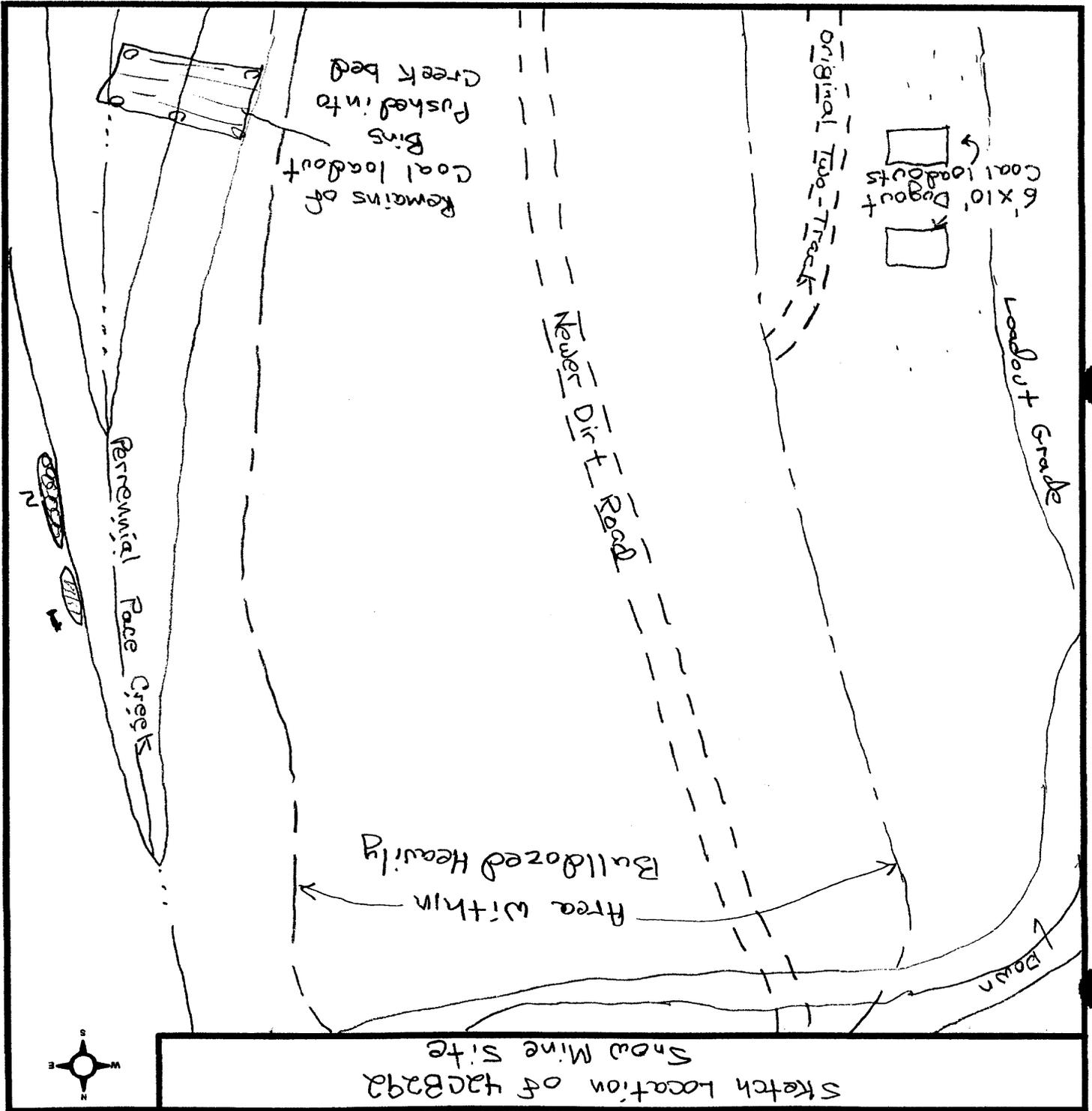
Describe: Two 6' x 10' dugouts used as coal loadouts. One wooden coal loadout, which has been partially destroyed measuring roughly 60 x 20 x 10 feet before demolition.

16. Comments/Continuations - Please make note of any Historic Record searches performed (for example - County Records, General Land Office, Historical Society, Land Management Agency Records, Oral Histories/Interviews)



- 1. Closed Mine Adit
- 2. Dry laid stone (Erosion Control) wall

No Scale



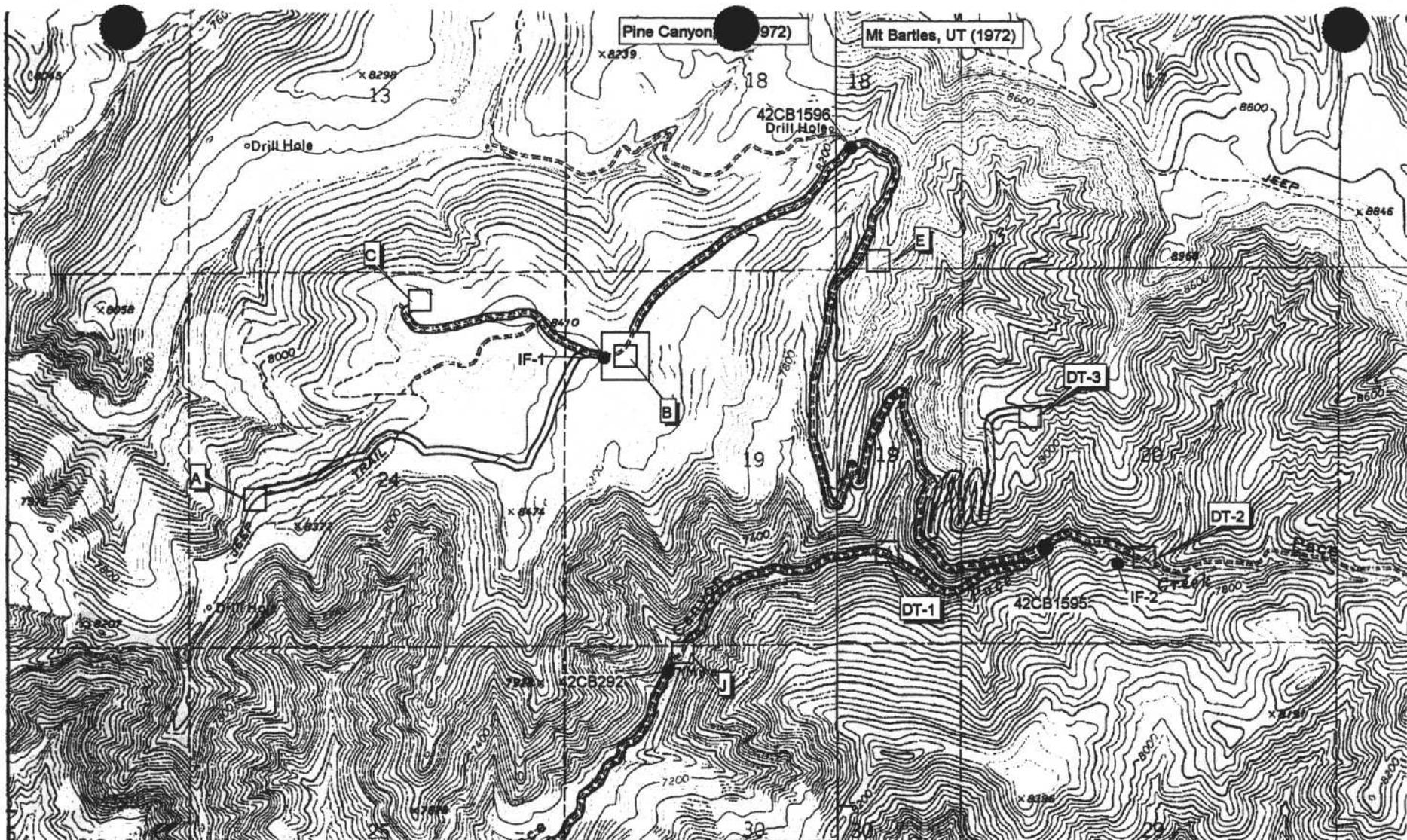
42CB292



View Northeast over Demolished center of site



View Southeast of destroyed Loadout



SENCO-PHENIX



Scale 1:24000
1"=2,000'

- | | |
|---|------------------|
|  | Previous Survey |
|  | Current Survey |
|  | Eligible Sites |
|  | Ineligible Sites |

Drill Holes and Access Roads
Dugout Mine of Canyon Fuel Company, LLC
Sections 18, 19, 20, 30, T13S, R13E
Section 24, T13S, R12E
June 2001
SPUT- 387

IMACS SITE FORM

Part A - Administrative Data

INTERMOUNTAIN ANTIQUITIES COMPUTER SYSTEM

Form approved for use by:

BLM - Utah, Idaho, Wyoming, Nevada

Division of State History - Utah, Wyoming

USFS - Intermountain Region

NPS - Utah, Wyoming

*1. State No. 42CB1595

*2. Agency No.

*3. Temp. No.

County Carbon

4. State: Utah

5. Project: Dugout Drill Hole Series

*6. Report No: U01SC240bp

7. Site Name / Property Name:

8. Class Prehistoric Historic Paleontologic Ethnographic

9. Site Type: Historic Cabin

*10. Elevation: 7020 ft..

*11. UTM Grid Zone: 12 543771 m E 4391790 m N

*12. SE of SE 1/4 of NW 1/4 of SW 1/4 Section: 20 T.13S R.13E

*13. Meridian: SLC

*14. Map Reference: Mount Bartles, Utah (1972)

15. Aerial Photo:

16. Location and Access: From Wellington, Utah travel east on Highway 6 for ca. 7 miles. Turn left onto Pace Canyon road. Follow the improved dirt road northerly ca. 4.5 miles to northwesterly tending dirt road. Follow that road northwesterly ca. 2.2 miles to cabin site. Locked gate at 1 mile on last road.

*17. Land Owner: Private

*18. Federal Administrative Units:

*19. Location of Curated Materials:

20. Site Description: The site is a wood frame and sided one room cabin adjacent to a log foundation under a pile of trash that is predominantly lumber and boards that have been removed from the cabin. The cabin is made of two by four wood framing covered by two courses of slanted cut wood with variable size boards ranging in size from one by four to one by sixteen inches. The two courses of wood were separated by tarpaper. The roof is wood boards covered by asphalt strip roofing. There is an aluminum flashing for a stovepipe in the cabin and part of a pipe in the adjacent debris. The structure measures 13' 3" x 7' 4 3/4" and stands 6' 2" tall. The interior of the cabin is 6' from floor to ceiling. The door opening is 2' 5" x 5' 10" with two windows on the east and west ends measuring 2' 9" high by 1' 2" wide. The cabin has no foundation and appears to be of the same size as the adjacent log foundation. The cabin may have been moved off the foundation. There are a few fragments of clear glass that may have been windows at one point. The adjacent trash pile is predominantly lumber from the cabin. The only datable artifact is a steel full size railroad rail embossed with "BS BO Steelton 1948." There is no domestic refuse at the site except for a metal cot and bedspring inside the cabin. Robert Hackney hunted this area in the early 1950s and stated that the roads at that time stopped at the mine.

*21. Site Condition Excellent (A) Good (B) Fair (C) Poor (D)

*22. Impact Agent(s): Construction

*23. National Register Status Significant (C) Non-Significant (D) Unevaluated (Z)

Justify: The site has no further information potential and is probably less than 50 years old.

24. Photos: 00CB1595: 1-4

25. Recorded by: John Senulis

*26. Survey Organization: SENCO-PHENIX

28. Survey Date: 6-5-2001

27. Assisting Crew Members: Jeanne Senulis, Brett & Lee Richman, Robert Hackney

List of Attachments: Part B Topo Map Photos Continuation Sheets
 Part C Site Sketch Artifact/Feature Sketch
 Part E Other

*Encoded data items

Part A - Environmental Data

*29. **Slope:** 01 (Degrees) 175 **Aspect:** (Degrees) **Site No:** 42CB1595
 *30. **Distance to Permanent Water** 0 x 100 meters
Type of Water Source Spring/Seep (A) Stream/River (B) Lake (C) Other (D)
Name of Water Source: Pace Creek

*31. **Geographic Unit:** CAC Mancos Shale Lowlands

*32. **Topographic Location**

PRIMARY LANDFORM

SECONDARY LANDFORM

- | | | | | |
|--|---|--|---|---|
| <input type="checkbox"/> Mountain Spine (A) | <input type="checkbox"/> Alluvial Fan (A) | <input type="checkbox"/> Dune (I) | <input type="checkbox"/> Slope (Q) | <input type="checkbox"/> Riser (Y) |
| <input type="checkbox"/> Hill (B) | <input type="checkbox"/> Alcove/Rockshelter (B) | <input type="checkbox"/> Floodplain (J) | <input checked="" type="checkbox"/> Terrace/Bench (R) | <input type="checkbox"/> Multiple Landforms (1) |
| <input type="checkbox"/> Tableland/Mesa (C) | <input type="checkbox"/> Arroyo (C) | <input type="checkbox"/> Ledge (K) | <input type="checkbox"/> Talus Slope (S) | <input type="checkbox"/> Bar (2) |
| <input type="checkbox"/> Ridge (D) | <input type="checkbox"/> Basin (D) | <input type="checkbox"/> Mesa/Butte (L) | <input type="checkbox"/> Island (T) | <input type="checkbox"/> Lagoon (3) |
| <input checked="" type="checkbox"/> Valley (E) | <input type="checkbox"/> Cave (E) | <input type="checkbox"/> Playa (M) | <input type="checkbox"/> Outcrop (U) | <input type="checkbox"/> Ephemeral Wash (4) |
| <input type="checkbox"/> Plain (F) | <input type="checkbox"/> Cliff (F) | <input type="checkbox"/> Port. Geo. (N) | <input type="checkbox"/> Spring Mound/Bog (V) | <input type="checkbox"/> Kipuka (5) |
| <input type="checkbox"/> Canyon (G) | <input type="checkbox"/> Delta (G) | <input type="checkbox"/> Plain (O) | <input type="checkbox"/> Valley (W) | <input type="checkbox"/> Saddle/Pass (6) |
| <input type="checkbox"/> Island (H) | <input type="checkbox"/> Detached Monolith (H) | <input type="checkbox"/> Ridge/Knoll (P) | <input type="checkbox"/> Cutbank (X) | <input type="checkbox"/> Graben (7) |

Describe: The site is located on a bench above Pace Creek drainage

*33. **Onsite Depositional Context**

- | | | | |
|---|--|--|--|
| <input type="checkbox"/> Fan (A) | <input type="checkbox"/> Outcrop (Q) | <input type="checkbox"/> Moraine (J) | <input type="checkbox"/> Desert Pavement (P) |
| <input type="checkbox"/> Talus (B) | <input type="checkbox"/> Extinct Lake (F) | <input type="checkbox"/> Flood Plain (K) | <input type="checkbox"/> Stream Bed (R) |
| <input type="checkbox"/> Dune (C) | <input type="checkbox"/> Extant Lake (G) | <input type="checkbox"/> Marsh (L) | <input type="checkbox"/> Aeolian (S) |
| <input type="checkbox"/> Stream Terrace (D) | <input checked="" type="checkbox"/> Alluvial Plain (H) | <input type="checkbox"/> Landslide/Slump (M) | <input type="checkbox"/> None (T) |
| <input type="checkbox"/> Playa (E) | <input type="checkbox"/> Colluvium (I) | <input type="checkbox"/> Delta (N) | <input type="checkbox"/> Residual (U) |

Description of Soil: Tan sandy loams

34. **Vegetation**

a. **Life Zone**

- Arctic-Alpine(A) Hudsonian(B) Canadian(C) Transitional(D) Upper Sonoran(E) Lower Sonoran(F)

b. **Community**

Primary Onsite: Q

Secondary Onsite: H

Surrounding Site: G

- | | | | |
|--------------------|-----------------------------|-------------------------|--------------------|
| Aspen (A) | Other/Mixed Conifer (G) | Grassland/Steppe(M) | Marsh/Swamp(S) |
| Spruce/Fir (B) | Pinyon-Juniper Woodland (H) | Desert Lake Shore (N) | Lake/Reservoir (T) |
| Douglas Fir (C) | Wet Meadow (I) | Shadscale Community (O) | Agricultural (U) |
| Alpine Tundra (D) | Dry Meadow (J) | Tall Sagebrush (P) | Blackbrush (V) |
| Ponderosa Pine (E) | Oak-Maple Shrub (K) | Low Sagebrush (Q) | Creosote Brush (Y) |
| Lodgepole Pine (F) | Riparian (L) | Barren (R) | |

Describe: Sagebrush and grasses surrounded by PJ & Pine

*35. **Miscellaneous Text:**

36. **Comments/Continuations:**

Part C - Historic Sites

Site No. 42CB1595
Temp No.

