# APPLICATION FOR COAL PERMIT PROCESSING
## Detailed Schedule Of Changes to the Mining And Reclamation Plan

This is duplicate information and not intended for review.

**Permittee:** Canyon Fuel Company, LLC
**Mine:** Dugout Canyon Mine **Permit Number:** C/007/039
**Title:** SITLA Lease Amendment

Provide a detailed listing of all changes to the Mining and Reclamation Plan, which is required as a result of this proposed permit application. Individually list all maps and drawings that are added, replaced, or removed from the plan. Include changes to the table of contents, section of the plan, or other information as needed to specifically locate, identify and revise the existing Mining and Reclamation Plan. Include page, section and drawing number as part of the description.

| | | | DESCRIPTION OF MAP, TEXT, OR MATERIAL TO BE CHANGED |
|---|---|---|---|
| ☐ Add | ☒ Replace | ☐ Remove | Chapter 1, TOC, Text, Figure and Tables |
| ☐ Add | ☒ Replace | ☐ Remove | Chapter 1, Plates 1-1, 1-2, and 1-4 |
| ☐ Add | ☒ Replace | ☐ Remove | Chapter 2, Pages 2-1 thru 2-4, 2-29 and 2-30 |
| ☐ Add | ☒ Replace | ☐ Remove | Chapter 2, Plate 2-1 |
| ☒ Add | ☐ Replace | ☐ Remove | Appendix 2-2, add data to the back of the existing information |
| ☐ Add | ☒ Replace | ☐ Remove | Chapter 3, Page 3-1 |
| ☐ Add | ☒ Replace | ☐ Remove | Chapter 3, Plates 3-1, 3-2 and 3-3 |
| ☐ Add | ☒ Replace | ☐ Remove | Chapter 4, Pages 4-1 and 4-7 |
| ☐ Add | ☒ Replace | ☐ Remove | Chapter 4, Plate 4-1 |
| ☐ Add | ☒ Replace | ☐ Remove | Chapter 5, Table of Contents, Pages 5-1 thru 5-8, 5-13, 5-15, 5-16, 5-28, 5-29, 5-31, 5-33, 5-34, 5-36, 5-47, 5-48, 5-49, 5-57, 5-58, 5-59, 5-61, 5-64, 5-73, and 5-76 |
| ☐ Add | ☒ Replace | ☐ Remove | Chapter 5, Plate 5-7 |
| ☐ Add | ☒ Replace | ☐ Remove | Chapter 6, Plates 6-1, 6-4, 6-5, 6-6, and 6-7 |
| ☐ Add | ☒ Replace | ☐ Remove | Chapter 7, Pages 7-iii, 7-1, 7-6, 7-31, 7-35, 7-37, 7-42 thru 7-47, 7-49 thru 7-53, 7-58 and 7-62 |
| ☐ Add | ☒ Replace | ☐ Remove | Chapter 7, Plates 7-1, 7-2, 7-3, and 7-6 |
| ☒ Add | ☐ Replace | ☐ Remove | Appendix 7-1, add data to the back of the existing information |
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**Any other specific or special instruction required for insertion of this proposal into the Mining and Reclamation Plan.**

1/14/04

**Received by Oil, Gas & Mining**

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DIV. OF OIL, GAS & MINING

# APPLICATION FOR COAL PERMIT PROCESSING
## Detailed Schedule Of Changes to the Mining And Reclamation Plan

**Permittee:** Canyon Fuel Company, LLC
**Mine:** Dugout Canyon Mine **Permit Number:** C/007/039
**Title:** SITLA Lease Amendment - Revisions to Chapters 1, 3 & 4, Task ID # 1808

Provide a detailed listing of all changes to the Mining and Reclamation Plan, which is required as a result of this proposed permit application. Individually list all maps and drawings that are added, replaced, or removed from the plan. Include changes to the table of contents, section of the plan, or other information as needed to specifically locate, identify and revise the existing Mining and Reclamation Plan. Include page, section and drawing number as part of the description.

| | | | DESCRIPTION OF MAP, TEXT, OR MATERIAL TO BE CHANGED |
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| ☐ Add | ☒ Replace | ☐ Remove | Chapter 1, Pages 1-5 through 1-13 |
| ☒ Add | ☐ Replace | ☐ Remove | Chapter 1, Appendix 1-2 |
| ☒ Add | ☐ Replace | ☐ Remove | Chapter 3, Appendix 3-3, Add to the back of existing information |
| ☐ Add | ☒ Replace | ☐ Remove | Chapter 4, Pages 4-1 through 4-7 and TOC |
| ☒ Add | ☐ Replace | ☐ Remove | Chapter 4, Appendix 4-3 |
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**Any other specific or special instruction required for insertion of this proposal into the Mining and Reclamation Plan.**

March 26, 2004

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Form DOGM - C2 (Revised March 12, 2002)

# APPLICATION FOR COAL PERMIT PROCESSING
## Detailed Schedule Of Changes to the Mining And Reclamation Plan

**Permittee:** Canyon Fuel Company, LLC
**Mine:** Dugout Canyon Mine **Permit Number:** C/007/039
**Title:** SITLA Lease Amendment, Revisions to Chapter 4, Task ID # 1884

Provide a detailed listing of all changes to the Mining and Reclamation Plan, which is required as a result of this proposed permit application. Individually list all maps and drawings that are added, replaced, or removed from the plan. Include changes to the table of contents, section of the plan, or other information as needed to specifically locate, identify and revise the existing Mining and Reclamation Plan. Include page, section and drawing number as part of the description.

| | | | DESCRIPTION OF MAP, TEXT, OR MATERIAL TO BE CHANGED |
|---|---|---|---|
| ☐ Add | ☒ Replace | ☐ Remove | Chapter 4, Page 4-4, pagination corresponds to March 2004 submittal |
| ☒ Add | ☐ Replace | ☐ Remove | Chapter 4, Appendix 4-3, add to back of existing information |
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**Any other specific or special instruction required for insertion of this proposal into the Mining and Reclamation Plan.**

4/29/04

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# APPLICATION FOR COAL PERMIT PROCESSING
## Detailed Schedule Of Changes to the Mining And Reclamation Plan

**Permittee:** Canyon Fuel Company, LLC
**Mine:** Dugout Canyon Mine **Permit Number:** C/007/039
**Title:** SITLA Lease Amendment, Revisions to Chapter Task ID #1915

Provide a detailed listing of all changes to the Mining and Reclamation Plan, which is required as a result of this proposed permit application. Individually list all maps and drawings that are added, replaced, or removed from the plan. Include changes to the table of contents, section of the plan, or other information as needed to specifically locate, identify and revise the existing Mining and Reclamation Plan. Include page, section and drawing number as part of the description.

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| ☐ Add | ☐ Replace | ☒ Remove | Chapter 7, Plate 7-3 |
| ☐ Add | ☐ Replace | ☒ Remove | Confidential Folder - Biological Information related to Wildlife - Do not throw away* |
| ☒ Add | ☐ Replace | ☐ Remove | Biological Wildlife Information from Confidential File add to Appendix 3-3 of M&RP* |
| ☐ Add | ☐ Replace | ☒ Remove | RA Appendix 4-1 from Refuse Pile Amendment Binder - Do not throw away* |
| ☒ Add | ☐ Replace | ☐ Remove | RA Appendix 4-1 from Refuse Pile Amendment to Confidential File* |
| ☐ Add | ☐ Replace | ☒ Remove | Attachment 4-1 from Degassification Amendment Binder - Do not throw away* |
| ☒ Add | ☐ Replace | ☐ Remove | Attachment 4-1 from Degassification Amendment to Confidential File* |
| ☒ Add | ☐ Replace | ☐ Remove | Appendix 4-3 - Cultural Information associated with SITLA Lease to Confidential File |
| ☒ Add | ☐ Replace | ☐ Remove | Attachment 4-1 Cover Sheet to Degassification Amendment designating location of Attachment* |
| ☒ Add | ☐ Replace | ☐ Remove | RA Appendix 4-1 Cover Sheet to Refuse Pile Amendment designating location of Appendix* |
| ☒ Add | ☐ Replace | ☐ Remove | Appendix 4-3 - Cover Sheet to M&RP designating location of Appendix |
| ☐ Add | ☐ Replace | ☒ Remove | Chapter 1, a revised Chapter 1 has been submitted as a separate amendment. |
| ☐ Add | ☐ Replace | ☒ Remove | Appendix 4-3, the Nickens report entitled "A sample-oriented cultural resource inventory in Carbon, Emery and Sanpete Counties, Utah" needs to be removed. |
| ☐ Add | ☐ Replace | ☒ Remove | Chapter 3, Tables 3-1 and 3-2. |
| ☐ Add | ☒ Replace | ☐ Remove | Chapter 3, Pages 3-ii, 3-iii, 3-iv, 3-13 thru 3-34, and 3-55 |
| ☐ Add | ☒ Replace | ☐ Remove | Chapter 5, Page 5-33 |
| ☐ Add | ☒ Replace | ☐ Remove | Chapter 7, Pages 7-5, 7-22, 7-23, 7-27 thru 7-32, 7-35, 7-37, 7-62 thru 7-65 |
| ☐ Add | ☒ Replace | ☐ Remove | Plate 7-1 |
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**Any other specific or special instruction required for insertion of this proposal into the Mining and Reclamation Plan.**

11/29/04
* All though these documents are assoicated with different binders the tasks were part of deficiencies associated with SITLA Lease,TASK ID. NO.1915

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MAR 11 2005
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Form DOGM - C2 (Revised March 12, 2002)

# APPLICATION FOR COAL PERMIT PROCESSING
## Detailed Schedule Of Changes to the Mining And Reclamation Plan

**Permittee:** Canyon Fuel Company, LLC
**Mine:** Dugout Canyon Mine **Permit Number:** C/007/039
**Title:** SITLA Lease Amendment, Revisions to Chapter 3, Task ID #1915

Provide a detailed listing of all changes to the Mining and Reclamation Plan, which is required as a result of this proposed permit application. Individually list all maps and drawings that are added, replaced, or removed from the plan. Include changes to the table of contents, section of the plan, or other information as needed to specifically locate, identify and revise the existing Mining and Reclamation Plan. Include page, section and drawing number as part of the description.

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**Any other specific or special instruction required for insertion of this proposal into the Mining and Reclamation Plan.**

3/11/05

Submitted following conversation with Jerriann Ernstsen to clarify descriptions of raptor and bat surveys.

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MAR 11 2005
DIV. OF OIL, GAS & MINING

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DATE: 11/29/04 TASK ID # 1915 + 1884

CHAPTER 1 TEXT, TABLES + FIGURES

# APPENDIX 1-2

Insurance and Proof of Publication

Green

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;<br>Portion of SW1/4NE1/4SE1/4SE1/4;<br>Portion of the S1/2NW1/4SE1/4SE1/4;<br>Portion of SW1/4NE1/4SW1/4SE1/4;<br>Portion of N1/2SE1/4SW1/4SE1/4;<br>Portion of NE1/4SW1/4SW1/4SE1/4;<br>Portion of S1/2SW1/4SW1/4SE1/4 |
| Section 23: | NW1/4; NE1/4; SE1/4; NE1/4SW1/4; NW1/4NW1/4SW1/4;<br>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<br>Portion of SW1/4NE1/4NE1/4NW1/4<br>Portion of E1/2SW1/4NE1/4NW1/4<br>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**

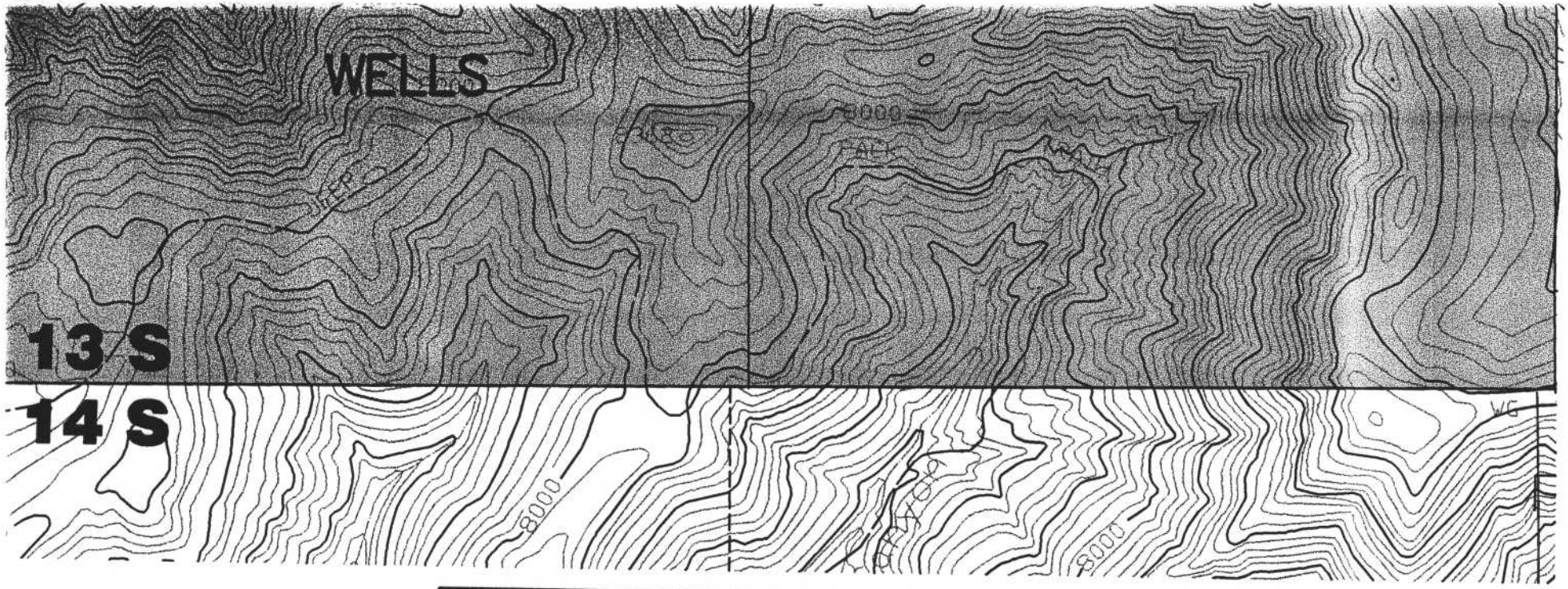
| | |
|---|---|
| Section 18 | Portion N1/2NE1/4 |

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.




| REVISION | |
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| DATE | BY |
| 12/17/03 | RR |

**Canyon Fuel Company, LLC**
Soldier Canyon & Dugout Canyon Mines

# SURFACE OWNERSHIP

## Dugout Canyon Mine

0' 1000'

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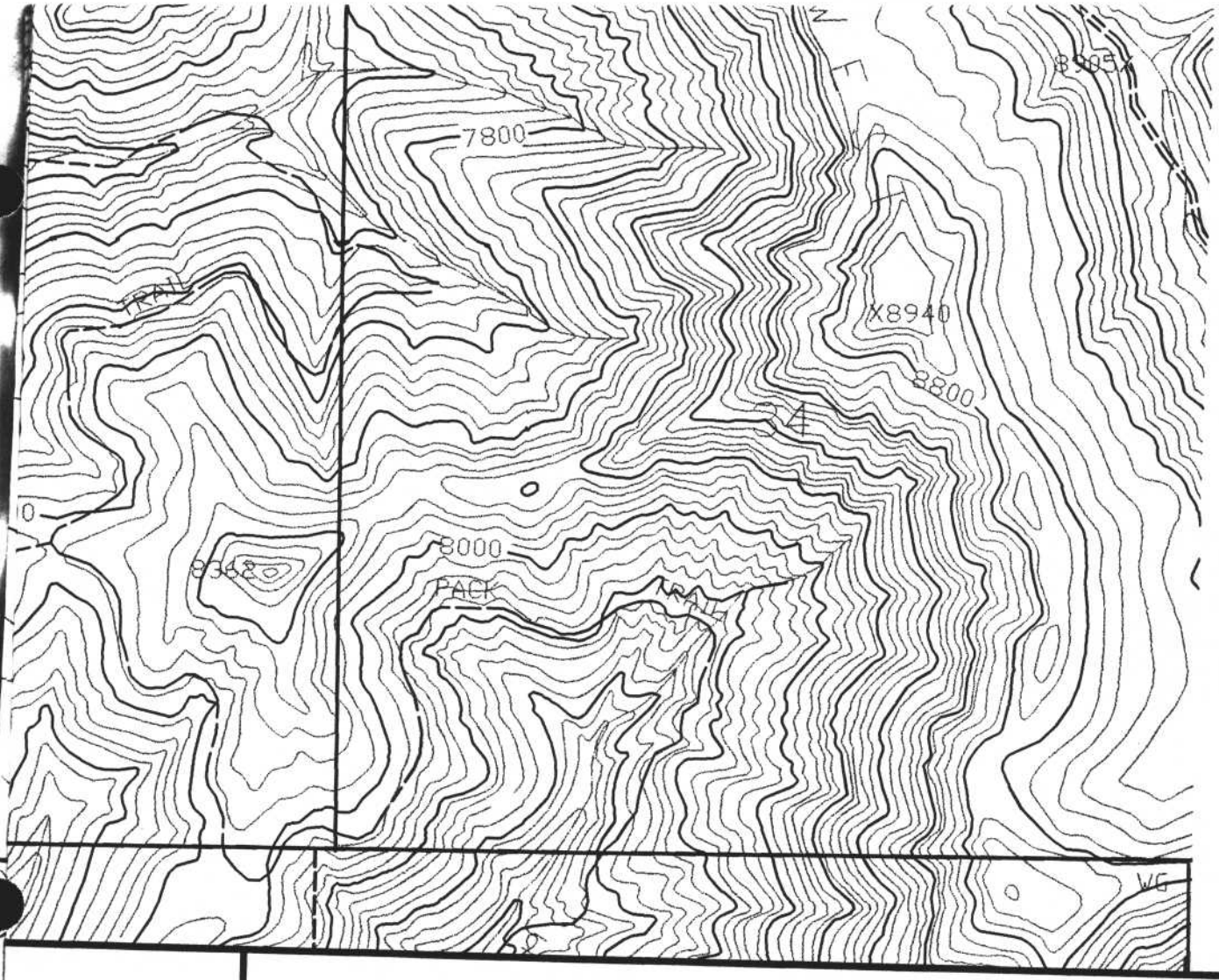
| DRAWN BY: JLP | DATE: MAY 5, 1999 D-438.PCP | SCALE: 1"=1000' |
| APPROVED BY: DGS | FILE NAME: X\DOGM\Working Files\Dugout\Sitla\Plate 1-1.dwg | DRAWING OR MAP NUMBER PLATE 1-1 |

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| DATE | BY |
| 12/19/03 | DGS |

# Canyon Fuel Company, LLC

Soldier Canyon & Dugout Canyon Mines

## COAL OWNERSHIP

RED

## Dugout Canyon Mine

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|---|---|---|
| DRAWN BY: JLP | DATE: MAY 10, 1999 D-439.PCP | SCALE: 1"=1000' |
| APPROVED BY: DGS | FILE NAME: X\DOGM\Working Files\Dugout\Sitla\Plate 1-2.dwg | DRAWING OR MAP NUMBER PLATE 1-2 |

# SUPERCEEDED

DATE: 3/11/05 TASK ID # 1915

CLEAN COPY

This PLATE NEEDS TO BE REPLACED
WITH The COPY SUBMITTED 3/11/05

The ONLY thing which HAS been
ADDED IS Degas WELLS
G-4 thru G-6

The PLATE which is CURRENTLY IN The
MRP CONTAINS The Degas WELLS
But NOT The SITLA LEASE ADDITION.

Thus the New MAP

| REVISIONS | |
|---|---|
| DATE | BY |
| 03/05/03 | RR |
| 07/30/03 | RR |
| 10/27/03 | RR |

**Canyon Fuel Company, LLC**
**Soldier Canyon & Dugout Canyon Mines**

See PROCEEDING NOTE

# DUGOUT CANYON MINE PERMIT AREA

## Dugout Canyon Mine

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| DRAWN BY: RR | DATE: FEBRUARY 26, 2003 | SCALE: 1" = 2000' |
| APPROVED BY: VSM | FILE NAME: x:\dogm\dugout\sitla\plate 1-4.dwg | DRAWING OR MAP NUMBER PLATE 1-4 |

# CHAPTER 2

# SOILS

# CHAPTER 2

# SOILS

## 210 INTRODUCTION

This chapter and associated appendices of this M&RP contain all pertinent information relating to identification, management, and reclamation activities associated with the soil resources present in the disturbed area of the Dugout Canyon Mine. The information has been compiled from the previously approved soil sections for the Sage Point-Dugout Canyon Mine and Soldier Canyon Mine permits, ACT/007/009 and Act/007/018, respectively, as well as new soil survey information gathered as part of this permit application. The soil studies were conducted in accordance with the Utah Division of Oil, Gas, and Mining guidelines that were in effect at the time each study was conducted. All previous surveys fulfilled the requirements established by the U.S. Soil Conservation Service (SCS). The site specific soil survey conducted for this permit application was conducted in accordance with the standards set by the National Cooperative Soil Survey and analyzed by horizon according to Table 1 of the Division's "Guidelines for the Management of Topsoil and Overburden for Underground and Surface Coal Mining" (Leatherwood, 1988).

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.

A base map of the soils in the permit area has been created by compiling maps from the "Soil Survey of Carbon Area, Utah" prepared by the SCS (Jensen, 1988). The base map illustrates the locations and areal extent of the endemic soil resources within the permit area at an Order III level (Plate 2-1). In the disturbed area of the permit area, an Order I survey was conducted. The locations and areal extent of the endemic soil resources within the disturbed area identified during the Order I survey are illustrated on Plate 2-2.

This chapter provides a description of the pre-mining resources as specified under R645-301-221. Topsoil and subsoil to be saved under R645-301-232 will be removed and segregated from other material. After removal, topsoil will be immediately redistributed in accordance with R645-301-242, stockpiled pending redistribution under R645-301-234, or if demonstrated that an alternative procedure will provide equal or more protection for the topsoil, the Applicant will seek approval from the Division.

## 220 ENVIRONMENTAL DESCRIPTION

The Dugout Canyon Mine is located in the northern Book Cliffs - Roan Plateau region. More specifically, the mine is located within Dugout Canyon. The majority of the disturbed area is located on the northwest side of the canyon (Plate 2-1). The elevation of the disturbed area ranges between approximately 7000 and 7150 feet above MSL. Soils in the mine area are not cultivated due to their thin nature and relatively steep slopes on which they lie. These soils have formed in colluvium derived from sandstone and shale. Soils in the area are usually shallow and consist predominantly of stony to gravelly sandy loams with moderate permeability. The soils are highly susceptible to water erosion. Rock outcrops consist of alternating layers of sandstone and shale. Subordinate amounts of coal are also present.

### 221 Prime Farmland Investigation

As part of the application for the Sage Point-Dugout Canyon Mine permit, ACT/007/009, a reconnaissance of the disturbed areas was conducted in 1980 to determine if prime farmland was present, and if present, whether it would be impacted by mining activities. The reconnaissance included the presently-proposed disturbed area within the Dugout Canyon Mine permit area. Copies of the applicable pages from the prime farmland investigation for the Sage Point-Dugout Canyon Mine permit and correspondence with the Soil Conservation Service have been included as Appendix 2-1. One area within the previous area of investigation was determined to potentially be prime farmland. However, this area was located near the mouth of Soldier Creek Canyon, outside of the presently proposed permit area. No prime farmland was found in Dugout Canyon or anywhere else within the presently-proposed permit area during the previous investigation.

As part of this permit application, a survey of the disturbed area of the Dugout Canyon Mine was conducted to determine whether the soils could be considered as prime farmland. The Dugout Canyon Mine disturbed area lies within the Rock outcrop-Rubbleland-Travessilla complex and Croydon loam soils area (Plates 2-1 and 2-2). Neither of these soils are considered suitable prime farmland as described by the SCS (Jensen, 1988). No evidence of past cultivation of the soils in the disturbed area was found during the site investigation. Hence, based on the results of both detailed investigations conducted within the area, it is concluded that no prime farmland exists within the proposed permit area.

## 222 Soil Survey

Soil survey information for those portions of the permit area to be affected by surface operations at the Dugout Canyon Mine is presented in Sections 222.100 through 222.300.

### 222.100 Soils Map

A map delineating the areal extent of the endemic soils resources within the permit area at an Order III survey level is presented on Plate 2-1. A description of these soils has been reproduced from the SCS "Soil Survey of the Carbon County Area" (Jensen, 1988), and has been included as Appendix 2-2. An Order I soil survey was conducted of the Dugout Canyon Mine disturbed area in October and November 1995. Plate 2-2 illustrates the areal extent of the soils studied as part of the Order I soil survey, the location of the soil test pits excavated during the survey, and the extent of the identified soils.

### 222.200 Soil Identification

Following is a list of the soils found in and adjacent to the permit area. Their corresponding map units as illustrated on Plate 2-1 are also listed.

| Map Unit | Soil Identification |
|---|---|
| 3 | Badland-Rubbleland-Rock outcrop complex |

| | |
|---|---|
| 6 | Beje-Comodore complex |
| 7 | Beje-Trag complex |
| 13 | Cabba family-Guben-Rock outcrop complex |
| 21 | Croydon loam, 8 to 30 percent slopes |
| 23 | Curecanti family - Pathead complex |
| 32 | Frandsen-Gullied land complex |
| 33 | Gerst-Badland-Rubbleland complex, 15 to 50 percent slopes |
| 36 | Gerst-Strych-Badland complex, 3 to 50 percent slopes |
| 37 | Gerst-Strych-Badland complex, 50 to 70 percent slopes |
| 46 | Guben-Pathead extremely stony loams |
| 47 | Guben-Rock outcrop complex |
| 50 | Haverdad loam, moist, 1 to 5 percent slopes |
| 52 | Hernandez family, 3 to 8 percent slopes |
| 53 | Hernandez family, moist, 1 to 6 percent slopes |
| 62 | Midfork family-Comodore complex |
| 66 | Mivida gravelly fine sandy loam, 3 to 8 percent slopes |
| 72 | Pathead-Corecanti family association |
| 75 | Perma family, 15 to 40 percent slopes |
| 81 | Persayo-Greybull complex |
| 84 | Podo-Rock outcrop complex |
| 86 | Rabbitex-Doney family-Midfork family complex |
| 88 | Rabbitex family-Datino Variant complex |
| 96 | Rock outcrop-Rubbleland-Travessilla complex |
| 97 | Rottulee family-Trag complex |
| 100 | Senchert loam, 3 to 15 percent slopes |
| 101 | Senchert loam, 30 to 50 percent slopes |
| 103 | Senchert-Toza family complex |
| 105 | Senchert family-Senchert complex |
| 107 | Supert-Winetti complex |
| 109 | Silas-Brycan loams |
| 113 | Strych very stony loam, 3 to 15 percent slopes |

According to the SCS (Jensen, 1988), soils present on the east facing slopes of Dugout Canyon are part of the Rock outcrop-Rubbleland-Travessilla complex while those on the west facing slopes are part of the Croydon loam and Midfork family-Comodore complex.

However, observation of the soils present on the west and northwest facing slopes suggest that inclusions of the Comodore-Datino Variant complex are prevalent throughout. The conclusion that Comodore-Datino Variant complex soils are present in this area is based on the presence of characteristics typical of these soils such as: 40 to 60 percent slopes, elevations of slopes between 6800 and 8100 feet, 40 to 60 percent slopes, Douglas-fir and

safety hazards during culvert installation. Decisions regarding the removal of soil from steep slopes will be made in the field by a qualified soils scientist in agreement with the construction supervisor. This decision will be made based on the steepness of the slope, the potential for slope failure uphill of the disturbed area if soils are removed at the slope toe, and the timing within the construction sequence (i.e. can backfill be placed against the slope immediately after topsoil is removed to support the slope). Additional information regarding the location of the steep slopes and the areas of soil removal associated with the construction of the Dugout Creek culvert is provided in Appendix 2-5. After construction of the culvert, an as-built map will be submitted illustrating the locations where steep slope soils were removed.

In areas where topsoil thicknesses of less than 6 inches are encountered, the topsoil and underlying unconsolidated materials will be removed and stockpiled together. The entire mixture will be treated as topsoil in compliance with R614-201-234.300. The recovery of topsoil and substitute topsoil will be maximized in both disturbed and undisturbed soils.

The substitute topsoil generated during mine construction, as discussed in Section 224, will be treated as topsoil and stored accordingly.

No facilities will be constructed and no soil disturbance is planned in conjunction with the incorporation of the SITLA lease (T13S R13E, Section 29, Portions of Section 17, 20, 21, 28 and 30) into the Dugout Canyon Mine permit area.

### 231.200 Suitability of Topsoil Substitutes/Supplements

See Section 233.200.

### 231.300 Testing of Topsoil Handling and Reclamation Procedures Regarding Revegetation

SCM will exercise care to guard against erosion during and after application of topsoil and will employ the necessary measures to ensure the stability of topsoil on graded slopes. Erosion control measures will include surface roughing and erosion mat placement on slope areas thought to be unstable. SCM

will fill, regrade, or otherwise stabilize any rills or gullies deeper than nine (9) inches which form in areas which have been regraded and topsoiled. The areas adjacent to any rills or gullies which have been filled, regraded or otherwise stabilized, will be reseeded or stabilized accordingly.

Methods used to evaluate success of Revegetation and stabilization are discussed in Chapters 3 and 5.

### 231.400 Construction, Modification, Use, and Maintenance of Topsoil Storage Piles

Topsoil and substitute topsoil removed form the Dugout Canyon Mine will be transported and stockpiled at the Soldier Canyon Mine soils stockpile area (Plate 2-3). The estimated volumes of topsoil and substitute topsoil to be stockpiled are presented in Table 2-2.

It is anticipated that the pile will be constructed in horizontal lifts of 1.5 to 2.0 feet. Tracked equipment will be used to reduce compaction. As described in Section 231.100, the stockpile will be graded to a maximum slope of 2:1 and seeded to promote surface stabilization. Some of the vegetation removed during the construction of the Dugout Canyon Mine will be incorporated into or placed on top of the stockpile. The interim reclamation seed mix described in Chapter 3 will be used for this purpose. Volume calculations for the amount of topsoil to be removed and placed in the storage pile are included in Appendix 2-6.

The Dugout Canyon Mine topsoil will be labeled and kept separate from the Soldier Canyon Mine soils. A description of the Soldier Canyon Mine topsoil stockpile area can be found in that M&RP. The Soldier Canyon Mine M&RP will be modified to allow for the storage of Dugout Canyon Mine substitute topsoil prior to the transport of the soil. The stockpiles will be isolated from the main surface area to protect the material from contaminants and unnecessary compaction that would interfere with vegetation. A sign will be installed at the base of each stockpile to identify it as a topsoil storage area. The stockpiles will be protected from wind and water erosion by being revegetated with a quick growing vegetative cover (proposed interim reclamation seed mix) and by installing berms and/or silt fence below the stockpiles to help trap sediment coming off the stockpile. These stockpiled soils will not be moved or disturbed until required for redistribution during final reclamation.

# APPENDIX 2-2

Soil Conservation Survey Descriptions of the Permit Area Soils

RED

is mainly Douglas-fir, pinyon, Salina wildrye, bluebunch wheatgrass, snowberry, and serviceberry.

Typically, the surface layer is brown extremely stony fine sandy loam about 9 inches thick. The subsoil is brown very stony loam about 7 inches thick. The substratum to a depth of 60 inches or more is pale brown very stony fine sandy loam. A layer of calcium carbonate accumulation is at a depth of about 16 inches.

Permeability of the Datino Variant soil is moderate. Available water capacity is about 4 to 6 inches. Water supplying capacity is 6 to 8 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 3 to 5 percent. Runoff is rapid, and the hazard of water erosion is high.

This unit is used as wildlife habitat and woodland.

The potential vegetation on the Comodore and Datino Variant soils includes an overstory of Rocky Mountain Douglas-fir and pinyon with a canopy of 50 percent. The understory vegetation is 40 percent grasses, 15 percent forbs, and 45 percent shrubs. Among the important plants are Salina wildrye, slender wheatgrass, birchleaf mountainmahogany, and snowberry.

This unit is limited for harvesting wood products because of the steepness of slope, stones and boulders on the surface, and the areas of Rock outcrop.

This unit is not grazeable by livestock because of the steepness of slope.