Glass:	#	Manufacture	Color	Function	Trademarks	Decoration
--------	---	-------------	-------	----------	------------	------------

Describe:

12. Maximum Density - #/sq m (glass and ceramics):

13. Tin Cans

Type	Opening	Size	Modified	Label/Mark	Function
------	---------	------	----------	------------	----------

Describe:

14. Landscape and Constructed Features (locate on site map)

- | | | | |
|--|---|--|---|
| <input type="checkbox"/> Trail/Road (TR) | <input type="checkbox"/> Dump (DU) | <input type="checkbox"/> Dam, Earthen (DA) | <input type="checkbox"/> Hearth/Campfire (HE) |
| <input type="checkbox"/> Tailings (MT, ML) | <input type="checkbox"/> Depression (DE) | <input type="checkbox"/> Ditch (DI) | <input type="checkbox"/> Quarry (QU) |
| <input type="checkbox"/> Rock Alignment (RA) | <input type="checkbox"/> Cemetery/Burial (CB) | <input type="checkbox"/> Inscriptions (IN) | <input type="checkbox"/> Other (OT) |

Describe:

15. Buildings and Structures (locate on site map)

#	Material	Type	#	Material	Type
1	Frame (K)	Single room structure	1	Log (P)	Foundation (BY)

Describe: The site is a wood frame and sided one room cabin adjacent to a log foundation under a pile of trash that is predominantly lumber and boards that have been removed from the cabin. The cabin is made of two by four wood framing covered by two courses of slanted cut wood with variable size boards ranging in size from one by four to one by sixteen inches. The two courses of wood were separated by tarpaper. The roof is wood boards covered by asphalt strip roofing. There is an aluminum flashing for a stovepipe inside the cabin and part of a pipe in the adjacent debris. The structure measures 13' 3" x 7' 4 3/4" and stands 6' 2" tall. The interior of the cabin is 6' from floor to ceiling. The door opening is 2' 5" x 5' 10" with two windows on the east and west ends measuring 2' 9" high by 1' 2" wide. The cabin has no foundation and appears to be of the same size as the adjacent log foundation.

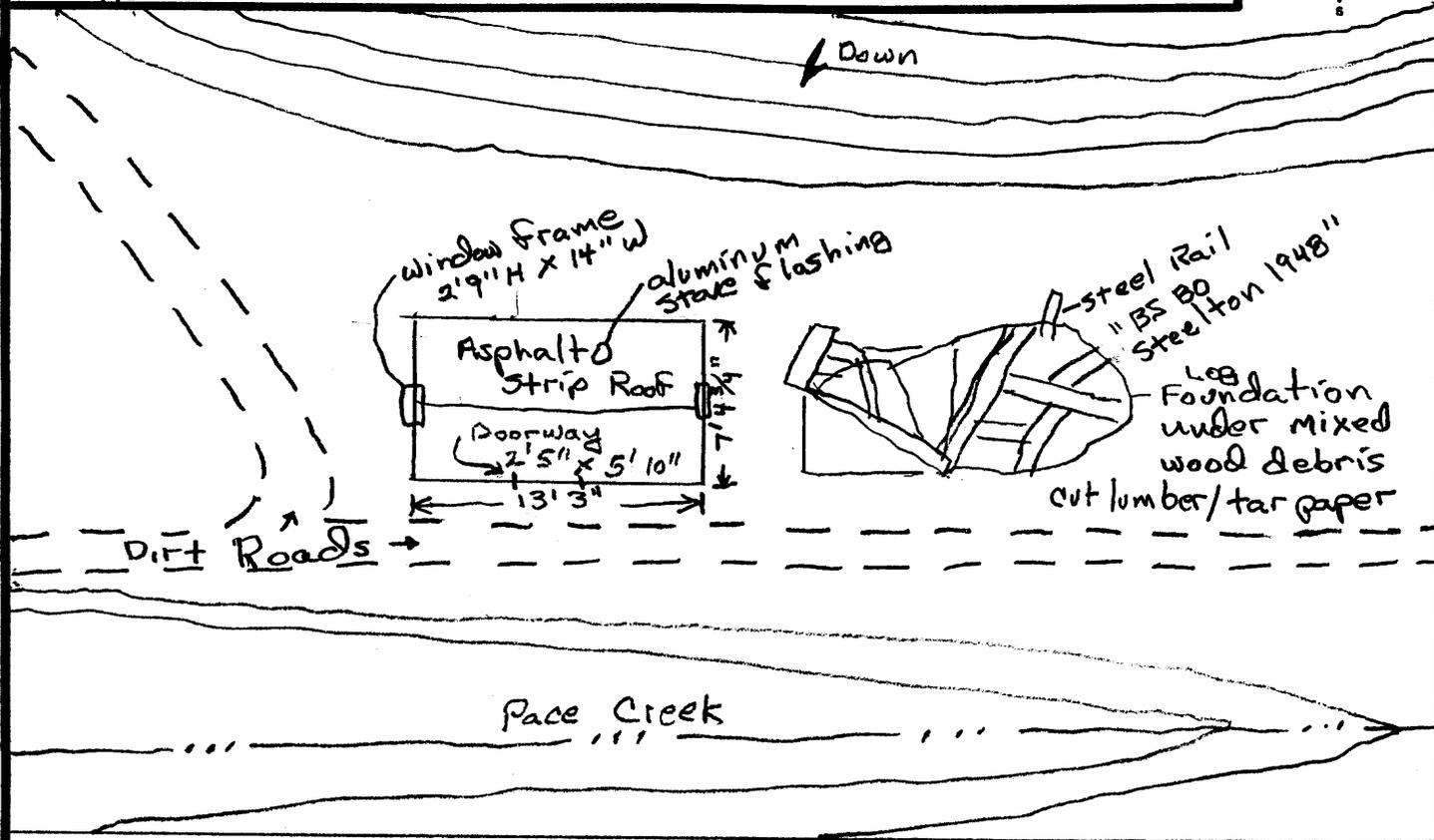
16. Comments/Continuations - Please make note of any Historic Record searches performed (for example - County Records, General Land Office, Historical Society, Land Management Agency Records, Oral Histories/Interviews)

Sketch Location of 42CB1595 Cabin

No scale



Down



Tarpaper between layers

Exterior

Front Elevation

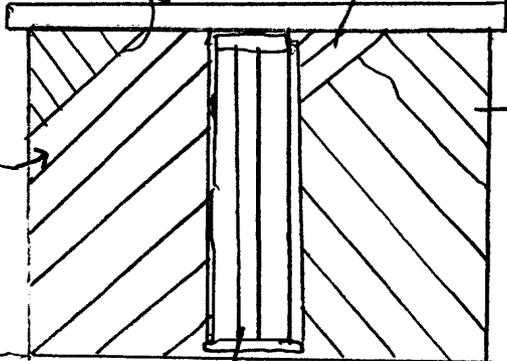
variable size

cut wood

1" x 6" 1 x 12"

1 x 14"

cut wire nails
varying sizes



Trash over Foundation

2x4 Frame Support
interior 6' floor to ceiling

No scale

Interior

variable width cut wood floor
one metal 6' x 3' cot
one twin bedspring

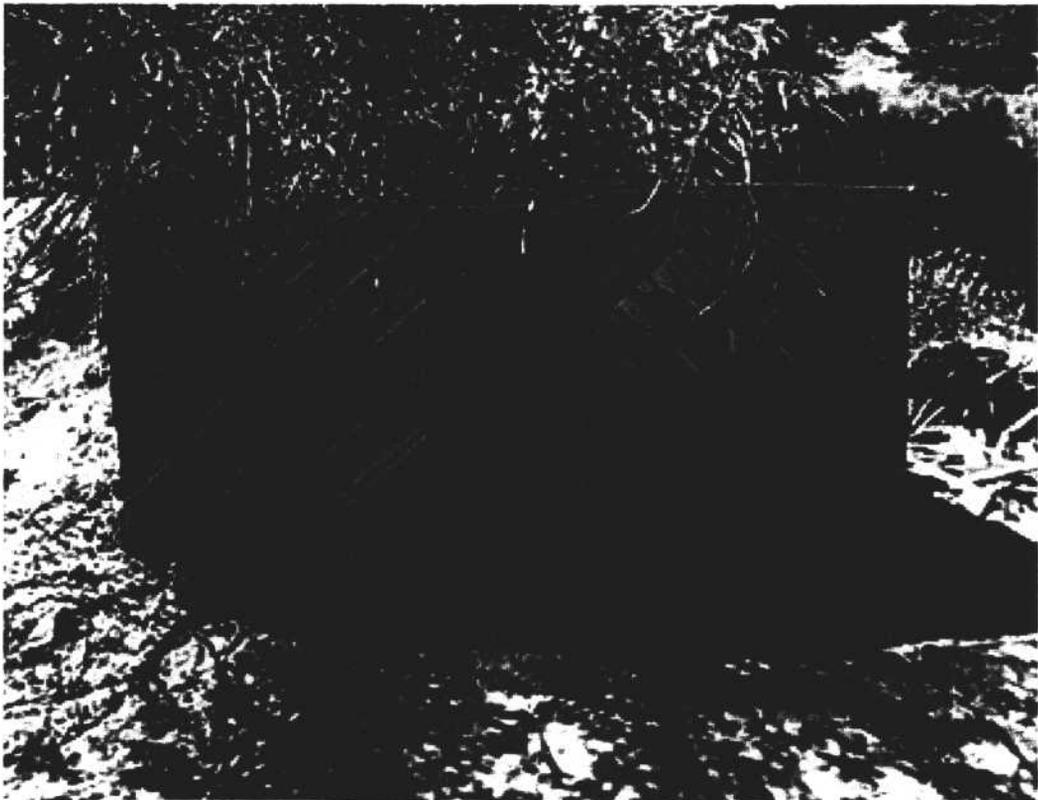


SENCO-PHENIX

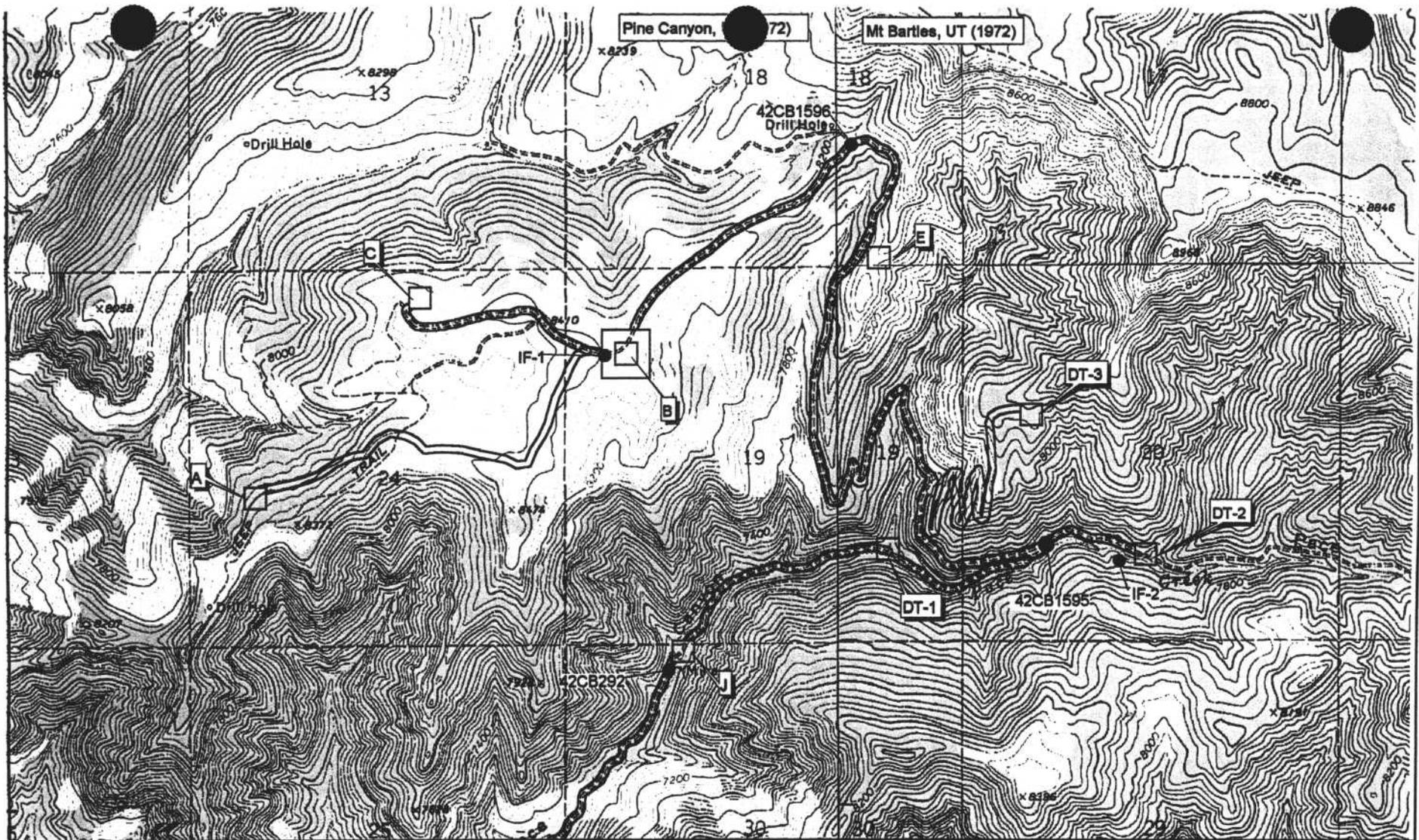
42CB1595



View Northwest over Site



View North over Site



SENCO-PHENIX



Scale 1:24000
1"=2,000'

-  Previous Survey
-  Current Survey
-  Eligible Sites
-  Ineligible Sites

Drill Holes and Access Roads
 Dugout Mine of Canyon Fuel Company, LLC
 Sections 18, 19, 20, 30, T13S, R13E
 Section 24, T13S, R12E
 June 2001
 SPUT- 387

IMACS SITE FORM

Part A - Administrative Data

INTERMOUNTAIN ANTIQUITIES COMPUTER SYSTEM

Form approved for use by:

BLM - Utah, Idaho, Wyoming, Nevada

Division of State History - Utah, Wyoming

USFS - Intermountain Region

NPS - Utah, Wyoming

*1. State No. 42CB1596

*2. Agency No.

*3. Temp. No.

County Carbon

4. State: Utah

5. Project: Dugout Drill Hole Series

*6. Report No: U01SC240bp

7. Site Name / Property Name:

8. Class Prehistoric Historic Paleontologic Ethnographic

9. Site Type: Historic Corral & Aspen Carvings

*10. Elevation: 8180 ft..

*11. UTM Grid Zone: 12 542935 m E 4393487 m N

*12. NE of SE 1/4 of NW 1/4 of SE 1/4 Section: 18 T.13S R.13E

*13. Meridian: SLC

*14. Map Reference: Mount Bartles, Utah (1972)

15. Aerial Photo:

16. Location and Access: From Wellington, Utah travel east on Highway 6 for ca. 7 miles. Turn left onto Pace Canyon road. Follow the improved dirt road northerly ca. 4.5 miles to northwesterly tending dirt road. Follow that road northwesterly ca. 2.2 miles to road juncture. Take side hill road up mountain to north for ca. 2.4 miles to road juncture. Site is in southwest part of juncture.

*17. Land Owner: Private

*18. Federal Administrative Units:

*19. Location of Curated Materials:

20. Site Description: The site is an old deteriorating corral with some Aspen carvings and a small trash pile. The corral is a post, wire and twine structure that has been rebuilt many times. It is about 20 feet in diameter. There is a small trash scatter across the road. The trash scatter is metal fragments, one hole in top can and recent (30 years) trash, i.e. aluminum cans etc. The Aspen carvings are "JB JB JB, May 14, Martin Davin, 1933, 7-30-67, Jim Hanna, Don PavdVlton (hard to read), Jim Hanna + Kayla Merrill." Most of the Aspen carvings cannot be read.

*21. Site Condition Excellent (A) Good (B) Fair (C) Poor (D)

*22. Impact Agent(s): Erosion

*23. National Register Status Significant (C) Non-Significant (D) Unevaluated (Z)

Justify: The site has no further information potential and parts are less than 50 years old.