This unit is in capability subclass VIIe, nonirrigated, and in the Mountain Very Steep Stony Loam (Douglas-fir) woodland site.

**21—Croydon loam, 8 to 30 percent slopes.** This deep, well drained, moderately slowly permeable soil is on foot slopes. It is between Winter Quarts Canyon and Boardinghouse Canyon, south of Scofield. It formed in alluvium derived dominantly from shale and sandstone. Slopes are about 300 to 400 feet long, are concave to convex, and mostly have east aspect. The present vegetation in most areas is mainly quaking aspen, blue wildrye, slender wheatgrass, peavine, bearded wheatgrass, and silver sagebrush. Elevation is 7,800 to 9,500 feet. The average annual precipitation is 20 to 25 inches, the average annual air temperature is 34 to 38 degrees F, and the average freeze-free period is 40 to 60 days.

Typically, the surface layer is dark yellowish brown and yellowish brown loam about 16 inches thick. The subsurface layer is very pale brown loam about 7 inches thick. The subsoil to a depth of 48 inches is light yellowish brown clay loam over weathered sandstone. Depth to weathered sandstone ranges from 40 to 60 inches or more.

Included in this unit are 5 percent soils that are similar to this Croydon soil but has about 25 percent cobbles in the surface layer and 5 percent Croydon loam that has slopes of 30 to 50 percent.

Permeability of this Croydon soil is moderately slow. Available water capacity is 7 to 9 inches. Water supplying capacity is 16 to 18 inches. Effective rooting depth is 40 to 60 inches or more. The organic matter content of the surface layer is 5 to 10 percent. Runoff is slow, and the hazard of water erosion is slight.

This unit is used as rangeland, woodland, and wildlife habitat and for urban development.

The potential vegetation on the Croydon soil includes an overstory of aspen with a canopy of 40 percent. The understory vegetation is 65 percent grasses, 15 percent forbs, and 20 percent shrubs. Among the important plants are slender wheatgrass, Columbia needlegrass, Thurber fescue, and quaking aspen.

This unit is well suited to the production of aspen. The site index for aspen ranges from 60 to 80. Production of aspen is about 40 cubic feet per year. Minimizing the risk of erosion is essential in harvesting timber. The main limitation for the harvesting of wood products is the steepness of slope.

The suitability of this unit for grazing is good. Management practices that maintain or improve the rangeland vegetation include proper grazing use, a planned grazing system, and proper location of water developments. If the desirable forage plants are mostly depleted, burning can be used to improve the rangeland vegetation.

The suitability for rangeland seeding is poor. The main limitation is competition from aspen.

This map unit is in capability subclass VIe, nonirrigated, and in High Mountain Loam (Aspen) woodland site.

**22—Croydon loam, 30 to 50 percent slopes.** This deep, well drained, moderately slowly permeable soil is on mountain slopes in the vicinity of Pleasant Valley. It formed in alluvium and colluvium derived dominantly from sandstone and shale. Slopes are 100 to 200 feet long, are concave to convex, and have north and east aspects. The present vegetation in most areas is mainly quaking aspen, snowberry, blue wildrye, slender wheatgrass, and peavine. Elevation is 7,800 to 9,500 feet. The average annual precipitation is 20 to 25 inches, the average annual air temperature is 34 to 38 degrees F, and the average freeze-free season is 40 to 60 days.

Typically, the surface layer is dark yellowish brown and yellowish brown loam about 16 inches thick. The subsurface layer is very pale brown loam about 7 inches thick. The subsoil to a depth of 48 inches is light yellowish brown clay loam over weathered sandstone. Depth to sandstone ranges from 40 to 60 inches or more.

Included in this unit are about 5 percent Uinta family soils under conifers and small areas of a soil that is about 10 inches thick over sandstone. Also included are small areas of Croydon loam that has slopes of 8 to 30 percent and Trag stony loam.

Permeability of this Croydon soil is moderately slow. Available water capacity is about 7 to 9 inches. Water supplying capacity is 16 to 18 inches. Effective rooting depth is 40 to 60 inches or more. The organic matter content of the surface layer is 5 to 10 percent. Runoff is rapid, and the hazard of water erosion is severe.

This unit is used as rangeland, woodland, and wildlife habitat.

The vegetation on the Croydon soil includes an overstory of aspen with a canopy of 60 percent. The understory vegetation is 65 percent grasses, 15 percent forbs, and 20 percent shrubs. Among the important plants are slender wheatgrass, Columbia needlegrass, Thurber fescue, and quaking aspen.

This unit is well suited to the production of aspen. The site index for aspen ranges from 60 to 80. Production of aspen is about 40 cubic feet per acre per year. This unit is severely limited for the harvesting of wood products because of the steepness of slope and the hazard of erosion. If wood products are harvested, care should be taken to minimize the risk of erosion. Proper design of road drainage systems is essential.

The suitability of this unit for grazing is good. Management practices that maintain or improve the rangeland vegetation include proper grazing use, a planned grazing system, and proper location of water developments. If the desirable forage plants are mostly depleted, burning can be used to improve the rangeland vegetation.

The suitability of this unit for rangeland seeding is poor because of the steepness of slope and competition from aspen.

This unit is in capability subclass VIIe, nonirrigated, and in High Mountain Loam (Aspen) woodland site.

**23—Curecanti family-Pathead complex.** This map unit is on mountain slopes in the area of Price Canyon. Slopes are 40 to 70 percent, 300 to 400 feet long, and plane to concave. Elevation is 7,000 to 9,000 feet. The average annual precipitation is about 16 to 20 inches, the average annual air temperature is 38 to 45 degrees F, and the average freeze-free period is 60 to 100 days.

This unit is 30 percent Curecanti family loam, 50 to 70 percent slopes; 25 percent Pathead extremely bouldery fine sandy loam, 40 to 70 percent slopes; 25 percent Pathead extremely stony loam, 50 to 70 percent slopes; and 20 percent other soils. About 10 percent of the unit has slopes of 40 to 50 percent. The Curecanti family soil has southwest and southeast aspects and is along small stabilized drainageways, and the other soils are intermingled throughout the unit.

Included in this unit are about 10 percent Perma family soils in drainageways, 7 percent Midfork family soils that have slopes of 50 to 70 percent and are in the deeper drainageways, and small areas of Senchert family soils in concave areas.

The Curecanti family soil is very deep and well drained. It formed in colluvium derived dominantly from sandstone and shale. The present vegetation is mainly Gambel oak, snowberry, slender wheatgrass, and Sandberg bluegrass.

Typically, the upper part of the surface layer is dark grayish brown loam about 7 inches thick and the lower part is brown very stony loam about 8 inches thick. The subsurface layer is very pale brown very stony loam about 5 inches thick. The subsoil to a depth of 60 inches or more is pale brown very stony loam.

Permeability of the Curecanti family soil is moderate. Available water capacity is about 5.0 to 6.5 inches. Water supplying capacity is 8 to 12 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 3 to 5 percent. Runoff is rapid, and the hazard of water erosion is severe.

The Pathead extremely bouldery fine sandy loam is moderately deep and well drained. It formed in colluvium derived dominantly from sandstone and shale. The present vegetation is mainly curlleaf mountainmahogany, Salina wildrye, and Gambel oak.

Typically, the surface layer is pale brown extremely bouldery fine sandy loam about 4 inches thick. The underlying material to a depth of 38 inches is pale brown and very pale brown very stony fine sandy loam. Depth to hard sandstone ranges from 20 to 40 inches.

Permeability of this Pathead soil is moderate. Available water capacity is about 1.3 to 3.0 inches. Water supplying capacity is 4.0 to 8.5 inches. Effective rooting depth is 20 to 40 inches. The organic matter content of the surface layer is 1 to 3 percent. Runoff is rapid, and the hazard of water erosion is slight.

The Pathead extremely stony loam is moderately deep and well drained. It formed in colluvium derived dominantly from sandstone and shale. The present vegetation is mainly Salina wildrye, black sagebrush, and winterfat.

Typically, the surface layer is brown extremely stony loam about 3 inches thick. The underlying material to a depth of 26 inches is pale brown very cobbly loam. Sandstone is at a depth of 20 to 40 inches.

Permeability of this Pathead soil is moderate. Available water capacity is about 1 to 2 inches. Water supplying capacity is 3.5 to 5.5 inches. Effective rooting depth is 20 to 40 inches. The organic matter content of the surface layer is 1 to 3 percent. Runoff is rapid, and the hazard of water erosion is slight.

This unit is used as rangeland, wildlife habitat, and recreation areas.

The potential plant community on the Curecanti family soil is 35 percent grasses, 10 percent forbs, and 55 percent shrubs. Among the important plants are Gambel oak, snowberry, and bluegrass.

This soil is not grazeable by livestock because of the steepness of slope.

The potential vegetation on the Travessilla soil includes an overstory of pinyon and Utah juniper with a canopy of 60 percent. The understory vegetation is 15 percent grasses, 10 percent forbs, and 75 percent shrubs. Among the important plants are pinyon, Utah juniper, birchleaf mountainmahogany, and Mexican cliffrose.

The site index for pinyon and Utah juniper is 32. Average yield is 4 cords of wood per acre. The potential for production of posts or Christmas trees is poor.

This unit is severely limited for the harvesting of wood products because of the steepness of slope and the hazard of erosion. If wood products are harvested, the slash should be left scattered on the surface to protect the soil from erosion.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, a planned grazing system, and proper location of water developments. If the pinyon and Utah juniper are thinned, the desirable plants present can be expected to increase for a short period before the pinyon and Utah juniper revegetate the unit.

The suitability of this soil for rangeland seeding is very poor because of the shallow soil depth. It is not practical to revegetate large areas of rangeland. For critical erosion control, small areas can be mechanically treated and seeded.

The Nelman and Travessilla soils are in capability subclass VIIs, nonirrigated, and Rock outcrop is in capability subclass VIIIs. The Nelman soil is in the Upland Loam (Basin Big Sagebrush) range site. The Travessilla soil is in the Upland Shallow Loam (Pinyon-Utah Juniper) woodland site. Rock outcrop is not placed in a range or woodland site.

**71—Pathead extremely bouldery fine sandy loam, 40 to 70 percent slopes.** This moderately deep, well drained soil is on mountain slopes and canyonsides. It is in the areas of Range Creek, Rock Creek, Whitmore Canyon, and Price Canyon. It formed in colluvium derived dominantly from sandstone and shale. Slopes are 100 to 200 feet long and have south aspects. The present vegetation in most areas is mainly curlleaf mountainmahogany, pinyon, juniper, Salina wildrye, and serviceberry. Elevation is 7,500 to 9,000 feet. The average annual precipitation is 16 to 20 inches, the average annual air temperature is 38 to 45 degrees F, and the average freeze-free period is 60 to 100 days.

Typically, the surface layer is pale brown extremely bouldery fine sandy loam about 4 inches thick. The underlying material to a depth of 38 inches is pale brown and very pale brown very stony fine sandy loam. Depth to bedrock ranges from 20 to 40 inches.

Included in this unit are about 15 percent Perma soils that have slopes of 60 to 80 percent; 10 percent Comodore soils; and small areas of Senchert loam and Rock outcrop. The soils are in concave areas.

Permeability of this Pathead soil is moderate. Available water capacity is about 1.5 to 3.0 inches. Water supplying capacity is 4.0 to 8.5 inches. Effective rooting depth is 20 to 40 inches. The organic matter content of the surface layer is 1 to 3. Runoff is rapid, and the hazard of water erosion is moderate.

This unit is used as rangeland, wildlife habitat, and recreation areas.

The potential plant community on the Pathead soil is 35 percent grasses, 15 percent forbs, and 50 percent shrubs. Among the important plants are curlleaf mountainmahogany, Salina wildrye, and snowberry.

This unit is not grazeable by livestock because of the steepness of slope.

This map unit is in capability subclass VIIe, nonirrigated, and in the Mountain Very Steep Stony Loam (Curlleaf Mountainmahogany) range site.

**72—Pathead-Curecanti family association.** This map unit is on mountain slopes. It is in the Spring Canyon and Gordon Creek areas, west of Helper. Slopes are 50 to 70 percent, 300 to 400 feet long, and convex. Elevation is 6,800 to 9,000 feet. The average annual precipitation is about 16 to 20 inches, the average annual air temperature is 38 to 45 degrees F, and the average freeze-free period is 60 to 100 days.

This unit is 40 percent Pathead extremely stony loam, 50 to 70 percent slopes; 30 percent Curecanti family loam, 50 to 70 percent slopes; and 30 percent other soils and miscellaneous areas. The Pathead soil is on ridges and shoulders, and the Curecanti family soil generally has north aspects and is in drainageways.

Included in this unit are about 8 percent Podo cobbly loam, 7 percent Midfork family soils, and small areas of Pathead extremely bouldery fine sandy loam, Podo very bouldery sandy loam, Senchert loam, and Rock outcrop.

The Pathead soil is moderately deep and well drained. It formed in colluvium derived dominantly from sandstone and shale. The present vegetation is mainly Salina wildrye, low gray sage, and winterfat. Typically, the surface layer is brown extremely stony loam about 3 inches thick. The underlying material is pale brown very cobbly loam to a depth of 26 inches. Sandstone is at a depth of 20 to 40 inches.

Permeability of the Pathead soil is moderate. Available water capacity is about 1 to 2 inches. Water supplying capacity is 3.5 to 6.5 inches. Effective rooting depth is 20 to 40 inches. The organic matter content of the surface layer is 1 to 3 percent. Runoff is rapid, and the hazard of water erosion is high.

The Curecanti family soil is very deep and well drained. It formed in colluvium derived dominantly from sandstone and shale. The present vegetation is mainly Gambel oak, snowberry, Kentucky bluegrass, and aspen peavine. Typically, the upper part of the surface layer is dark grayish brown loam about 7 inches thick and the lower part is brown very stony loam about 8 inches thick.

The subsurface layer is very pale brown very stony loam about 5 inches thick. The subsoil to a depth of 60 inches or more is pale brown very stony loam.

Permeability of the Curecanti family soil is moderate. Available water capacity is about 5.0 to 6.5 inches. Water supplying capacity is 8 to 12 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 3 to 5 percent. Runoff is rapid, and the hazard of water erosion is high.

This unit is used as wildlife habitat and rangeland.

The potential plant community on the Pathead soil is 60 percent grasses, 15 percent forbs, and 25 percent shrubs. Among the important plants are Salina wildrye, prairie junegrass, bluegrass, and snowberry.

This soil is not grazeable by livestock because of the steepness of slope and the hazard of erosion.

The potential plant community on the Curecanti family soil is 35 percent grasses, 10 percent forbs, and 55 percent shrubs. Among the important plants are Gambel oak, snowberry, serviceberry, and bluegrass.

This soil is not grazeable by livestock because of the steepness of slope.

This map unit is in capability subclass VIIe, nonirrigated. The Pathead soil in the Mountain Very Steep Loam (Saline Wildrye) range site, and the Curecanti family soil is in the Mountain Very Steep Loam (Oak) range site.

**73—Penoyer Variant loam, 1 to 3 percent slopes.** This very deep, well drained soil is on valley floors. It is near Helper, Price, Wellington, and Miller Creek. It formed in alluvium derived dominantly from sandstone and shale. Slopes are about 300 to 400 feet long and are slightly concave to convex. The vegetation in areas not cultivated is mainly Indian ricegrass, galleta, and shadscale. Elevation is 5,400 to 6,000 feet. The average annual precipitation is 6 to 8 inches, the average annual air temperature is 48 to 50 degrees F, and the average freeze-free period is 115 to 140 days.

Typically, the surface layer is light brownish gray loam about 9 inches thick. The underlying material to a depth of 60 inches or more is light brownish gray very fine sandy loam, loam, and silt loam.

Included in this unit are small areas of a soil, mainly near Hiawatha Junction, that is similar to this Penoyer Variant soil but has a silty clay loam surface layer and small areas of soils that are similar to this Penoyer Variant soil but have gravelly loam below a depth of 20 to 30 inches or have a gravelly loam surface layer.

Permeability of this Penoyer Variant soil is moderate. Available water capacity is about 10 to 12 inches. Water supplying capacity is 4 to 5 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 1 to 2 percent. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is moderate.

This unit is used mainly for irrigated crops and as rangeland. It is also used for homesite and urban development.

The potential plant community on the Penoyer Variant soil is 50 percent grasses, 10 percent forbs, and 40 percent shrubs. Among the important plants are galleta, Indian ricegrass, shadscale, and winterfat.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, a planned grazing system, and proper location of water developments. Severe drought may adversely affect the production of the perennial vegetation. Partial or total removal of livestock from the range may be necessary.

It is not practical to revegetate large areas of this unit because of the low annual precipitation. For critical erosion control, small areas can be mechanically treated and seeded. Plants that may be suitable for critical area seedings are adapted native plants.

If areas of this unit are irrigated, suitable management practices include conservation cropping systems with rotations of alfalfa hay, small grain, and corn. To maintain production, crop residue should be incorporated into the soil and fertilizer should be applied.

Irrigation water can be applied by the sprinkler or flood method. Fields can be leveled.

This map unit is in capability unit IIe-2, irrigated, and in capability subclass VIIe, nonirrigated. It is in the Desert Loam range site.

**74—Penoyer Variant loam, 3 to 6 percent slopes.** This very deep, well drained soil is on alluvial fans and valley floors. It is along the Price River, extending from Helper to Wellington. It formed in alluvium derived dominantly from sandstone and shale. Slopes are 200 to 300 feet long and are concave to convex. The vegetation in areas not cultivated is mainly Indian ricegrass, galleta, and shadscale. Elevation is 5,400 to 5,900 feet. The average annual precipitation is 6 to 8 inches, the average annual air temperature is 48 to 50 degrees F, and the average freeze-free period is 115 to 140 days.

Typically, the surface layer is light brownish gray loam about 9 inches thick. The underlying material to a depth of 60 inches or more is light brownish gray very fine sandy loam, loam, and silt loam.

Included in this unit are small areas of soils that are similar to this Penoyer Variant soil but have gravelly loam below a depth of 20 to 30 inches or have a gravelly loam surface layer.

Permeability of this Penoyer Variant soil is moderate. Available water capacity is about 10 to 12 inches. Water supplying capacity is 4 to 5 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 1 to 2 percent. Runoff is medium, and the hazard of water erosion is moderate. This soil is subject to sheet erosion. Rills and shallow gullies are in many areas. The hazard of soil blowing is moderate.

The potential plant community on the Senchert family soil is 60 percent grasses, 25 percent forbs, and 15 percent shrubs. Among the important plants are Thurber fescue, mountain brome, slender wheatgrass, aspen peavine, and mountain big sagebrush.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, a planned grazing system, and proper location of water developments. If the desirable forage plants are mostly depleted, brush management and seeding can be used to improve the rangeland vegetation. Suitable brush management practices include prescribed burning, chemical spraying, and mechanical treatment.

The suitability of the Senchert family soil for rangeland seeding is good. Plants suitable for seeding include adapted native plants and smooth brome, regar brome, alfalfa, and bitterbrush.

This map unit is in capability subclass VIe, nonirrigated. The Senchert soil is in the High Mountain Stony Loam (Engelmann Spruce) woodland site. The Senchert family soil is in the High Mountain Loam (Thurber Fescue) range site.

**103—Senchert-Toze family complex.** This map unit is on north, east, and west aspects of mountain slopes. It is in the vicinity of the Patmos Head, Mount Bartles, and Jump Creek. Slopes are 15 to 35 percent. The present vegetation is mainly aspen, white fir, and Douglas-fir. Elevation is 7,500 to 9,500 feet. The average annual precipitation is about 20 to 25 inches, the average annual air temperature is 36 to 38 degrees F, and the average freeze-free period is 40 to 60 days.

This unit is 50 percent Senchert loam, clayey substratum, 15 to 30 percent slopes; 30 percent Toze family loam, 15 to 35 percent slopes; and 20 percent other soils. The Senchert soil is in plane areas, and the Toze family soil is in concave areas. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are about 5 percent soils that are similar to the Senchert soil but are 40 to 60 inches thick; 5 percent Podo gravelly sandy loam, dry, 8 to 30 percent slopes, on canyon rims; 5 percent Trag clay loam in small sagebrush parks; and 5 percent soils that are similar to the Toze family soil but have slopes of 35 to 50 percent.

The Senchert soil is moderately deep and well drained. It formed in residuum and colluvium derived dominantly from sandstone and shale. Slopes are 300 to 400 feet long and are concave. Typically, the surface is covered with a mat of partially decomposed leaves, twigs, and needles about 1 inch thick. The surface layer is very dark grayish brown loam 4 inches thick. The subsoil is grayish brown clay loam about 14 inches thick. The substratum to a depth of 25 inches is light brownish gray silty clay over calcareous sandstone. Depth to sandstone ranges from 20 to 40 inches.

Permeability of the Senchert soil is moderately slow. Available water capacity is about 3.5 to 5.0 inches. Water supplying capacity is 8.5 to 12.0 inches. Effective rooting depth is 20 to 40 inches. The organic matter content of the surface layer is 5 to 10 percent. Runoff is slow, and the hazard of water erosion is moderate.

The Toze family soil is very deep and well drained. It formed in colluvium derived dominantly from sandstone, siltstone, and shale. Slopes are 200 to 400 feet long and are concave. Typically, the surface is covered with a mat of leaves, twigs, and needles about 1 inch thick. The upper 3 inches of the surface layer is dark grayish brown loam, and the lower 22 inches is dark grayish brown loam and gravelly silt loam. The next layer is grayish brown gravelly silt loam about 8 inches thick. Below this to a depth of 60 inches or more is pale brown very gravelly fine sandy loam. A layer of calcium carbonate accumulation is at a depth of about 24 inches.

Permeability of the Toze family soil is moderate. Available water capacity is about 6 to 9 inches. Water supplying capacity is 11 to 18 inches. The organic matter content of the surface layer is 3 to 5 percent. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used as rangeland, woodland, wildlife habitat, and recreation areas.

The potential vegetation on the Senchert and Toze family soils includes an overstory of Douglas-fir with a canopy of 60 percent. The understory vegetation is 10 percent grasses, 5 percent forbs, and 85 percent shrubs. Among the important plants are sedges, mountainlover, snowberry, Oregon-grape, and quaking aspen.

The site index for aspen is 50. Average yield is about 27,200 board feet per acre of trees 12 inches in diameter or more. The unit is moderately limited for producing and harvesting wood products because of the steepness of slope, the hazard of erosion, and plant competition during the regeneration of Douglas-fir.

Management practices that maintain or improve the rangeland vegetation on this unit include proper grazing use, a planned grazing system, and proper location of water developments. The suitability for grazing is poor because of the low forage production. If the Douglas-fir is thinned, the desirable plants present can be expected to increase for a short period before Douglas-fir revegetates the unit.

This map unit is in capability subclass VIIe, nonirrigated, and in the High Mountain Loam (Douglas-fir) range site.

**104—Senchert family, 3 to 15 percent slopes.** This moderately deep, well drained soil is on rolling ridges and plateaus. It is near Steer Ridge, Bruin Point, and Patmos Head. It in formed residuum and alluvium derived dominantly from sandstone and shale. Slopes are 3 to 15 percent, 200 to 300 feet long, and slightly concave to convex. The present vegetation is mainly

mountain big sagebrush and Thurber fescue. Elevation is 8,800 to 9,700 feet. The average annual precipitation is about 20 to 30 inches, the average annual air temperature is 36 to 38 degrees F, and the average freeze-free period is 40 to 60 days.

Typically, the surface layer is dark grayish brown loam about 11 inches thick. The subsoil to a depth of 35 inches is dark grayish brown loam and clay loam over sandstone. Depth to sandstone ranges from 20 to 40 inches.

Included in this unit are about 5 percent Beje fine sandy loam intermingled throughout the unit, 5 percent soils that are similar to this Senchert family soil but are more than 40 inches deep to bedrock and are intermingled throughout the unit, 5 percent Senchert loam, 3 to 15 percent slopes, and 5 percent Toze family loam.

Permeability of this Senchert family soil is moderately slow. Available water capacity is about 5 to 7 inches. Water supplying capacity is 12 to 16 inches. Effective rooting depth is 20 to 40 inches. The organic matter content of the surface layer is 5 to 10 percent. Runoff is slow, and the hazard of water erosion is moderate.

This unit is used as rangeland and wildlife habitat.

The potential plant community on the Senchert family soil is 60 percent grasses, 25 percent forbs, and 15 percent shrubs. Among the important plants are Thurber fescue, mountain brome, slender wheatgrass, aspen peavine, and mountain big sagebrush.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, a planned grazing system, and proper location of water developments. If the desirable forage plants are mostly depleted, brush management and seeding can be used to improve the rangeland vegetation. Suitable brush management practices include prescribed burning, chemical spraying, and mechanical treatment.

The suitability of this unit for rangeland seeding is good. Plants suitable for seeding include adapted native plants and smooth brome, regar brome, alfalfa, and bitterbrush.

This map unit is in capability subclass VIe, nonirrigated, and in the High Mountain Loam (Thurber Fescue) range site.

**105—Senchert family-Senchert complex.** This map unit is on mountain slopes. It is east of Scofield Reservoir. Slopes are 30 to 40 percent, 100 to 200 feet long, and concave to convex. Elevation is 8,000 to 9,100 feet. The average annual precipitation is about 20 to 30 inches, the average annual air temperature is 36 to 38 degrees F, and the average freeze-free period is 40 to 60 days.

This unit is 40 percent Senchert family very fine sandy loam, 30 to 50 percent slopes; 35 percent Senchert loam, 30 to 50 percent slopes; and 25 percent other soils. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are about 15 percent Podo cobbly loam and 10 percent soils that are similar to the Senchert soil but have 35 percent rock fragments and are under oak.

The Senchert family soil is moderately deep and well drained. It formed in alluvium and residuum derived dominantly from calcareous sandstone. The present vegetation is mainly mountain big sagebrush, vetch, and Columbia needlegrass. Typically, the surface layer is brown very fine sandy loam about 8 inches thick. The subsoil is brown clay loam about 16 inches thick. The substratum to a depth of 27 inches is very pale brown clay loam over calcareous sandstone. Depth to sandstone ranges from 20 to 40 inches.

Permeability of the Senchert family soil is moderate. Available water capacity is about 4.0 to 5.5 inches. Water supplying capacity is 9 to 13 inches. Effective rooting depth is 20 to 40 inches. The organic matter content of the surface layer is 5 to 10 percent. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate.

The Senchert soil is moderately deep and well drained. It formed in colluvium and residuum derived dominantly from sandstone. The present vegetation is mainly aspen, snowberry, and western coneflower. Typically, the surface layer is very dark grayish brown loam about 4 inches thick. The upper part of the subsoil is brown loam about 12 inches thick, and the lower part to a depth of 35 inches is brown clay loam over sandstone. Depth to sandstone ranges from 20 to 40 inches.

Permeability of the Senchert soil is moderate. Available water capacity is about 5 to 6 inches. Water supplying capacity is 12 to 17 inches. Effective rooting depth is 20 to 40 inches. The organic matter content of the surface layer is 5 to 10 percent. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used as rangeland, woodland, wildlife habitat, recreation areas, and watershed.

The potential vegetation on the Senchert family soil is 60 percent grasses, 25 percent forbs, and 15 percent shrubs. Among the important plants are Thurber fescue, mountain brome, slender wheatgrass, mountain big sagebrush, and aspen peavine.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, a planned grazing system, and proper location of water developments. If the desirable forage plants are mostly depleted, brush management and seeding can be used to improve the rangeland vegetation. Suitable brush management practices include prescribed burning, chemical spraying, and mechanical treatment.

The suitability of this soil for rangeland seeding is good. Plants suitable for seeding include adapted native

plants and smooth brome, regar brome, alfalfa, and bitterbrush.

The vegetation on the Senchert soil includes an overstory of aspen with a canopy of 40 percent. The understory vegetation is 65 percent grasses, 15 percent forbs, and 20 percent shrubs. Among the important plants are slender wheatgrass, Columbia needlegrass, Thurber fescue, and quaking aspen.

This soil is well suited to the production of aspen. The site index for aspen ranges from 60 to 80. The unit can produce about 40 cubic feet of aspen wood products per acre per year. This unit is severely limited for the harvesting of wood products because of the steepness of slope and the hazard of erosion.

The suitability of this soil for grazing is only fair because of the steepness of slope. Management practices that maintain or improve the rangeland vegetation include proper grazing use, a planned grazing system, and proper location of water developments. If the desirable forage plants are mostly depleted, burning can be used to improve the rangeland vegetation.

The suitability of this soil for rangeland seeding is poor. The main limitations are competition from aspen and steepness of slope.

This map unit is in capability subclass VIIe, nonirrigated. The Senchert family soil is in the High Mountain Loam (Thurber Fescue) range site. The Senchert soil is in the High Mountain Loam (Aspen) woodland site.

**106—Sheepcan-Podo-Rock outcrop complex.** This map unit is on mountain slopes along the northern side of Minniemaud Creek. Slopes are 40 to 60 percent. Elevation is 7,000 to 8,500 feet. The average annual precipitation is 15 to 18 inches, the average annual air temperature is 38 to 45 degrees F, and the average freeze-free period is 70 to 100 days.

This unit is 35 percent Sheepcan stony loam, 40 to 70 percent slopes, eroded, in the lower lying areas; 25 percent Podo gravelly loam, dry, 40 to 60 percent slopes, eroded, in the higher lying areas; 15 percent Rock outcrop intermingled with the areas of the Podo soil; and 25 percent other soils and miscellaneous areas. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are about 8 percent Pathead gravelly loam; 5 percent Guben extremely bouldery fine sandy loam, 50 to 80 percent slopes; 5 percent Shupert gravelly loam; and small areas of Datino Variant extremely stony fine sandy loam, Cabba family bouldery loam, 40 to 70 percent slopes, and Badland.

The Sheepcan soil is very deep and well drained. It formed in colluvium derived dominantly from sandstone and shale of the Green River Formation. About 20 percent of this soil has slopes of 40 to 50 percent. Slopes are 100 to 200 feet long, are concave to convex, and have south aspect. The present vegetation in most areas is mainly big sagebrush, Utah juniper, Rocky mountain juniper, and antelope bitterbrush. Typically, the surface layer is light yellowish brown stony loam about 9 inches thick. The upper 19 inches of the underlying material is light gray and pale yellow gravelly clay loam and cobbly clay loam, and the lower part to a depth of 60 inches or more is white very cobbly clay loam.

Permeability of the Sheepcan soil is moderately slow. Available water capacity is 6.0 to 7.5 inches. Water supplying capacity is 8.5 to 11.0 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 1 to 3 inches. Runoff is medium, and the hazard of water erosion is high.

The Podo soil is shallow and well drained. It formed in residuum and colluvium derived dominantly from shale of the Green River Formation. About 20 percent of this soil has slopes of 40 to 50 percent. Slopes are 200 to 300 feet long, are concave to convex, and have south aspect. The present vegetation in most areas is mainly Salina wildrye, curlleaf mountainmahogany, Utah juniper, pinyon, and Douglas-fir. Typically, the surface layer is pale brown gravelly loam about 1 inch thick. The underlying material to a depth of 8 inches is pale brown gravelly loam over hard shale. Depth to bedrock ranges from 8 to 20 inches.

Permeability of the Podo soil is moderately rapid. Available water capacity is about 1 to 2 inches. Water supplying capacity is 2 to 4 inches. Effective rooting depth is 8 to 20 inches. The organic matter content of the surface layer is 1 to 3 percent. Runoff is rapid, and the hazard of water erosion is high.

Rock outcrop consists of exposures of bedrock in the form of steep and very steep escarpments and ridges. The rock is sandstone, siltstone, and shale. These areas are mostly barren; however, enough soil material has collected in small depressional areas, crevices, and cracks to support some grasses and stunted trees and shrubs.

This unit is used as rangeland, woodland, wildlife habitat, and recreation areas.

The potential plant community on the Sheepcan soil is 60 percent grasses, 15 percent forbs, and 25 percent shrubs. Among the important plants are Salina wildrye, prairie junegrass, snowberry, and serviceberry.

This soil is not grazeable by livestock because of the steepness of slope and the hazard of erosion.

The potential vegetation on the Podo soil includes an overstory of pinyon, Utah juniper, and Douglas-fir with a canopy of 30 percent. The understory vegetation is 10 percent grasses, 15 percent forbs, and 75 percent shrubs. Among the important plants are birchleaf mountainmahogany, Utah serviceberry, bluegrass, and Salina wildrye.