24. Photos: Did not turn out-none

25. Recorded by: John Senulis

*26. Survey Organization: SENCO-PHENIX

28. Survey Date: 6-5-2001

27. Assisting Crew Members: Jeanne Senulis, Brett & Lee Richman, Robert Hackney

List of Attachments: Part B Topo Map Photos Continuation Sheets
 Part C Site Sketch Artifact/Feature Sketch
 Part E Other

*Encoded data items

Part A - Environmental Data

*29. Slope: 01 (Degrees) Aspect: 125 (Degrees) Site No: 42CB1596
 *30. Distance to Permanent Water 20 x 100 meters
 Type of Water Source Spring/Seep (A) Stream/River (B) Lake (C) Other (D)
 Name of Water Source: Pace Creek

*31. Geographic Unit: CAC Mancos Shale Lowlands

*32. Topographic Location

PRIMARY LANDFORM

SECONDARY LANDFORM

- | | | | | |
|--|---|---|---|---|
| <input type="checkbox"/> Mountain Spine (A) | <input type="checkbox"/> Alluvial Fan (A) | <input type="checkbox"/> Dune (I) | <input type="checkbox"/> Slope (Q) | <input type="checkbox"/> Riser (Y) |
| <input type="checkbox"/> Hill (B) | <input type="checkbox"/> Alcove/Rockshelter (B) | <input type="checkbox"/> Floodplain (J) | <input checked="" type="checkbox"/> Terrace/Bench (R) | <input type="checkbox"/> Multiple Landforms (1) |
| <input checked="" type="checkbox"/> Tableland/Mesa (C) | <input type="checkbox"/> Arroyo (C) | <input type="checkbox"/> Ledge (K) | <input type="checkbox"/> Talus Slope (S) | <input type="checkbox"/> Bar (2) |
| <input type="checkbox"/> Ridge (D) | <input type="checkbox"/> Basin (D) | <input type="checkbox"/> Mesa/Butte (L) | <input type="checkbox"/> Island (T) | <input type="checkbox"/> Lagoon (3) |
| <input type="checkbox"/> Valley (E) | <input type="checkbox"/> Cave (E) | <input type="checkbox"/> Playa (M) | <input type="checkbox"/> Outcrop (U) | <input type="checkbox"/> Ephemeral Wash (4) |
| <input type="checkbox"/> Plain (F) | <input type="checkbox"/> Cliff (F) | <input type="checkbox"/> Port.Geo.(N) | <input type="checkbox"/> Spring Mound/Bog (V) | <input type="checkbox"/> Kipuka (5) |
| <input type="checkbox"/> Canyon (G) | <input type="checkbox"/> Delta (G) | <input type="checkbox"/> Plain (O) | <input type="checkbox"/> Valley (W) | <input type="checkbox"/> Saddle/Pass (6) |
| <input type="checkbox"/> Island (H) | <input type="checkbox"/> Detached Monolith (H) | <input type="checkbox"/> Ridge/Knoll(P) | <input type="checkbox"/> Cutbank (X) | <input type="checkbox"/> Graben (7) |

Describe: The site is located on a broad bench above Pace Creek drainage

*33. Onsite Depositional Context

- | | | | |
|---|--|--|--|
| <input type="checkbox"/> Fan (A) | <input type="checkbox"/> Outcrop (Q) | <input type="checkbox"/> Moraine (J) | <input type="checkbox"/> Desert Pavement (P) |
| <input type="checkbox"/> Talus (B) | <input type="checkbox"/> Extinct Lake (F) | <input type="checkbox"/> Flood Plain (K) | <input type="checkbox"/> Stream Bed (R) |
| <input type="checkbox"/> Dune (C) | <input type="checkbox"/> Extant Lake (G) | <input type="checkbox"/> Marsh (L) | <input type="checkbox"/> Aeolian (S) |
| <input type="checkbox"/> Stream Terrace (D) | <input checked="" type="checkbox"/> Alluvial Plain (H) | <input type="checkbox"/> Landslide/Slump (M) | <input type="checkbox"/> None (T) |
| <input type="checkbox"/> Playa (E) | <input type="checkbox"/> Colluvium (I) | <input type="checkbox"/> Delta (N) | <input type="checkbox"/> Residual (U) |

Description of Soil: Tan sandy loams

*34. Vegetation

a. Life Zone

- Arctic-Alpine(A) Hudsonian(B) Canadian(C) Transitional(D) Upper Sonoran(E) Lower Sonoran(F)

b. Community

Primary Onsite: A

Secondary Onsite: H

Surrounding Site: G

- | | | | |
|--------------------|-----------------------------|-------------------------|--------------------|
| Aspen (A) | Other/Mixed Conifer (G) | Grassland/Steppe(M) | Marsh/Swamp(S) |
| Spruce/Fir (B) | Pinyon-Juniper Woodland (H) | Desert Lake Shore (N) | Lake/Reservoir (T) |
| Douglas Fir (C) | Wet Meadow (I) | Shadscale Community (O) | Agricultural (U) |
| Alpine Tundra (D) | Dry Meadow (J) | Tall Sagebrush (P) | Blackbrush (V) |
| Ponderosa Pine (E) | Oak-Maple Shrub (K) | Low Sagebrush (Q) | Creosote Brush (Y) |
| Lodgepole Pine (F) | Riparian (L) | Barren (R) | |

Describe: Aspen grove with sagebrush and grasses surrounded by PJ & Pine

*35. Miscellaneous Text:

36. Comments/Continuations:

Part C - Historic Sites

Site No: 42CB1596

Temp No:

1. Site Type: Corral and Aspen carvings

2. Historic Theme(s): Farming Ranching

CULTURAL AFFILIATION	DATING METHOD	CULTURAL AFFILIATION	DATING METHOD
3. Culture: Euro-American	Cross Dating		

Describe: carving dates

4. Oldest Date: 1930's

Recent Date: 1990s

How Determined: carvings, artifacts

5. Site Dimensions: 30 m X 20 m Area: 600 sq m

6. Surface Collections Method None (A) Designed Sample (C)
 Grab Sample (B) Complete Collection (D)

Sampling Method:

7. Estimated Depth of Cultural Fill Surface (A) 20-100 cm (C) Fill noted but unknown (E)
 0-20 cm (B) 100 cm + (D) Depth suspected, but not tested (F)

How Estimated:

(If tested, show location of site map)

8. Excavation Status Excavated (A) Tested (B) Unexcavated (C)

Testing Method:

9. Summary of Artifacts and Debris

<input checked="" type="checkbox"/> Glass (GL)	<input type="checkbox"/> Bone (BO)	<input type="checkbox"/> Leather (LE)	<input type="checkbox"/> Ammunition (AM)	<input type="checkbox"/> Domestic Items (DI)
<input checked="" type="checkbox"/> Metal (ME)	<input type="checkbox"/> Ceramics (CS)	<input checked="" type="checkbox"/> Wire (WI)	<input checked="" type="checkbox"/> Wood (WD)	<input type="checkbox"/> Kitchen Utensils (KU)
<input checked="" type="checkbox"/> Nails (NC,NW)	<input type="checkbox"/> Fabric (FA)	<input checked="" type="checkbox"/> Tin Cans	<input type="checkbox"/> Rubber (RB)	<input type="checkbox"/> Car/Car Parts (CR)

Describe: The corral is a post, wire and twine structure that has been rebuilt many times. It is about 20 feet in diameter. There is a small trash scatter across the road. The trash scatter is metal fragments, one hole in top can and recent (30 years) trash, i.e. aluminum cans etc. The Aspen carvings are "JB JB JB, May 14, Martin Davin, 1933, 7-30-67, Jim Hanna, Don PavdVlton (hard to read), Jim Hanna + Kayla Merrill." Most of the Aspen carvings can not be read

10. Ceramic Artifacts:	Paste	Glaze/Slip	Decoration	Pattern	Vessel Form(s)	#
------------------------	-------	------------	------------	---------	----------------	---

a. Estimated Number of Ceramic Trademarks: 0

Describe:

Part C - Historic Sites

Site No. 42CB1596

Temp No.

11. Glass:	#	Manufacture	Color	Function	Trademarks	Decoration
	1	ABS	clear	bottle	none	none
	1	ABS	brown	"	none	none

Describe: Two whole bottles with no markings on base but recent.

12. Maximum Density - #/sq m (glass and ceramics):

13. Tin Cans

Type	Opening	Size	Modified	Label/Mark	Function
Hole in top	cut around	12 oz.	no	no	food?
Aluminum	pull tab	12 oz.	no	no	beer

Describe:

14. Landscape and Constructed Features (locate on site map)

- | | | | |
|--|---|--|---|
| <input type="checkbox"/> Trail/Road (TR) | <input type="checkbox"/> Dump (DU) | <input type="checkbox"/> Dam, Earthen (DA) | <input type="checkbox"/> Hearth/Campfire (HE) |
| <input type="checkbox"/> Tailings (MT, ML) | <input type="checkbox"/> Depression (DE) | <input type="checkbox"/> Ditch (DI) | <input type="checkbox"/> Quarry (QU) |
| <input type="checkbox"/> Rock Alignment (RA) | <input type="checkbox"/> Cemetery/Burial (CB) | <input type="checkbox"/> Inscriptions (IN) | <input type="checkbox"/> Other (OT) |

Describe:

15. Buildings and Structures (locate on site map)

#	Material	Type	#	Material	Type
1	combination	corral			

Describe: Wood post, wire and twine corral about 20 feet in diameter. Rebuilt and patched many times. Still in use today.

16. Comments/Continuations - Please make note of any Historic Record searches performed (for example - County Records, General Land Office, Historical Society, Land Management Agency Records, Oral Histories/Interviews)

1990

IMACS ENCODING FORM

Encoder's Name J SENUKIS

To be completed for each site form.
For instructions and codes, see IMACS Users Guide.

1 State Site Number 2 - Agency Site Number 6 Agency Report Number 10 Elevation

11

<input type="text" value="12"/>	<input type="text" value="542935"/>	<input type="text" value="4393497"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>

 Zone Easting Northing

12

<input type="text" value="SE"/>	<input type="text" value="NW"/>	<input type="text" value="SE"/>	<input type="text" value="18"/>	<input type="text" value="13"/>	<input type="text" value="S"/>	<input type="text" value="13"/>	<input type="text" value="E"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>				
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>				
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>				

 1/4 1/4 1/4 Sec. T. R.

13 Merid. 14 USGS Map 17 Owner

18 Forest Dist./Park 19 Loc. Cur. Materials 21 Cond. 22 Impacts 23 N.R. 26 Organ. 28 - - Survey Date 29 Slope Aspect

30 Water: distance/type 31 Geog. Unit 32 1st 2st Topographic Locatio 33 Dep. 34 1 2 3 Vegetation 35 Misc. Text, Site Name

2 Culture/Dating Method 3 Area 4 Collect 5 Depth 6 Excav. Status 7 Prehistoric Artifacts

8

<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

 Little Tools: # / type 9 # Flaking Stages 11

<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

 Ceramics: #/type 13 Features: # / type 14 Architecture: # / material / type

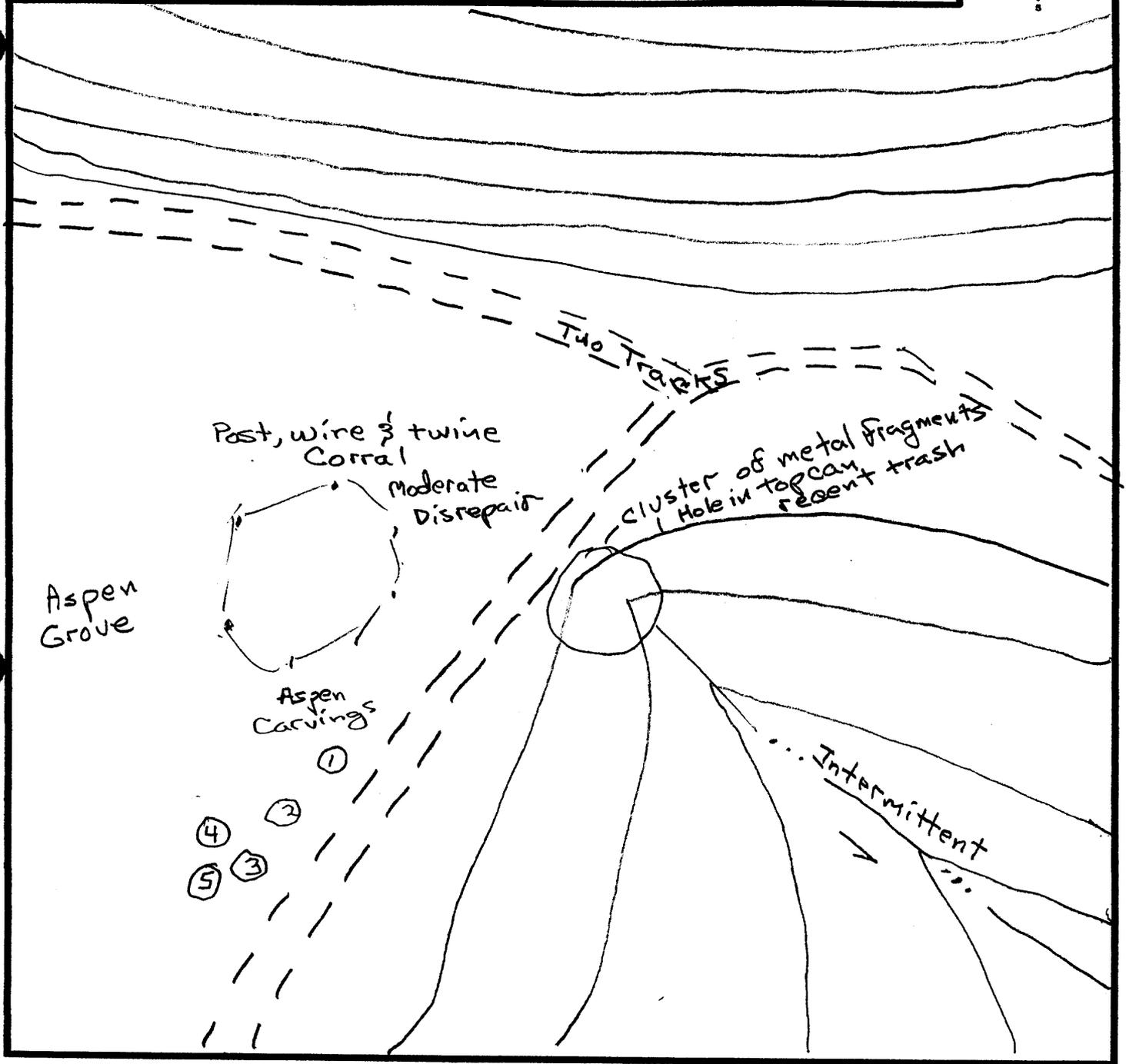
2 Historic Themes 3 Culture/Dating Method 4 Dates 5 Area 6 Collect 7 Depth 8 Excav. Status 9

<input type="text" value="GL"/>	<input type="text" value="WJ"/>	<input type="text"/>
<input type="text" value="ME"/>	<input type="text" value="TC"/>	<input type="text"/>
<input type="text" value="NW"/>	<input type="text" value="WD"/>	<input type="text"/>

 Artifacts

14 Features: # / type 15 Architecture: # / material / type

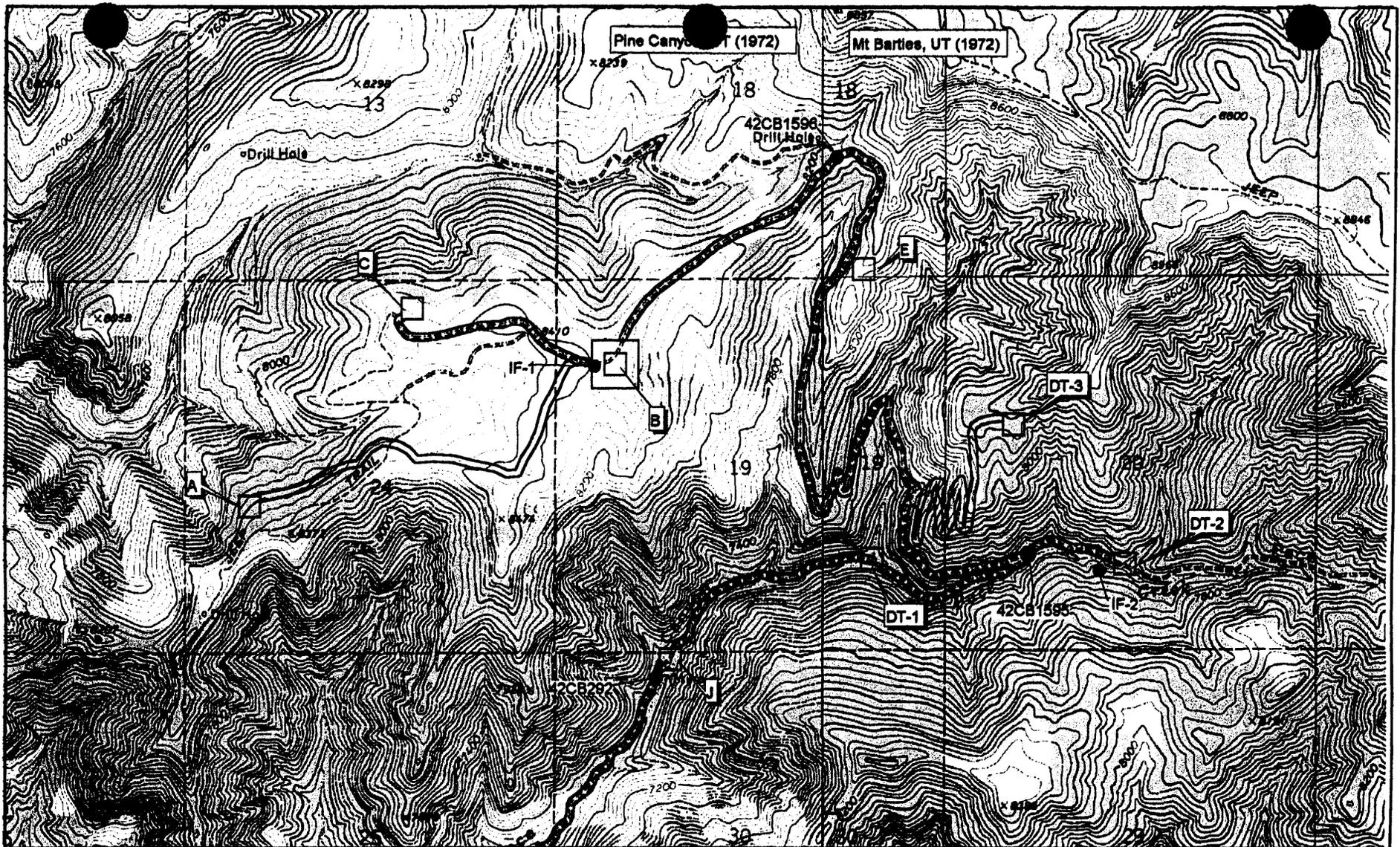
Sketch Location of 42CB1596
Corral



SENCO-PHENIX

Aspen Carvings

1. "JB JB JB"
2. "May 14, Martin Davis, 1933"
3. "7-30-67 Jim Hanna"
4. "Don Pavdilton - hard to read
July 12, 1938"
5. "Jim Hanna + Kayla Merrill"



SENCO-PHENIX



Scale 1:24000
1"=2,000'

- | | |
|---|------------------|
|  | Previous Survey |
|  | Current Survey |
|  | Eligible Sites |
|  | Ineligible Sites |

Drill Holes and Access Roads
 Dugout Mine of Canyon Fuel Company, LLC
 Sections 18, 19, 20, 30, T13S, R13E
 Section 24, T13S, R12E
 June 2001
 SPUT- 387



SENCO-PHENIX

AN INTENSIVE CULTURAL RESOURCE SURVEY AND INVENTORY OF THE 2003 DUGOUT CANYON MINE EXPLORATION DRILL HOLES AND ACCESS ROADS

Private Lands

Carbon County, Utah

PERFORMED FOR
Dugout Canyon Mine of
Canyon Fuel Company, LLC

In Accordance with BLM and
Utah State Guidelines
Antiquities Permit #U03SC477p

SPUT-457
June 24, 2003

John A. Senulis

Direct Charge of Fieldwork

UTAH SHPO

COVER SHEET

Project Name: **AN INTENSIVE CULTURAL RESOURCE SURVEY AND INVENTORY OF THE 2003 DUGOUT CANYON MINE EXPLORATION DRILL HOLES AND ACCESS ROADS**

Dugout Canyon Mine of Canyon Fuels LLC.

State #U031SC0477p

Report Date: June 24, 2003

County (ies): Carbon

Principal Investigator/ Field Supervisor: John A. Senulis/John Senulis

Records Search/Location/Dates: June 6, 2003, Price River Field Office of the BLM

Acreage Surveyed: 376 acres

Intensive Acres: 37

Recon/Intuitive Acres: 0

U.S.G.S. 7.5 Quad: Pine Canyon, Utah (1972), Mount Bartles, Utah (1972)

Sites Reported	Number	Smithsonian Site #(s):
Archeological Sites:	1	42CB1906
Revisit (No IMACS update)	0	
Revisit (IMACS update attch.)	0	
New Sites (IMACS attached)	1	42CB1906
Archeological Site Total:	0	
Historic Structures:		
(USHS Site Form Attached)		
Total NRHP Eligible Sites,	0	

Checklist of Required Items:

1. 1 Copy of Final Report
2. Copy of U.S.G.S. 7.5' map showing surveyed/excavated area
3. Completed IMACS Site Inventory Forms Including
 - Parts A and B or C
 - IMACS Encoding Form
 - Site Sketch Map
 - Photographs
 - Copy of USGS 7.5' Quad with Smithsonian site Number
4. Completed Cover Sheet

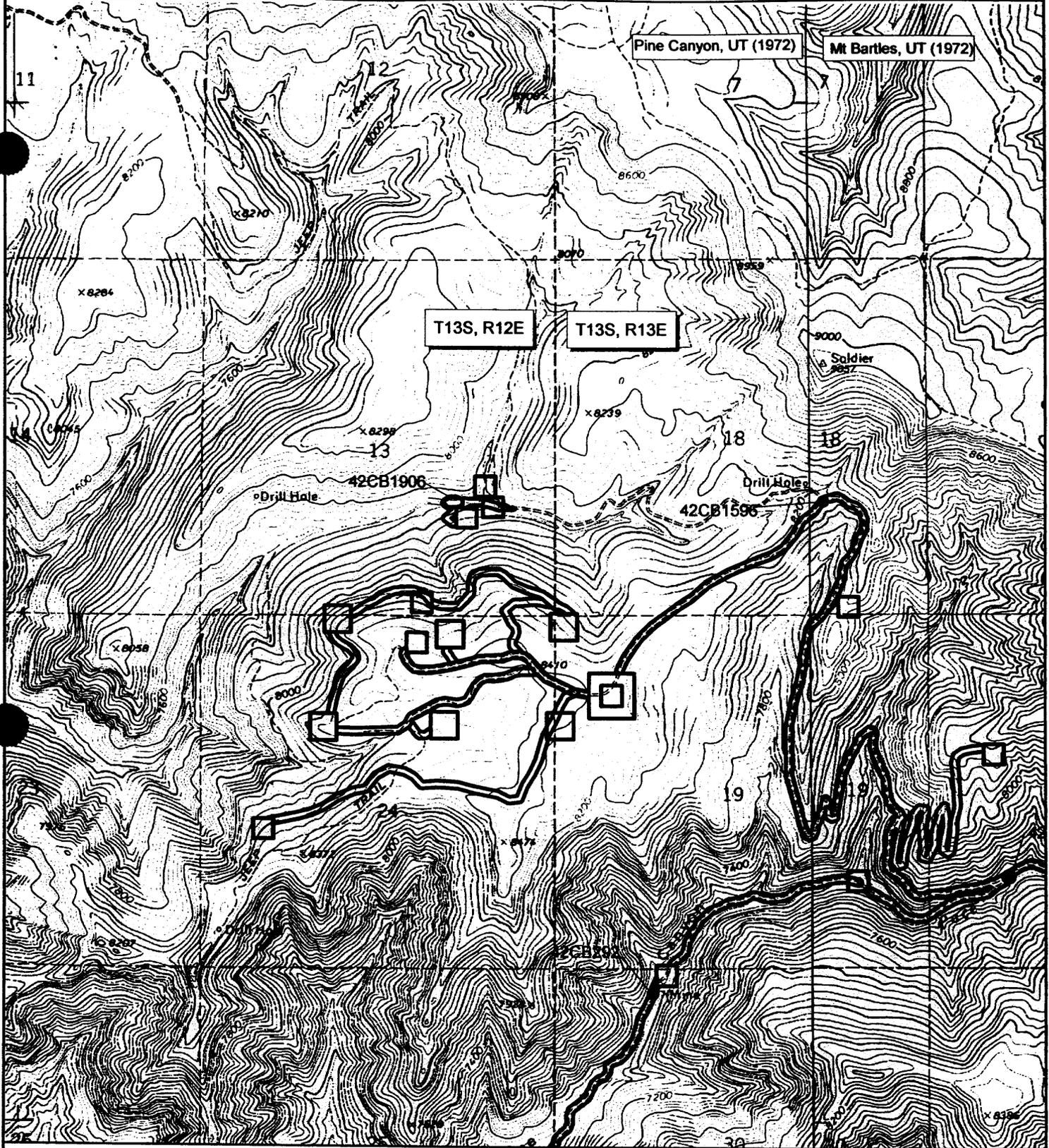
Abstract

SESCO-PHENIX performed an intensive cultural resource survey on four proposed drill holes and connecting access roads for the Dugout Canyon Mine of Canyon Fuel LLC. The proposed drill holes and access roads are located on private land. The purpose of the survey was to identify and evaluate cultural resources that may exist within the project area.

Cultural resources were located in the form of one historic archeological site:

- 42CB1906 The site is a historic sawmill and log corral site. There wasn't a constructed sawmill building, a portable sawmill was set up on the site and then moved when the logging operations were finished. The site is located on the first southern terrace above a tributary of Dugout Creek. There are very few artifacts on the site. The artifacts include 1 flattened and deteriorated sanitary can, 1 sanitary can lid, 2 clear bottle glass fragments, 1 - 10 inch diameter metal pipe - drains under the two-track road, 2 clear bottle glass fragments, 1 vehicle tire, 1 metal plate and the remains of a coal-fired cook stove - white enamel inset on front door - marked with "Cribben & Sexton Co. Chicago". A two-track road passes to the west of the site. There is a bulldozed and burned slash pile to the east of the possible foundations remains. There is a large pile of log trimmings on the terrace edge and continuing down in to the creek bottom - the pile appears to have been burned at some point. There are a number of sandstone rocks, possibly representing the foundation of a line shack. There is no structure present; there is a single piece of lumber - 2x4 - 5 feet in length with 3 round nails in each end. The corral is situated on the north side of the creek in the creek bottom. It currently has three standing sides and is composed of aspen logs, standing aspen trees and wire. There are 3 - 30 foot long logs on the west side, 5 - 30 foot long logs in the middle and 4 - 45 foot long logs on the east sides; the ends have been cribbed. There is smooth wire wrapped around the eastern aspen tree and around some down logs, possibly a gate for the corral. There are 7 logs lying on the ground to the south of the standing corral, along with a ca. 30-foot long 6x6 wooden beam (see structure sketch). The major portion of the site has been removed; there is little potential for further information. The site is not recommended for nomination to the National Register of Historic Places.

No other cultural resources were located and the potential for undetected remains is remote. A finding of no effect is appropriate and archeological clearance without stipulations is recommended.



Pine Canyon, UT (1972)

Mt Bartles, UT (1972)

T13S, R12E

T13S, R13E

42CB1906

42CB1595

11

7

x 8284

x 8270

8600

8900

x 8298

x 8239

9000

Soldier

8837

x 8258

Drill Hole

Drill Hole

19

SENCO-PHENIX



Scale 1:24,000
1" = 2,000'

 Current Survey
 Previous Survey

 Eligible Sites
 Ineligible Sites

Exploration Holes & Access Roads
Dugout Mine of Canyon Fuel, LLC
Carbon County, Utah
Sections 13, T13S, R12E
June 2003
SPUT-457

Project Location

The project consists of four exploration drill holes in Section 13, T13S, R12E. Three of the holes are in the Dugout Creek drainage, while the other is on the mesa above the drainage. In Section 19, T13S, R13E, Carbon County, Utah. Access to the drill holes will mostly follow existing two-track dirt roads that were built to facilitate logging in the general area. A total of 1.7 miles were included in the study area. Seven 400 x 400 foot drill locations were surveyed in Section 24, T13S, R12E, and Sections 19, T13S, R13E. All drill locations were flagged. The proposed project is noted on the enclosed copy of U.S.G.S. Composite 7.5' Quad: Pine Canyon, Utah (1972) and Mount Bartles, Utah (1972).

Environment

The project area in the Dugout Creek drainage is where several permanent branches of Dugout Creek convene. Soils are light tan sandy clay loam with gravels. Vegetation includes a riparian community consisting of cottonwood, aspen, willow, mountain mahogany, serviceberry, rabbitbrush, low sagebrush, grasses and forbs surrounded by mixed conifer forest. The upper project area is a mesa above Dugout Canyon. The mesa is basically sagebrush flat intermixed with pockets of Pinyon-Juniper and stands of Aspen. The understory consists of mountain mahogany, rabbitbrush, ephedra, galleta grass, yucca, and serviceberry.

Previous Research

A file search by the Antiquities Section of the Utah Division of State History on April 25, 2002 updated by John Senulis of SENCO-PHENIX at the Price River Field Office of the BLM on June 6, 2003 revealed that the following projects are reported for the current project area:

- 1980, AERC surveyed several sample blocks in Sections 13 and 24, T13S, R12E and Sections 18, 19 and 30 T13S, R13E. They also surveyed the access road into the Snow Mine site. One archeological site was located:
 - 42CB292 The site was described as "Coal mine located in Pace Canyon consists of one known mine portal which has been closed. Site of historic Snow Mine in Pace Canyon which was active in 1906 but had its primary production period from 1932-1940." The site was relatively pristine at the time and still contained a standing coal loadout and foundation with depth potential. Avoidance was recommended pending further historic research. As noted the site has since been extensively modified.
- 1982, UARC surveyed five drill holes and access roads including the road that connects this part of Dugout Canyon with the mesa above. No cultural resources were located.
- 1983, Metcalf-Zier Archeologists surveyed several access roads and drill locations in Sections 13 and 24, T13S, R12E and Section 19, T13S, R13E. The only cultural resource located was an isolated prehistoric waste flake.
- 2002, SENCO-PHENIX surveyed several drill holes and an extensive series of roads. One cultural resource in the general project area was located.
 - 42CB1596 was a corral and Aspen art site. It was not recommended for nomination to the NRHP.

Methodology

SENCO-PHENIX performed a Class III intensive walkover survey on June 11, 2003. John Senulis directed the field crew consisting of Jeanne Senulis and Cathy Dodt-Ellis. Meandering transects no further spaced than 15 meters were employed for the drill holes. The 300 x 300 foot drill holes were mostly in previously disturbed areas. The access roads were surveyed to a right of way of 30 meters. An exception to this was the area where 42CB1906 was located, which got a broader coverage. Special attention was given to those areas of subsurface soil exposure from animal burrowing and erosion. When the site was located the artifacts were pinflagged and the site was photographed. The sites were plotted using a WAAS enabled GPS unit. The readings were then transferred to the ARCVIEW mapping program as a permanent database.

All field notes and digital photographs are on file at the offices of SENCO-PHENIX in Price, Utah.

Findings and Recommendations

Cultural resources were located in the form of one historic archeological site:

- 42CB1906 The site is a historic sawmill and log corral site. There wasn't a constructed sawmill building, a portable sawmill was set up on the site and then moved when the logging operations were finished. The site is located on the first southern terrace above a tributary of Dugout Creek. There are very few artifacts on the site. The artifacts include 1 flattened and deteriorated sanitary can, 1 sanitary can lid, 2 clear bottle glass fragments, 1 - 10 inch diameter metal pipe - drains under the two-track road, 2 clear bottle glass fragments, 1 vehicle tire, 1 metal plate and the remains of a coal-fired cook stove - white enamel inset on front door - marked with "Cribben & Sexton Co. Chicago". A two-track road passes to the west of the site. There is a bulldozed and burned slash pile to the east of the possible foundations remains. There is a large pile of log trimmings on the terrace edge and continuing down in to the creek bottom - the pile appears to have been burned at some point. There are a number of sandstone rocks, possibly representing the foundation of a line shack. There is no structure present; there is a single piece of lumber - 2x4 - 5 feet in length with 3 round nails in each end. The corral is situated on the north side of the creek in the creek bottom. It currently has three standing sides and is composed of aspen logs, standing aspen trees and wire. There are 3 - 30 foot long logs on the west side, 5 - 30 foot long logs in the middle and 4 - 45 foot long logs on the east sides; the ends have been cribbed. There is smooth wire wrapped around the eastern aspen tree and around some down logs, possibly a gate for the corral. There are 7 logs lying on the ground to the south of the standing corral, along with a ca. 30-foot long 6x6 wooden beam (see structure sketch). The major portion of the site has been removed; there is little potential for further information. The site is not recommended for nomination to the National Register of Historic Places.

No other cultural resources were located and the potential for undetected remains is remote. A finding of no effect is appropriate and archeological clearance without stipulations is recommended.

These recommendations are subject to modification and review by the Utah SHPO.

IMACS SITE FORM

Part A - Administrative Data

INTERMOUNTAIN ANTIQUITIES COMPUTER SYSTEM

Form approved for use by:

LM - Utah, Idaho, Wyoming, Nevada

Division of State History - Utah, Wyoming

USFS - Intermountain Region

NPS - Utah, Wyoming

*1. State No. 42CB1906

*2. Agency No.

*3. Temp. No.