The site index for pinyon and Utah juniper is 37. Average yield is 6 cords of wood per acre. The potential for the production of posts or Christmas trees is poor.

Harvesting of wood products is severely limited by the steepness of slope, the hazard of erosion, and rock fragments on the surface.

This soil is not grazeable by livestock because of the steepness of slope and the stoniness of the surface layer.

The Sheepcan and Podo soils are in capability subclass VIIe, nonirrigated, and the Rock outcrop is in capability subclass VIIIs. The Sheepcan soil is in the Mountain Very Steep Loam (Saline Wildrye) range site, and the Podo soil is in the Upland Very Steep Shallow Loam (Pinyon-Utah Juniper) woodland site. The Rock outcrop is not placed in a range site or a woodland site.

**107—Shupert-Winetti complex.** This map unit is on narrow valley and canyon floors in the Book Cliffs and in an area northwest of Price and east of Sunnyside. Slopes are 1 to 8 percent, 100 to 200 feet long, and concave. The present vegetation in most areas is mainly basin big sagebrush, rabbitbrush, cheatgrass, needleandthread, and dropseed. Elevation ranges from 4,600 to 7,200 feet but commonly is 5,200 to 6,400 feet. The average annual precipitation is 12 to 16 inches, the average annual air temperature is 43 to 45 degrees F, and the average freeze-free period is 80 to 100 days.

This unit is 40 percent Shupert gravelly loam, 1 to 8 percent slopes; 35 percent Winetti bouldery sandy loam, 1 to 8 percent slopes; and 25 percent other soils. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are about 15 percent Haverdad loam on toe slopes, 5 percent Glenberg family very fine sandy loam on toe slopes at lower elevations, and 5 percent soils that are similar to the Winetti soil but are along the stream channels and support riparian vegetation.

The Shupert soil is very deep and well drained. It formed in alluvium derived dominantly from sandstone and shale. Typically, the surface layer is pale brown gravelly loam about 3 inches thick. The next layer is pale brown clay loam about 6 inches thick. Below this to a depth of 60 inches or more is light brownish gray and light yellowish brown clay loam.

Permeability of the Shupert soil is moderately slow. Available water capacity is about 10.0 to 11.5 inches. Water supplying capacity is 6.5 to 10.0 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 1 to 2 percent. Runoff is slow, and the hazard of water erosion is moderate. This soil is subject to flooding during prolonged, high-intensity storms. Channeling and deposition are common along streambanks.

The Winetti soil is very deep and well drained. It formed in alluvium derived dominantly from sandstone and shale. Typically, the surface layer is grayish brown bouldery sandy loam about 6 inches thick. The next layer is pale brown loam about 5 inches thick. The next layer is pale brown and brown very bouldery loam about 23 inches thick. Below this to a depth of 60 inches or more is pale brown very gravelly sandy loam.

Permeability of the Winetti soil is moderately rapid. Available water capacity is about 4.0 to 5.5 inches. Water supplying capacity is 4.5 to 8.0 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 1 to 3 percent. Runoff is slow, and the hazard of water erosion is slight. This soil is subject to flooding during prolonged, high-intensity storms. Channeling and deposition are common along streambanks.

This unit is used mainly as rangeland and wildlife habitat. It is also used for irrigated crops.

The potential plant community on the Shupert and Winetti soils is 60 percent grasses, 10 percent forbs, and 30 percent shrubs. Important plants are basin wildrye, western wheatgrass, basin big sagebrush, and rubber rabbitbrush.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, a planned grazing system, and proper location of water developments. If the desirable forage plants are mostly depleted, brush management and rangeland seeding can be used to improve the rangeland vegetation. Suitable brush management practices include prescribed burning, chemical spraying, and mechanical treatment.

The suitability of this unit for rangeland seeding is good. Plants suitable for seeding include adapted native plants and Russian wildrye, crested wheatgrass, and ladak alfalfa.

This map unit is in capability unit IIIe-3, irrigated, and in capability subclass VIIe, nonirrigated. It is in the Loamy Bottom range site.

**108—Silas loam.** This very deep, somewhat poorly drained soil is in narrow alluvial valleys. It is in Pleasant Valley, north of Scofield, and in Emma Park, near Willow Creek. It formed in alluvium derived dominantly from sandstone and shale of the Price River and Black Hawk Formations. Slopes are 0 to 3 percent, 100 to 200 feet long, and concave to convex. The present vegetation in most areas is mainly Kentucky bluegrass, wiregrass, carex, and arrowgrass. Elevation is 7,200 to 7,700 feet. The average annual precipitation is 16 to 20 inches, the average annual air temperature is 38 to 45 degrees F, and the average freeze-free period is 60 to 80 days.

Typically, the surface layer is dark grayish brown loam about 28 inches thick. The next layer is grayish brown loam about 15 inches thick. Below this to a depth of 60 inches or more is light brownish gray sandy clay loam. Mottles are at a depth of 28 to 60 inches.

Included in this unit are about 10 percent tuffaceous material that originated from the sulfur spring in the area where the railroad crosses the highway and extends north to Scofield Reservoir and about 5 percent Brycan

loam on alluvial fans at the foot of the mountain slopes. Also included are small areas of soils that are similar to this Silas soil but are poorly drained and are adjacent to Scofield Reservoir and in low areas.

Permeability of this Silas soil is moderate. Available water capacity is about 9 to 11 inches. Effective rooting depth is 60 inches or more for water-tolerant plants but is limited to 20 to 40 inches for non-water-tolerant plants. The organic matter content of the surface layer is 5 to 10 percent. Runoff is slow, and the hazard of water erosion is none.

This unit is used for irrigated pasture, grass hay, rangeland, and wildlife habitat.

The potential plant community on the Silas soil is 65 percent grasses, 15 percent forbs, and 20 percent shrubs. Among the important plants are sedges, tufted hairgrass, willow, shrubby cinquefoil, and clover.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, a planned grazing system, and proper location of water developments.

The suitability of this unit for grazing is good. The main limitations are the high water table and potential water pollution. Livestock grazing should be managed to protect the streambanks from excessive erosion.

This map unit is in capability subclass VIw, nonirrigated, and in the Mountain Meadow range site.

**109—Silas-Brycan loams.** This map unit is in narrow alluvial valleys and fans. It is in Pleasant Valley, along Mud Creek; along the Price River, below Scofield Reservoir; along Beaver Creek; and at the head of Jump Creek. Slopes are 0 to 8 percent. Elevation is 7,700 to 8,600 feet. The average annual precipitation is 16 to 20 inches, the average annual air temperature is 38 to 45 degrees F, and the average freeze-free period is 60 to 80 days.

This unit is 65 percent Silas loam, wet, 0 to 3 percent slopes; 20 percent Brycan loam, 3 to 8 percent slopes; and 15 percent other soils. The Silas soil is in low areas adjacent to the stream channel, and the Brycan soil is on alluvial fans adjacent to the narrow alluvial valleys. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of soils that are similar to the Silas soil but are poorly drained; soils that are similar to the Silas soil but have slopes of 3 to 6 percent; flooded areas of soils, adjacent to streams, that have a loamy very fine sand surface layer 8 to 12 inches thick; and soils that are similar to the Brycan soil but are about 30 percent pebbles throughout.

The Silas soil is very deep and somewhat poorly drained. It formed in alluvium derived dominantly from sandstone and shale of the Black Hawk Formation. Slopes are 300 to 500 feet long and are plane to concave. The present vegetation in most areas is mainly silver sagebrush, bluegrasses, sedges, wiregrass, and scattered Colorado blue spruce. Typically, the surface layer is dark grayish brown loam about 28 inches thick. The next layer is grayish brown loam about 15 inches thick. Below this to a depth of 60 inches or more is light brownish gray sandy clay loam. Mottles are at a depth of 28 to 60 inches. A water table fluctuates between depths of 20 and 25 inches in spring and between depths of 35 and 45 inches during the drier season. In some areas this soil is about 20 percent pebbles and cobbles at a depth of 36 inches. In some areas this soil is stratified. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Permeability of the Silas soil is moderate. Available water capacity is about 9 to 11 inches. Effective rooting depth is 60 inches or more for water-tolerant plants but is limited to 18 to 24 inches for non-water-tolerant plants. The organic matter content of the surface layer is 5 to 10 percent. Runoff is slow, and the hazard of water erosion is none.

The Brycan soil is very deep and well drained. It formed in alluvium derived dominantly from sandstone and shale of the Black Hawk Formation. Slopes are 100 to 200 feet long and are plane to convex. The present vegetation in most areas is mainly mountain big sagebrush and rabbitbrush. Typically, the surface layer is dark grayish brown and brown loam 12 inches thick. The subsoil is brown loam 20 inches thick. The substratum to a depth of 60 inches or more is brown silt loam.

Permeability of the Brycan soil is moderately slow. Available water capacity is about 9.0 to 10.5 inches. Water supplying capacity is 10 to 16 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 2 to 4 percent. Runoff is medium, and the hazard of water erosion is moderate.

Most areas of this unit are used for irrigated pasture, rangeland, and wildlife habitat. A few areas are used for urban development.

The potential plant community on the Silas soil is 65 percent grasses, 15 percent forbs, and 20 percent shrubs. Among the important plants are sedges, tufted hairgrass, willow, shrubby cinquefoil, and clover.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, a planned grazing system, and proper location of water developments.

The suitability of the Silas soil for grazing is good. The main limitations are the fluctuating water table and the potential for pollution of water. Livestock grazing should be managed to protect the streambanks from erosion. If possible no other revegetation practices should be applied because this soil is a critical wildlife area.

The potential plant community on the Brycan soil is 60 percent grasses, 10 percent forbs, and 30 percent shrubs. Among the important plants are bluebunch

wheatgrass, Letterman needlegrass, Salina wildrye, mountain big sagebrush, and snowberry.

If the desirable forage plants are mostly depleted, brush management and rangeland seeding can be used to improve the rangeland vegetation. Suitable brush management practices include prescribed burning, chemical spraying, and mechanical treatment.

The suitability of the Brycan soil for rangeland seeding is good. Plants suitable for seeding include those native to the soil and intermediate wheatgrass, smooth brome, regar brome, slender wheatgrass, and alfalfa. The suitability of this soil for grazing is good.

This map unit is in capability subclass VIw, nonirrigated. The Silas soil is in the Mountain Meadow range site. The Brycan soil is in the Mountain Loam (Saline Wildrye) range site.

**110—Stormitt gravelly sandy clay loam, 3 to 10 percent slopes.** This very deep, well drained soil is on benches near Helper, Price, and the Carbon-Emery county line. It formed in glacial outwash derived dominantly from sandstone, quartzite, and shale. Slopes are 200 to 400 feet long and are concave to convex. The present vegetation in most areas is mainly galleta, shadscale, black sagebrush, and Indian ricegrass. Elevation is 5,450 to 6,200 feet. The average annual precipitation is 8 to 10 inches, the average annual air temperature is 47 to 49 degrees F, and the average freeze-free period is 110 to 135 days.

Typically, the surface layer is pale brown gravelly sandy clay loam about 1 inch thick. The subsoil is light yellowish brown and brownish yellow gravelly sandy clay loam about 8 inches thick. The substratum to a depth of 60 inches or more is very pale brown very cobbly sandy clay loam. In some areas the surface layer has been lost through erosion.

Included in this unit are about 5 percent Minchey loam in draws and 5 percent soils that are similar to this Stormitt soil but are 20 to 40 inches deep to sandstone and are on ridges.

Permeability of this Stormitt soil is moderate. Available water capacity is about 5 to 7 inches. Water supplying capacity is 3.5 to 5.5 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 1 to 2 percent. Runoff is moderate, and the hazard of water erosion is slight. In places shallow gullies have formed.

This unit is used as rangeland in spring and fall.

The potential plant community on the Stormitt soil is 35 percent grasses, 10 percent forbs, and 55 percent shrubs. Among the important plants are Wyoming big sagebrush, Indian ricegrass, galleta, and needleandthread.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, a planned grazing system, and proper location of water developments.

The suitability of this unit for rangeland seeding is poor. The main limitations are the stoniness of the soil and the low annual precipitation. Plants suitable for seeding include those native to the unit and crested wheatgrass, pubescent wheatgrass, and prostrate kochia.

This map unit is in capability subclass VIIs, nonirrigated, and in the Semidesert Gravelly Loam (Wyoming Big Sagebrush) range site.

**111—Stormitt-Minchey complex.** This map unit is on benches and mesas near Price, Wellington, and the Carbon-Emery county line. Slopes are 1 to 10 percent. The present vegetation in most areas is mainly galleta, shadscale, Wyoming big sagebrush, and Indian ricegrass. Elevation is 5,500 to 6,000 feet.

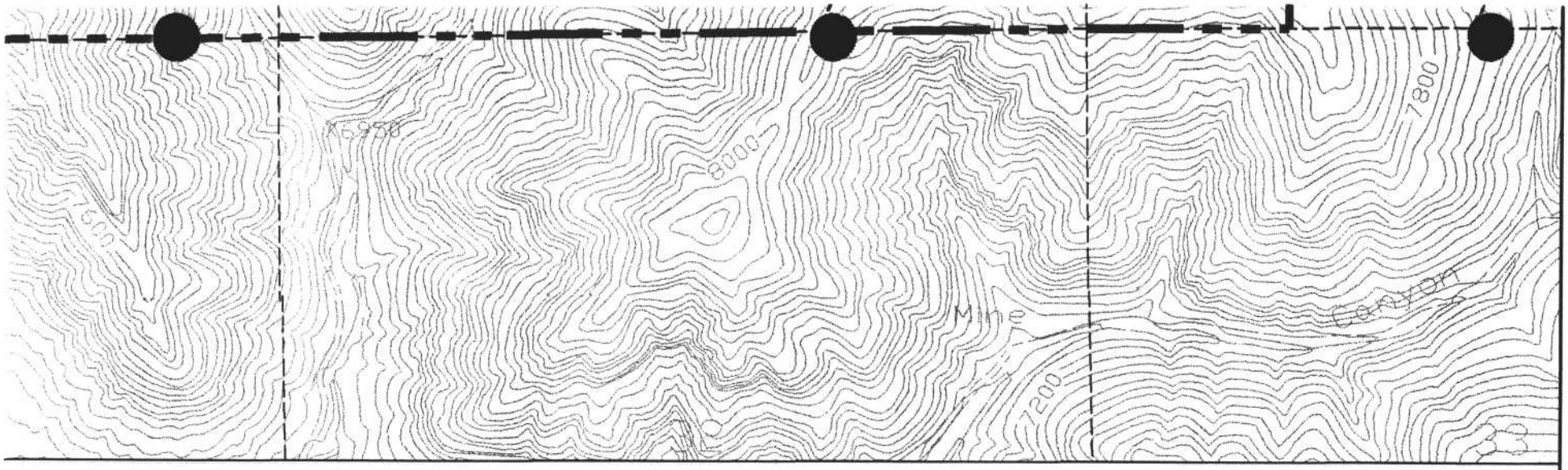
This unit is 55 percent Stormitt gravelly sandy clay loam, 3 to 10 percent slopes, eroded; 35 percent Minchey loam, 1 to 3 percent slopes; and 10 percent other soils. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit is about 10 percent Mivida very fine sandy loam.

The Stormitt soil is very deep and well drained. It formed in glacial outwash derived dominantly from sandstone, shale, and quartzite. Slopes are 100 to 300 feet long and are concave to convex. The average annual precipitation is 8 to 10 inches, the average annual air temperature is 47 to 49 degrees F, and the average freeze-free period is 110 to 135 days. Typically, the surface layer is pale brown gravelly sandy clay loam about 1 inch thick. The subsoil is light yellowish brown and brownish yellow gravelly sandy clay loam about 8 inches thick. The substratum to a depth of 60 inches or more is very pale brown very cobbly sandy clay loam. In some areas the surface layer has been lost through erosion.

Permeability of the Stormitt soil is moderate. Available water capacity is about 5 to 7 inches. Water supplying capacity is 4 to 5 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 1 to 2 percent. Runoff is moderate, and the hazard of water erosion is medium. In places shallow gullies have formed.

The Minchey soil is very deep and well drained. It formed in moderately fine textured glacial outwash derived dominantly from sandstone, quartzite, and shale. Slopes are 200 to 400 feet long and are convex. The average annual precipitation is 6 to 8 inches, the average annual air temperature is 48 to 50 degrees F, and the average freeze-free period is 115 to 140 days. Typically, the surface layer is pale brown loam 3 inches thick. The next layer is brown, pale brown, or very pale brown clay loam or sandy clay loam about 29 inches thick. Below this to a depth of 60 inches or more is pale



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**Canyon Fuel Company, LLC**
Soldier Canyon & Dugout Canyon Mines

# NATIVE SOIL TYPES PRESENT IN DUGOUT CANYON MINE PERMIT AREA

## Dugout Canyon Mine

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# BIOLOGY

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# CHAPTER 3
# BIOLOGY

## 310 INTRODUCTION

This chapter presents a description of the biological resources found on the Dugout Canyon permit and adjacent areas. 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.

The data used in preparation of this chapter have been gathered from the Sage Point-Dugout Canyon Mining and Reclamation Plan, Soldier Creek Coal Company Mining and Reclamation Plan, Environmental Research and Technology, Inc., Utah Division of Wildlife Resource (UDWR), Utah State Fish and Game, Eureka Energy Company (Nicolas Temnikov and Christopher A. Slaboszewicz), Soil Survey of Carbon Area, Utah, aerial photography, and Natural Gas Corporation of California.

### 311 Vegetative, Fish and Wildlife Resources

Vegetative, fish, and wildlife resource conditions in and adjacent to the proposed Dugout Canyon Mine are discussed in Section 320.

### 312 Potential Impact to Vegetative, Fish and Wildlife Resources

Potential impacts to vegetative, fish, and wildlife resources and the associated mitigation plan are presented in Sections 330 and 340 of this chapter.

### 313 Description of Reclamation Plan

The reclamation plan used to restore the vegetative, fish and wildlife resources to a condition suitable for the postmining land use is presented in Section 340.

# 320 ENVIRONMENTAL DESCRIPTION

## 321 Vegetation Information

This section contains the environmental descriptions of the vegetation for the permit and adjacent areas.

### 321.100 Plant Communities Within the Proposed Permit Area

Vegetation communities of the permit area were first investigated by Dr. Steven Richardson of Logan, Utah during 1979. These studies encompassed the 22,506 acres of the formerly proposed Sage Point - Dugout Canyon permit area. Dr. Richardson's studies were subsequently upgraded in 1980 by Mr. Steven R. Viert and presented in the Sage Point - Dugout Canyon permit application submitted December 8, 1980 and approved by the Division in May, 1984 (Permit No. ACT/007/009). The vegetation designations used on Plate 3-1 are a combination of their studies, aerial photography, in association with the Soil Survey of Carbon Area, Utah and field verification.

Plate 3-1 has been prepared using the following vegetation designations:

| | |
|---|---|
| Barren Ground | (B) |
| Douglas Fir | (DF) |
| Deciduous Streambank | (DS) |
| Farmland-Weeds | (FW) |
| Greasewood-Sagebrush | (GS) |
| High Shrubs | (HS) |
| Mixed Conifer | (MC) |
| Mixed Conifer-Mountain Brush | (MCMB) |
| Pinyon-Juniper | (PJ) |
| Ponderosa Pine | (PP) |
| Quaking Aspen | (QA) |
| Sagebrush | (S) |
| Shrub-Grass-Juniper | (SGJ) |
| Deciduous Stream Bank Vegetation and limited riparian vegetation (Pace and Rock Creek) | (DSR) |

As discussed in the report prepared by Mt. Nebo Scientific, the disturbed area contains riparian, rabbitbrush/yellow sweet clover, and Pinyon/Juniper vegetation designations (see Appendix 3-1).

The dominant vegetation communities occurring in the area are somewhere below the climax stage of succession. Historic livestock grazing practices have caused a decline, or disappearance, of many naturally occurring species and their replacement by others (often noxious weeds). Over several years, this effect has altered the composition of the floral communities of the area.

Other impacts to the vegetation communities of the area have resulted from the previous construction of roads. Roads and trails tend to follow drainages and have thereby impacted the riparian, sagebrush, mountain brush, and coniferous communities. Weeds usually dominate the disturbed road banks. Mining facilities constructed prior to the enactment of SMCRA displaced an additional small amount of native vegetation.

Baseline sampling by Dr. Richardson only occurred on five of the ten communities existing within the permit area. These five communities are Douglas Fir, Mixed Conifer, Pinyon-Juniper, Shrub-Grass-Juniper, and Deciduous Streambank. Quantitative descriptions of floral communities presented in this M&RP are based on the former Sage Point-Dugout Canyon permit document. Appendix 3-1 presents data for the vegetation communities discussed in this section. The adequacy of the sampling effort is indicated in Appendix 3-1.

The farmland-weeds vegetation type resulted from abandoned agricultural activities (due to lack of water) and is significant only from the standpoint that mule deer tend to feed on remaining alfalfa during the spring green-up. It should be noted that none of this community occurs within the permit boundary.

Due to multiple consultants/companies gathering vegetation data, the following table has been provided to clarify the plant communities names used by each.

| Sampling Organization | Plant Community | | | |
|---|---|---|---|---|
| Natural Resources Conservation Service | Riparian | Pinyon-Utah Juniper | Douglas-fir | Disturbed |
| Richardson/Viert Study | Deciduous Streambank | Pinyon-Juniper | Mixed Conifer and Douglas fir | N/A |
| Mt. Nebo Scientific Study | Riparian | Pinyon/Juniper | N/A | Rabbitbrush/ yellow sweet clover |
| Pat Johnston Study | Riparian | Pinyon/Utah Juniper | N/A | N/A |

Douglas Fir

The Douglas Fir community occurs on the north facing slopes at upper elevations in deeper productive soils. Floral and structural composition is that of a forest community consisting primarily of Douglas Fir with a few scattered Ponderosa pine, Rocky Mountain juniper, and quaking aspen trees in the overstory.

Ground cover of the overstory in the Douglas Fir community averages 65.0% and productivity of the trees was not determined. This community exhibits an average of 380.5 trees/ac comprised mainly of Douglas Fir (68.8% of all trees), Ponderosa pine (26.1%), and pinyon pine (4.1%). Examination of average basal diameters of the trees indicates a late-successional and mature community.

Ground cover of the understory is dominated by shrubs (18.4% cover), especially serviceberry, big sagebrush, snowberry, and creeping barberry with 4.2, 3.8, 3.8, and 2.5% cover, respectively. Grasses exhibit a sparse 0.8% cover while forbs only average 1.6% cover. Productivity of this understory totals 35.8 g/m$^2$ or approximately 320 lb/ac. Shrubs contribute 26.2 g/m$^2$ while grasses and forbs contribute 2.7 g/m$^2$ and 6.4 g/m$^2$, respectively. Creeping barberry, mountain mahogany, big sagebrush, and snowberry shrubs dominate with 7.7, 5.0, 4.9, and 4.9 g/m$^2$, respectively. The adequacy of the sampling effort is indicated in Appendix 3-1.

Mixed Conifer

The mixed conifer vegetation type is an ecotonal community which occurs on the slopes of mid-elevational canyons that cut into the Book Cliffs. Floral and structural composition is that of a forest community consisting primarily of coniferous tree species in the overstory. These overstory tree species include Douglas Fir, Rocky Mountain maple, pinyon pine, and Utah juniper.

Ground cover of the overstory in the mixed conifer community averages 24.5% with Douglas Fir, Rocky Mountain juniper, and Rocky Mountain maple trees dominating with 10.0, 5.0 and 3.5% cover, respectively. Productivity of the trees was not determined; however, the community exhibits a density of 223.7 trees/ac. Examination of average basal diameters of the trees indicates a mid- to late-successional community with young Douglas Fir trees.

Ground cover of the understory is dominated by shrubs (11.5% cover), especially snowberry and big sagebrush with 4.5 and 3.5% cover, respectively. Grasses contribute another 4.5% cover, especially western wheatgrass (3.0% cover), while forbs exhibit only 2.5% cover. Productivity of this understory totals 38.5 $g/m^2$ or approximately 345 lbs/ac. Of this total, shrubs contribute 20.2 $g/m^2$, grasses 4.9 $g/m^2$, and forbs 13.1 $g/m^2$ with big sagebrush, Louisiana sagewort, and mountain mahogany dominating (7.7, 5.9, and 3.3 $g/m^2$, respectively).

Pinyon - Juniper

The pinyon - juniper community is primarily an open woodland of mature pinyon pine and Utah juniper with very sparse understory vegetation. The community occurs mainly on mesa tops and broad alluvial deposits at the foot of the Book Cliffs, as well as on the more southern exposed slopes of the lower canyons. Pinyon - juniper is one of the most important vegetation communities for mule deer during the winter.

Ground cover of the overstory in the pinyon - juniper community averages 20.0% and productivity of the trees was not determined. This community exhibits an average of 291.1 trees/ac comprised

entirely of pinyon pine (43.0% of the trees) and Utah juniper (57.0%). Examination of average basal diameters of the trees indicates a near climax mature community.

Ground cover of the sparse understory is dominated by shrubs (5.2% cover), especially by mountain mahogany with 2.5% cover. Cover by grasses was non-existent in the sampled areas and forbs only averaged 3.4% cover with euphorbia (spurge family) the dominant forb with 2.2% of the cover. The productivity of this understory is very light with only 3.3 g/m$^2$ (30 lbs/ac) of total annual production. Black sagebrush, mountain mahogany, and buckwheat were the dominant plants with 0.7, 0.5, and 0.5 g/m$^2$, respectively.

The Pinyon-Utah Juniper community within the disturbed area boundary was surveyed during the Fall of 1997 by Patricia Johnston (see Appendix 3-1). During the survey the cover was 65.94%, with the woody species stems per acre being 2,334.4. George Cook of the Natural Resources Conservation Service (NRCS) surveyed the site to determine pre-mining productivity as defined in Item 4, Section IV, Productivity Measurements, UDOGM Vegetation Guidelines, Appendix A, February 1992. Productivity is discussed in Section 321.200.

Deciduous Streambank

The deciduous streambank community occurs only in a narrow band (usually less than 50 ft wide) along portions of Dugout Creek and other narrow valley bottoms with at least intermittent stream flows. This community differs from adjacent vegetation on canyon slopes (usually mixed conifer, Douglas fir, sagebrush, or mountain brush) in that deciduous trees and shrubs are more common on banks of stream channels. Floral and structural composition is that of a forest community consisting primarily of narrowleaf cottonwood, Rocky Mountain maple, and Douglas Fir trees in the overstory.

Total ground cover of the community averages 63.4% with 38.2, 14.6, 2.4, and 0.4% of the cover due to trees, shrubs, grasses, and forbs, respectively. Dominant trees in the overstory include Rocky Mountain maple, narrowleaf cottonwood, Douglas Fir, and water birch with 12.0, 11.3, 6.0,

and 5.3% cover, respectively. Productivity of the overstory was not determined. However, the community exhibits an average of 216.1 trees/ac. Examination of average diameters of the trees indicates a mid- to late-successional community with only fair reproduction of the overstory species.

Ground cover of the understory is dominated by shrubs (14.6% cover), especially elderberry, snowberry and Wood's rose with 3.0, 3.0 and 2.7% cover, respectively. Cover by grasses (2.4%) and to a certain degree, forbs (8.2%), is subdued because of past grazing pressure by livestock, but is still a viable component of the community. Productivity is known only for the community as a whole (102.5 g/m$^2$ or 912 lbs/ac), and despite past grazing pressures, it is still the most productive community in the area.

In Pace Creek and Rock Creek Canyons, heavy grazing and erosion has resulted in sections of the stream banks having little or no deciduous and/or riparian vegetation. The vegetation within these drainages has been identified on Plate 3-1 with the symbol DSR.

Riparian (1997)

During 1997 a study was performed on the riparian community of Dugout Creek by Patricia Johnston. The study covered approximately 2,100 feet of the creek channel. The study included the gathering of data on cover (84.83%) and woody species density (1,624.6 stems per acre) within the disturbed area boundary. George Cook of the Natural Resources Conservation Service surveyed the site to determine productivity and condition (see Section 321.200). Reports from Patricia Johnston and George Cook are included in Appendix 3-1.

The majority of the riparian vegetation and soils within the study area were disturbed during an earlier mining operation with debris evident along much of the length of Dugout Creek. As was common during early mining, the channel was most likely realigned as additional space for facilities was needed.

Shrub - Grass - Juniper

The shrub - grass - juniper vegetation type is another ecotonal community found between the greasewood - sagebrush and pinyon - juniper communities primarily on south and east facing steep rocky slopes along the base of the Book Cliffs. It can occasionally be found on upland benches

and flats. This community exhibits a greater abundance of perennial grasses than any other vegetation type found within the area.

The shrub - grass - juniper community exhibits a sparse overstory of pinyon and juniper trees (2.9% ground cover) which at maturity do not obtain the size of the trees in the pinyon - juniper community. Density of these trees only averages 57.3 trees/ac, and productivity of this sparse overstory was not measured.

The understory of this community is dominated by grasses with 9.3% ground cover, while shrubs exhibit 6.4% cover and forbs exhibit a sparse 0.4% cover. Dominant species include creeping wildrye, galleta grass, and black sagebrush with 5.4, 3.2 and 4.6% cover, respectively. Productivity of this understory totals 59.3 g/m$^2$ or 528 lbs/ac with contributions by grasses, shrubs, and forbs of 40.9, 17.1, and 1.2 g/m$^2$, respectively. Dominant plants are the same as indicated for ground cover.

Ponderosa Pine

Quantitative information for the Ponderosa pine community does not exist as it is too limited in areal extent and it has not been, nor will it be, disturbed by mine facilities. The community is present in the high canyons of the Book Cliffs usually in association with Douglas Fir and mixed conifer vegetation types. Ponderosa pine is the predominant species present; however, Douglas Fir, pinyon pine, and Utah juniper occur with less frequency. A thin growth of mountain shrubs as well as grasses and forbs similar to the mixed conifer community is present in the understory.

Quaking Aspen

Quantitative information about the aspen community was not collected due to its limited areal extent within the upland benches of the Book Cliffs; and because it has not been, nor will it be, disturbed by the mining operation. Quaking aspen is the dominant species in the overstory with

an occasional Rocky Mountain maple or Gambel's oak being present. The understory is often park like, dominated by grasses and forbs with only a few shrubs present (mainly snowberry).

Sagebrush

The sagebrush community occurs on the dip slope between 7,200 and 9,000 feet in elevation. Quantitative information was not collected for this community as no mining disturbance has occurred in the past nor is expected to occur in the future. This community often intergrades with other communities, making delineation difficult in certain instances. However, big sagebrush (usually the subspecies mountain big sagebrush) is the dominant species in the community, existing in characteristically dense stands. Common species existing in the understory include lupines, wheatgrasses, bluegrasses, and scarlet gilia.

In 1996, the mean total living cover for the mine's disturbed area (Plate 3-1B) and reference area were 36.90% and 47.50% respectively (Mt. Nebo Scientific, August 1, 1996). The area surveyed by Mt. Nebo was disturbed in a previous mining operation, with no indication that reseeding was completed when mining ceased. NRCS range site descriptions/conditions indicate that the area (surveyed by Mt. Nebo) prior to disturbance was most likely Pinyon/Utah juniper - upland very steep shallow loam.

Refer to Appendix 3-1 for the 1996 Mt. Nebo report discussing the vegetation sampling done at the Dugout Canyon Mine site within the proposed disturbed area. The Mt. Nebo report discusses the vegetation cover, composition, density, reference area, and includes photographs of the transects and reference area.

### 321.200 Land Productivity Prior to Mining

The land productivity of the area to be disturbed by mining was not measured in 1925 when mining first disturbed the area. Appendix 3-1 contains additional data pertaining to vegetation.

George S. Cook of the NRCS surveyed the condition and production of the range site areas within the disturbed area boundary in 1997, his findings were as follows:

| | | | |
|---|---|---|---|
| PJ Sage | Condition - Good | Production - 800 | Potential Production - 800 |
| Riparian | Condition - Fair | Production - 1500 | Potential Production - 2200 |

The production is based on air dry weight of total herbage produced per acre. Patricia Johnston accompanied Mr. Cook. See Appendix 3-1 for a copy of the December 3, 1997 letter from Mr. Cook.

## 322 Fish and Wildlife Information

A summary of the fish and wildlife resource information for the permit and adjacent areas is contained in Sections 322.100 through 322.300. The data pertaining to wildlife in the following sections were collected by the UDWR (J. S. Burruss, L. B. Dalton, Larry J. Wilson, Ben Morris, Bill Bates), Eureka Energy Company personnel, and Environmental Research and Technology, Inc.