County Carbon

4. State: Utah

5. Project: SPUT- 457

*6. Report No: UT03SC0477

7. Site Name / Property Name:

8. Class Prehistoric Historic Paleontologic Ethnographic

9. Site Type: Historic sawmill/ corral site

*10. Elevation: 7720 feet amsl

*11. UTM Grid Zone: 12 541228-541310 mE 4393487-4393487 mN

*12. SW ¼ of SW ¼ of NW ¼ of SE ¼ Section: 13 T.13S R.12E

*13. Meridian: SLC

*14. Map Reference: Pine Canyon, UT (1972)

15. Aerial Photo: N/A

16. Location and Access: From Wellington, Utah, travel east on Highway 6 for ca. 7 miles. Turn left onto Pace Canyon Road. Follow the improved dirt road northerly ca. 4.5 miles to northwesterly trending dirt road. Follow that road northwesterly ca. 2.2 miles to road juncture. Take side hill road up mountain to north for ca. 2.4 miles to road juncture. Take the right fork and drive for ca. 1.2 miles to another road fork, take the left fork for ca. 100 meters to the site location along the creek.

*17. Land Owner: Private

*18. Federal Administrative Units: N/A

*19. Location of Curated Materials: N/A

20. Site Description: The site is a historic sawmill and log corral site. There wasn't a constructed sawmill building, a portable sawmill was set up on the site and then moved when the logging operations were finished. The site is located on the first southern terrace above a tributary of Dugout Creek. Soils are light tan sandy clay loam with gravels. Vegetation includes a riparian community consisting of cottonwood, aspen, willow, mountain mahogany, serviceberry, rabbitbrush, low sagebrush, grasses and forbs surrounded by mixed conifer forest. There are very few artifacts on the site. The artifacts include 1 flattened and deteriorated sanitary can, 1 sanitary can lid, 2 clear bottle glass fragments, 1 - 10 inch diameter metal pipe - drains under the two-track road, 2 clear bottle glass fragments, 1 vehicle tire, 1 metal plate and the remains of a coal-fired cook stove - white enamel inset on front door - marked with "Cribben & Sexton Co. Chicago". A two track road passes to the west of the site. There is a bulldozed and burned slash pile to the east of the possible foundations remains. There is a large pile of log trimmings on the terrace edge and continuing down in to the creek bottom - the pile appears to have been burned at some point. There are a number of sandstone rocks, possibly representing the foundation of a line shack. There is no structure present; there is a single piece of lumber - 2x4 - 5 feet in length with 3 round nails in each end. The corral is situated on the north side of the creek in the creek bottom. It currently has three standing sides and is composed of aspen logs, standing aspen trees and wire. There are 3 - 30 foot long logs on the west side, 5 - 30 foot long logs in the middle and 4 - 45 foot long logs on the east sides; the ends have been cribbed. There is smooth wire wrapped around the eastern aspen tree and around some down logs, possibly a gate for the corral. There are 7 logs lying on the ground to the south of the standing corral, along with a ca. 30 foot long 6x6 wooden beam (see structure sketch). The major portion of the site has been removed; there is little potential for further information. The site is not considered eligible for the NRHP.

*21. Site Condition Excellent (A) Good (B) Fair (C) Poor (D)

*22. Impact Agent(s): Dismantling, erosion, possible vandalism

*23. National Register Status Significant (C) Non-Significant (D) Unevaluated (Z)

Justify: The major portion of the site has been removed; there is little potential for further information.

24. Photos: 42CB - 1-4, SENCO-PHENIX

25. Recorded by: Cathy Dodt-Ellis

*26. Survey Organization: SENCO-PHENIX

28. Survey Date: 06/10/03

27. Assisting Crew Members: John Senulis, Jeanne Senulis

List of Attachments:

Part B

Part C

Part E

Topo Map

Site Sketch

Other

Photos

Artifact/Feature Sketch

Continuation Sheets

Part A - Environmental Data

Site No: 42CB1906

*29. Slope: 02 (Degrees) Aspect: 340 (Degrees)

*30. Distance to Permanent Water 001 x 100 meters

Type of Water Source Spring/Seep (A) Stream/River (B) Lake (C) Other (D)

Name of Water Source: Dugout Creek

*31. Geographic Unit: Mancos Shale Lowlands

*32. Topographic Location

PRIMARY LANDFORM

SECONDARY LANDFORM

- | | | | | |
|--|---|--|---|---|
| <input type="checkbox"/> Mountain Spine (A) | <input type="checkbox"/> Alluvial Fan (A) | <input type="checkbox"/> Dune (I) | <input type="checkbox"/> Slope (Q) | <input type="checkbox"/> Riser (Y) |
| <input type="checkbox"/> Hill (B) | <input type="checkbox"/> Alcove/Rockshelter (B) | <input type="checkbox"/> Floodplain (J) | <input checked="" type="checkbox"/> Terrace/Bench (R) | <input type="checkbox"/> Multiple Landforms (1) |
| <input type="checkbox"/> Tableland/Mesa (C) | <input type="checkbox"/> Arroyo (C) | <input type="checkbox"/> Ledge (K) | <input type="checkbox"/> Talus Slope (S) | <input type="checkbox"/> Bar (2) |
| <input type="checkbox"/> Ridge (D) | <input type="checkbox"/> Basin (D) | <input type="checkbox"/> Mesa/Butte (L) | <input type="checkbox"/> Island (T) | <input type="checkbox"/> Lagoon (3) |
| <input checked="" type="checkbox"/> Valley (E) | <input type="checkbox"/> Cave (E) | <input type="checkbox"/> Playa (M) | <input type="checkbox"/> Outcrop (U) | <input type="checkbox"/> Ephemeral Wash (4) |
| <input type="checkbox"/> Plain (F) | <input type="checkbox"/> Cliff (F) | <input type="checkbox"/> Port. Geo. (N) | <input type="checkbox"/> Spring Mound/Bog (V) | <input type="checkbox"/> Kipuka (5) |
| <input type="checkbox"/> Canyon (G) | <input type="checkbox"/> Delta (G) | <input type="checkbox"/> Plain (O) | <input type="checkbox"/> Valley (W) | <input type="checkbox"/> Saddle/Pass (6) |
| <input type="checkbox"/> Island (H) | <input type="checkbox"/> Detached Monolith (H) | <input type="checkbox"/> Ridge/Knoll (P) | <input type="checkbox"/> Cutbank (X) | <input type="checkbox"/> Graben (7) |

Describe: The site is located on the first southern terrace above a tributary of Dugout Creek.

*33. Onsite Depositional Context

- | | | | |
|---|--|--|--|
| <input type="checkbox"/> Fan (A) | <input type="checkbox"/> Outcrop (Q) | <input type="checkbox"/> Moraine (J) | <input type="checkbox"/> Desert Pavement (P) |
| <input type="checkbox"/> Talus (B) | <input type="checkbox"/> Extinct Lake (F) | <input type="checkbox"/> Flood Plain (K) | <input type="checkbox"/> Stream Bed (R) |
| <input type="checkbox"/> Dune (C) | <input type="checkbox"/> Extant Lake (G) | <input type="checkbox"/> Marsh (L) | <input type="checkbox"/> Aeolian (S) |
| <input type="checkbox"/> Stream Terrace (D) | <input checked="" type="checkbox"/> Alluvial Plain (H) | <input type="checkbox"/> Landslide/Slump (M) | <input type="checkbox"/> None (T) |
| <input type="checkbox"/> Playa (E) | <input type="checkbox"/> Colluvium (I) | <input type="checkbox"/> Delta (N) | <input type="checkbox"/> Residual (U) |

Description of Soil: Light tan sandy clay loam with gravels.

34. Vegetation

a. Life Zone

- Arctic-Alpine(A) Hudsonian(B) Canadian(C) Transitional(D) Upper Sonoran(E) Lower Sonoran(F)

b. Community Primary Onsite: L Secondary Onsite: G Surrounding Site: L

- | | | | |
|--------------------|-----------------------------|-------------------------|--------------------|
| Aspen (A) | Other/Mixed Conifer (G) | Grassland/Steppe(M) | Marsh/Swamp(S) |
| Spruce/Fir (B) | Pinyon-Juniper Woodland (H) | Desert Lake Shore (N) | Lake/Reservoir (T) |
| Douglas Fir (C) | Wet Meadow (I) | Shadscale Community (O) | Agricultural (U) |
| Alpine Tundra (D) | Dry Meadow (J) | Tall Sagebrush (P) | Blackbrush (V) |
| Ponderosa Pine (E) | Oak-Maple Shrub (K) | Low Sagebrush (Q) | Creosote Brush (Y) |
| Lodgepole Pine (F) | Riparian (L) | Barren (R) | |

Describe: Riparian community consisting of cottonwood, aspen, willow, mountain mahogany, serviceberry, rabbitbrush, low sagebrush, grasses and forbs surrounded by mixed conifer forest.

*35. Miscellaneous Text:

36. Comments/Continuations:

Part C - Historic Sites

Site No: 42CB1906

1. Site Type: Historic sawmill/ corral site

2. Historic Theme(s): Logging/ ranching

CULTURAL AFFILIATION

DATING METHOD

CULTURAL AFFILIATION

DATING METHOD

3. Culture: European/ American

General cross-dating

Describe: Known logging operations, old coal-burning stove.

4. Oldest Date: 1940's

Recent Date: 1960's

How Determined: General cross-dating.

5. Site Dimensions: 30 m X 80 m Area: 1885 sq m

6. Surface Collections Method None (A) Designed Sample (C)
 Grab Sample (B) Complete Collection (D)

Sampling Method: N/A

7. Estimated Depth of Cultural Fill Surface (A) 20-100 cm (C) Fill noted but unknown (E)
 0-20 cm (B) 100 cm + (D) Depth suspected, but not tested (F)

How Estimated: Observation.

(If tested, show location of site map)

8. Excavation Status Excavated (A) Tested (B) Unexcavated (C)

Testing Method: N/A

Summary of Artifacts and Debris

Glass (GL) Bone (BO) Leather (LE) Ammunition (AM) Domestic Items (DI)
 Metal (ME) Ceramics (CS) Wire (WI) Wood (WD) Kitchen Utensils (KU)
 Nails (NC,NW) Fabric (FA) Tin Cans Rubber (RB) Car/Car Parts (CR)

Describe: There are very few artifacts on the site. The artifacts include 1 flattened and deteriorated sanitary can, 1 sanitary can lid, 2 clear bottle glass fragments, 1 - 10 inch diameter metal pipe - drains under the two-track road, 2 clear bottle glass fragments, 1 vehicle tire, 1 metal plate and the remains of a coal-fired cook stove - white enamel inset on front door - marked with "Cribben & Sexton Co. Chicago".

10. Ceramic Artifacts: Paste Glaze/Slip Decoration Pattern Vessel Form(s) #

a. Estimated Number of Ceramic Trademarks:

Describe: N/A

Part C - Historic Sites

Site No. 42CB1906

1. Glass:	#	Manufacture	Color	Function	Trademarks	Decoration
	2	ABS	clear	bottle	N/A	N/A

Describe: 2 clear bottle glass fragments.

12. Maximum Density - #/sq m (glass and ceramics): 2

13. Tin Cans						
Type	Opening	Size	Modified	Label/Mark	Function	
Sanitary		fruit/vegetable	N/A	N/A	N/A	

Describe: One deteriorated sanitary can and one sanitary can lid.

14. Landscape and Constructed Features (locate on site map)

- | | | | |
|---|---|--|--|
| <input checked="" type="checkbox"/> Trail/Road (TR) | <input type="checkbox"/> Dump (DU) | <input type="checkbox"/> Dam, Earthen (DA) | <input type="checkbox"/> Hearth/Campfire (HE) |
| <input type="checkbox"/> Tailings (MT, ML) | <input type="checkbox"/> Depression (DE) | <input type="checkbox"/> Ditch (DI) | <input type="checkbox"/> Quarry (QU) |
| <input type="checkbox"/> Rock Alignment (RA) | <input type="checkbox"/> Cemetery/Burial (CB) | <input type="checkbox"/> Inscriptions (IN) | <input checked="" type="checkbox"/> Other (OT) |

Describe: A two track road passes to the west of the site. There is a bulldozed and burned slash pile to the east of the possible foundations remains. There is a large pile of log trimmings on the terrace edge and continuing down in to the creek bottom – the pile appears to have been burned at some point.

15. Buildings and Structures (locate on site map)

#	Material	Type	#	Material	Type
1	unknown	possible line shack			
1	log, standing tree and wire	corral			

Describe: There are a number of sandstone rocks, possibly representing the foundation of a line shack. There is no structure present; there is a single piece of lumber - 2x4 - 5 feet in length with 3 round nails in each end. The corral is situated on the north side of the creek in the creek bottom. It currently has three standing sides and is composed of aspen logs, standing aspen trees and wire. There are 3 – 30 foot long logs on the west side, 5 – 30 foot long logs in the middle and 4 – 45 foot long logs on the east sides; the ends have been cribbed. There is smooth wire wrapped around the eastern aspen tree and around some down logs, possibly a gate for the corral. There are 7 logs lying on the ground to the south of the standing corral, along with a ca. 30 foot long 6x6 wooden beam (see structure sketch).

16. Comments/Continuations - Please make note of any Historic Record searches performed (for example - County Records, General Land Office, Historical Society, Land Management Agency Records, Oral Histories/Interviews)

1990

IMACS ENCODING FORM

Encoder's Name CATHY DODT-ELLS

To be completed for each site form.
For instructions and codes, see IMACS Users Guide.

A

1 420R906 State Site Number

2 - Agency Site Number

6 Agency Report Number

10 7220 Elevation

11

12	541228	4393487
12	54310	4393487

 Zone Easting Northing

12

SW	NW	SE	13	13	S	12	E

 1/4 1/4 1/4 Sec. T. R.

13 1 Merid.