### 322.100 Level of Detail

The scope and level of detail within this M&RP are sufficient to design the protection and enhancement plan for wildlife and fish in the area.

This assessment of wildlife resources has been compiled pursuant to guidelines issued by the Division.

### 322.200 Site-specific Resource Information

Eight permanent experimental and four permanent control wildlife transects were established in the permit and adjacent areas by UDWR in December 1979. Appendix 3-2 contains a figure showing the transect locations. The transects were located within pinyon-juniper, desert shrub, and mixed

conifer vegetation communities; and used to monitor wildlife habitats. The wildlife habitats included in the study were small mammals, medium-sized mammals, large mammals, raptors, game birds, song birds, reptiles, and amphibians. The four permanent control transects were located in areas not proposed for disturbance by mining operations. Appendix 3-2 contains the information pertaining to the transect studies.

Macroinvertebrates and Fish

Due to the variable nature of the stream flows in the project area and the limited number of species of macroinvertebrates identified by the UDWR and the Division, further study of aquatic macroinvertebrates was not pursued.

The low importance of the streams, as a fishery resource, has categorized them as being of little value for extensive aquatic study. Therefore, detailed aquatic studies were not performed in accordance with permission from the Division in 1979 (see letter from Mary Ann Wright, Appendix 3-3).

Small Mammals

Small mammals represent a significant part of the ecosystem. The majority are herbivores and are the primary source of food for higher trophic levels, particularly raptorial birds, canids, and felids. Small mammals, including shrews, mice, voles, chipmunks, and ground squirrels were sampled with live traplines within each transect. Relative abundance was determined for each species by transect, but not by habitat type, within the individual transects. Data concerning bats were not collected during this study, however a bat survey of the riparian and disturbed area was performed in 1997 by Mark Perkins and included in Appendix 3-3.

Medium Mammals

The transect study did not attempt to make density estimates due to the extreme ecological variability of these mammals. The study did identify species and frequency of habitat use in the area.

Limited portions of Dugout Canyon provide habitats for weasels, badgers, and skunks. Even though the breeding and rearing activities of these non-migratory species and their dens and burrow systems are important to maintenance of their populations, the area to be disturbed is small and the species are widespread and adapt easily to the activities of man.

Large Mammals

Habitat use by all large mammals, other then mule deer, was determined in a quantitative manner. Plate 3-2 (confidential) exhibits the significant habitat for mule deer and elk in the area. Habitat use in the proximity of the permit area was determined by pellet group count and observation of track frequency. Pellet counts were made in late spring, following movement to summer range. Track counts were made once each month in January through May on all transects.

The area to be disturbed parallels a water source and therefore is important to all wildlife species. The fact that elk and deer utilize some portion of the permit area during the year means that all activities must be considered.

Mule deer on the mine area are considered by the UDWR to be part of Herd Unit 32 and the elk as part of Herd Unit 24. The deer utilize the entire permit area but seasonally concentrate in and utilize specific habitat types. During the summer the mule deer generally utilize all of the habitats near water. The most heavily used communities are the sage, mountain brush-mixed conifer, and the composite of aspen, mountain mahogany, manzanita, and pine/fir. There is normally more browse in these communities than in the others.

With the onset of fall and winter, the mule deer latitudinally migrate. Initially (late fall and early winter) they concentrate on the plateau area where they intermingle with the elk; but when the snow gets too deep for them to traverse they move into the low elevation sage and pinyon-juniper areas. The wintering areas for mule deer make them susceptible to road strikes in the vicinity of the proposed haul and access road for the Dugout Canyon Mine. The access roads to Pace and

Rock Canyon crosses area used by deer as winter range, however traffic is sporadic during the winter months and heavier during the summer and fall months.

Raptors

Golden eagles are a common year long resident of the area, with suitable nesting habitat spread throughout the permit area. The cooper's hawk is known to nest in the permit area.

A variety of falcons are year long residents of the area, utilizing cliffs for their nests. To date there are no known aerie sites for falcons within or immediately adjacent to the disturbed area.

Raptors were studied during the 1979 - 1980 UDWR transect study, in 1981 by Janet Lee Young and by Hayden-Wing Associates in 1984. These reports are provided in Appendix 3-3.

Raptor nest surveys were done by the UDWR in 1995, 1997, 1998, and 1999. The nest locations identified in 1997 and 1998 are shown on Plate 3-2 in the mine's UDOGM confidential folder (confidentiality required by UDWR). All nests located in the 1997 survey were cliff nests (Ben Morris, UDWR, January 20, 1998). All nests located in the 1998 and 1999 surveys were cliff nests.

Migratory and Song Birds

Birds were studied during the 1979 - 1980 UDWR transect study. However, a more extensive study was done by Hayden-Wing Associates in 1984. Their report can be found in Appendix 3-3.

Reptiles and Amphibians

Increasing elevation rapidly reduces the number and kind of reptiles and amphibians. Furthermore, in Utah the effects of the more northern latitude reduces the number of herptiles in much the same way as does the increase in elevation.

These geographical and associated climatic factors have eliminated most desert species, leaving species that are adapted either to mountain habitats or montane type habitats. Based on extensive literature review and limited field work, it was determined that potentially 8 species of amphibians and 18 species of reptiles inhabit the area. Of these species only 5 were recorded by the UDWR in 1980: Eastern fence lizard, Sagebrush lizard, Tree lizard, Short-horned lizard, and the Gopher

snake. A WESTECH biologist observed two other species in 1979, the Western whiptail and the Midget faded rattlesnake. All amphibians and reptiles are legally protected, but since the species listed are all widespread throughout the mountains of Utah, none are treated as high-interest species. It is doubtful that the proposed action would seriously impact populations, but localized individuals may be involved in habitat destruction due to subsidence. An exception to this would be if subsidence caused drying of present wet habitats essential to reproduction. Refer to Section 332 for a discussion of "Possible Short-Term and Long Term Impacts to Species Dependent on Springs, Creeks and Drainages".

**Threatened and Endangered Plant and Wildlife Species.** Passage of the Endangered Species Act of 1973 (Public Law 23-20S) provided the legal basis for establishment of lists of endangered and threatened plant and wildlife species ( Appendix 3-3).

Although three species (black-footed ferret, bald eagle, and peregrine falcon) on the list could potentially inhabit the area, an inventory of endangered wildlife species performed in 1979 by the UDWR recorded no threatened and endangered species within the proposed permit area. No confirmed sightings of black-footed ferrets have occurred within Carbon County during 1995, 1996, and the first quarter of 1997, however bald eagles have been seen flying in the vicinity of the mine (Bill Bates, UDWR).

A literature review and field studies for both the Soldier Canyon and the Sage Point - Dugout Canyon permit documents were performed to assess the possible presence of any threatened, endangered, or sensitive plant and wildlife species in the respective permit and adjacent areas.

These study areas included the proposed Dugout Canyon disturbed area. The literature review indicated that no species listed (or proposed as candidates) by the U.S. Fish and Wildlife Service (FWS) as threatened or endangered were likely to inhabit the area. In addition, the field investigations which occurred in 1979, 1980, 1983, and 1984 did not identify or locate any threatened or endangered species. No threatened or endangered plant species including Canyon sweetvetch were found within the disturbed area by Robert Thompson during his 1995 survey (see Robert Thompson letter, Appendix 3-1). Mr. Thompson is qualified and has performed threatened and endangered surveys for the U.S. Forest Service.

As reported in the 1997 bat survey "we noted no suitable habitat, did not record via detectors or capture, or note by indicators presence of *Corynorhinus townsendii*. It is our opinion the bat does

not occur in the immediate vicinity of the proposed disturbance area. We also did not note suitable habitat for or encounter *Euderma maculatum* by mist net, via detectors or during audible bat transects".

**Windy Gap Process as it Applies to Existing Coal Mines in the Upper Colorado River Basin**

Per meetings with Division of Water Quality personnel during application for a UPDES permit in 2004, "there is no data supporting the premise that surface waters associated with the area of the mine operations reached the Price River or Colorado River prior to or since mining disturbance".

Mining Consumption:

Culinary Water is purchased from PRWID and hauled by D & D Trucking to the Mine.

Estimated **Purchased** Gallons/yr: 1,003,200

Ventilation Consumption/Evaporation:

29,354 gallons/day (3/05/04 ventilation survey)

44,000 gallons/day (9/13/04 ventilation survey)

73,354 X 0.5 = 36,677 gallons/day (survey average)

36,677 x 365 = 13,387,105 gallons/yr

Coal Producing Consumption/Coal Moisture Loss:

| | | |
|---|---|---|
| Water added to coal produced - | | 4.03% inherent moisture - source Dugout Geologist |
| | | 5.80% run-of-mine moisture - year to date average |
| | | 1.77% moisture added to coal by cutting operation |
| Projected Tonnage 2004 | | 4,245,737 tons |
| Projected Tonnage 6 year average | | 4,369,084 tons |
| Tons water/yr | 77,333 | |
| Pounds water/yr | 154,665,562 | |
| Gallons water/yr | 18,522,822 | |

Sediment Pond Evaporation:

| | |
|---|---|
| Mine Site Pond | 0.107 acres (surface area) |
| | 18.1 in/yr (high estimate based on HCI Technical Memo, August 22, 2002) |
| | 0.16 ac/ft |
| | 7030 gallons/yr |
| Refuse Pile Pond | 0.41 acres (surface area) |
| | 9 in/yr |
| | 0.31 ac/ft |
| | 5612 gallons/yr (five month period, high estimate) |

Spring and Seeps Effects From Subsidence - Not Applicable

Alluvial Aquifer Abstractions into Mines - Not Applicable
Alluvial Well Pumpage - Not Applicable
Deep Aquifer Pumpage - Not Applicable
Postmining Inflow to Workings - Not Applicable
Direct Diversions: - Not Applicable
Dust Suppression - 3,500 gallons per truck load, 3 loads per day, for 30 days = 315,000 gallons plus 3,000 per truck load, 1.25 loads per day, for 45 days = 168,750. Total: 483,750 gallons per year.
Mine Discharge: 6 Month Average 362,118 gpd = 132,172,948 gal/yr

Calculation estimates for water use in 2004 were necessary since we are using 2004 purchases and usage and the year is 2 months short.

**Habitats of Unusually High Value.** High value habitats in Dugout Canyon include the riparian area and the cliff escarpments. Major portions of established habitat will not be disturbed, but the restricted access by wildlife to the water source within the area of disturbance could displace wildlife. The cliff areas adjacent to the disturbed area could harbor mountain lion, bobcat and bear; and with increased activity and noise they may avoid the area. Elk and deer who may frequent Dugout Canyon will likely avoid the area during the heaviest of activity, but resume their normal patterns once they become accustomed to it.

In a letter dated April 22, 1996 to James W. Carter the director of UDOGM, Robert G. Valentine director of the UDWR makes the following comment "much of the area is classified as critical deer winter range and is heavily used by deer and occasionally by elk and antelope". Use classification drawings of the Dugout Canyon area for large mammals (deer, elk, antelope, etc.) were requested from the UDWR in January of 1996 by SCM. The cover letter dated January 30, 1996 from the UDWR and the drawings are included in Appendix 3-3 for interpretation by UDOGM. SCM has interpreted and transferred the information (provided by UDWR) to Plate 3-2. The use classifications were extended on Plate 3-2 with the incorporation of Federal Lease U-07064-027821.

A survey for bats was performed by Mark Perkins in September of 1997. A report of this survey is included in Appendix 3-3 with a figure showing the bat survey locations. Future surveys for bats will be done concurrent with raptor surveys within the permit boundary prior to cliff disturbing planned subsidence. Pertinent data gathered in these surveys will be included in this M&RP.

No data or definition was available to determine the criteria for an area to be classified as of "unusually high value" for bats. However, since extensive rock faces, cliffs, and escarpments are

present throughout the Book Cliffs Region, the land within the permit boundary is not unusual or unique to the area. The Castlegate Sandstone, Blackhawk, and Price River are the cliff forming formations present in the Dugout Canyon area. Refer to Chapter 6 for descriptions of these formations and Plate 3-3 for their locations.

In the Perkins-Dugout Mine Bat Survey the following statement was made "development plans for the proposed disturbance area contains some mitigation for resident bat species. A proposed runoff pond will likely provide accessible year round water and an associated bio-mass. Presently Dugout Creek is not classified as a perennial stream. In addition, plans include several outdoor flood lights which may act as an attractant for phototropic insects and provide a concentrated and stable food resource for local bat populations. Due to no cliff subsidence and mitigating actions noted above, it is our opinion that excepting the disturbance to and removal of 2,000 ft. of riparian zone, impact (either positive or negative) on local bat populations is minimal".

Raptor and Bat Survey

Raptor nest surveys will be conducted annually in the Spring prior to mining activities or potential subsidence within the permit area and in proposed expansion areas to the permit to obtain base line data. In addition, raptor nest locations will be monitored/surveyed the year following the first monitoring/survey if nests were observed during the survey and if operations result in subsidence. The permittee will contact the Division prior to any raptor nest protection efforts.

A bat survey for Utah sensitive bat species is planned for 2005 (May thru September), this survey will cover the cliff areas adjacent to a proposed fan breakout in Pace Canyon. Baseline bat surveys of Utah sensitive bat species will be conducted between May and September in riparian habitat expected to be impacted by subsidence. In addition, Utah sensitive bat species will be monitored/surveyed the year following the first monitoring/survey if Utah sensitive bat species were observed during the survey and if mining operations result in subsidence impact to the riparian habitat.

Since water and its corresponding vegetation are important throughout the state of Utah, regulatory agencies have been requiring mitigation for disturbance and eventual replacement from the coal industry. SCM will comply with the requirements of mitigation and eventual replacement of the

resources which may be lost or disturbed during this mining operation, refer to Sections 331, 340, 350, and 762.100.

As a mitigation effort SCM replanted 7,500 feet of disturbed riparian streambank above the northern disturbed area boundary with a modified version of Seed Mix No. 1 (mitigation seed mix), to assist in restoring vegetation which has been disturbed by the logging industry.

**Mitigation Seed Mix (Hydroseed/Broadcast Quantities)**

| SPECIES | # pls/acre |
|---|---|
| Bluebunch wheatgrass | 5.0 |
| Intermediate wheatgrass | 5.0 |
| Slender wheatgrass | 5.0 |
| Smooth brome | 5.0 |
| Indian ricegrass | 3.0 |
| Blueleaf aster | 1.0 |
| Blue flax | 1.5 |
| Northern sweetvetch | 1.5 |
| Mountain big sagebrush | 1.0 |
| TOTAL | 28.0 |

Willows were transplanted along the edges of the stream channel above the mine site disturbed area, with the mitigation seed mix being planted from the east edge of the stream channel to the outside edge of the logging road cut. The area between the edge of the stream channel and road cut varies from 10 to 45 feet as it travels the 7,500 feet planned for replanting. The west side of the channel was not disturbed by logging. For clarification the stream channel changes to the west side of the road upstream from the disturbed area boundary.

Due to the steepness and roughness of the slope the area was hydroseeded. The mitigation seed mix (listed above) was sprayed using hydroseeding equipment over the mitigation area. A second pass of the hydroseeding equipment sprayed the mulch/tackifier on top of the previously sprayed seed mix. Two thousand pounds per acre of the Division approved (Appendix 3-1) wood fiber mulch (Ecofiber, trade name) were used on the mitigation area. The seeding and planting was completed during 1998.

Additional mitigation for disturbance is being done to comply with the requirements of the UDWR. The mitigation included the cutting of grown pinyon and juniper trees to improve the growth of the understory adjacent to the Nine Mile Canyon Road. These mitigation efforts are being coordinated directly with the UDWR.

SCM will plant approximately 4,000 willows including both the mitigation described previously and during final reclamation. A portion of the willows were planted during the spring of 1998 to satisfy the mitigation commitment. Willows were planted wherever the channel afforded sufficient space. The channel above the mine site is covered with rock slides in several stretches of approximately 100 feet each. Additional willows will be planted to complete the commitment, however the numbers being planted may decrease since it was discovered during the Spring planting that the channel affords a limited environment for willows. CFC has discussed this matter with Paul Baker of UDOGM and a commitment made by CFC to continue to keep UDOGM involved in the mitigation process. Paul Baker was contacted in 2001 concerning the progression of the willows planted, photographs were taken and forwarded to Mr. Baker for his review. Survival rate for the willows planted was estimated at 75%.

During a site visit in December of 1997, Bill Bates of the UDWR requested that the riparian mitigation include the installation of habitat/stability enhancement structures within Dugout Creek upstream from the proposed disturbed area. SCM commits to the installation of structures similar to those identified in Figure 7-12 should all regulatory agencies and SCM be in agreement. The location and type of structure will be correlated with UDWR, U.S. Fish and Wildlife Service, and the Division.

### 322.300 Fish and Wildlife Service Review

If requested, SCM authorizes the release of information pertaining to Section 322 and 333 to the U.S. Fish and Wildlife Service Regional and Field office for their review.

### 323 Maps and Aerial Photographs

The permit area was mapped by use of a mosaic of aerial photographs and assured by ground inspection in some areas. Maps are contained within the reports provided in Appendices 3-1, 3-2 and 3-3.

During a meeting with the UDWR on January 20, 1998 Ben Morris requested that "the nest locations and related data gathered in the 1997 raptor survey of the Dugout Canyon Mine area be kept confidential". Therefore this survey will not be discussed or presented in this permit document, but can be reviewed by Division personnel within the Dugout Canyon Mine "confidential binder". The confidential binder contains Plate 3-2 which shows the location of nests found during the raptor surveys conducted by UDWR. In a Technical Analysis (Task ID #1915) for the inclusion of the SITLA Lease into the permitted area, instructions were given by UDOGM personnel to remove this information from the confidential folder and include it in the M&RP. This information is currently contained in Appendix 3-3.

Vegetation drawings and appendices within the permit area not included in the M&RP are included in the following amendments:

<u>Refuse Pile Amendment</u>

RA Figure 3-1 Surrounding Representative Vegetation Communities
RA Figure 3-2 Vegetation at Site Prior to Mining Disturbance
RA Attachment 3-1 Vegetation Data

<u>Methane Degassification Amendment</u>

Figure 3-1 Vegetation Reference Areas
Figure 3-2 Adjacent Vegetation
Attachment 3-1 Vegetation Inventory

### 323.100 Location and Boundary of Proposed Reference Area

SCM will use range sites as described and designated by the NRCS Range Handbook and the UDOGM Vegetation Guidelines. Further description can be found in Section 356.100.

Mt. Nebo Scientific did sample a reference area during its 1996 vegetation survey, however SCM does not currently plan to use this data. Reference area(s) are not designated on any plate or figure within this M&RP, except as noted in Section 323.

### 323.200 Elevations and Locations of Monitoring Stations

Raptor nest locations and elk and deer range are shown on Plate 3-2. The permit area contains no fish monitoring stations.

### 323.300 Facilities for Protection and Enhancement

Sections 333.300 and 358.500 contain additional discussion pertaining to protective measures to be taken by SCM in behalf of wildlife.

### 323.400 Vegetation Type and Plant Communities

Vegetative types and plant communities are outlined on Plate 3-1 and 3-1A of this application.

Vegetation types and plant communities on Plate 3-1 were interpreted directly from aerial photographs except for selected areas. The inclusion of small vegetation units was limited and included the exclusion of small, long or narrow units of vegetation within other units. Vegetation depicted on Plate 3-1A represents vegetation ground surveyed and identified in the field.

# 330 OPERATION PLAN

## 331 Measures Taken to Disturb the Smallest Practicable Area

No vegetative disturbance is anticipated beyond that encountered during construction of the surface facilities. The area to be disturbed by operational facilities will be kept to a minimum. Only facilities required to maintain the coal operation or satisfy environmental or safety requirements will be built.

Disturbed areas will be seeded with a mixture which will meet the requirements necessary to stabilize and provide cover; and with sufficient production and diversity characteristic to satisfy regulatory requirements.

Sections 341 describes the seed mixes to be used in both interim and final reclamation of the disturbed areas. For both the interim and final reclamation mixes, the vegetation data were evaluated to determine seed mixture constituents in light of production, cover, and diversity requirements. The soils report was reviewed to select species adapted to the soil's physical and chemical condition. Plant species were selected on the basis of wildlife needs and requirements. In addition, the operations plan was reviewed to determine the need for species with quick establishment, rapid spreading, and high erosion control potentials.

## 332 Description of Anticipated Impacts of Subsidence

Subsidence and its anticipated impacts are discussed in Sections 333 and 525 of this M&RP.

The potential effects of subsidence on nests could be one or several of the following:

- Displacement and relocation of nesting raptor(s)/birds,
- Injury to or death of nest inhabitants,
- Nest destruction.

Subterranean changes caused by subsidence to wildlife habitat is not currently understood. Subsidence could disrupt burrow systems destroying the home and habitat of burrowing mammals, reptiles, and amphibians and possibly cause death to some species in the immediate area. Since subsidence occurs systematically and in small areas at a given time, only localized populations will be impacted and only for a short period of time. Reproductive potential coupled with dispersal will facilitate recovery and negate the temporary population reduction.

Possible Short-Term and Long Term Impacts to Species Dependent on Springs, Creeks and Drainages

Impact to species dependent on springs, creeks and drainages could include disturbance of shelter, food, increased evaporation, rise and/or decrease in water temperature, water flow, and bank stability. Most species of wildlife are highly adaptable, while others with limited mobility are not. These species (mollusk (Physella virgata) and tiger salamander, mentioned in the TA on Task ID #1915) have likely been impacted by the drought conditions in Utah since 1999. These species have either died or have moved to locations where water and habitat are more abundant. If they have moved, then should their habitat change again, they will likely move to a more suitable area. (Joseph M. Kiesecker - Dept. Of Biology, Pennsylvania State University; Andrew R. Blaustein and Lisa K. Belden - Dept. of Zoology, Oregon State University; Global Amphibian Assessment, AmphibiaWeb (http://elib.cs.berkeley.edu; Alex Kirby, BBC News Online "Global amphibians in deep trouble" October 14, 2004; U.S. Water News Online, "Georgia drought harming wetland species" January 2002; UPI Science News, "Wildlife suffering from record drought" 8/30/02), Subsidence could in the future impact these species, however to the best of the permittee's knowledge neither the listed species or other species dependent on springs, creeks and drainages have been identified as being impacted by subsidence within the permitted area. In addition, there has been no impact identified to springs, creeks or drainages within the Dugout Mine permitted area.

It is anticipated that streams within the permit area will not be significantly impacted as discussed in Chapter 5, Section 525.100. Interruptions of flow within perennial, intermittant, and ephemeral streams is not anticipated. Therefore, flows sustaining riparian and stream bank vegetation should continue during and after subsidence. Refer to Section 731.200 for a proposed monitoring and mitigation plan.

### 333 Plan to Minimize Disturbances and Adverse Impacts

General control and mitigation measures addressing potential operational related biological impacts will include the following:

- Minimizing the total area of disturbance,
- Design, construction, and operation of facilities to minimize biological impacts including barriers to wildlife movements,
- Design and installation of electrical equipment to minimize electrocution hazards,
- Establishment of stream buffer zones,
- Control and monitoring of surface discharges and water quality,
- Exclusion of wildlife from potentially hazardous areas, and
- Reclamation of disturbed areas when they are no longer needed.

The raptor survey by the UDWR in 1997 lists the three nests within Section 16, T13S, R12E, as being two inactive hawk nests and an old dilapidated golden eagle nest. The dilapidated nest and an inactive hawk nest are located over a area planned for mining during 2001 to 2005 (comparison of Plates 3-2 and 5-7). The second inactive hawk nest is within the area of potential subsidence but not over mining. Since the condition of these nests may change by the time mining reaches their location a plan for their protection or taking will not be determined at this time.

The nests in Section 16 will be monitored in the annual raptor survey. Nine months or the summer prior to the period of potential subsidence a determination by SCM, UDWR (Fish and Wildlife) and UDOGM will be made as to the method(s) to be used for the protection of the nest(s).

Section 22, T13S, R12E contains a raven nest and an active golden eagle nest. Bill Bates and Ben Morris concurred that "the raven nest in Section 22 was not of particular concern, but that the golden eagle nest should be monitored." See Sections 322.200, 333.300 and 358.100 for the raptor monitoring commitments. The golden eagle nest is located over a area planned for

mining during 2000 to 2001 (comparison of Plates 3-2 and 5-7). This nest will most likely continue to be active. The plan to protect the nesting birds will include a survey of the nest location the year prior to second mining to determine activity. In addition, the potential for laying, incubation or existence of young will be evaluated. The spring prior to the period of potential subsidence a determination by SCM, UDWR (Fish and Wildlife) and UDOGM will be made as to the method(s) to be used for the protection of the nest(s) (see Section 333.300).

Only one of the old dilapidated golden eagle nests surveyed in Section 23 during 1997 was surveyed during the 1998 raptor survey. The UDWR in Price and Salt Lake and the Fish and Wildlife Service both in Salt Lake and Denver have been contacted to determine the need for a "take permit" for this nest.

According to a comparison of the raptor surveys performed in 1995 and 1997, the nest inhabitants, conditions and existence may change. Therefore each nest should be evaluated separately and not as a collective. Methods of protection will be determined on a case by case basis using the "best technology available".

The raptor nests located in the survey taken in 1998 are plotted on Plate 3-2 .

### 333.100 Minimized Disturbance to Endangered or Threatened Species

SCM will apply all methods necessary to minimize disturbances or any adverse effects to endangered and threatened species listed on the tables in Appendix 3-3.

### 333.200 Species and Habitats

All species and habitats within the permit area will be protected to the best of SCM ability. Wildlife habitat protection will be considered in the construction of facilities. For additional information, see Section 333.300.

### 333.300 Protective Measures

Upon notification or suspicion of raptor nests within the permit boundary cliff escarpment subsidence zone the following inventory will be taken to determine the potential actions to be taken by SCM.

- Verify the existence of a nest or nests,
- Verify occupation by birds/raptors, eggs or young,
- Determine the condition of nest or nests,
- Location of nest in relationship to recoverable resource (creation of table with nest location number and planned year for undermining).

The information collected in the inventory will be discussed with various agency personnel (i.e., UDOGM, USFWS, DWR, etc.). SCM and the various agencies will determine:

- a method of avoidance when possible,
- determine seasons/months for nests to be covered/uncovered,
- explore alternative methods of protection or removal, and
- develop a mitigation plan when needed.

The method(s) to be used will be determined prior to the period of potential subsidence.

SCM does not currently know the exact locations or thicknesses of recoverable resource, therefore to determine the potential loss of revenues is premature in relation to the avoidance of a raptor nest or nests. Each nest(s) and its corresponding occupant(s) and circumstances will be evaluated by a qualified person nine months or the summer prior to the period of potential subsidence. A determination by SCM, UDWR (Fish and Wildlife) and UDOGM will be made as to the method(s) to be used for the protection/avoidance/removal of the nest(s) (refer above to inventory listing in this section).

SCM commits to include wildlife awareness and protection training in it's annual training curriculum for employees and request the haulage contractors to provide the same training for it's employees.

Wildlife accustom to their current sources of food may be endangered with a change or enhancement of plant species. The improvement or addition of water developments can act to concentrate wildlife in a specific area, thus causing compaction to soils and over grazing of vegetation in an area. Areas which may be fenced to exclude livestock from an area, may also exclude wildlife, thus causing increased competition for food and territory in another area. Since SCM is unaware of the possible advantages or disadvantages to change in an area of habitat, we commit to use the best technology currently available to handle specific concerns, and which will benefit the greatest range of wildlife. Should the enhancement of habitat outside the disturbed area become necessary to attract wildlife away from the mining facilities, efforts will be coordinated with the UDWR.

Revegetation of disturbed areas, as part of the reclamation effort, will include a mixture of grasses, forbs, shrubs and trees which are beneficial to wildlife.

As part of the overall surface water monitoring program, SCM will monitor surface water flow to determine it's relationship to area subsidence. See Chapter 7 of this M&RP for a discussion of the water monitoring program.

Areas of potential mining will be surveyed for raptor nests prior to the beginning of mining and two seasons after mining has ceased. Pertinent data gathered in these surveys will be included in this M&RP and evaluated by qualified personnel to determine the method(s) to be used to avoid, protect, or take the raptor's nest(s).

Before a pesticide is used, the type and concentration will be approved in conjunction with UDWR or the Division.

During the construction of the Dugout Mine, wildlife in the area will most likely be displaced due to the noise and added human activity. Construction, mining, supplier personnel and their corresponding equipment will be required to stay within the disturbed area boundary during construction activities. Loading, unloading, and staging of materials and equipment designated for the construction of the Dugout Canyon Mine facilities will be done within the disturbed area boundary. Fluids used to maintain construction equipment will be stored in a safe method, to prevent contamination.

## 340 RECLAMATION PLAN

The reclamation plan will include the following: seed mix, rate of seedlings per acre, stocking rates for shrub and tree plantings, planting techniques, fertilization methods, and amount and frequency of application. The fish and wildlife plan for the permit area is outlined in Section 342.

### 341 Revegetation

The reclamation plan for final revegetation is included in this section for lands to be disturbed by coal mining and reclamation operations.

The short-term goal of this revegetation plan is the immediate stabilization of the disturbed sites through erosion control. This objective will be achieved through controlled grading practices, proper seedbed preparation to encourage rapid plant establishment, inclusion of rapidly establishing species in the seed mixture to be planted, and mulch application.

The long-term goals are to establish useful, productive range and wildlife habitat. These goals will be attained through the selection and placement of desirable and productive plant species, and a commitment to monitor and maintain revegetated areas throughout the bond liability period.

### 341.100 Schedule and Timetable

The reclamation timetable is outlined in Figure 5-4. The reclamation monitoring schedule is outlined in Table 3-3.

The planting of seeds and seedlings will be undertaken at the most feasible time following disturbance activities. Planting will begin after the plant growth medium has been replaced. Final reclamation grasses, forbs, shrubs, and seedlings will be planned for planting in late August through early October. Should the planting window close prior to completion of seeding, a sterile, quick growing ground cover will be planted to control erosion during the winter months. The final reclamation seed mixture will be planted the following spring and fall.

## 341.200 Descriptions

**Species and Amounts of Seed.** All revegetated areas within the disturbed area boundary will be planted with the seed mixes listed below:

**Interim Seed Mix** (Drilled Quantities)

| SPECIES | # pls/acre |
|---|---|
| Indian ricegrass | 2 |
| Western wheatgrass | 3 |
| Slender wheatgrass | 3 |
| Thickspike wheatgrass | 4 |
| Kentucky Bluegrass | 1 |
| TOTAL | 13 |

**Final Reclamation Seed Mix #1** (Drilled Quantities)

| SPECIES | # pls/acre |
|---|---|
| **Grasses, Forbs, and Shrubs** | |
| Bluebunch Wheatgrass | 3.0 |
| Western wheatgrass | 4.0 |
| Slender wheatgrass | 1.0 |
| Thickspike wheatgrass | 1.0 |
| Idaho fescue | 1.0 |
| Indian ricegrass | 2.0 |
| Blueleaf aster | 0.5 |
| Blue flax | 1.0 |
| Palmer Penstemon | 0.5 |
| Northern sweetvetch | 1.0 |
| Mountain big sagebrush | 0.5 |
| Louisiana sagebrush | 1.0 |
| Fourwing saltbrush | 1.0 |
| Bitterbrush | 1.0 |
| Curl-leaf mountain mahogany | 1.0 |
| TOTAL | 19.5 |
| **Transplants and/or seedlings per acre** | |
| Snowberry | 75 |
| Utah serviceberry | 75 |
| Pinyon pine | 200 |
| Utah juniper | 200 |
| TOTAL | 550 |

**TABLE 3-3**

**RECLAMATION MONITORING SCHEDULE**

| | YEAR | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| QUALITATIVE SAMPLING | X | X | X | X | X | X | X | X | X | X |
| QUANTITATIVE SAMPLING | | | | | | | | | | |
| Cover | | X | X | | X | | | | X | X |
| Frequency | | X | X | | X | | | | X | X |
| Woody Plant Density | | X | X | | X | | | | X | X |
| Transplant Survival | X | X | X | | X | | | | | |
| Productivity | | | | | | | | | X | X |

**Final Reclamation Seed Mix #2** (Drilled Quantities)

| SPECIES | # pls/acre |
|---|---|
| **Grasses, Forbs, and Shrubs** | |
| Mountain brome | 3.0 |
| Western wheatgrass | 5.0 |
| Indian ricegrass | 3.0 |
| Slender wheatgrass | 3.0 |
| Thickspike wheatgrass | 3.0 |
| Kentucky bluegrass | 1.5 |
| Columbine | 1.0 |
| Blue flax | 1.0 |
| Palmer penstemon | 1.0 |
| Northern sweetvetch | .5 |
| Louisiana sagebrush | 1.0 |
| TOTAL | 23.0 |

**Transplants and/or seedlings per acre**

| | |
|---|---|
| Carex spp. | 500 |
| Horsetail | 500 |
| TOTAL | 1000 |

**Streambanks/channel bottom will receive the following trees[a] and shrubs**

| | Seedlings/acre |
|---|---|
| Narrowleaf cottonwood | 250 |
| Rocky Mountain maple | 250 |
| Willow [b] | 4000 |
| Woods rose | 1000 |
| Snowberry | 250 |
| Utah serviceberry | 250 |
| Blue elderberry | 250 |
| Chokecherry | 250 |
| Golden current | 250 |
| TOTAL | 6750 |

* UDWR requested no conifers be included in the riparian seed mix.

(b) Cuttings/transplants and/or seedlings will be used. The quantity of willows to actually be planted may vary due to the availability of suitable area within the channel for planting. CFC requests permission to consult with a botanist and UDOGM at the time of reclamation to determine the final number of willows to be planted and to prepare a plan for potential planting and replanting should seedling be lost due to pestilence. It may be beneficial to plant the willows over a period of years as the stream has time to deposit sediment, thus providing natural areas for planting. If deemed appropriate by the botanist and UDOGM at the time of reclamation the 4,000 willows per acre commitment will be met.

The rate of seeding per acre when broadcast will be doubled of the rate of seeding when drilled.

Seed Mix No.1 will be used on the majority of the disturbed area (Pinyon-Utah juniper - upland very steep shallow loam, Plate 3-1A). Seed Mix No. 2 will be used to reseed the riparian area of Dugout Creek (Plate 3-1A). Hydrophytic vegetation will be planted during the low flow of the reclamation channel.

**Method Used for Planting and Seeding.** The surface will be ripped to between 6 and 24 inches to reduce surface compaction. Ripping will be completed on approximately 4-foot centers. Final ripping depths will be determined by the soil materials being ripped. On slopes too steep for ripping the soil materials will be pocked/gouged.

Following ripping, topsoil (or substitute topsoil) will be applied to the ripped surface and left in a roughened state. Topsoil samples will be collected and sent to the laboratory for analysis to determine fertilizer requirements. The area will be broadcast fertilized with the recommended fertilizer using a hand held "cyclone-type" seeder in smaller areas, applied in a hydroseeding mixture or with a rotary implement attached to the revegetation tractor in larger areas. Where possible, a ripper equipped tractor or other appropriate equipment will be used to incorporate the fertilizer into the soil. On slopes too steep to accommodate the use of a tractor or other appropriate equipment the fertilizer will be incorporated with the track hoe bucket teeth or other Division approved technology. All nutrients will be applied in a single application.

Seeding for grasses, shrubs, and forbs will be accomplished by drilling and/or broadcasting. All equipment used will be equipped with metering devices. Except as noted below all areas will be fertilized and seeded using the same methodology.

Broadcast seeding will be used on slopes too steep to accommodate a tractor.

Seedlings/transplants will be planted by first clearing a circle of 12 to 24 inches in diameter from which mulch materials and grasses will be cleared. The hole will be dug 4 to 6 inches deeper than the seedling roots to accommodate positioning of the seedling. Fertilizer will either be mixed with the loose soil from the hole or a fertilizer tablet will be planted with each seedling. After seedling placement, the hole will be backfilled with soil and fertilizer then lightly tamped. A gently sloped basin will be formed around the seedling to catch water. The basin will be mulched to aid in moisture retention.

Technical notes (No. 23, September 1993) and project information data published by the NRCS were consulted to provide detail for planting the riparian area, willows, and cottonwoods.

"Rhisomatous willows usually should be planted on inside curves of a stream channel, they are rarely found on sharp outside curves in nature. Shrubby species are normally planted on outside curves of a stream channel as a continuous barrier. Plant the entire reach with the same species. Taller shrubby species may also be planted mid-bank to upper bank and on the floodplains for diversity and additional stabilization or as a buffer zone. Plant tree species up the bank from the shrubby species or on top of the bank."

"Plug, containerized, bare-root, potted and paper-sleeve planting are best used on mid-bank to upper bank or floodplains where long periods of inundation or water erosion is minimized, but where adequate moisture is available through natural precipitation. Where plant have a low risk of physically being pulled or eroded out due to shallow rooting systems during establishment and where there is no competing vegetation."

Transplants (cuttings, whips, plugs, bare-root, potted) "less than 3/8" inch diameter are not recommended because energy reserves in the stems are limited. Pole cutting (3/4" large diameter unrooted stems) are recommended for most planting from water line to mid-bank. Pole cuttings of willows and cottonwoods are also recommended on upper-banks and flood plains where the water table is relatively deep."

"Cutting length is largely determined by the depth to the mid-summer water table and erosive force of the stream at the planting site. Planting can occur at the water line, up the bank, and on top of bank in relatively dry soil, as long as cuttings are long enough to reach into the mid-summer water table. Make sure, several inches of cutting are in the mid-summer water table, 3-4 buds are above ground, and no less than ½ the total length is in the ground"

"However the larger the cutting diameter, the longer the cutting should be, and the deeper the hole should be. Larger diameter and longer cuttings will be needed for more severely eroding sites and where the water table is deeper."

"Plant the cuttings about 1 - 3 feet apart for shrubby types and 6-12 feet apart for tree types. In areas where you expect erosion, plant shrubby types 1 - 1.5 feet apart to better protect the banks. Exact spacing between tree-types further up the bank and shrubby types below should be based on crown characteristics and height. General ideas on spacing can be found in the Idaho Tree Planting Handbook."

"A tractor-mounted post hole digger, a one or two man post hole digger, a soil auger, a large bar, a planting shovel, or just punching the cutting into most soil have all been used successfully in the past to plant willows."

The reclaimed riparian area will be planted with cuttings/transplants/seedlings using the following guidelines as suggested by NRCS literature.

- The Idaho Tree Planting Handbook or similar instructional material will be consulted during reclamation to determine the spacing for the planting of shrubs and tree cuttings/transplants/seedlings. Trees and shrubs will be interspersed with areas seeded with grasses and forbs.

- Species will be planted with a tractor-mounted post hole digger, a one or two man post hole digger, a soil auger, a large bar, a planting shovel, or punching into soil.
- Tree species will be planted up the bank from the shrub species or on top of the channel slope.
- Shrubs species will be planted between the top of the riprap and the top of the channel slope.
- Willows will be planted in the riprap on the channel side slopes and the edges of the channel bottom.
- Stems for planting will be 3/8" diameter or larger.
- Length of cuttings will be determine by where they are planted (i.e. water line, top of slope or etc. ), but will be long/large enough to reach into the anticipated water table, with 3-4 buds above ground.

The cuttings/transplants/seedlings will be interspersed with areas of grass and forbs in a mosaic pattern as in the current riparian area. The shrub density data from the 1997 survey designates the trees within the riparian area to be: 27.2 maples, 96.5 junipers, 107.4 cottonwoods and 28.8 firs per acre. SCM proposes to plant 250 maples and 250 cottonwoods per acre. Junipers and firs have not been included in Seed Mix #2 at the requested of the UDWR. The 500 maples and cottonwoods should be sufficient to achieve bond release if the mortality rate is between 10 and 25% (Dan Ogle, NRCS Plant Material Specialist). NRCS guidelines are considered recommendations and SCM understands they are ultimately responsible for meeting revegetation success standards.

If cottonwoods are planted as cuttings or poles they will be long enough to reach the water table and large enough in size (1 - 3" diameter) to have sufficient energy reserves for survival. An irrigation program will be considered if the cottonwoods are planted as transplants. The particular character of cottonwood to be planted will be determined at the time of reclamation.

Transplants with root balls will be planted as described previously and with the recommendations of published literature available at the time of reclamation. Channel slopes as currently designed, vary between 3 and 4 feet.

Figure 3-1 is provided to approximate the location of each planting zone described above, not as a typical design of the stream channel slopes, their height, width or length.

Seeding methods are discussed previously in this section.

The Division has requested information concerning the average high and low water mark for the reclaimed Dugout Creek channel as a means of evaluating the potential survivability of phreatophytes which will be planted during reclamation. However, from a hydrologic standpoint the concept of average high and low water marks in vague for a channel since the levels are both time- and probability-dependent. For example, it is common to speak of the water-surface profile, which might be expected during the 10-year, 7-day low-flow periods or the 25-year, 6-hour precipitation event, but not the "average" low flow or the "average" high flow. SCM will provide such data if it can be meaningfully defined and will assist with revegetation success. In any event, cuttings/transplants will be planted to facilitate successful re-establishment of the riparian vegetation, with the depth of planting being determined by a consensus of the published literature which is available at the time of reclamation and the drilling of periodic holes along the reclamation channel to determine the depth to the water table.

**Mulching Techniques.** Following seeding, the disturbed areas will be mulched with a Division-approved mulching material. For bonding calculations, wood fiber mulch will be

the assumed mulching application. Application will be initiated at the tip of the slope and working downhill. Mulch will be applied at the rate of 2000 pounds per acre and anchored with a tackifier.

In consultation with the Division, should a determination be made that a slope(s) is too steep to retain a mulch application, the slope(s) will be pocked/gouged and will receive no mulch application. Mulching and revegetation will not be attempted on sheer rock outcrops.

Mulch used for the mitigation project in 1998 of the upper portion of Dugout Canyon is discussed in Section 322.200.

**Irrigation, Pest and Disease Control.** No irrigation is planned and pesticides will not be used unless previously approved by the Division.

**Measures Proposed for Revegetation Success.** SCM will plant species of the same seasonal variety as those existing prior to the proposed disturbance.

To effect bond release at the end of the 10-year responsibility period, SCM will measure required vegetation variables (ground cover, herbaceous productivity, and woody plant density) as outlined on Table 3-3. Measurement will occur during the same time each year using appropriate techniques.

Productivity sampling will involve use of a sample random technique whereby 1 to 2 $m^2$ plots (rectangular in shape) will be clipped by life form for all current annual production. Sample parameters determined for these variables will be used to test the success of revegetation during each of these years and will prove establishment of adequate cover, suitable productivity, reasonable density, and adequate species composition.

The estimated parameters for the variables of ground cover, herbaceous productivity, and woody plant density will be obtained in a statistically-adequate manner. Refer to Section 356.200 for a discussion on revegetation success standards.

The revegetative success standard for cover in the Pinyon-Juniper area is 66% and 85% for the riparian area.

### 341.300 Greenhouse Studies, Field Trials or Other Equivalent Studies

SCM will comply, should the Division provide evidence to support additional testing to demonstrate that reclamation as required by the State Program can be accomplished according to information provided in this M&RP.

## 342 Fish and Wildlife

Revegetation to sustain and improve wildlife habitat will be SCM's primary concern following the termination of mining operations. High value habitats will be restored and enhanced beyond their pre-mining conditions since the area is being redisturbed after previous mining. The plan is consistent with Sections 330 and 358.

### 342.100 Enhancement Measures

Enhancements of the stream channel are discussed in Sections 322.200 and 762.100. No additional enhancements are planned.

### 342.200 Plants Used for Wildlife Habitat

The plant species in the reclamation seed mix are consistent with those presently grown in the permit area, with additional species added for diversity as requested by the Division. Section 341.200 contains the proposed reclamation seed, tree, and shrub mix.

**Nutritional Value.** The nutritional value will be consistent with that of vegetation in the surrounding areas.

**Cover.** The goal of SCM is to establish plant species which will provide sufficient cover for the fish and wildlife of the area. See Section 341 for additional discussion.

**Ability to Support and Enhance.** The plant species included in the proposed reclamation mixes have the ability to support and enhance the fish or wildlife habitat after the release of the performance bonds. Shrubs and trees will be planted to enhance survival and provide wildlife habitat. The trees and shrubs in the final reclamation seed mix will be used to ensure establishment of an enhanced vegetation community within the disturbed site. The disturbed riparian community will be restored and enhanced during reclamation efforts.

### 342.300 Cropland

Cropland is not a postmining land use.

### 342.400 Residential, Public Service and Industrial Land Use

No residential, industrial or public service use is planned at the present time for the permit area following the termination of mining.

## 350 PERFORMANCE STANDARDS

### 351 General Requirements

SCM commits to conduct all operations in accordance with the plans submitted in Sections R645-301-330 through R645-301-340 of the permit application.

## 352 Contemporaneous Reclamation

Reclamation activities prior to final reclamation will, to the extent feasible, be performed contemporaneously with mining operations. Areas to receive interim reclamation will be seeded with the interim seed mix.

The interim seed mix (Section 341.200) will be used to establish a shallow rooting cover of grasses for those areas disturbed during the development of the Gilson Well pad and relocation of Dugout Creek (west fork). The riparian area associated with the disturbance will receive reclamation as dictated in the stream channel alteration permit and Section 341 of the M&RP.

Revegetation will not be done in areas required to be kept barren of vegetation such as areas around mine ventilation openings.

### 353 Revegetation: General Requirements

A vegetative cover will be established on all reclaimed areas to allow for the designated postmining land use of livestock grazing and wildlife habitat. Other than a road which will be retained through the facilities area following reclamation to allow access to private land within the permit area, all roads within the disturbed area boundary will be reclaimed. The vegetative cover will be in accordance with the approved permit and reclamation plan. All species of vegetation to be used in reclamation activities, whether planted by seed or seedling, will be approved by the Division (i.e. interim, mitigation, #1 and #2 seed mixes).

#### 353.100 Vegetative Cover

The seed mix proposed for revegetation is intended to provide vegetative cover that will be diverse, effective, and permanent. The seed mixture was selected with respect to the climate, potential seedbed quality, erosion control, drought tolerance, and the mixture's ability for quick establishment and spreading.

**Native Species.** The reclamation vegetative mixture (seeds, shrubs, and trees) will be comprise of species indigenous to the area, capable of achieving the postmining land use as approved by the

Division. Diversity of species should allow ultimate utilization of plants by wildlife and domestic livestock.

The revegetative species will be purchased from suppliers who will certify their percentages of purity, germination, hard seed, and percentages of maximum weed seed content.

**Extent of Cover.** The vegetative cover will be at least equal in extent to the cover as determined by the range site sampling as discussed in Section 341.200.

**Stabilizing.** The vegetative cover mixture is capable of stabilizing the soil surface from erosion.

### 353.200 Reestablished Plant Species

**Compatible.** The reestablished plant species have been selected to insure their compatibility with the approved postmining use.

**Seasonal Characteristics.** The revegetation plant species will have the same growing season as the original vegetation, or in this instance, as the adjacent areas.

**Self-generation.** The reestablished plants are species capable of self-generation and plant succession.

**Compatibility.** The seed mix suggested for revegetation contains plants native to the area and compatible with the plant and animal species of the permit area.

**Federal and Utah Laws or Regulations.** The seed mixture purchased to revegetate the mine area will contain no poisonous or noxious plant. No species will be introduced in the area without being approved by the Division.

### 353.300 Vegetative Exception

SCM does not require vegetative exception at this time.

### 353.400 Cropland

The permit area contains no land designated as cropland.

### 354 Revegetation: Timing

SCM will follow the recommended guidelines for revegetation as discussed in Section 341.100.

### 355 Revegetation: Mulching and Other Soil Stabilizing Practices

Mulch and/or other soil stabilizing practices (pocking, gouging, roughening, etc.) will be used on all areas that have been regraded and covered by topsoil or topsoil substitutes (see Section 341.200). SCM will exercise care to guard against erosion during and after application of topsoil and will employ the necessary measures to ensure the stability of topsoil on graded slopes.

### 356 Revegetation: Standards for Success

The standards for revegetation success are discussed in this section.

Range Site Success Standards for Reclamation:

| | Pinyon/Utah Juniper | Riparian |
|---|---|---|
| Ground Cover | 66% | 85% |
| NRCS Production | 800 lbs/acre | 1500 lbs/acre |
| Shrub-Tree Density/Stocking | 2200 stems/acre | 2200 stems/acre |
| Diversity | 2 Tree/shrub species | 2 Tree/shrub species |
| | 3 Grass species | 3 Grass species |
| | 2 Forb species | 2 Forb species |

For a species to be counted as one of the species that constitute vegetation diversity it must exist in the actual plant community at a minimum of 5%.

The sampling methods to be used during reclamation will be specific to the requirements at the time of reclamation. Nonetheless, according to the currently approved UDOGM guidelines, these sampling methods would be used: sample adequacy, cover (line interception), density (belt transects or plots) and productivity (clipping and/or NRCS estimation). The Jaccard's Community Coefficient will be used to calculate acceptable plant similarity and diversity.

During the Fall of 1997, productivity for the disturbed area was determined by George Cook, a range conservationist for the NRCS. Mr. Cook determined the Pinyon/Utah Juniper area to be in good condition with 800 lbs/acre air dry weight production. The riparian area was determined to be in fair condition with 1500 lbs/acre of air day weight production. Should the NRCS determination of production be insufficient to satisfy the requirement for standards of success, SCM commits to sample productivity at a corresponding range site.

Range sites for reclamation comparison purposes were chosen by a qualified person contracted by SCM and in cooperation with the Division. Range sites in Fish Creek Canyon representing both the pinyon/juniper and riparian vegetation types were sampled for cover in September, 1998 (Appendix 3-1). These specific range sites correspond with the cover quantities sampled for the pinyon/juniper and riparian areas within the Dugout Mine disturbed area boundary. The cover data for each range site was submitted to the Division for evaluation and approved for reclamation comparison (Appendix 3-1). The designated range sites will be used as a reference area until final revegetative bond release has been issued. The location of the area to be used for range site comparison is designated on Plates 3-1 and 3-1D .

The sites for sampling were chosen (September, 1998) in cooperation with Paul Baker (UDOGM).

## 356.100 Success of Revegetation

The success standards for approval will be judged on the effectiveness of the vegetation for postmining land use and the standards outlined in Section 353.

Within the Utah Division of Oil, Gas and Mining Vegetation Guidelines (Revised February, 1992) three methods for sampling vegetation are discussed; reference areas, range sites and the baseline data method. Each method describes the requirements for its subsequent use, however the sampling of diversity was not discussed within any of these methods.

The baseline data method could not be used at the Dugout Canyon Mine site due to previous disturbance by mining. Likewise the reference areas method could not be used since reference areas were not approved by the Division. Therefore the range site method has been adopted for use at the Dugout Canyon Mine.

The range site number used for comparison of revegetation success is 033XY342UT, upland very steep shallow loam (Pinyon-Utah Juniper). The area sampled by Patricia Johnston in 1997 met the requirements of Method #2 - Range Sites of the UDOGM Vegetation Guidelines, February 1992. Legible copies of data sheets from the sampling are included in Appendix 3-1.

**Sampling Techniques.** SCM will comply with the standards for success, statistically valid sampling techniques for measuring success, and the approved methods outlined in the Division's "Vegetation Information Guidelines" for sampling.

**Standards for Success.** The standards for success will include criteria representative of unmined lands in the area of the permit and as discussed in Section 356.200.

### 356.200 Standards for Success

Standards of success will be applied in accordance with the approved postmining land use as described in this section.

**Grazing Land or Pasture Land.** The ground cover and production of living plants on the revegetated area will be at least equal to the specified success standards.

**Cropland.** There is no area designated as cropland within he permit area.

**Fish and Wildlife Habitat.** The success of revegetation for fish and wildlife habitat will be determined on the basis of tree and shrub stocking and vegetative ground cover. Minimum stocking and planting arrangements will be those approved by the Division on the basis of local and regional conditions. Cover success will not be less than that required to achieve the approved postmining land use.

**Industrial, Commercial or Residential.** The postmining land use for the permit area is not designated for industrial, commercial, or residential use.

**Previously Disturbed Areas.** Dugout Canyon contains the remains of earlier mining operations. The site was not reclaimed or revegetated following the earlier operations.

Due to the previous disturbance of the site, SCM will restore the vegetative ground cover to that of the surrounding area as discussed in Section 341.200 and the ground cover will be adequate to control erosion.

### 356.300 Siltation Structure Maintenance

Siltation structures will be maintained until removal is authorized by the Division and the disturbed areas have been stabilized and revegetated. Siltation structures will be removed

no sooner than two years after the last augmented seeding. For additional details on siltation structures, see Section 542 of this M&RP.

### 356.400 Removal of Siltation Structures

The land on which siltation structures are located will be revegetated in accordance with the reclamation plan discussed in Sections 353 through 357 of this M&RP.

## 357 Revegetation: Extended Responsibility Period

SCM will be responsible for the success of revegetation for a period of 10 years following seeding, fertilization, and irrigation (if deemed necessary) of the reclaimed mine area or upon Division bond release.

### 357.100 Extended Period Begins

The period of extended responsibility will begin the year after the disturbed area has been reseeded and fertilized.

### 357.200 Vegetative Parameters

Vegetation parameters will equal or exceed the approved success standard during the last 2 years of the responsibility period. The success standards are outlined in Section 356.

### 357.300 Husbandry Practices

SCM will comply with Division-approved husbandry practices which will be normal conservation practices within the region of the mine. These practices may include disease, pest, and vermin control; and any pruning, reseeding, and transplanting required.

### 358 Protection of Fish, Wildlife and Related Environmental Values

SCM will minimize disturbances and adverse impacts on fish, wildlife, and their related environments as outlined in Section 333.

The intermittent flow of streams within the lease area does not support a population of game fish; therefore, there are no fisheries within the disturbed area to protect. In addition, the streams in Pace and Rock Canyons have intermittent flow and do not support a population of game fish. See Chapter 7 of this M&RP for methods to protect water sources in the area.

Proposed surface disturbance associated with mining activities will be reviewed by the DWR and UDOGM in reference to wildlife exclusionary periods, see letter in Appendix 3-3 concerning mitigation for disturbance in 2004 - 2006.

### 358.100 Existence of Endangered or Threatened Species

Coal mining will not be conducted where it's operation might jeopardize the existence of any endangered or threatened species. The mining of coal will not result in the planned destruction or adverse modification of these species critical habitat, unless approved by appropriate agency(ies).

Any state or federally listed endangered or threatened specie will be reported to the Division upon its discovery. A ground nest survey for raptors and bird species of special interest was performed prior to site disturbance by a qualified person. A letter report of the ground nest survey is included in Appendix 3-3. Mining operations will proceed in accordance with Division stipulations. These stipulations also apply to reclamation operations at the Dugout Canyon Mine.

Lists of threatened, endangered, and sensitive species are included in Appendix 3-3. In addition, Appendix 3-3 contains 2003 and 2004 survey data for Mexican Spotted Owls and a letter from the DWR concerning installation of nesting boxes to satisfy mitigation requirements.

### 358.200 Bald and Golden Eagles

Coal mining and reclamation operations will be conducted in a manner protective of bald and golden eagles. SCM will promptly report any golden or bald eagle nests found within the permit boundaries and will proceed with operations in accordance with the Division's stipulations for protection of those nests. Refer to Section 333 for a discussion of methods of nest protection during potential subsidence.

### 358.300 Taking of Endangered or Threatened Species

SCM understands that there is no permission implied by these regulations for taking of endangered or threatened species, their nests, or eggs.

### 358.400 Replacement of Wetland and Riparian Vegetation

The Division will be consulted on the best technology to replace and enhance the riparian vegetation to be disturbed.

### 358.500 Manmade Wildlife Protection Measure

**Electric Power Lines.** All power lines within the Dugout Canyon Mine disturbed area will comply or be modified to be raptor safe and comply with the guidelines of REA Bulletin 61-10, "Power Line Contacts by Eagles and Other Large Birds". Refer to Plates 4-1 and 5-2 for power pole locations.

**Potential Barriers.** When possible, structures built by SCM in Dugout Canyon will be designed and built to provide corridors of passage to large mammals.

**Pond Protection.** Fences or other appropriate methods will be used to exclude wildlife from ponds containing hazardous or toxic materials. However, SCM does not intend to store hazardous or toxic materials in ponds.

**REFERENCES:**

Blumer, Ralph J., 1979. Environmental Analysis, pp 25-26.

Hoag, Chris J. , How to Plant Willows and Cottonwood Dormant Pole Cuttings for Riparian Rehabilitation. Riparian/Wetland Project Information Series No. 4

Kuchler, A.W. 1975. Potential Natural Vegetation of the Conterminous United States. Amer. Geo. Soc., Spec. Publ. No. 36. Map.

USDA, 1988. Soil Survey of Carbon Area, Utah. Soil Conservation Service.

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Utah Division of Wildlife Resources, 1990. Fauna of Southeastern Utah and Life Requisites Regarding Their Ecosystems. Pub. No. 90-11.

Utah Division of Wildlife Resources, 1979. Study to Determine Effects of Coal Development on Wildlife in Southeastern Utah. Prepared for Eureka Energy Company.

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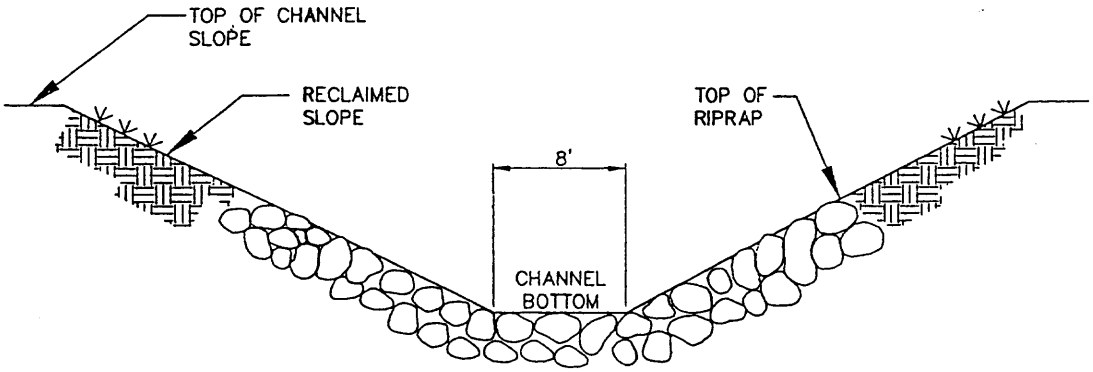