14 PINE CANYON, UT (1972) USGS Map

17 PR Owner

18 Forest Dist./Park

19 Loc. Cur. Materials

21 D Cond.

22 DM ER VA Impacts

23 D N.R.

26 SC Organ.

28 06 - 10 - 03 Survey Date

29 02 340 Slope Aspect

30 001 B Water: distance/type

31 CAC Geog. Unit

32 C R 1st 2st Topographic Locatio

33 H Dep.

34 E LGL 1 2 3 Vegetation

35 Misc. Text, Site Name

B

2 Culture/Dating Method

3 Area

4 Collect

5 Depth

6 Excav. Status

7 Prehistoric Artifacts

8

 Lithic Tools: # / type

9 # Flaking Stages

11

 Ceramics: #/type

13 Features: # / type

14 Architecture: # / material / type

C

2 LG FR Historic Themes

3 EAF Culture/Dating Method

4 1940s 1960s Dates

5 1,885 Area

6 A Collect

7 A Depth

8 C Excav. Status

9

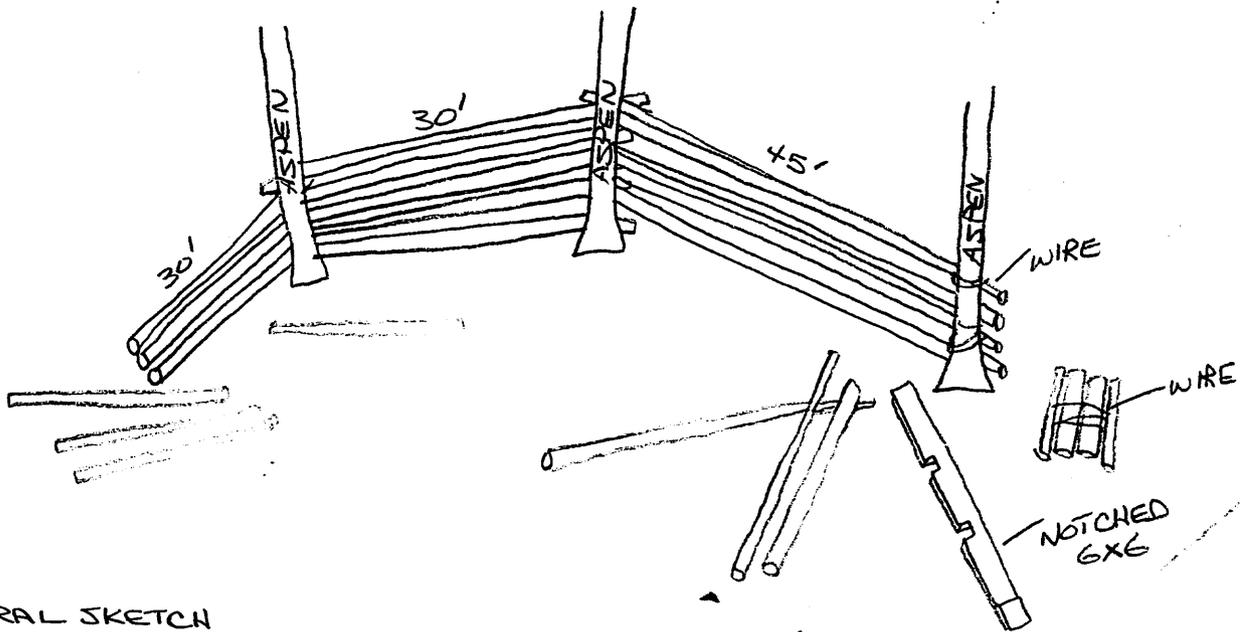
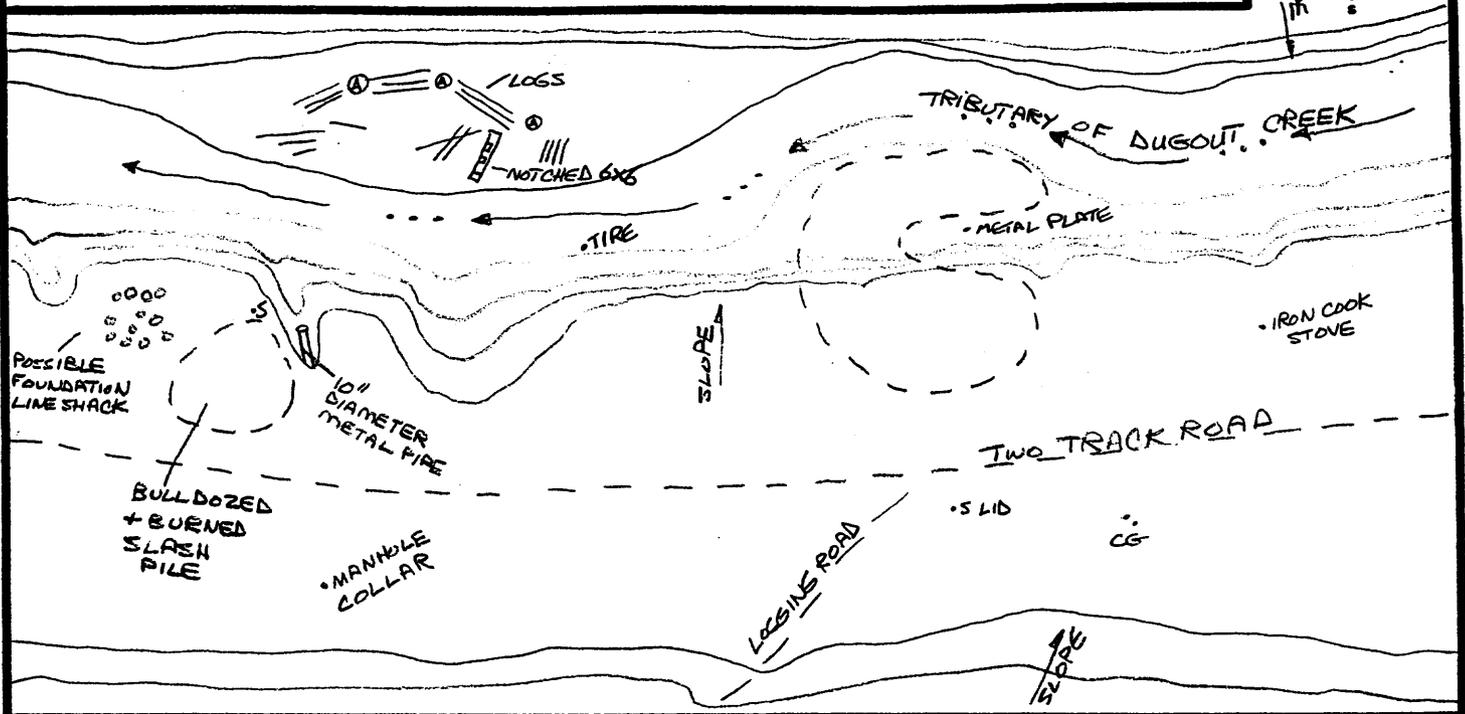
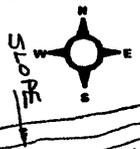
NW	WD	
WI	DI	
TC		

 Artifacts

14 1 TR ZOT Features: # / type

15 1 B BY 1 PAJ Architecture: # / material / type

SITE SKETCH MAP- 42CB 1906



0 5 10 METER SITE SCALE

CDE 6/11/03

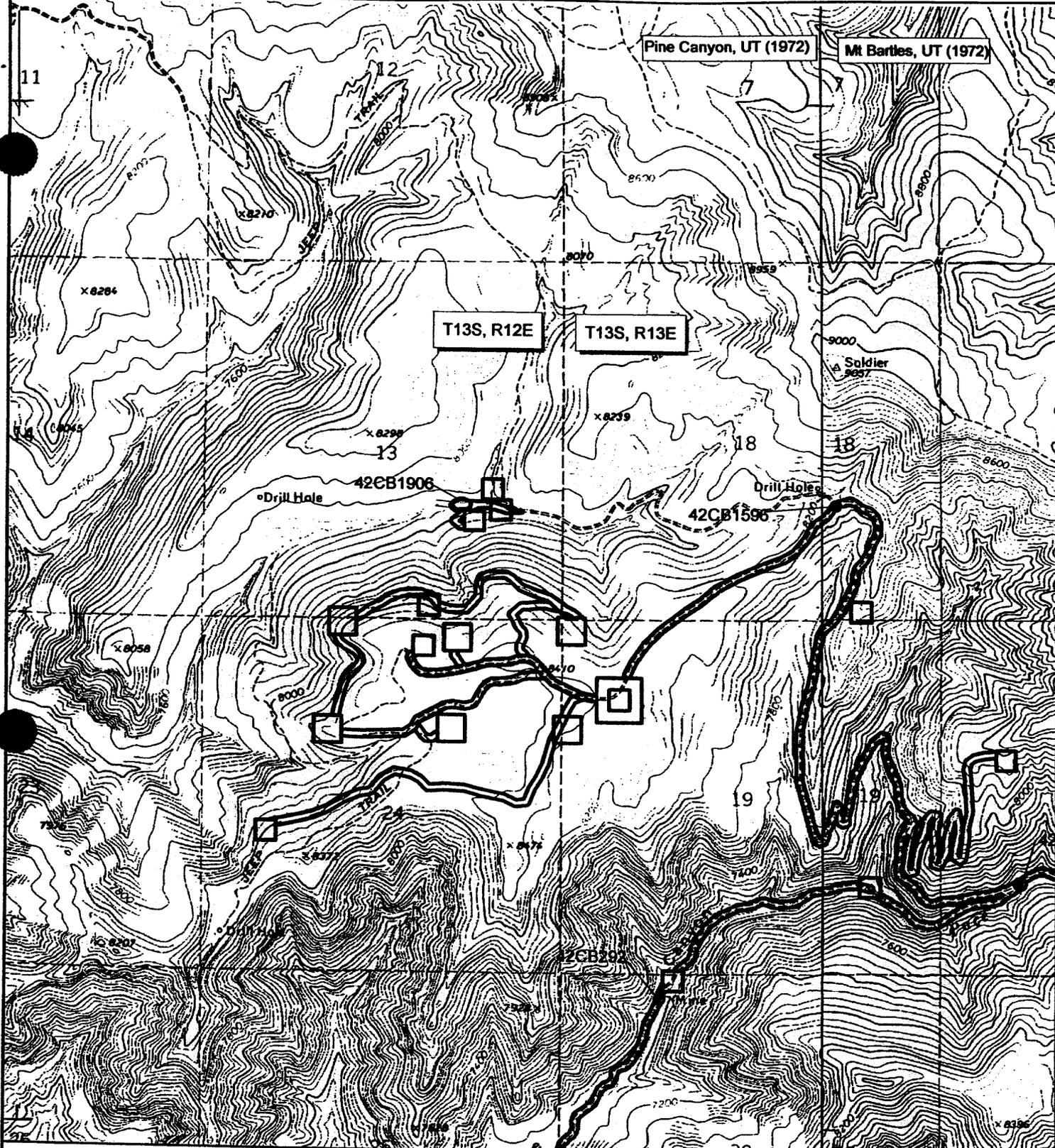


SENCO-PHENIX

- Ⓐ - ASPEN TREE
- S - SANITARY CAN
- S LID - SANITARY CAN LID
- CG - CLEAR GLASS

VEGETATION - COTTONWOOD, WILLOW, SERVICE BERRY, OAK, ASPEN, MIXED CONIFER GRASSES, FORBS

SOIL - LOOSE, TAN SANDY CLAY LOAM W/ GRAVELS



Pine Canyon, UT (1972)

Mt Bartles, UT (1972)

T13S, R12E

T13S, R13E

42CB1906

42CB1596

11

12

7

13

18

18

19

30



SENCO-PHENIX



Scale 1:24,000
1" = 2,000'

 Current Survey
 Previous Survey

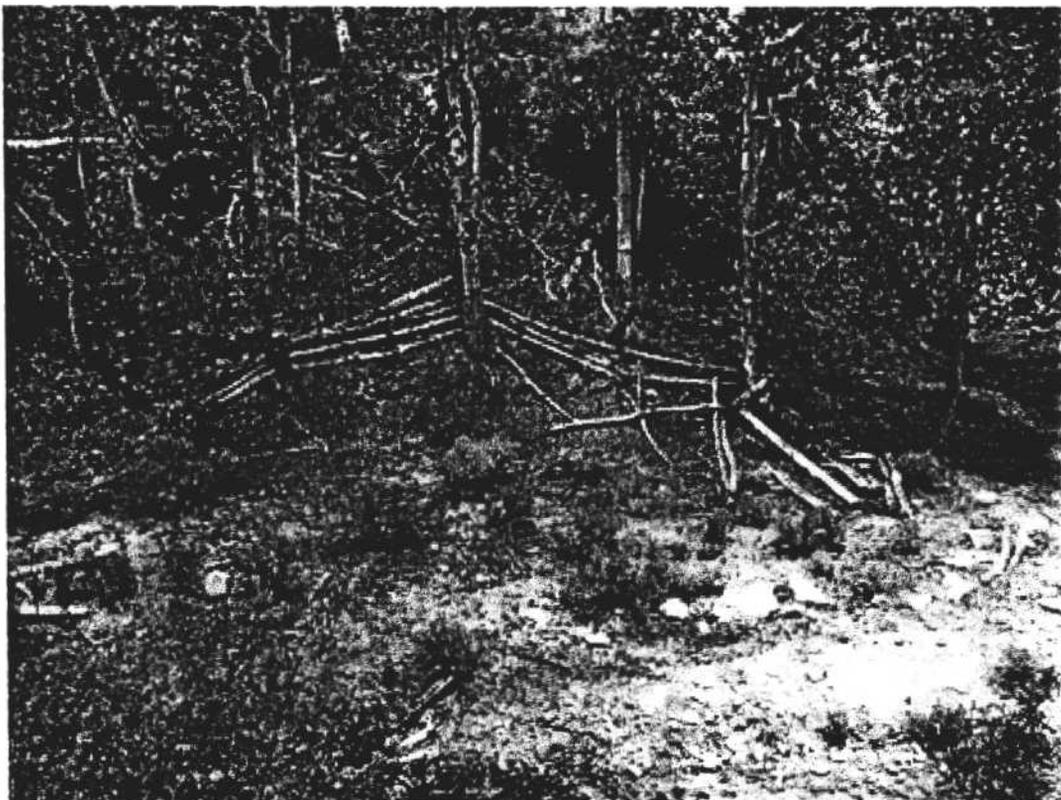
 Eligible Sites
 Ineligible Sites

Exploration Holes & Access Roads
Dugout Mine of Canyon Fuel, LLC
Carbon County, Utah
Sections 13, T13S, R12E
June 2003
SPUT-457

42CB1906



General View East of Site



View North of Corral



SENCO-PHENIX

**AN INTENSIVE CULTURAL RESOURCE SURVEY AND INVENTORY
OF THE 2003 DUGOUT CANYON MINE PACE CANYON EXPLORATION
DRILL HOLES BLOCK AREA AND ACCESS ROAD**

BLM/Private Lands

Carbon County, Utah

PERFORMED FOR
**Dugout Canyon Mine of
Canyon Fuel Company, LLC**

In Accordance with BLM and
Utah State Guidelines
Antiquities Permit #U03SC841bp

SPUT-463
October 8, 2003

John A. Senulis

Direct Charge of Fieldwork

UTAH SHPO

COVER SHEET

Project Name: AN INTENSIVE CULTURAL RESOURCE SURVEY AND INVENTORY OF THE 2003 DUGOUT CANYON MINE PACE CANYON EXPLORATION DRILL HOLES BLOCK AREA AND ACCESS ROAD

Dugout Canyon Mine of Canyon Fuels LLC.

State #U03SC0841bp

Report Date: October 8, 2003

County (ies): Carbon

Principal Investigator/ Field Supervisor: John A. Senulis/John Senulis

Records Search/Location/Dates: September 19, 2003, Price River Field Office of the BLM

Acreage Surveyed: 13 acres

Intensive Acres: 13

Recon/Intuitive Acres: 0

U.S.G.S. 7.5 Quad: Pine Canyon, Utah (1972), Mount Bartles, Utah (1972)

Sites Reported	Number	Smithsonian Site #(s):
Archeological Sites:	1	42CB1998
Revisit (No IMACS update)	0	
Revisit (IMACS update attch.)	0	
New Sites (IMACS attached)	1	42CB1998
Archeological Site Total:	0	
Historic Structures:		
(USHS Site Form Attached)		
Total NRHP Eligible Sites,	0	

Checklist of Required Items:

1. 1 Copy of Final Report
2. Copy of U.S.G.S. 7.5' map showing surveyed/excavated area
3. Completed IMACS Site Inventory Forms Including
 - Parts A and B or C
 - IMACS Encoding Form
 - Site Sketch Map
 - Photographs
 - Copy of USGS 7.5' Quad with Smithsonian site Number
4. Completed Cover Sheet

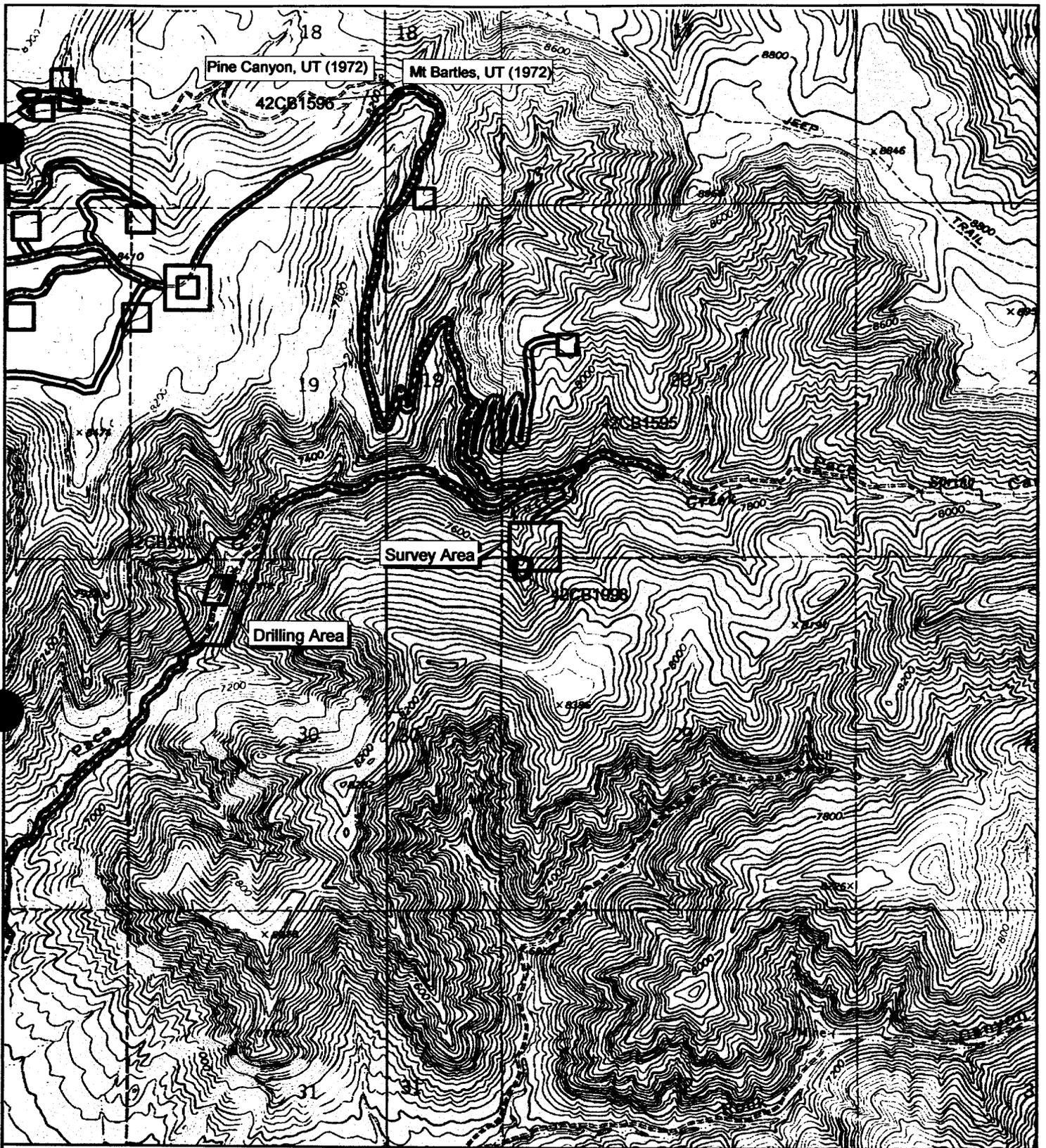
Abstract

SENCO-PHENIX performed an intensive cultural resource survey and literature review for two proposed drilling areas for the Dugout Canyon Mine of Canyon Fuel LLC. The first portion of the project is on BLM land in an area previously surveyed by AERC (1980). This area contains one archeological site 42CB292 the old Snow Mine. That site was re-recorded by SENCO-PHENIX (2001) and found to be not eligible for the National Register of Historic Places because of extensive surface disturbance. The BLM portion of the proposed project, in Section 30, T13S, R13E, will need no further archeological survey and archeological clearance is recommended. The previous work is more fully documented in a letter from SENCO-PHENIX to Vicky Miller of Canyon Fuel LLC (2003 attached). The second proposed drilling area and access road are located on private land in Sections 20 and 29, T13S, R13E. That area was surveyed to identify and evaluate cultural resources that may exist within the project area.