NOT TO SCALE

INCORPORATED
EFFECTIVE:
MAR 3 1 2000
UTAH DIVISION OIL, GAS AND MINING

FIG 3-1. RECLAMATION CHANNEL SLOPE DEFINITIONS

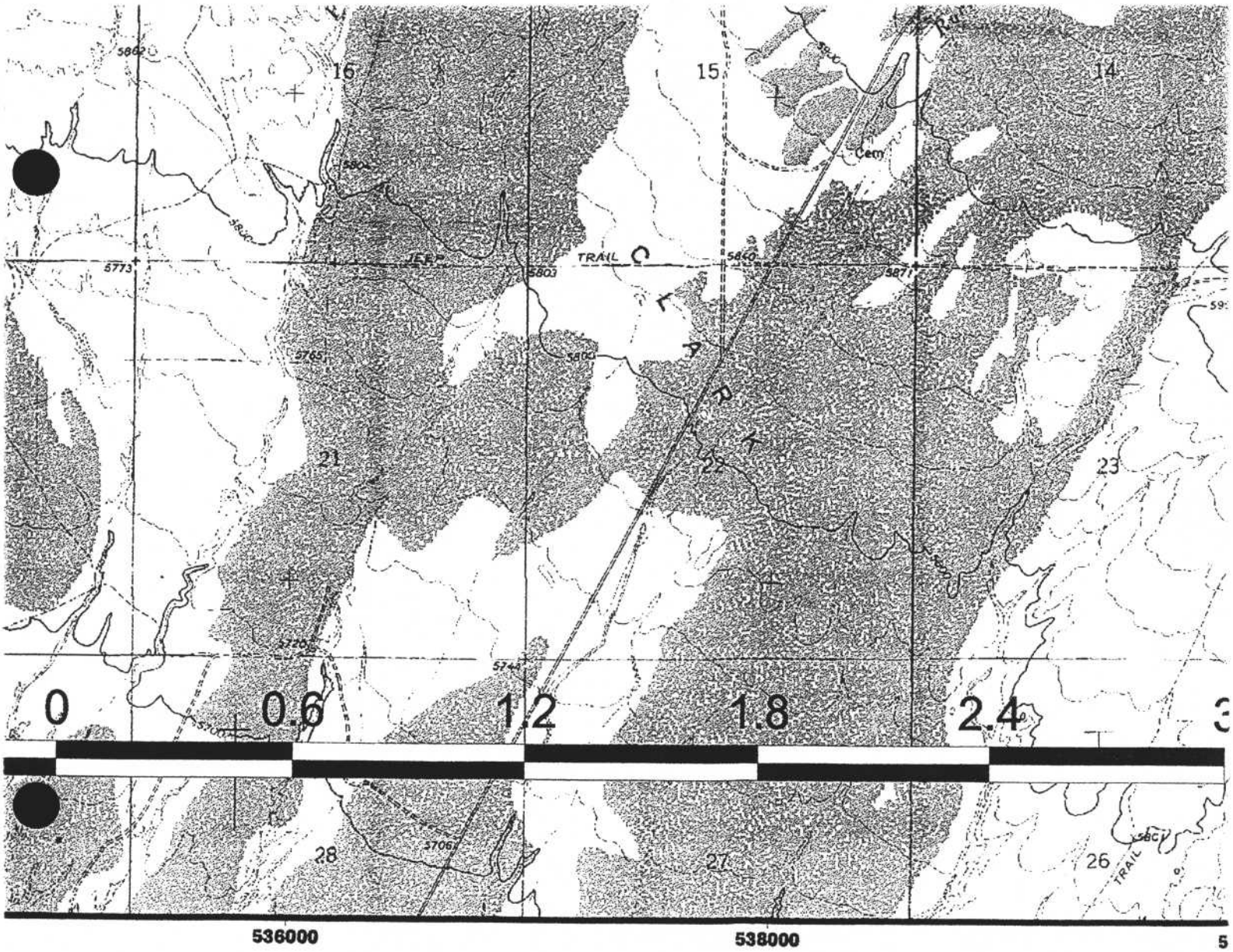
EarthFax

**APPENDIX 3-3**

Fish and Wildlife Data

Add information from CONFIDENTIAL FOLDER PER REQUEST UNDER TASK ID # 1915

BLUE




# 2003 Raptor Survey
# Dugout Canyon Mine

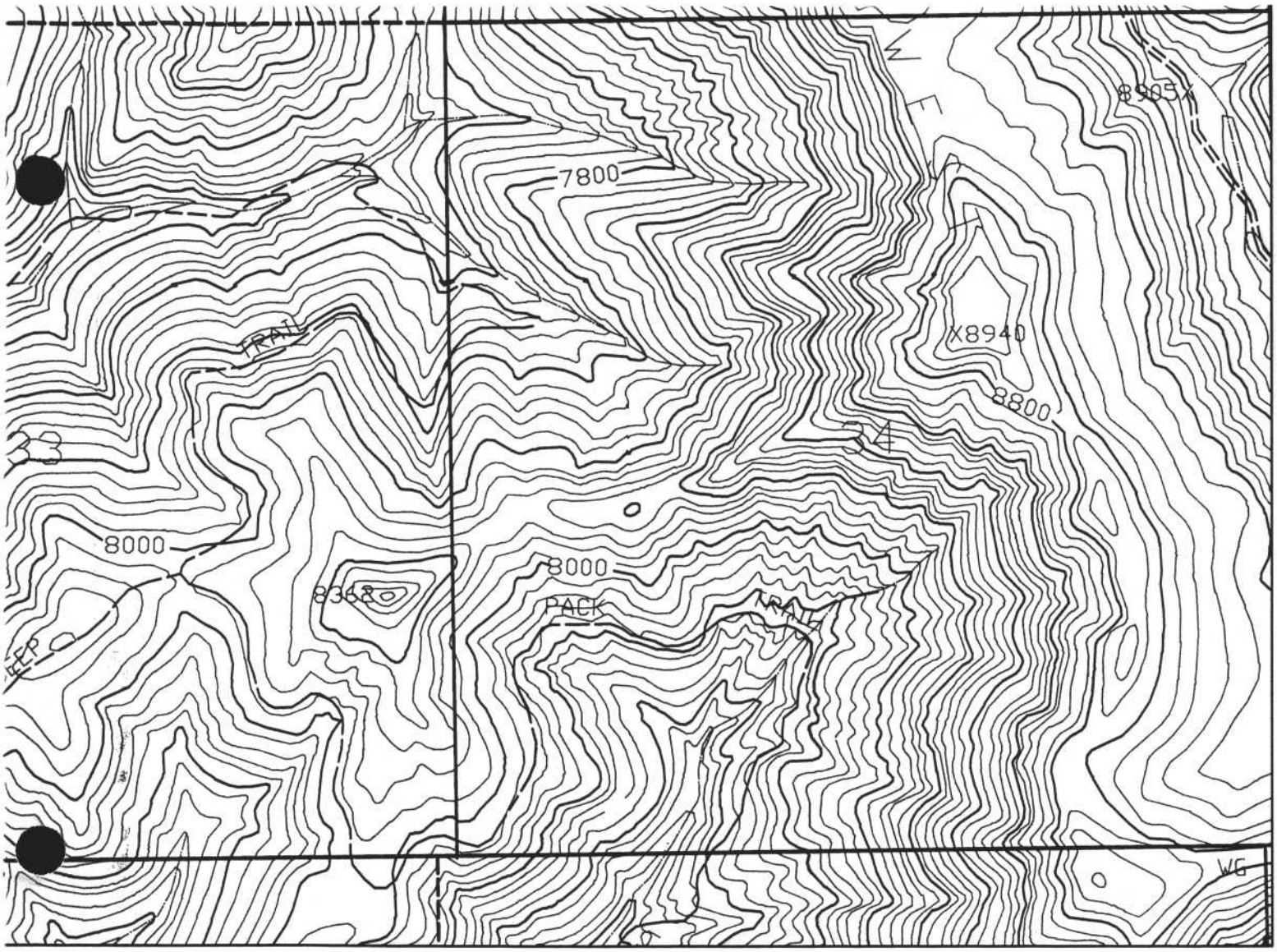
UTAH
RESOURCES
Wildlife Resources

2003 Raptor Survey for Dugout Mine

| Nest_no | X_utm27 | Y_utm27 | Date | Species | Type | Statu___03 | Eggs | Yng | Age | Comments03 |
|---|---|---|---|---|---|---|---|---|---|---|
| 3 | 539126 | 4390806 | 5/21/03 | Golden Eagle | Cliff | tended | | | | greenry |
| 4 | 538985 | 4390820 | 5/21/03 | Red-tailed Hawk | Cliff | not found | | | | . |
| 6 | 538469 | 4390923 | 5/21/03 | Prairie Falcon | Cliff | active | 99 | 99 | 99 | Hen on nest |
| 7 | 540367 | 4390585 | | Golden Eagle | Cliff | not surveyed | | | | . |
| 8 | 540356 | 4390542 | | Unknown | Cliff | not surveyed | | | | . |
| 9 | 540581 | 4391529 | 5/21/03 | Golden Eagle | Cliff | tended | | | | two nests, one above other |
| 10 | 540231 | 4390885 | 5/21/03 | Golden Eagle | Cliff | not found | | | | . |
| 11 | 540972 | 4390651 | 5/21/03 | Golden Eagle | Cliff | inactive | | | | . |
| 12 | 541029 | 4390525 | 5/21/03 | Golden Eagle | Cliff | inactive | | | | . |
| 13 | 541457 | 4390716 | 5/21/03 | Raven | Cliff | inactive | | | | . |
| 14 | 541495 | 4390700 | 5/21/03 | Raven | Cliff | active | 0 | 99 | 99 | 1 young seen |
| 17 | 533851 | 4393728 | | Golden Eagle | Cliff | not surveyed | | | | . |
| 18 | 533690 | 4393631 | | Golden Eagle | Cliff | not surveyed | | | | . |
| 19 | 533191 | 4392836 | | Golden Eagle | Cliff | not surveyed | | | | . |
| 20 | 533192 | 4392835 | | Golden Eagle | Cliff | not surveyed | | | | . |
| 21 | 532932 | 4392991 | | Golden Eagle | Cliff | not surveyed | | | | . |
| 23 | 538142 | 4392848 | 5/21/03 | Golden Eagle | Cliff | tended | | | | greenry |
| 24 | 538192 | 4391889 | 5/21/03 | Raven | Cliff | not found | | | | . |
| 25 | 535849 | 4392101 | 5/21/03 | Golden Eagle | Cliff | inactive | | | | poor condition |
| 27 | 535759 | 4393224 | 5/21/03 | Golden Eagle | Cliff | inactive | | | | 2 nests 15 m apart |
| 28 | 535648 | 4393312 | 5/21/03 | Golden Eagle | Cliff | inactive | | | | . |
| 29 | 534477 | 4391915 | | Raven | Cliff | not surveyed | | | | . |
| 30 | 533090 | 4392304 | | Golden Eagle | Cliff | not surveyed | | | | . |
| 31 | 533200 | 4392211 | | Golden Eagle | Cliff | not surveyed | | | | . |
| 32 | 533355 | 4392135 | | Raven | Cliff | not surveyed | | | | . |
| 34 | 534548 | 4391964 | | Unknown | Cliff | not surveyed | | | | . |
| 35 | 531775 | 4393441 | | Golden Eagle | Cliff | not surveyed | | | | . |
| 36 | 532363 | 4393569 | | Golden Eagle | Cliff | not surveyed | | | | . |
| 37 | 531849 | 4395047 | | Golden Eagle | Cliff | not surveyed | | | | . |
| 38 | 531570 | 4395252 | | Unknown | Cliff | not surveyed | | | | . |
| 39 | 531787 | 4393607 | | Golden Eagle | Cliff | not surveyed | | | | . |
| 40 | 531593 | 4393644 | | Golden Eagle | Cliff | not surveyed | | | | . |
| 408 | 537593 | 4387311 | | Golden Eagle | Cliff | not surveyed | | | | . |
| 424 | 543494 | 4393789 | | Unknown | Cliff | not surveyed | | | | . |
| 425 | 541949 | 4389550 | | Golden Eagle | Cliff | not surveyed | | | | . |
| 426 | 542787 | 4390104 | | Golden Eagle | Cliff | not surveyed | | | | . |
| 774 | 536293 | 4391834 | 5/21/03 | Golden Eagle | Cliff | inactive | | | | On sloping outcrop, top of middle cliff band. Material falling off ledge. |
| 775 | 536339 | 4391818 | 5/21/03 | Golden Eagle | Cliff | inactive | | | | Just around from GE #774 |
| 776 | 539515 | 4392608 | 5/21/03 | Golden Eagle | Cliff | inactive | | | | Shift nest 20-25 m NW |
| 777 | 534195 | 4392117 | | Golden Eagle | Cliff | not surveyed | | | | . |
| 778 | 542872 | 4389362 | | Raven | Cliff | not surveyed | | | | . |
| 779 | 543951 | 4388915 | | Golden Eagle | Cliff | not surveyed | | | | Possibly 2 nests here. |

2003 Raptor Survey for Dugout Mine

| Nest_no | X_utm27 | Y_utm27 | Date | Species | Type | Statu___03 | Eggs | Yng | Age | Comments03 |
|---|---|---|---|---|---|---|---|---|---|---|
| 780 | 543981 | 4387820 | | Golden Eagle | Cliff | not surveyed | | | | . |
| 781 | 543954 | 4387824 | | Golden Eagle | Cliff | not surveyed | | | | . |
| 782 | 543908 | 4387830 | | Golden Eagle | Cliff | not surveyed | | | | 4 nests together. |
| 783 | 544330 | 4388023 | | Golden Eagle | Cliff | not surveyed | | | | . |
| 783 | 544330 | 4388023 | | Golden Eagle | Cliff | not surveyed | | | | . |
| 1279 | 538739 | 4390786 | 5/21/03 | Red-tailed Hawk | Cliff | inactive | | | | |
| 1301 | 538469 | 4390846 | 5/21/03 | Raven | Cliff | inactive | | | | |
| 1302 | 538423 | 4390963 | 5/21/03 | Raven | Cliff | inactive | | | | |
| 1303 | 538582 | 4390851 | 5/21/03 | Raven | Cliff | active | 0 | 3 | 15 | |
| 1304 | 540267 | 4393126 | 5/21/03 | Red-tailed Hawk | Cliff | inactive | | | | |




LOGY, INC

| REVISION | |
|---|---|
| DATE | BY |
| 6/12/01 | JCB |
| 12/17/03 | RR |

# Canyon Fuel Company, LLC

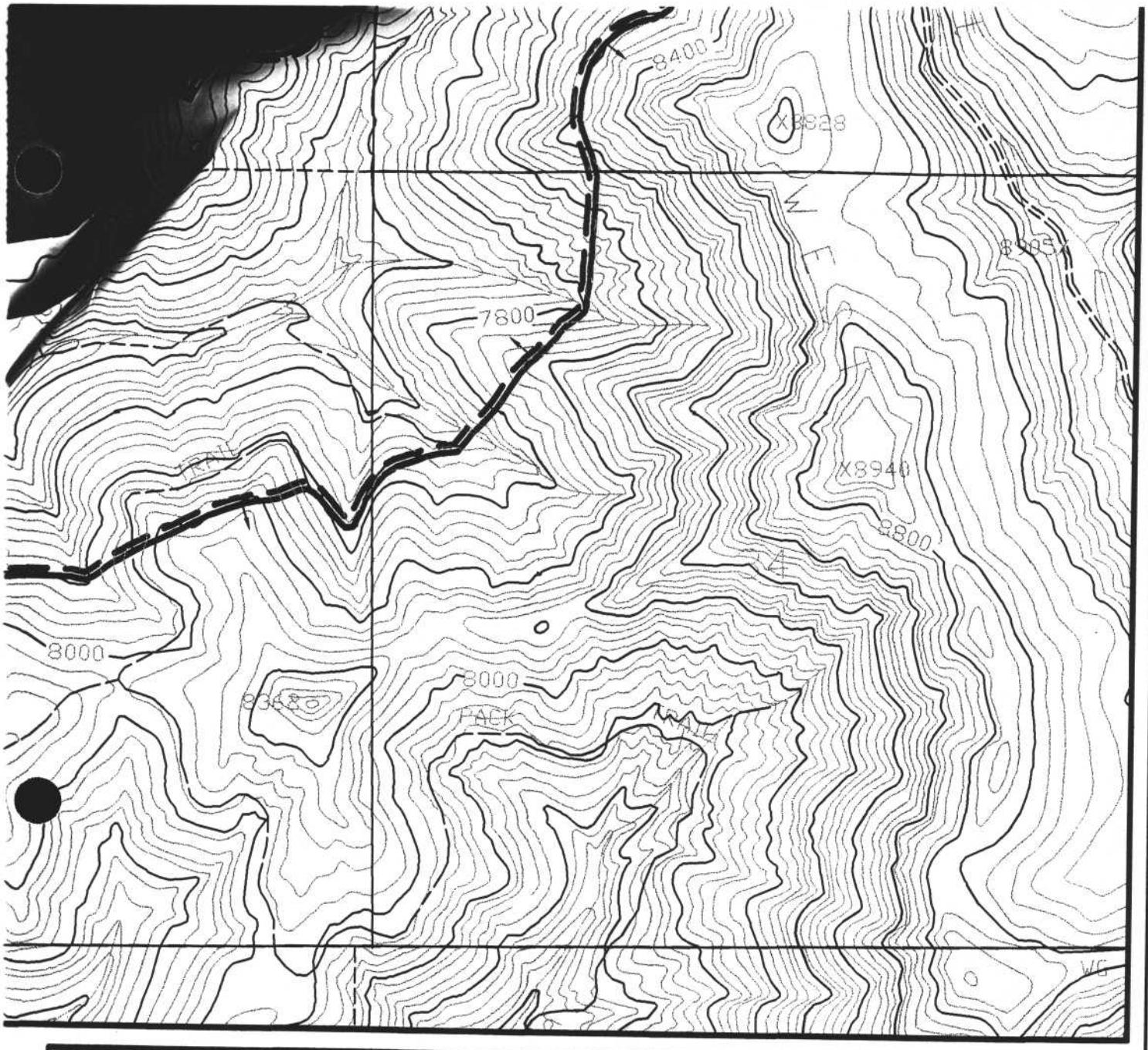
Soldier Canyon & Dugout Canyon Mines

## VEGETATION

RED

## Dugout Canyon Mine

| | | |
|---|---|---|
| DRAWN BY: JLP | DATE: JULY 19, 1999 D-463.ctb | SCALE: 1" = 1000' |
| APPROVED BY: | FILE NAME: X\DOGM\2 Working Files\Dugout\Sitla\Plate 3-1.dwg | DRAWING OR MAP NUMBER PLATE 3-1 |




| REVISIONS | |
|---|---|
| DATE | BY |
| 6/12/01 | JCB |
| 8/2/01 | JCB |
| 10/27/03 | RR |
| 12/18/03 | RR |

**Canyon Fuel Company, LLC**
Soldier Canyon & Dugout Canyon Mines

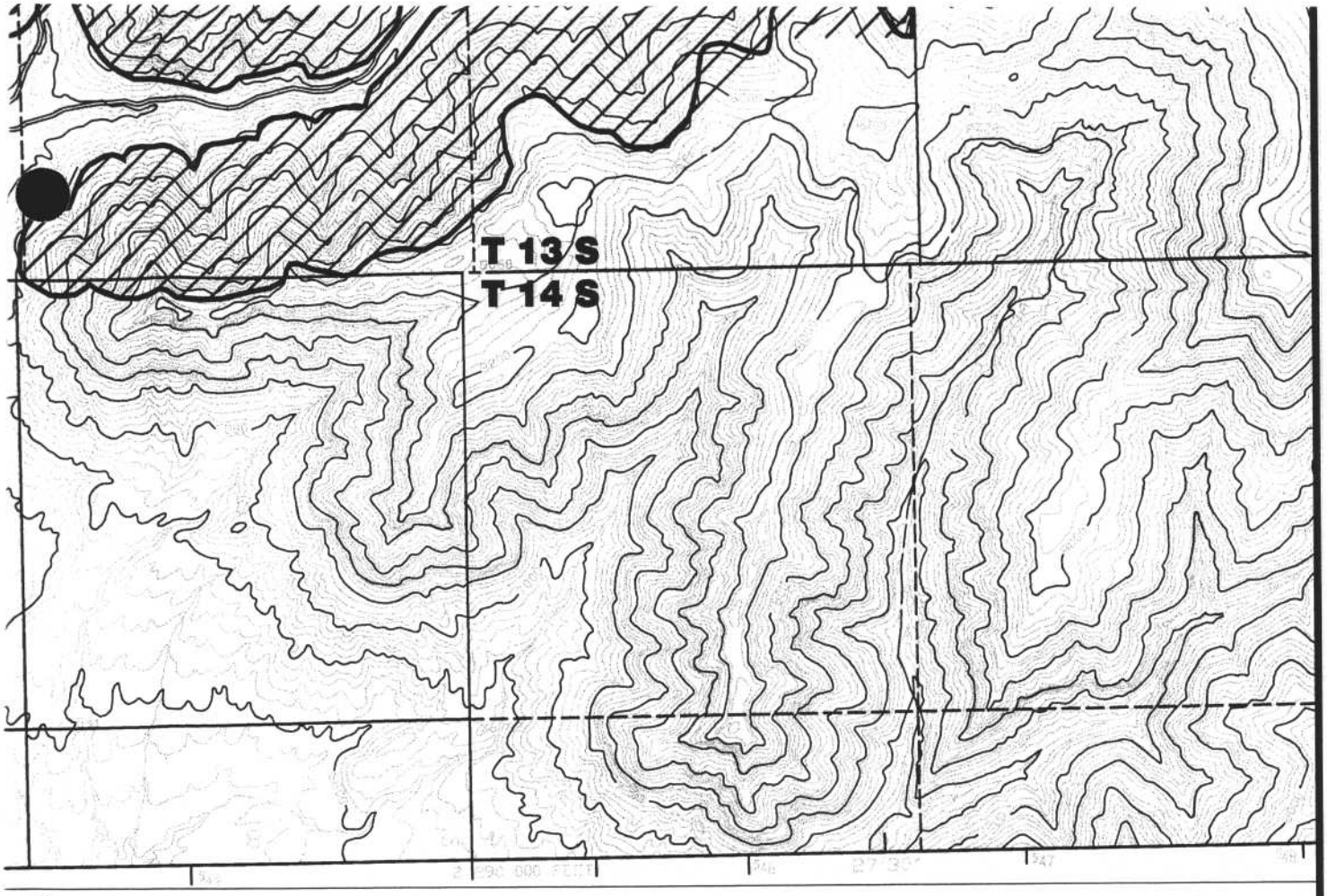
# WILDLIFE

RED

## Dugout Canyon Mine

| | | |
|---|---|---|
| DRAWN BY: RR | DATE: MARCH 21, 2003 D-441.PCP | SCALE: 1" = 1000' |
| APPROVED BY: JCB | FILE NAME: | DRAWING OR |

PLATE 3-2




| REVISIONS | |
|---|---|
| DATE | BY |
| 10/27/03 | RR |

**Canyon Fuel Company, LLC**
**Soldier Canyon & Dugout Canyon Mines**

# POTENTIAL LOCATIONS OF CLIFF ESCARPMENTS WITHIN PERMIT BOUNDARY AND ADJACENT AREA

RED

## Dugout Canyon Mine

| | | |
|---|---|---|
| DRAWN BY: JLP | DATE: APRIL 26, 1999 | SCALE: 1" = 2000' |
| APPROVED BY: MWS | FILE NAME: P:\DOGM\Dugout\OLD DWGS\SITLA\Plate 3-3.dwg | DRAWING OR MAP NUMBER **PLATE 3-3** |

# CHAPTER 4

# LAND USE AND AIR QUALITY

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# 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. A letter from John Senulis, Archeologist with Senco Phenix detailing their file search and surveys of the area has been incorporated into Appendix 4-3. The letter is addressed to Kenny Wintch, the SITLA Archeologist and a copy has been sent to Mr. Dykman at SHPO. The letter states " No sites eligible for nomination to the National Register of Historic Places have been found in or adjacent to the permit expansion area. It is very unlikely that future survey will reveal sites eligible.....Furthermore all activity will be underground with no surface disturbance. For these reasons a finding of "no effect on historic properties" is appropriate and archeologic clearance without stipulations is recommended."

**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.

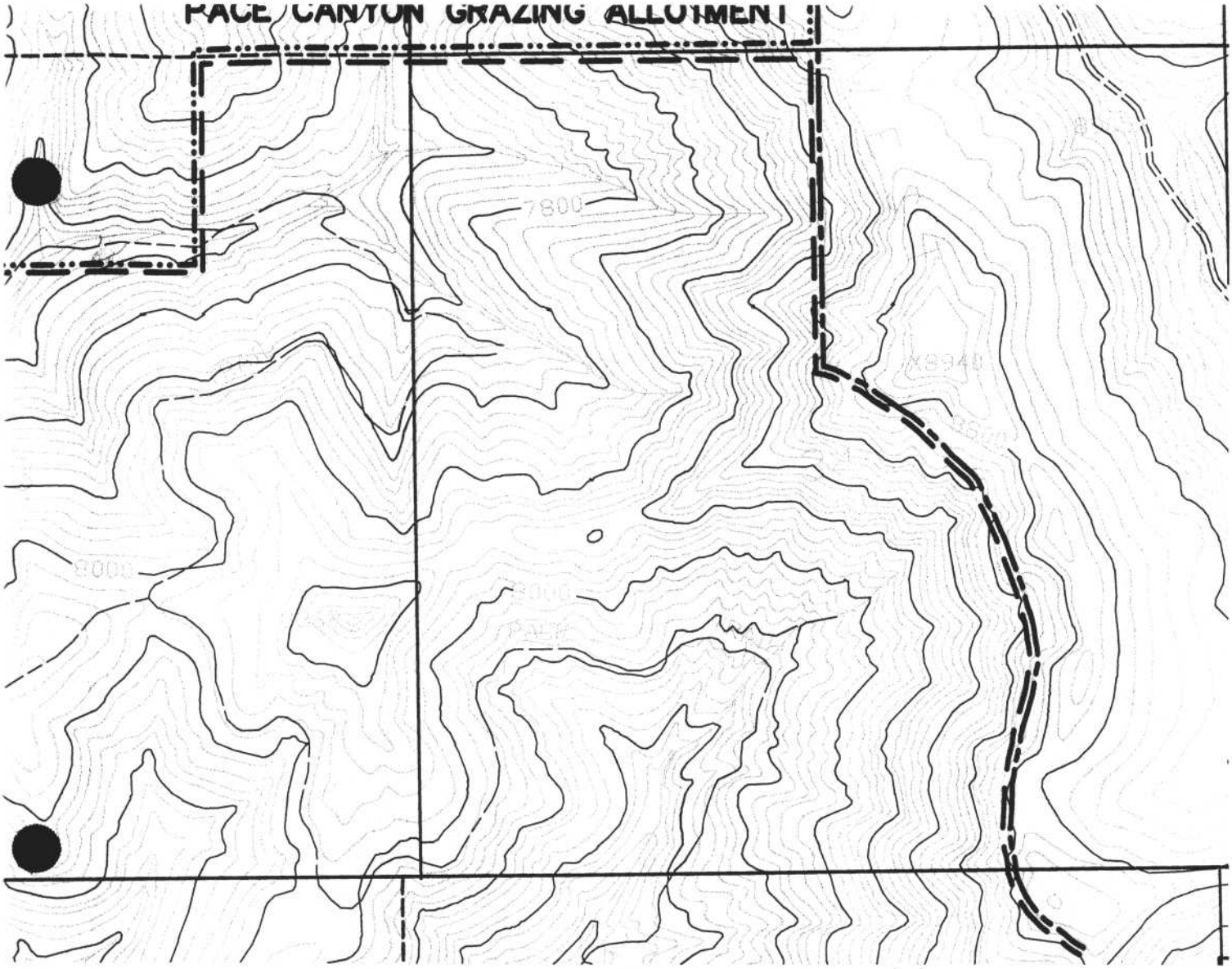
Efforts to restore wildlife habitat are discussed in Chapter 3 of this M&RP. Specific periods of habitation by wildlife species of the disturbed and adjacent area are discussed in Appendices 3-2 and 3-3. Since the disturbed area is privately owned the timing and extent of use for grazing will be made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




| REVISION | |
|---|---|
| DATE | BY |
| 6/12/01 | JCB |
| 12/18/03 | RR |

# Canyon Fuel Company, LLC

Soldier Canyon & Dugout Canyon Mines

## LAND USE

RED

## Dugout Canyon Mine

| | | |
|---|---|---|
| DRAWN BY: JLP | DATE: MAY 13, 1999 D-443.PCP | SCALE: 1" = 1000' |
| APPROVED BY: VSM | FILE NAME: X\DOGM\Working Files\Dugout\Sitla\Plate 4-1.dwg | DRAWING OR MAP NUMBER PLATE 4-1 |

# APPENDIX 4-3

Cultural and Historical Studies

SITLA Lease and Adjacent Area

Green

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

GREEN

**APPENDIX 4-3**

Cultural and Historical Studies

SITLA Lease and Adjacent Area

Add information to CONFIDENTIAL FOLDER PER REQUEST UNDER TASK ID # 1915

BIVC

# 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

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

Summary Report of
Inspection for Cultural Resources

For BLM Use Only

Attachment

BLM Report ID No. ____-_____ (1–10)

Report Acceptable Yes __ No __

Mitigation Acceptable Yes __ No __

Comments: _____

1. Cultural Report or Project Sage Creek-Dugout Canyon (11–40)

2. Development Company Eureka Energy Company

3. BLM Mini Permit No. ____ (41–45)

4. BLM Antiquities Permit No. 80-Ut-069 (46–51)

5. Report Date 9 (Month, 56–58) 17 (Day, 59) 1980 (Year, 60–62)

6. Field Work Dates 1979-1980

7. Responsible Institution AERC (63–77)

Fill in spaces 81, 85, 93, 97 only if:
V = Vernal Meridian
H = Half Township

8. Fieldwork Location: TWN 12S* (78–81) Range 12E (82–85) Section(s) 32 (86, 87) (88, 89)
TWN 13S* (90–93) Range 11E (94–97) Section(s) 24, 25, 36 (98, 99) (100, 101)

9. Resource Area PR (102, 103) Other: Carbon County

BO = Bonneville, WA = Wasatch, HR = House Range, WS = Warm Springs,
SE = Sevier River, HM = Henry Mtns., BR = Beaver River, DX = Dixie,
KA = Kanab, ES = Escalante, SJ = San Juan, GR = Grand, PR = Price River,
SR = San Rafael, DM = Diamond Mountain, BC = Book Cliffs.

10. Description of Examination Procedures:
Projects conducted in the mine plan permit area are detailed in AERC Paper No. 19. The areas reported in that Paper are noted with an asterisk under #8 above.

Project conducted outside the mine plan permit area included railroad and road corridor evaluations in all the other sections of #8. Archeologists (cont'd.)

11. Linear Miles Surveyed 50 (104–112)
and/or
Definable Acres Surveyed ____ (113–121)
and/or
*Legally Undefinable Acres Surveyed 3500 (122–130)
(*A parcel hard to cadastrally locate i.e., center of section)

12. Inventory Type I (131)
R = Reconnaisance
I = Intensive
S = Statistical Sample

13. Description of Findings (attach appendices, if appropriate)
A total of 32 cultural resource sites were recorded in the mine plan permit area (see AERC Paper No. 19 for details). These sites included 42Cb134, 135, 167, 168, 170, 171, 172, 173, 174, 175, 183, 184, 185, 186, 187, 188, 190, 192, 193, 193, 195, 196, 197, 198, 199, 200, 201, 202, 204, 205, 206 and 207. (cont'd.)

14. Number Sites Found: 37 (132)
No sites = 0

15. Collection: Y (133) Y = Yes, N =

16. 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.

17. Conclusion/Recommendations:

AERC recommends that a cultural resource clearance be granted to Eureka Energy Company based on adherence to the following stipulations:
(see reverse)

18. Signature of person in direct charge of field work: F.R. Hauck
F.R. Hauck, Ph.D.

19. Signature and Title of Institutional Officer Responsible F.R. Hauck
F. R. Hauck, Ph.D.

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.)

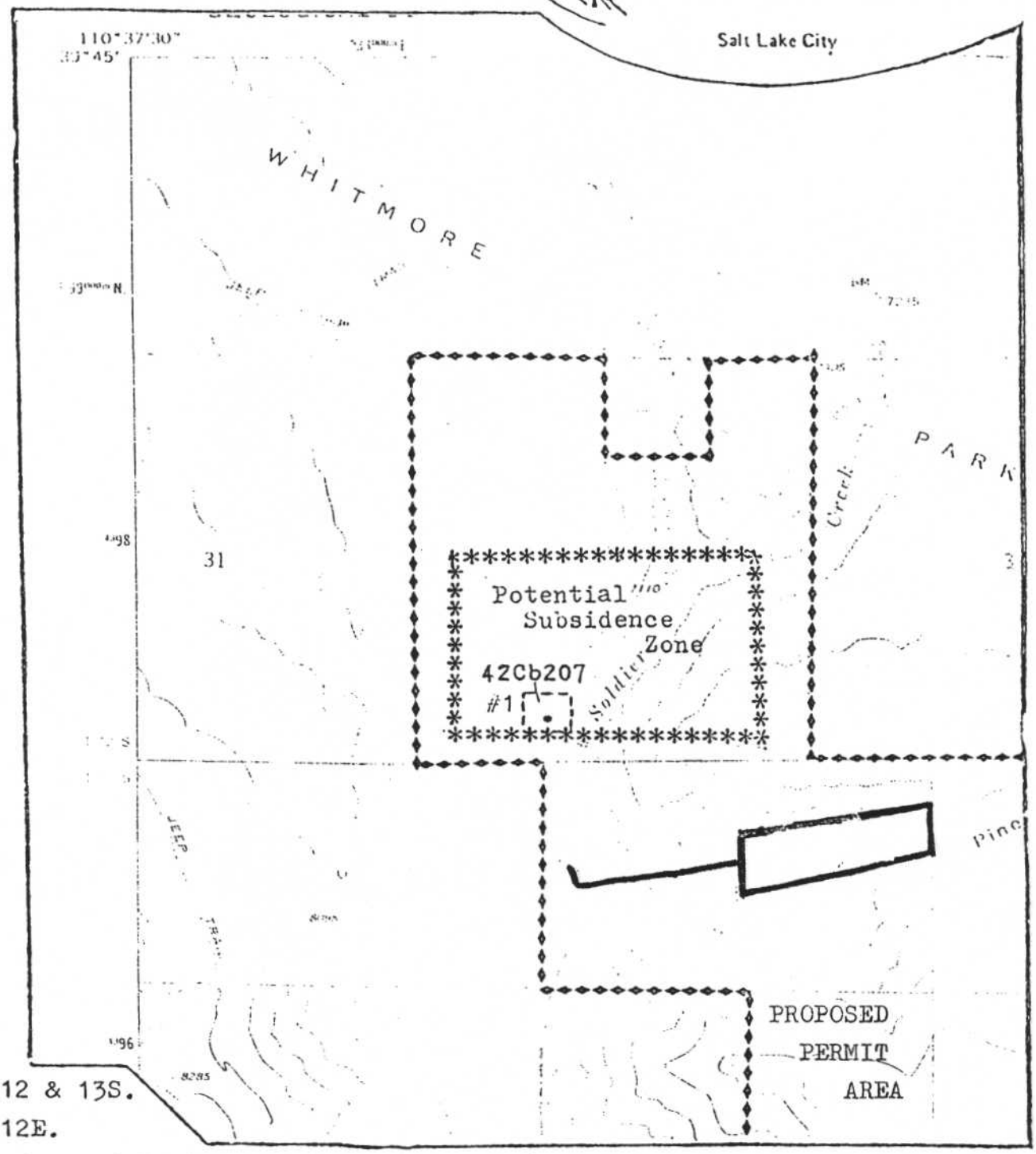
*T. 13S., R. 12E., Sections 5, 14, 15, 16, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36;
*T. 13S., R. 13E., Sections 19, 30;
T. 14S., R. 11E., Sections 1*, 12, 13, 24, 26, 35;
T. 14S., R. 12E., Sections 3*, 4*, 5*, 6*, 8, 18;
T. 15S., R. 11E., Sections 2, 3, 8, 9 and 10.

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.

ARCHEOLOGICAL-ENVIRONMENTAL
RESEARCH CORPORATION

Salt Lake City




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

Meridian: Salt Lake B. & M.