Cultural resources were located in the form of one historic archeological site:

42CB1998: The site is a mid to late twentieth century temporary sawmill site. A portable sawmill was set up on the site and then moved when the logging operations were finished. The remains include 3 slash piles of partially milled lumber of logs that were too small to mill. There are small features that may have been associated with portable buildings or tents. These include 3-4" by 6" logs that may have been a tent base and a small stack of 2 x 4s and 2 x 8s. There was an aspen tree board ladder beside the 3 logs. It consisted of 2 x 1 x 14 inch boards nailed onto an aspen tree, some of the boards were becoming embedded in the tree. There are very few artifacts on the site and some may be from subsequent herding activities. Several two-track logging roads pass through the site. The predominant artifacts are sanitary and evaporated milk tin cans and fragments of clear and brown glass but also a fragment of an automobile car seat, a chainsaw blade guide, an aluminum squeeze tube, and an "Argentina" potted meat can. Some of the clear glass fragments are from "Kerr" canning jars. The site is located on a terrace above an intermittent drainage of Pace Creek. Soils are light tan sandy clay loam with gravels. Vegetation includes a regenerating plant community consisting of a mixed conifer forest with white pine, cottonwood, aspen, willow, mountain mahogany, serviceberry, maple, scrub oak, pinyon-juniper, low sagebrush, grasses and forbs. The major portion of the site has been removed; there is little potential for further information. The site is not considered eligible for the NRHP.

No other cultural resources were located and the potential for undetected remains is remote. A finding of no effect is appropriate and archeological clearance without stipulations is recommended.



SENCO-PHENIX



Scale 1:24,000
1" = 2,000'

-  Current Survey
-  Previous Survey
-  Eligible Sites
-  Ineligible Sites

Pace Canyon Drilling Program
Dugout Mine of Canyon Fuel, LLC
 Carbon County, Utah
 Sections 20, 29, 30, T13S, R13E
 September 2003
 SPUT-463

Project Location

The project consists of a ten-acre block in which Canyon Fuel will drill several drill holes within the block. The block unit was chosen to give the company ability to vary the locations if needed. The project area is in the SW/SW ¼ of section 20 and the NW/NW ¼ of Section 29, both T13S, R13E, Carbon County, Utah. Access to the project area will mostly follow an existing ca. 1,100-foot two-track dirt road that was built to facilitate logging in the general area. The proposed drill holes were flagged. The proposed project is noted on the enclosed copy of U.S.G.S. Composite 7.5' Quad: Pine Canyon, Utah (1972) and Mount Bartles, Utah (1972).

Environment

The project area is within the Pace Creek drainage. The site is located on a terrace above an intermittent drainage of Pace Creek. Soils are light tan sandy clay loam with gravels. Vegetation includes a regenerating plant community consisting of a mixed conifer forest with white pine, cottonwood, aspen, willow, mountain mahogany, serviceberry, maple, scrub oak, pinyon-juniper, low sagebrush, grasses and forbs.

Previous Research

A file search by John Senulis of SENCO-PHENIX at the Price River Field Office of the BLM on September 19, 2003 revealed that the following projects are reported for the current project area:

- 1980, AERC surveyed several sample blocks in Sections 13 and 24, T13S, R12E and Sections 18, 19 and 30 T13S, R13E. They also surveyed the access road into the Snow Mine site. One archeological site was located:
 - 42CB292 The site was described as "Coal mine located in Pace Canyon consists of one known mine portal which has been closed. Site of historic Snow Mine in Pace Canyon which was active in 1906 but had its primary production period from 1932-1940." The site was relatively pristine at the time and still contained a standing coal loadout and foundation with depth potential. Avoidance was recommended pending further historic research. As noted the site has since been extensively modified.
- 2001, SENCO-PHENIX surveyed several drill holes and an extensive series of roads. Two new sites were recorded and one previously recorded site was re-recorded:
 - 42CB292 The site was the historic Snow Mine in Pace Canyon, which was active in 1906 but had its primary production period from 1932-1940. The area has been heavily logged since the initial recordation and the area around the mine extensively disturbed by heavy equipment, probably dozed. The foundation has been destroyed and the coal loadout has been collapsed and pushed into the bed of Pace Creek. The rock-covered adit and adjacent stonewall are still there on the other side of Pace Creek. There are two 6 x 10 dugouts used as coal loadouts on the west side of the road. Other than recent trash no artifacts were observed. The integrity of the site has been basically destroyed. The site was not recommended for the NRHP.
 - 42CB1595 was a small wood framed one-room cabin that was probably related to the logging industry. It was not recommended for nomination to the NRHP.
 - 42CB1596 was a corral and Aspen art site. It was not recommended for nomination to the NRHP.

Methodology

John and Jeanne Senulis of SENCO-PHENIX performed a Class III intensive walkover survey on September 23, 2003. Meandering transects no further spaced than 15 meters were employed for the ten-acre block area. The access road was surveyed to a right of way of 30 meters except where the two-track joins the Pace Canyon road, which was surveyed to a width of 150 feet. Special attention was given to those areas of subsurface soil exposure from animal burrowing and erosion. When the site was located the artifacts were pinflagged and the site was photographed. The sites were plotted using a WAAS enabled GPS unit. The readings were then transferred to the ARCVIEW mapping program as a permanent database.

All field notes and digital photographs are on file at the offices of SENCO-PHENIX in Price, Utah.

Findings and Recommendations

Cultural resources were located in the form of one historic archeological site:

42CB1998: The site is a mid to late twentieth century temporary sawmill site. A portable sawmill was set up on the site and then moved when the logging operations were finished. The remains include 3 slash piles of partially milled lumber of logs that were too small to mill. There are small features that may have been associated with portable buildings or tents. These include 3-4" by 6" logs that may have been a tent base and a small stack of 2 x 4s and 2 x 8s. There was an aspen tree board ladder beside the 3 logs. It consisted of 2 x 1 x 14 inch boards nailed onto an aspen tree, some of the boards were becoming embedded in the tree. There are very few artifacts on the site and some may be from subsequent herding activities. Several two-track logging roads pass through the site. The predominant artifacts are sanitary and evaporated milk tin cans and fragments of clear and brown glass but also a fragment of an automobile car seat, a chainsaw blade guide, an aluminum squeeze tube, and an "Argentina" potted meat can. Some of the clear glass fragments are from "Kerr" canning jars. The site is located on a terrace above an intermittent drainage of Pace Creek. Soils are light tan sandy clay loam with gravels. Vegetation includes a regenerating plant community consisting of a mixed conifer forest with white pine, cottonwood, aspen, willow, mountain mahogany, serviceberry, maple, scrub oak, pinyon-juniper, low sagebrush, grasses and forbs. The major portion of the site has been removed; there is little potential for further information. The site is not considered eligible for the NRHP.

No other cultural resources were located and the potential for undetected remains is remote. A finding of no effect is appropriate and archeological clearance without stipulations is recommended.

These recommendations are subject to modification and review by the BLM Field Office Manager and the Utah SHPO.

References

Hauck, F. R. & D. G. Weder

- 1980 *Intensive Archeological Surface Evaluation of the Proposed Sage Point-Dugout Canyon Project in Carbon County, Utah*, Archeological-Environmental Research Corporation Paper Number 19, Salt Lake City, (Utah Antiquities # 80-67).

Senulis, John A.

- 2001 *An Intensive Cultural Resource Survey and Inventory of the Dugout Canyon Mine Drill Holes and Access Roads*, SENCO-PHENIX Archeological Consultants, Price, Utah. (Utah Antiquities # 01-240)



SENCO-PHENIX

September 25, 2003

Ms. Vicky Miller
Soldier Canyon Mine of Canyon Fuel, LLC
P.O. Box 1029
Wellington, UT 84542

Dear Vicky,

Enclosed is a map showing the location of your proposed drilling activities in the NE ¼ of Section 30, T13S, R13E, Carbon County, Utah. You will note that the area surrounding the proposed drilling program is labeled "Previous Survey." In 1980 AERC surveyed several sample blocks in Sections 18, 19 and 30 T13S, R13E. They also surveyed the access road into Pace Canyon to the Snow Mine site (42CB292). The site was the historic Snow Mine in Pace Canyon, which was active in 1906 but had its primary production period from 1932-1940. The site was in moderately fair condition in 1980 and still contained a standing coal loadout and a foundation with depth potential. Avoidance was recommended pending further historic research, although the site was not recommended for nomination to the National Register of Historic Places (NRHP) (Hauck & Weder: 1980).

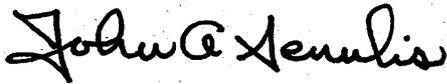
When SENCO-PHENIX did the cultural resource inventory for Canyon Fuel's 2001 drilling program we were asked by the BLM to evaluate the Snow Mine utilizing current NRHP criteria. Our recommendation was "The area has been heavily logged since the initial recordation and the area around the mine extensively disturbed by heavy equipment, probably dozed. The foundation has been destroyed and the coal loadout has been collapsed and pushed into the bed of Pace Creek. The rock-covered adit and adjacent stonewall are still there on the other side of Pace Creek. There are two 6 x 10 dugouts used as coal loadouts on the west side of the road. Other than recent trash no artifacts were observed. The integrity of the site has been basically destroyed. The site is not recommended for the NRHP" (Senulis: 2001).

The AERC block survey did not find any other cultural resources other than 42CB292. Site 42CB292 is not eligible for the NRHP, therefore, no historic properties will be affected and no further cultural resource inventory is necessary prior to your drilling

program. Archeological clearance is recommended without additional archeological work.

If we can be of additional help please do not hesitate to contact us.

Sincerely,



John A Senulis
Principal Investigator

Jas: bhoh

Attachment

References

Hauck, F. R. & D. G. Weder

1980 *Intensive Archeological Surface Evaluation of the Proposed Sage Point-Dugout Canyon Project in Carbon County, Utah*, Archeological-Environmental Research Corporation Paper Number 19, Salt Lake City, (Utah Antiquities # 80-67).

Senulis, John A.

2001 *An Intensive Cultural Resource Survey and Inventory of the Dugout Canyon Mine Drill Holes and Access Roads*, SENCO-PHENIX Archeological Consultants, Price, Utah. (Utah Antiquities # 01-240)

IMACS SITE FORM

Part A - Administrative Data

INTERMOUNTAIN ANTIQUITIES COMPUTER SYSTEM

Form approved for use by:

BLM - Utah, Idaho, Wyoming, Nevada

Division of State History - Utah, Wyoming

USFS - Intermountain Region

NPS - Utah, Wyoming

*1. State No. 42CB1998

*2. Agency No.

*3. Temp. No.

County Carbon

4. State: Utah

5. Project: SPUT- 462

*6. Report No: UT03SC0840

7. Site Name / Property Name:

8. Class Prehistoric Historic Paleontologic Ethnographic

9. Site Type: Historic sawmill site

*10. Elevation: 7780 feet amsl

*11. UTM Grid Zone: 12 534469 mE 4391368 mN (see #36)

*12. NW ¼ of NW ¼ of NW ¼ of NW ¼ Section: 29, T.13S R.13E

*13. Meridian: SLC

*14. Map Reference: Mt. Bartles, UT (1972)

15. Aerial Photo: N/A

16. Location and Access: From Wellington, Utah, travel east on Highway 6 for ca. 7 miles. Turn left onto Pace Canyon Road. Follow the improved dirt road northerly ca. 4.5 miles to northwesterly trending dirt road. Follow that road northwesterly ca. 2.5 miles to road juncture. Park walk back 100 feet on east side of road to two-track going up mountain. Walk on two-track ca. 800 feet southwest to site.

*17. Land Owner: Private

*18. Federal Administrative Units: N/A

*19. Location of Curated Materials: N/A

20. Site Description: The site is a mid to late twentieth century temporary sawmill site. A portable sawmill was set up on the site and then moved when the logging operations were finished. The remains include 3 slash piles of partially milled lumber of logs that were too small to mill. There are small features that may have been associated with portable buildings or tents. These include 3-4" by 6" logs that may have been a tent base and a small stack of 2 x 4s and 2 x 8s. There was an aspen tree board ladder beside the 3 logs. It consisted of 2 x 1x 14 inch boards nailed onto an aspen tree, some of the boards were becoming embedded in the tree. There are very few artifacts on the site and some may be from subsequent herding activities. Several two-track logging roads pass through the site. The predominant artifacts are sanitary and evaporated milk tin cans and fragments of clear and brown glass but also a fragment of an automobile car seat, a chainsaw blade guide, an aluminum squeeze tube, and an "Argentina" potted meat can. Some of the clear glass fragments are from "Kerr" canning jars. The site is located on a terrace above an intermittent drainage of Pace Creek. Soils are light tan sandy clay loam with gravels. Vegetation includes a regenerating plant community consisting of a mixed conifer forest with white pine, cottonwood, aspen, willow, mountain mahogany, serviceberry, maple, scrub oak, pinyon-juniper, low sagebrush, grasses and forbs. The major portion of the site has been removed; there is little potential for further information. The site is not considered eligible for the NRHP.

*21. Site Condition Excellent (A) Good (B) Fair (C) Poor (D)

*22. Impact Agent(s): Dismantling, erosion, possible vandalism

*23. National Register Status Significant (C) Non-Significant (D) Unevaluated (Z)

Justify: The major portion of the site has been removed; there is little potential for further information.

24. Photos: 42CB1998 - 1-4, SENCO-PHENIX

25. Recorded by: John Senulis

*26. Survey Organization: SENCO-PHENIX

28. Survey Date: 9/23/03

27. Assisting Crew Members: Jeanne Senulis

List of Attachments:

Part B

Part C

Part E

Topo Map

Site Sketch

Other

Photos

Artifact/Feature Sketch

Continuation Sheets

Encoded data items

Part A - Environmental Data

Site No: 42CB1998

*29. Slope: 03 (Degrees) Aspect: 340 (Degrees)

*30. Distance to Permanent Water 4 x 100 meters

Type of Water Source Spring/Seep (A) Stream/River (B) Lake (C) Other (D)

Name of Water Source: Pace Creek

*31. Geographic Unit: Mancos Shale Lowlands

*32. Topographic Location

PRIMARY LANDFORM

- Mountain Spine (A)
- Hill (B)
- Tableland/Mesa (C)
- Ridge (D)
- Valley (E)
- Plain (F)
- Canyon (G)
- Island (H)
- Alluvial Fan (A)
- Alcove/Rockshelter (B)
- Arroyo (C)
- Basin (D)
- Cave (E)
- Cliff (F)
- Delta (G)
- Detached Monolith (H)

SECONDARY LANDFORM

- Dune (I)
- Floodplain (J)
- Ledge (K)
- Mesa/Butte (L)
- Playa (M)
- Port. Geo. (N)
- Plain (O)
- Ridge/Knoll (P)
- Slope (Q)
- Terrace/Bench (R)
- Talus Slope (S)
- Island (T)
- Outcrop (U)
- Spring Mound/Bog (V)
- Valley (W)
- Cutbank (X)
- Riser (Y)
- Multiple Landforms (1)
- Bar (2)
- Lagoon (3)
- Ephemeral Wash (4)
- Kipuka (5)
- Saddle/Pass (6)
- Graben (7)

Describe: The site is located on a terrace above a intermittent tributary of Pace Creek.

*33. Onsite Depositional Context

- Fan (A)
- Talus (B)
- Dune (C)
- Stream Terrace (D)
- Playa (E)
- Outcrop (Q)
- Extinct Lake (F)
- Extant Lake (G)
- Alluvial Plain (H)
- Colluvium (I)
- Moraine (J)
- Flood Plain (K)
- Marsh (L)
- Landslide/Slump (M)
- Delta (N)
- Desert Pavement (P)
- Stream Bed (R)
- Aeolian (S)
- None (T)
- Residual (U)

Description of Soil: Light tan sandy clay loam with gravels.

34. Vegetation

a. Life Zone

- Arctic-Alpine (A) Hudsonian (B) Canadian (C) Transitional (D) Upper Sonoran (E) Lower Sonoran (F)

b. Community

Primary Onsite: G

Secondary Onsite: Q

Surrounding Site: G

- | | | | |
|--------------------|-----------------------------|-------------------------|--------------------|
| Aspen (A) | Other/Mixed Conifer (G) | Grassland/Steppe (M) | Marsh/Swamp (S) |
| Spruce/Fir (B) | Pinyon-Juniper Woodland (H) | Desert Lake Shore (N) | Lake/Reservoir (T) |
| Douglas Fir (C) | Wet Meadow (I) | Shadscale Community (O) | Agricultural (U) |
| Alpine Tundra (D) | Dry Meadow (J) | Tall Sagebrush (P) | Blackbrush (V) |
| Ponderosa Pine (E) | Oak-Maple Shrub (K) | Low Sagebrush (Q) | Creosote Brush (Y) |
| Lodgepole Pine (F) | Riparian (L) | Barren (R) | |

Describe: Vegetation includes a regenerating plant community consisting of a mixed conifer forest with white pine, cottonwood, aspen, willow, mountain mahogany, serviceberry, maple, scrub oak, pinyon-juniper, low sagebrush, grasses and forbs.

*35. Miscellaneous Text:

36. Comments/Continuations: also 543480 mE, 4391279 mN; 543528 mE, 4391292 mN, 543537 mE, 4391362 mN.

Part C - Historic Sites

Site No: 42CB1998

1. Site Type: Historic sawmill

2. Historic Theme(s): Logging/ ranching

CULTURAL AFFILIATION

DATING METHOD

CULTURAL AFFILIATION

DATING METHOD

3. Culture: European/ American

General cross-dating

Describe: Known logging operations,

4. Oldest Date: 1940's

Recent Date: 1960's

How Determined: General cross-dating.

5. Site Dimensions: 60 m X 60 m Area: 2826 sq m

6. Surface Collections Method None (A) Designed Sample (C)
 Grab Sample (B) Complete Collection (D)

Sampling Method: N/A

7. Estimated Depth of Cultural Fill Surface (A) 20-100 cm (C) Fill noted but unknown (E)
 0-20 cm (B) 100 cm + (D) Depth suspected, but not tested (F)

How Estimated: Observation.

(If tested, show location of site map)

8. Excavation Status Excavated (A) Tested (B) Unexcavated (C)

Testing Method: N/A

9. Summary of Artifacts and Debris

Glass (GL) Bone (BO) Leather (LE) Ammunition (AM) Domestic Items (DI)
 Metal (ME) Ceramics (CS) Wire (WI) Wood (WD) Kitchen Utensils (KU)
 Nails (NC,NW) Fabric (FA) Tin Cans Rubber (RB) Car/Car Parts (CR)

Describe: The remains include 3 slash piles of partially milled lumber of logs that were too small to mill. There are small features that may have been associated with portable buildings or tents. These include 3-4" by 6" logs that may have been a tent base and a small stack of 2 x 4s and 2 x 8s. There was an aspen tree board ladder beside the 3 logs. It consisted of 2 x 1 x 14 inch boards nailed onto an aspen tree, some of the boards were becoming embedded in the tree. There are very few artifacts on the site and some may be from herding activities. The predominant artifacts are sanitary and evaporated milk tin cans and fragments of clear and brown glass but also a fragment of an automobile car seat, a chainsaw blade guide, an aluminum squeeze tube, and an "Argentina" potted meat can. Some of the clear glass fragments are from "Kerr" canning jars.

10. Ceramic Artifacts: Paste Glaze/Slip Decoration Pattern Vessel Form(s) #

a. Estimated Number of Ceramic Trademarks:

Describe: N/A

Part C - Historic Sites

Site No. 42CB1998

1. Glass:	#	Manufacture	Color	Function	Trademarks	Decoration
	20	ABS	clear	bottle/canning	Kerr	N/A
	10	ABS	brown	beer bottle		

Describe: Some of the clear glass fragments are from "Kerr" canning jars.

12. Maximum Density - #/sq m (glass and ceramics): 1

13. Tin Cans

Type	Opening	Size	Modified	Label/Mark	Function
Sanitary	cut around	10-30	N/A	N/A	N/A
Evaporated milk	punched	12	N/A	N/A	N/A

Describe: There were 25 rusted, deteriorated sanitary cans including 5-quart paint cans and lids and 32 oz. Juice cans. There were 12 evaporated milk cans.

14. Landscape and Constructed Features (locate on site map)

- | | | | |
|---|---|--|--|
| <input checked="" type="checkbox"/> Trail/Road (TR) | <input type="checkbox"/> Dump (DU) | <input type="checkbox"/> Dam, Earthen (DA) | <input type="checkbox"/> Hearth/Campfire (HE) |
| <input type="checkbox"/> Tailings (MT, ML) | <input type="checkbox"/> Depression (DE) | <input type="checkbox"/> Ditch (DI) | <input type="checkbox"/> Quarry (QU) |
| <input type="checkbox"/> Rock Alignment (RA) | <input type="checkbox"/> Cemetery/Burial (CB) | <input type="checkbox"/> Inscriptions (IN) | <input checked="" type="checkbox"/> Other (OT) |

Describe: Several two-track logging roads pass through the site.

15. Buildings and Structures (locate on site map)

#	Material	Type	#	Material	Type
1	log	possible tent base			
1	combination	ladder in aspen tree			

Describe: There are small features that may have been associated with portable buildings or tents. These include 3-4" by 6" logs that may have been a tent base and a small stack of 2 x 4s and 2 x 8s. There was an aspen tree board ladder beside the 3 logs. It consisted of 2 x 1 x 14 inch boards nailed onto an aspen tree, some of the boards were becoming embedded in the tree.

16. Comments/Continuations - Please make note of any Historic Record searches performed (for example - County Records, General Land Office, Historical Society, Land Management Agency Records, Oral Histories/Interviews)

1990

IMACS ENCODING FORM

Encoder's Name J SENULIS

To be completed for each site form.
For instructions and codes, see IMACS Users Guide.

1 42CB1998
State Site Number

2 -
Agency Site Number

6
Agency Report Number

10 7780
Elevation

11	<u>12</u>	<u>534469</u>	<u>4391368</u>
	<u>12</u>	<u>543480</u>	<u>4391279</u>
	<u>12</u>	<u>543528</u>	<u>4391290</u>
	<u>12</u>	<u>543537</u>	<u>4391362</u>
	Zone	Easting	Northing

12	<u>NW</u>	<u>NW</u>	<u>NW</u>	<u>29</u>	<u>13</u>	<u>S</u>	<u>13</u>	<u>E</u>
	1/4	1/4	1/4	Sec.	T.		R.	

13 1
Merid.

14 MT BARTLES, UT (1972)
USGS Map

17 PR
Owner

18 JG
Forest Dist./Park

19 NA
Loc. Cur. Materials

21 D
Cond.

22 ER VA DM
Impacts

23 D
N.R.

28 SC
Organ.

28 9 - 23 - 03
Survey Date

29 03 340
Slope Aspect

30 4 B
Water: distance/type

31 CAC
Geog. Unit

32 E R
1st 2st
Topographic Locato

33 H
Dep.

34 E G Q G
1 2 3
Vegetation

35
Misc. Text, Site Name

2
Culture/Dating Method

3
Area

4
Collect

5
Depth

6
Excav. Status

7
Prehistoric Artifacts

8
Lithic Tools: # / type

9
Flaking Stages

11
Ceramics: #/type

13
Features: # / type

14
Architecture: # / material / type

2 LG
Historic Themes

3 EA F
Culture/Dating Method

4 1940 1960
Dates

5 2826
Area

6 A
Collect

7 A
Depth

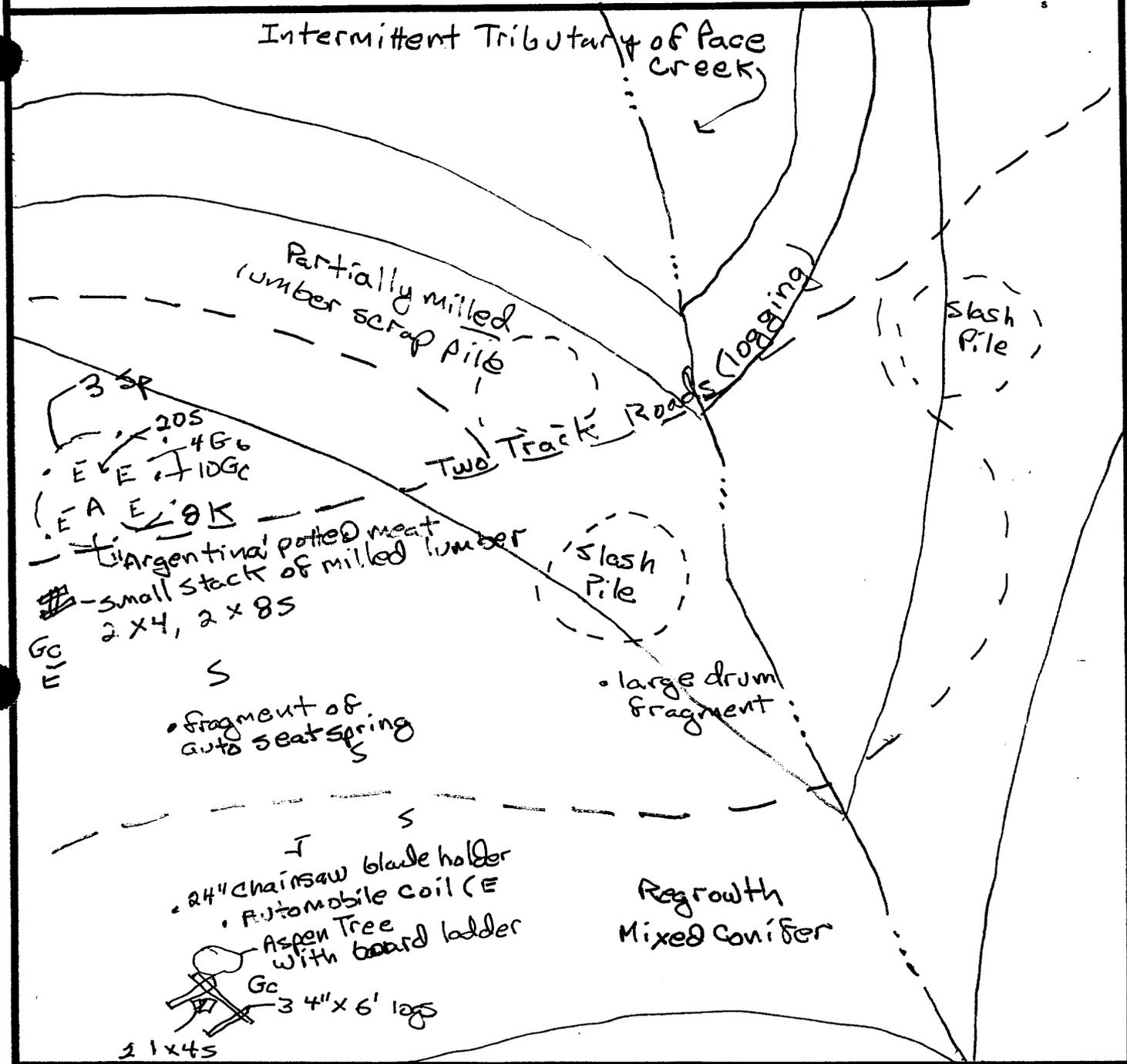
8 C
Excav. Status

9	<u>GL</u>	<u>TC</u>	<u> </u>
	<u>NC</u>	<u>WD</u>	<u> </u>
	<u>WI</u>	<u>CR</u>	<u> </u>
			Artifacts

14 3 TR 1 DT
Features: # / type

15 1 P BY 1 W
Architecture: # / material / type

Sketch location of 42CB1998



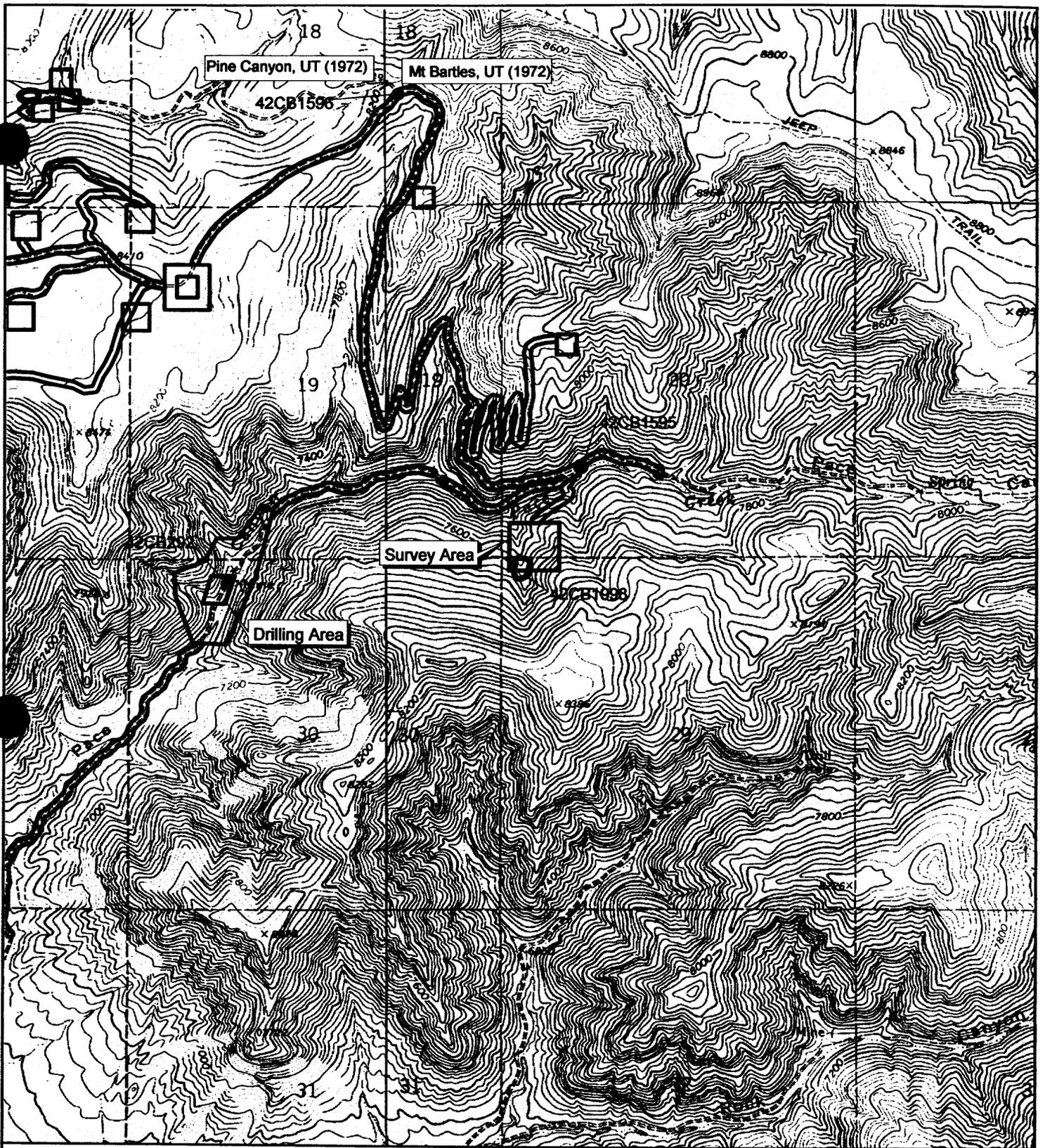
0 Meters 10

Key

- Quart Paint Cans $\frac{3}{4}$ lids
- SP - Sanitary tin can - most cut around
- E - Evaporated Milk can - punched opening
- J - 32oz Nidgel Juice can
- G - Glass: c = Clear, b = brown
- K - Kerr glass canning jar frag
- A - Aluminum Squeeze tube



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Scale 1:24,000
1" = 2,000'

-  Current Survey
-  Previous Survey
-  Eligible Sites
-  Ineligible Sites

Pace Canyon Drilling Program
Dugout Mine of Canyon Fuel, LLC
Carbon County, Utah
Sections 20, 29, 30, T13S, R13E
September 2003
SPUT-463

42CB1998



General View Southeast of Site



View South of Tree Ladder and Tent Base