Quad: Pine Canyon, Utah
7.5 Minute - USGS

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

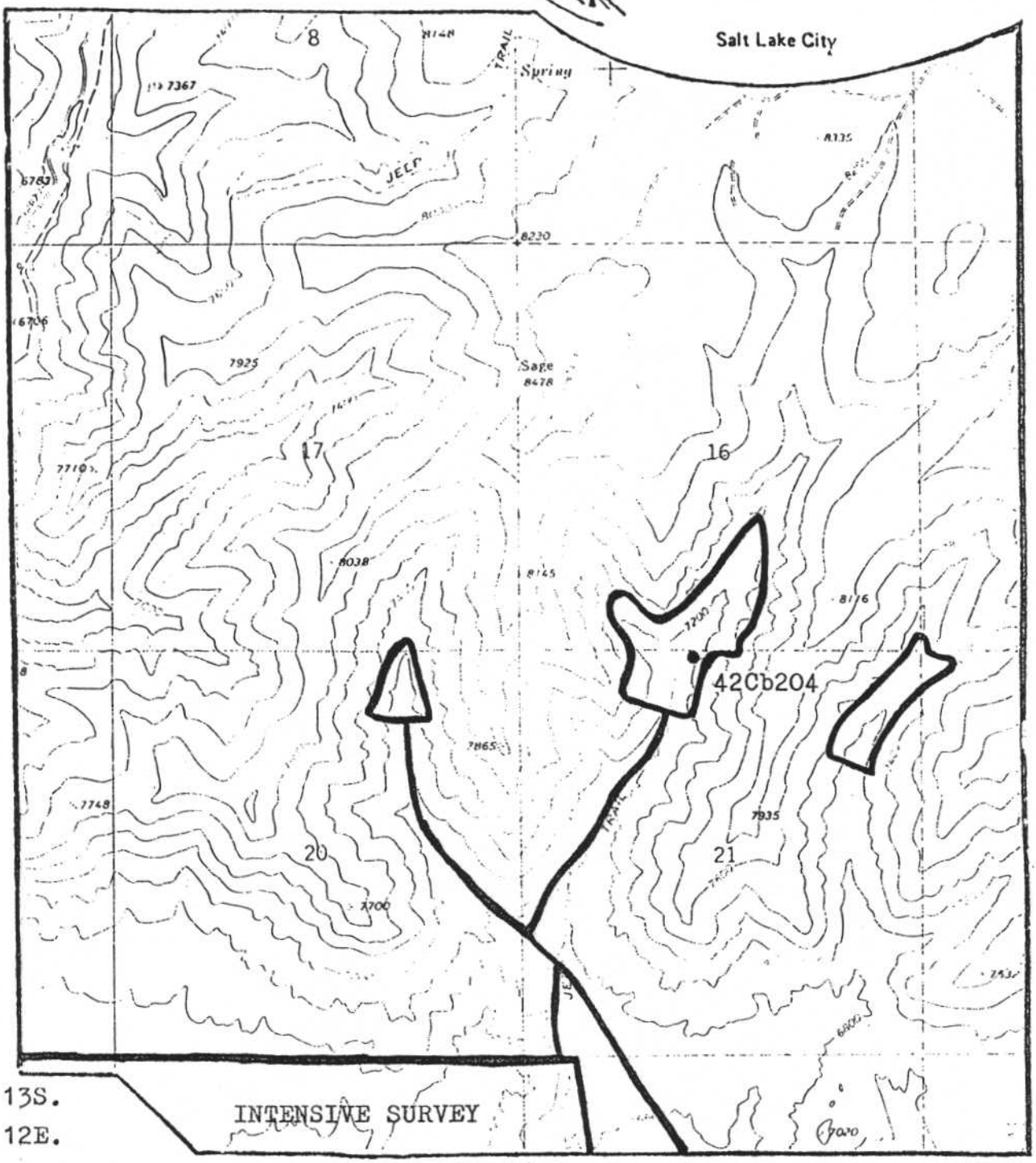
Figure 1
SITE LOCATION
IN
SOLDIER CREEK LOCALITY
OF
CARBON COUNTY, UTAH

Legend:
Archeological Site
Sample Survey Unit
Intensive Survey Zone

0 .5 1
.5 0 .5 1 Km

ARCHEOLOGICAL-ENVIRONMENTAL
RESEARCH CORPORATION

Salt Lake City




T. 13S.
R. 12E.

Meridian: Salt Lake B. & M.

Quad: Pine Canyon, Utah
7.5 Minute USGS

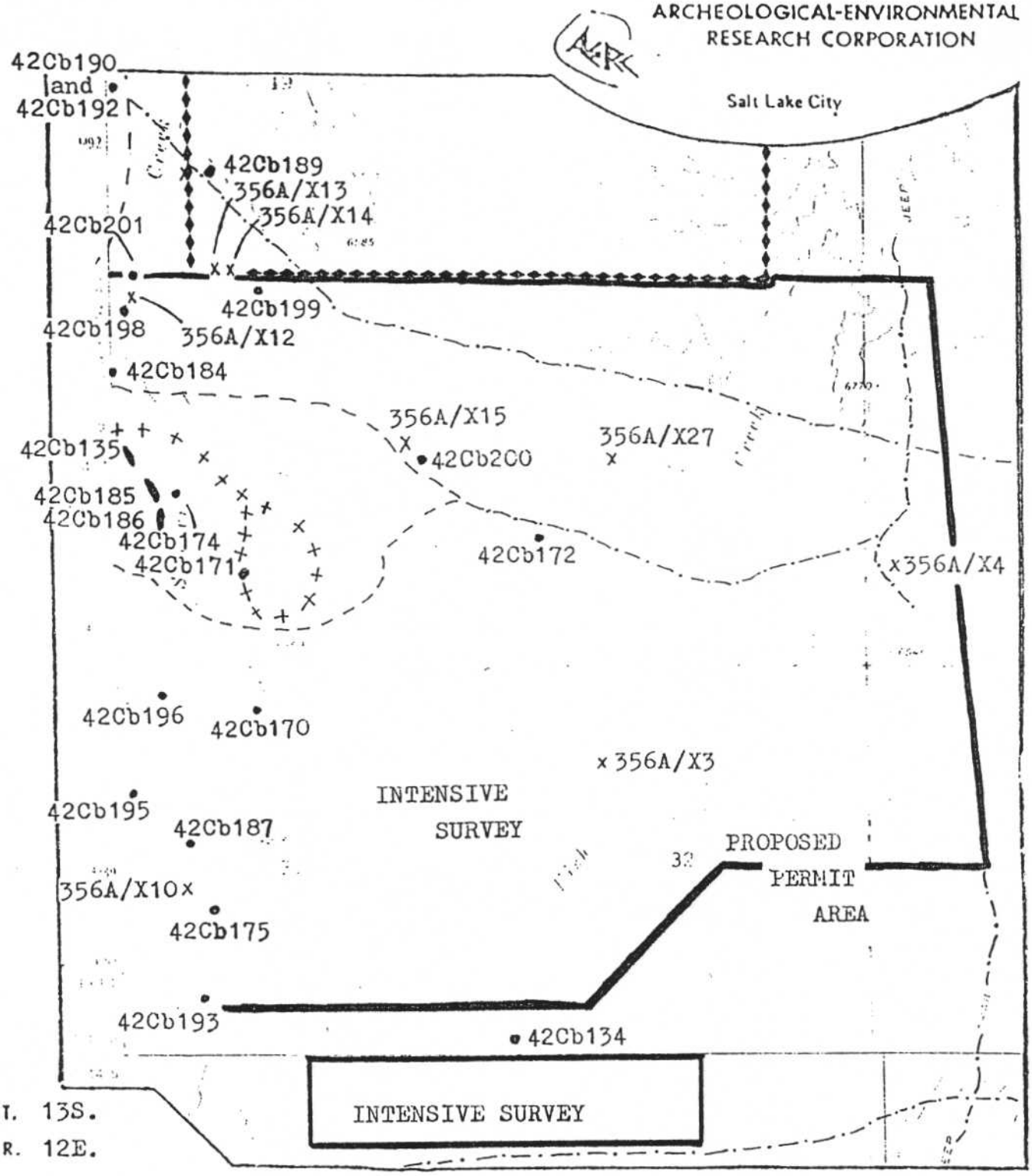
Project: EREC-79
Series: Eastern Utah
Date: 9-17-80

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

Legend:
Intensive Survey Zone
Corridor
Archeological Site

0 .5 1
.5 0 .5 1 Km

ARCHEOLOGICAL-ENVIRONMENTAL RESEARCH CORPORATION




T. 13S.

R. 12E.

Meridian: Salt Lake B. & M.

Quad: Pine Canyon, Utah 7.5 Minute USGS

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

Legend:

| | |
|---|---|
| Archeological Site | • |
| Isolated Artifact | × |
| Railroad Spur | + + |
| Construction Zone | |
| Corridor | |

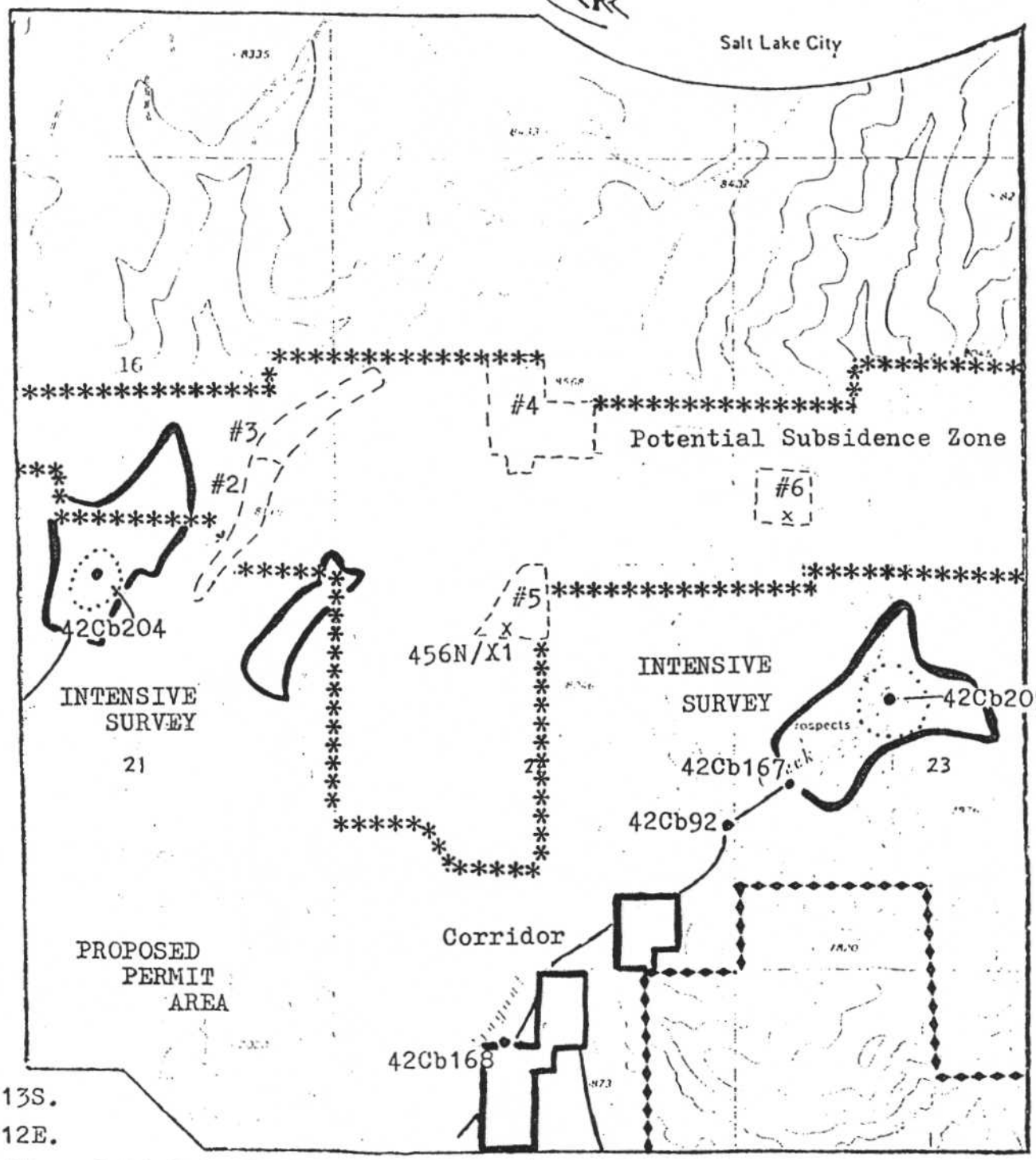
0 .5 1

.5 0 .5 1 Km

N

ARCHEOLOGICAL-ENVIRONMENTAL
RESEARCH CORPORATION

Salt Lake City




T. 13S.

R. 12E.

Meridian: Salt Lake B. & M.

Quad: Pine Canyon, Utah 7.5 Minute USGS

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

Legend:

Archeological Site •

Isolated Artifact x

Sample Survey Unit

Portal Zone

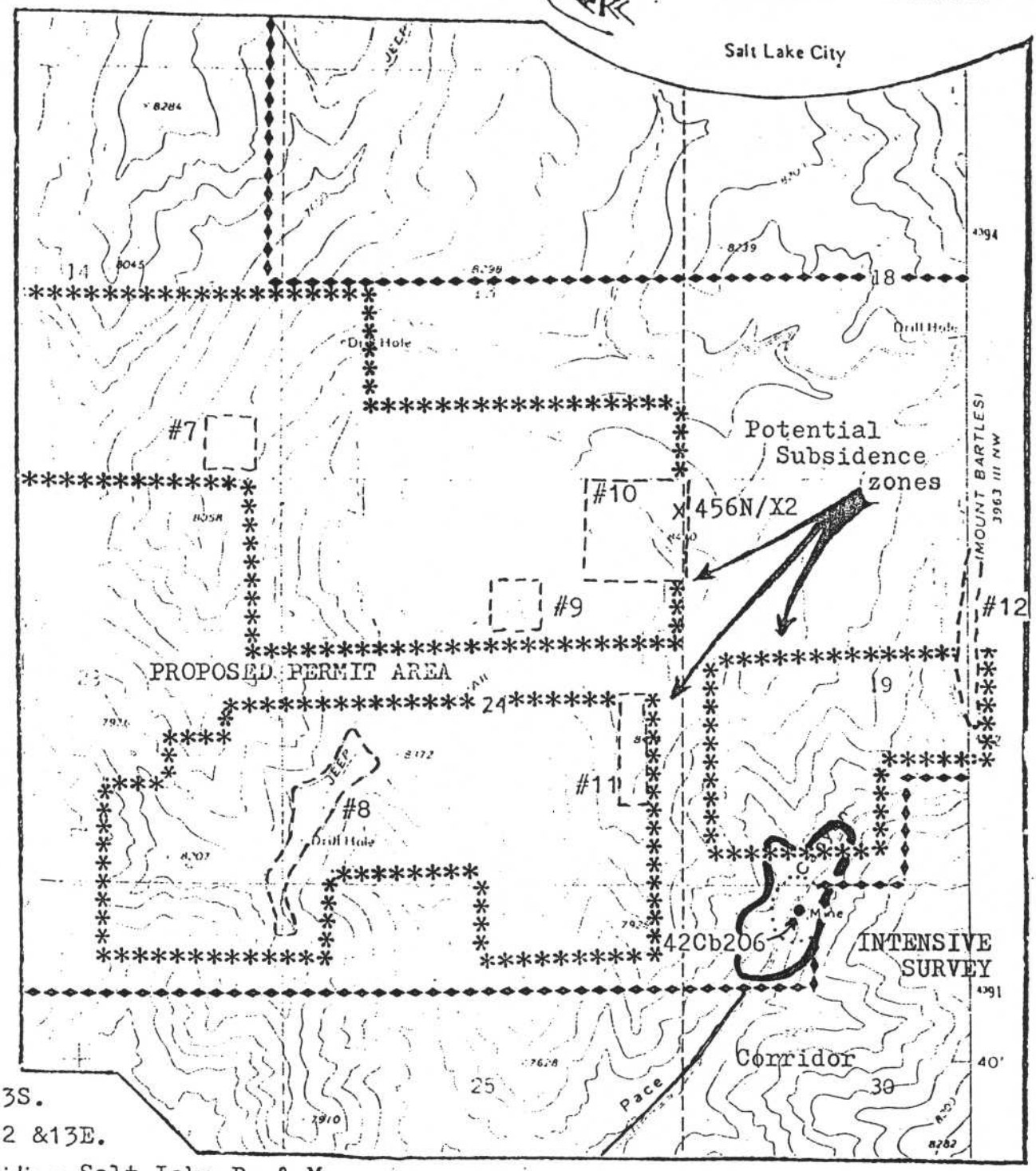
0 .5 1

.5 0 .5 1 Km

N

ARCHEOLOGICAL-ENVIRONMENTAL
RESEARCH CORPORATION

Salt Lake City




T. 13S.

R. 12 &13E.

Meridian: Salt Lake B. & M.

Quad:

Pine Canyon, Utah

7.5 Minute USGS

Project: EREC-80-1

Series: Eastern Utah

Date: 7-25-80

Figure 5

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

Legend:

Archeological Site •

Isolated Artifact ×

Sample Survey Unit

Portal Zone

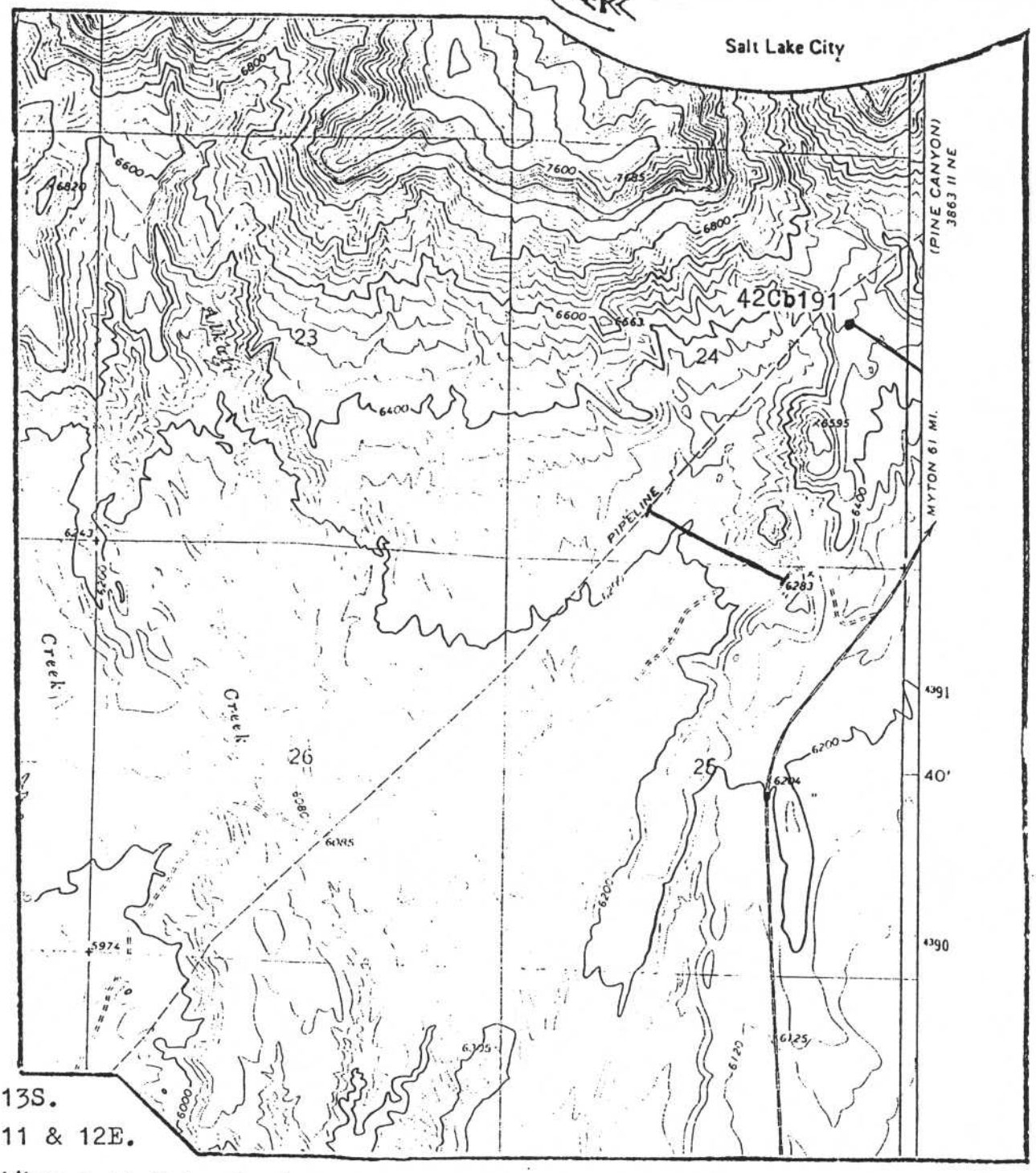
0 .5 1

.5 0 .5 1 Km

N

ARCHEOLOGICAL-ENVIRONMENTAL
RESEARCH CORPORATION

Salt Lake City




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

Meridian: Salt Lake B. & M.

Quad: Deadman Canyon, Utah 7.5 Minute USGS

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

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

Legend:
Archeological Site
Corridor Survey

0 5 1
5 0 5 1 Km

ARCHEOLOGICAL-ENVIRONMENTAL RESEARCH CORPORATION

Salt Lake City

42Cb183

42Cb173

42Cb184

Construction Zone for Service Facilities

42Cb197

INTENSIVE SURVEY

42Cb188

42Cb195

Reservoir Site

42Cb194

Pipeline

PROPOSED PERMIT AREA

T. 13 & 14S.

R. 11 & 12E.

Meridian: Salt Lake B. & M.

Project: EREC-79-1

Series: Eastern Utah

Date: 7/25/80

Figure 7

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

Quad: Deadman Canyon, Utah

7.5 Minute USGS

Legend:

Archeological Site •

Isolated Artifact x

Intensive Survey Zone

0 .5 1 Mi

.5 0 .5 1 Km

N

ARCHEOLOGICAL-ENVIRONMENTAL
RESEARCH CORPORATION

AERC

Salt Lake City

INTENSIVE SURVEY

INTENSIVE SURVEY

INTENSIVE SURVEY

Fish

32

33

42Cb134

42Cb202

TRAIL

356A/X23

356A/X21

JEEP

PROPOSED PERMIT AREA

5

4

356A/X26

Creek

Dugout

8

9

T. 13S.

R. 12 & 13E.

Meridian: Salt Lake B. & M.

Quad: Pine Canyon, Utah 7.5 Minute USGS

Project: EREC-80-1

Series: Eastern Utah

Date: 7-25-80

Figure 8

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

Legend:

Archeological Site •

Isolated Artifact ×

Corridor

Intensive Survey

0 .5 1

.5 0 .5 1 Km

N

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 ph~~otographic 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

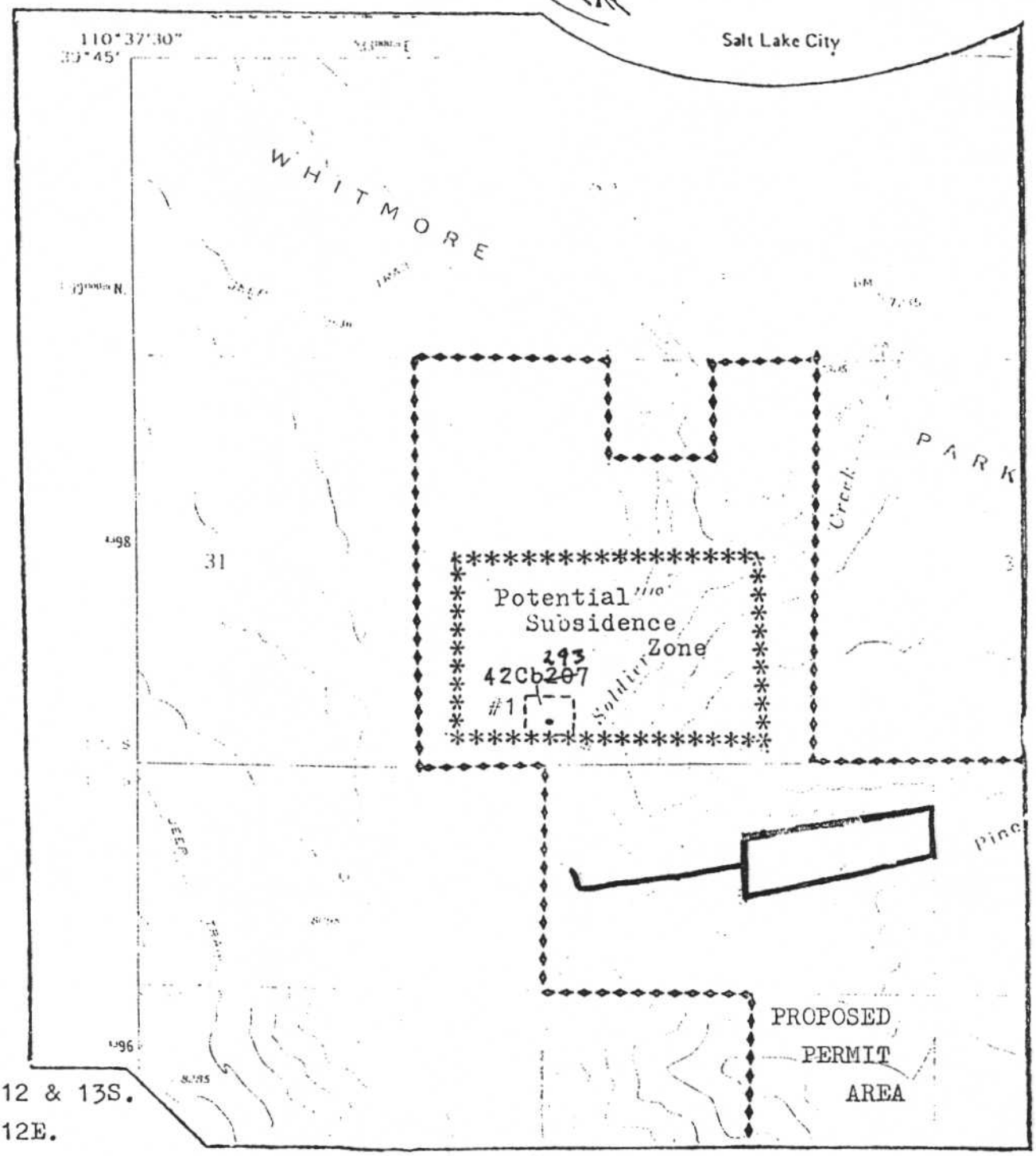
Site Reports Under Separate Cover
Provided to Relevant Agencies

# APPENDIX B

## General Project Maps

ARCHEOLOGICAL-ENVIRONMENTAL
RESEARCH CORPORATION

Salt Lake City




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

Meridian: Salt Lake B. & M.

Quad: Pine Canyon, Utah
7.5 Minute - USGS

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

Figure 1

SITE LOCATION
IN
SOLDIER CREEK LOCALITY
OF
CARBON COUNTY, UTAH

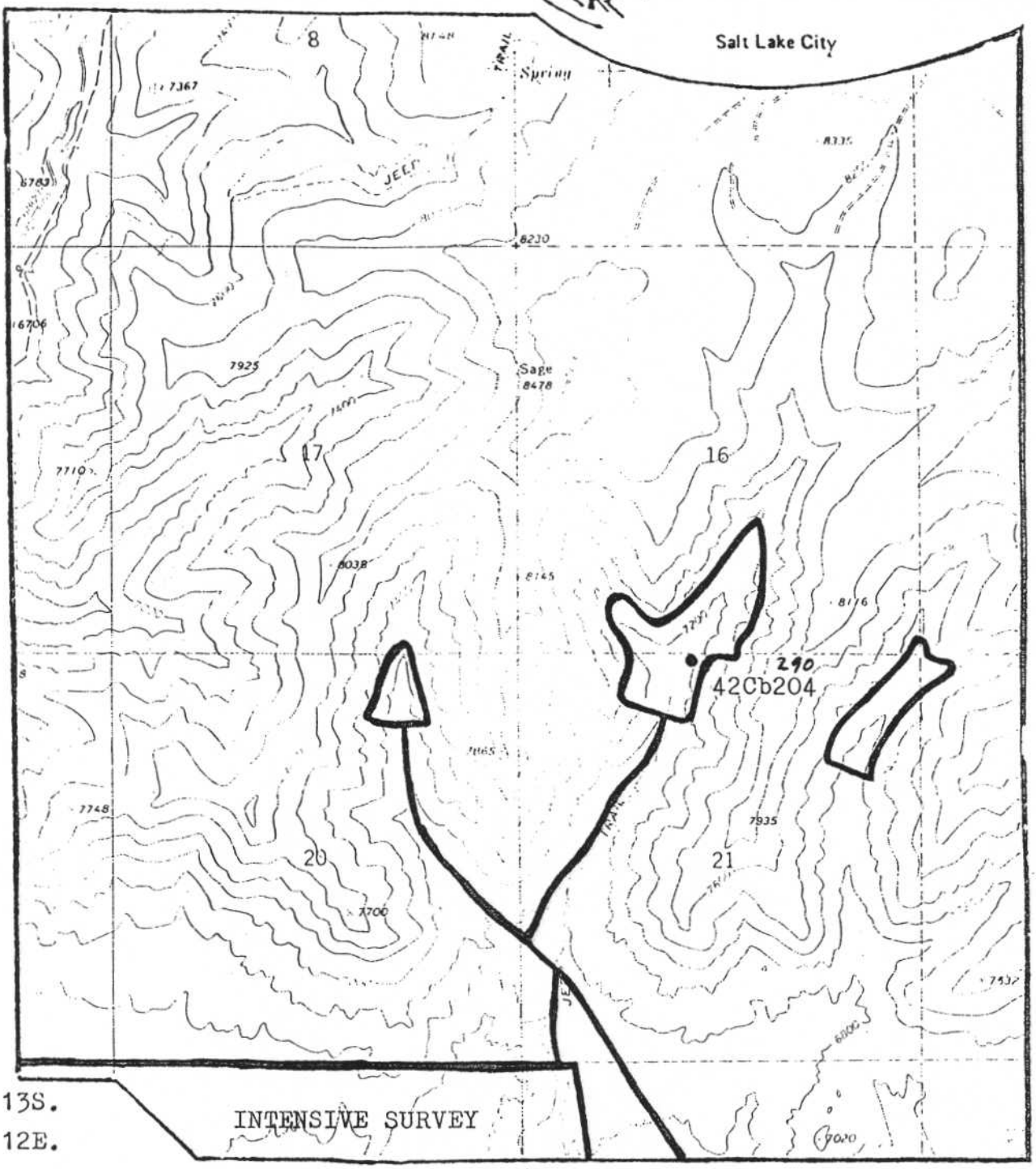
Legend:
Archeological Site
Sample Survey Unit
Intensive Survey Zone

0 .5 1
.5 0 .5 1 Km

N

ARCHEOLOGICAL-ENVIRONMENTAL
RESEARCH CORPORATION

Salt Lake City




T. 13S.
R. 12E.

Meridian: Salt Lake B. & M.

Quad: Pine Canyon, Utah 7.5 Minute USGS

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

Legend:
Intensive Survey Zone
Corridor
Archeological Site

0 .5 1

.5 0 .5 1 Km

ARCHEOLOGICAL-ENVIRONMENTAL RESEARCH CORPORATION

Salt Lake City

42Cb190 276
and
42Cb192 278
42Cb189 275
356A/X13
356A/X14
42Cb201 287
42Cb199 285
42Cb198 284
356A/X12
42Cb184
356A/X15
42Cb200 286
356A/X27
42Cb135
42Cb185 271
42Cb186 272
42Cb174
42Cb171
42Cb172
x356A/X4
42Cb196 282
42Cb170
x 356A/X3
42Cb195 281
42Cb187 273
INTENSIVE SURVEY
PROPOSED PERMIT AREA
356A/X10x
42Cb175
42Cb193 279
42Cb134
INTENSIVE SURVEY

T. 13S.
R. 12E.

Meridian: Salt Lake B. & M.

Quad: Pine Canyon, Utah 7.5 Minute USGS

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

Figure 3

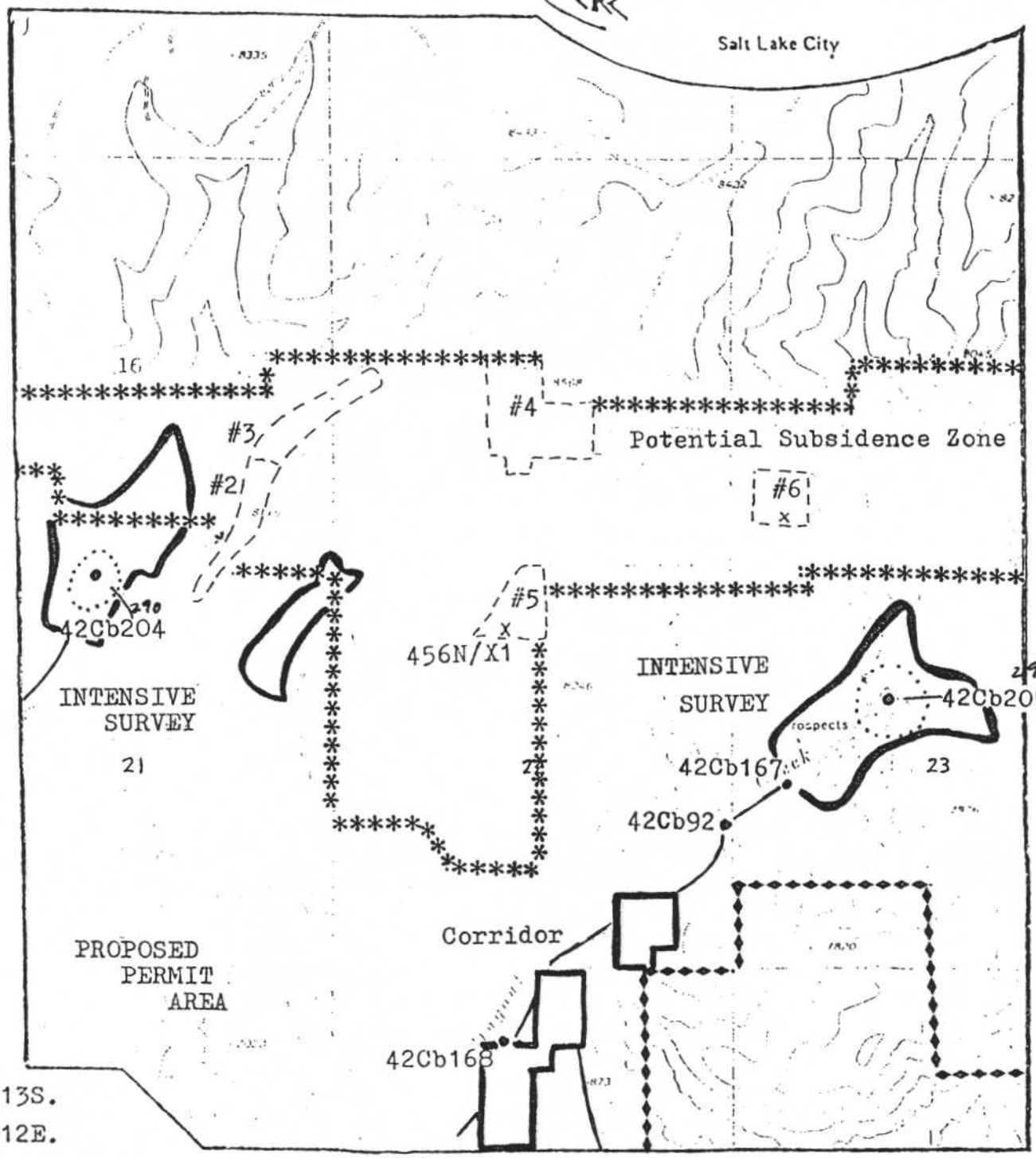
SITE LOCATIONS IN THE SOLDIER AND FISH CREEK LOCALITY OF CARBON COUNTY, UTAH

Legend:
Archeological Site •
Isolated Artifact x
Railroad Spur + +
Construction Zone
Corridor

0 .5 1
.5 0 .5 1 Km

N

ARCHEOLOGICAL-ENVIRONMENTAL
RESEARCH CORPORATION




T. 13S.
R. 12E.

Meridian: Salt Lake B. & M.

Quad:
Pine Canyon, Utah
7.5 Minute USGS

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

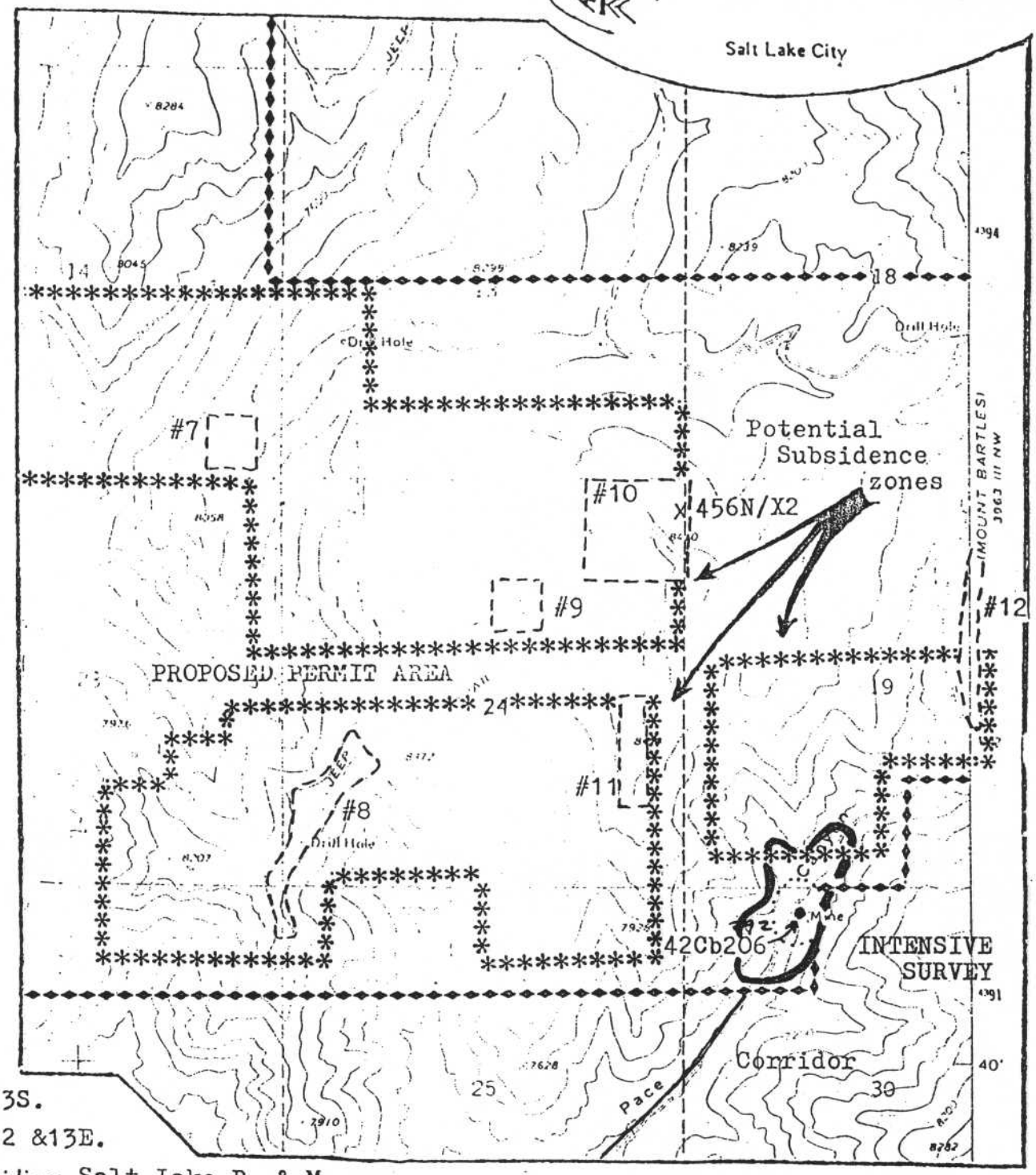
Legend:
Archeological Site •
Isolated Artifact x
Sample Survey Unit
Portal Zone

0 .5 1
.5 0 .5 1 Km

N

ARCHEOLOGICAL-ENVIRONMENTAL RESEARCH CORPORATION

Salt Lake City




T. 13S.

R. 12 &13E.

Meridian: Salt Lake B. & M.

Quad:

Pine Canyon, Utah

7.5 Minute USGS

Project: EREC-80-1

Series: Eastern Utah

Date: 7-25-80

Figure 5

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

Legend:

Archeological Site •

Isolated Artifact ×

Sample Survey Unit

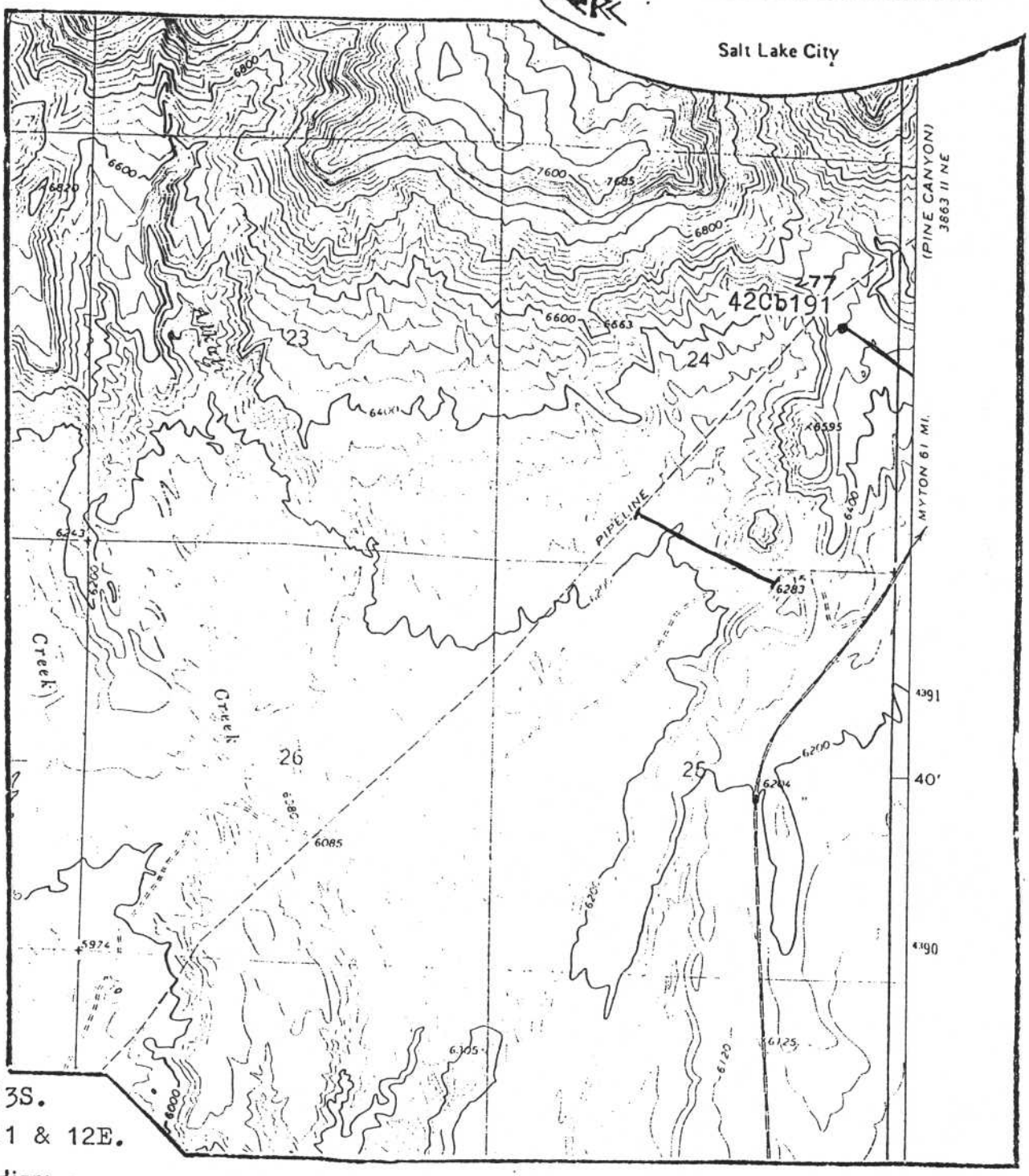
Portal Zone

0 .5 1

.5 0 .5 1 Km

N

ARCHEOLOGICAL-ENVIRONMENTAL
RESEARCH CORPORATION




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

Meridian: Salt Lake B. & M.

Quad: Deadman Canyon, Utah 7.5 Minute USGS

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

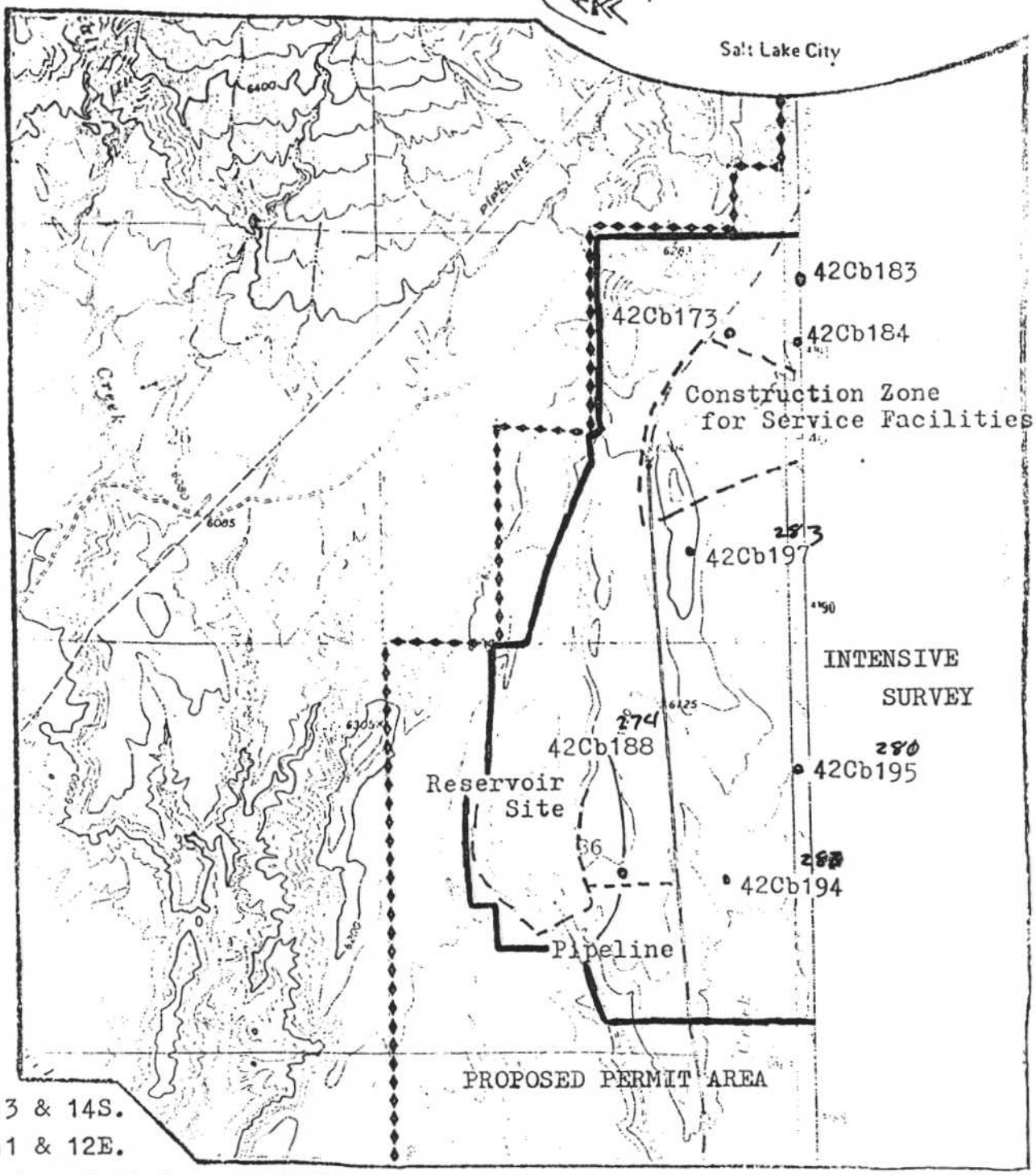
Figure 6
SITE LOCATION
IN
SOLDIER CREEK LOCALITY
OF
CARBON COUNTY, UTAH

Legend:
Archeological Site
Corridor Survey

0 5 1
5 0 5 1 Km

ARCHEOLOGICAL-ENVIRONMENTAL RESEARCH CORPORATION

Salt Lake City




T. 13 & 14S.

R. 11 & 12E.

Meridian: Salt Lake B. & M.

Project: EREC-79-1

Series: Eastern Utah

Date: 7/25/80

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

Quad: Deadman Canyon, Utah 7.5 Minute USGS

Legend:
Archeological Site •
Isolated Artifact ×
Intensive Survey Zone

0 .5 1 Mi

.5 0 .5 1 Km

N

ARCHEOLOGICAL-ENVIRONMENTAL
RESEARCH CORPORATION

Salt Lake City

INTENSIVE SURVEY

INTENSIVE SURVEY

32

33

42Cb134

42Cb202

356A/X23

356A/X21

INTENSIVE SURVEY

PROPOSED PERMIT AREA

5

4

356A/X26

8

9

T. 13S.

R. 12 & 13E.

Meridian: Salt Lake B. & M.

Quad: Pine Canyon, Utah 7.5 Minute USGS

Project: EREC-80-1

Series: Eastern Utah

Date: 7-25-80

Figure 8

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

Legend:

Archeological Site •

Isolated Artifact ×

Corridor

Intensive Survey

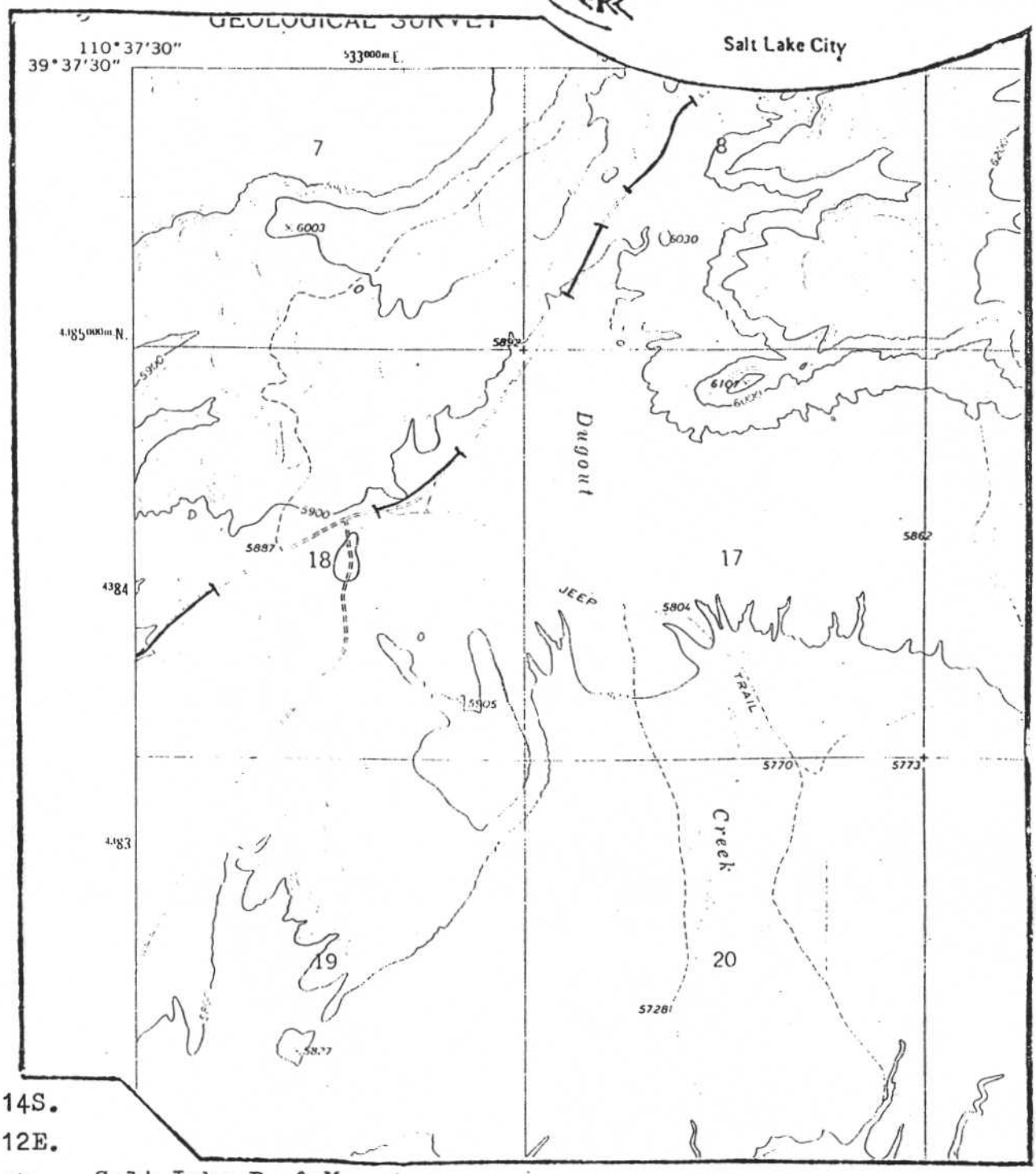
0 .5 1

.5 0 .5 1 Km

N

ARCHEOLOGICAL-ENVIRONMENTAL
RESEARCH CORPORATION

Salt Lake City




T. 14S.

R. 12E.

Meridian: Salt Lake B. & M.

Quad: Sunnyside Junction Utah 7.5 Minute USGS

Project: EREC-79

Series: Eastern Utah

Date: 9-17-80

Figure 9
CORRIDOR EVALUATIONS
IN THE
DUGOUT CREEK LOCALITY
OF
CARBON COUNTY, UTAH

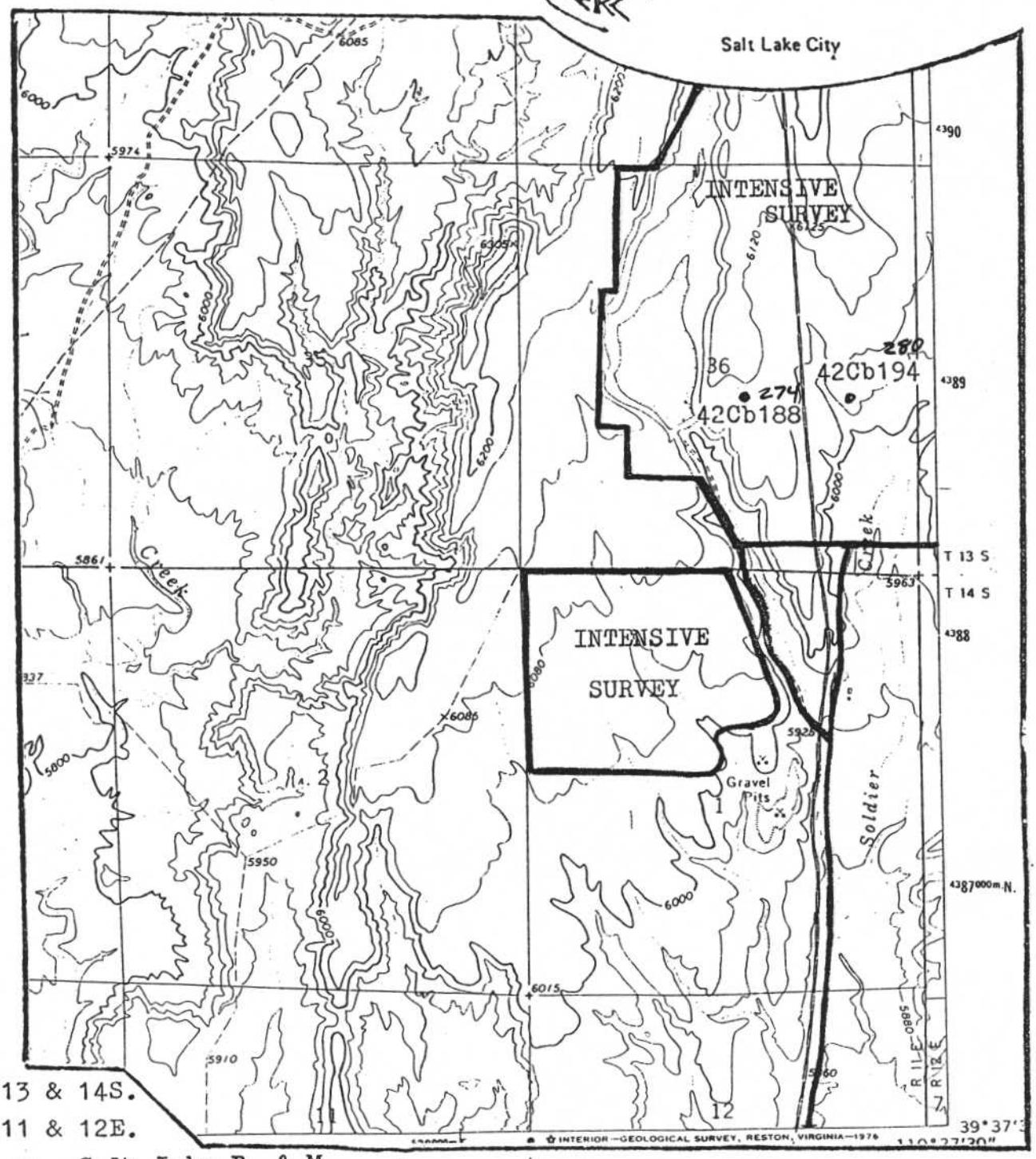
Legend:

Corridor

0 .5 1

.5 0 .5 1 Km

ARCHEOLOGICAL-ENVIRONMENTAL
RESEARCH CORPORATION




T. 13 & 14S.

R. 11 & 12E.

Meridian: Salt Lake B. & M.

Quad: Deadman Canyon, Utah 7.5 Minute USGS

Project: EREC-79

Series: Eastern Utah

Date: 9-17-80

Figure 10

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

Legend:

Corridor

Intensive Survey Zone

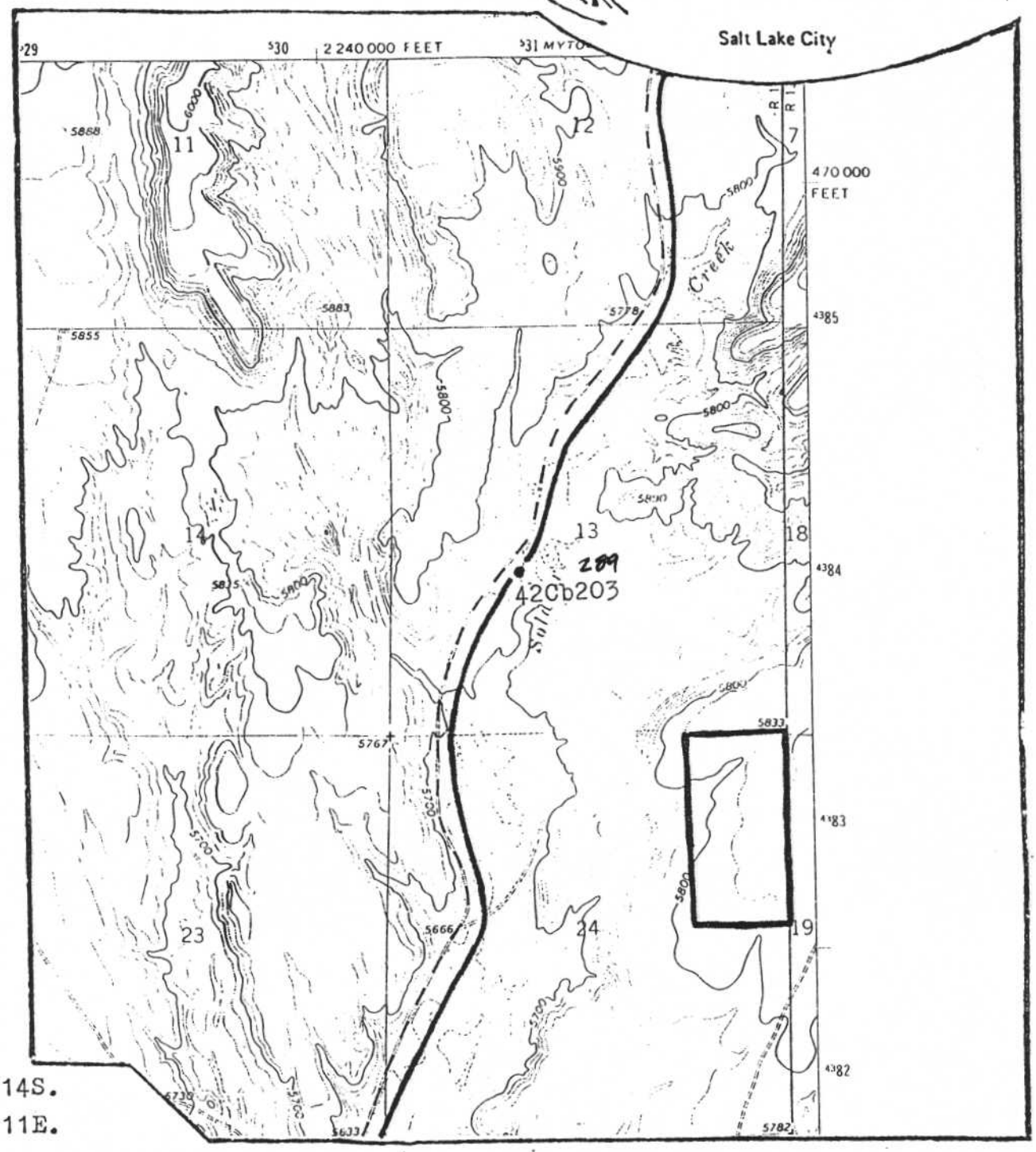
Archeological Site

0 .5 1

.5 0 .5 1 Km

ARCHEOLOGICAL-ENVIRONMENTAL
RESEARCH CORPORATION

Salt Lake City




T. 14S.

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

**Legend:**

Corridor

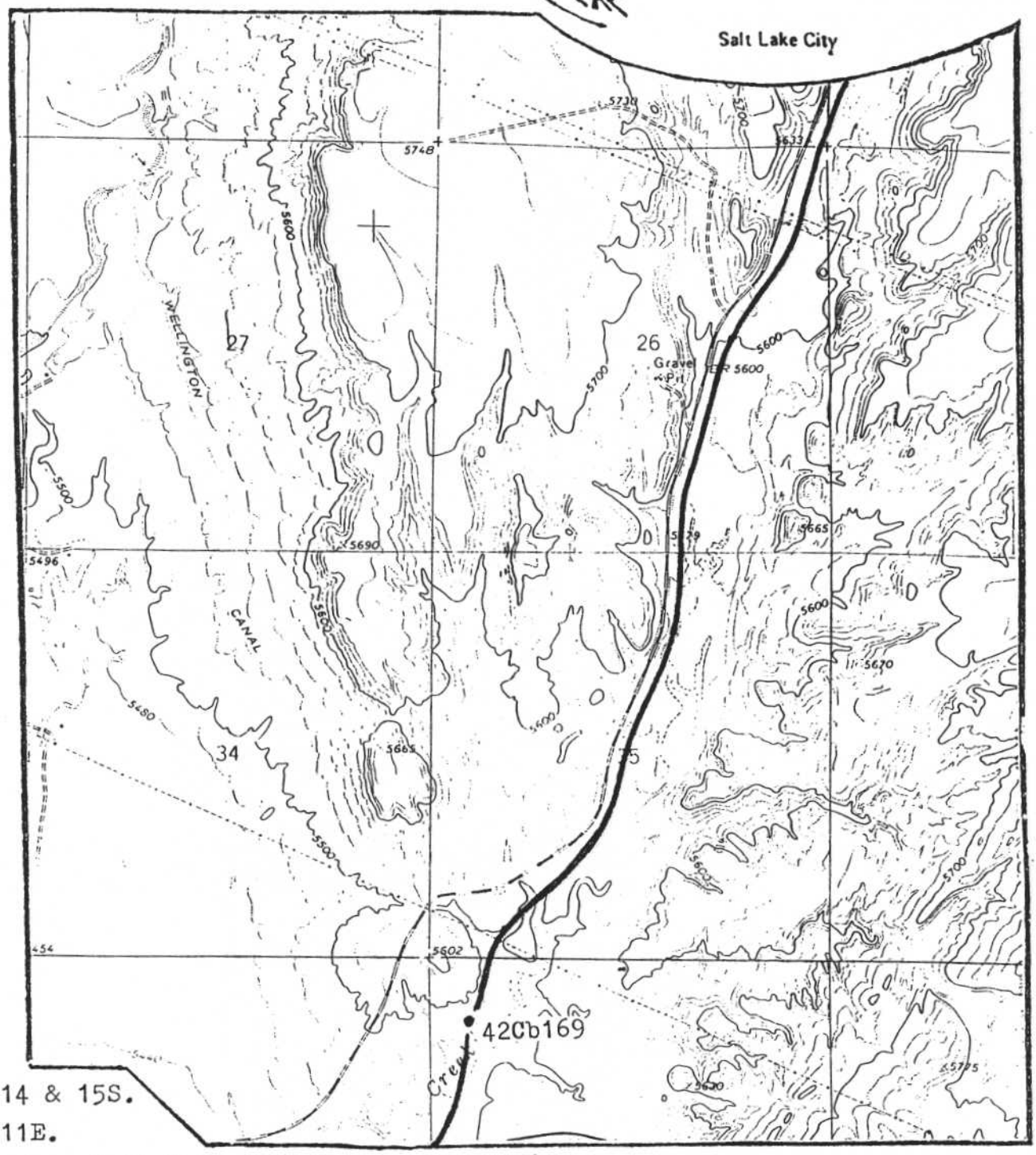
Archeological Site

Intensive Survey Zone

0 .5 1

.5 0 5 1 Km

ARCHEOLOGICAL-ENVIRONMENTAL
RESEARCH CORPORATION




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

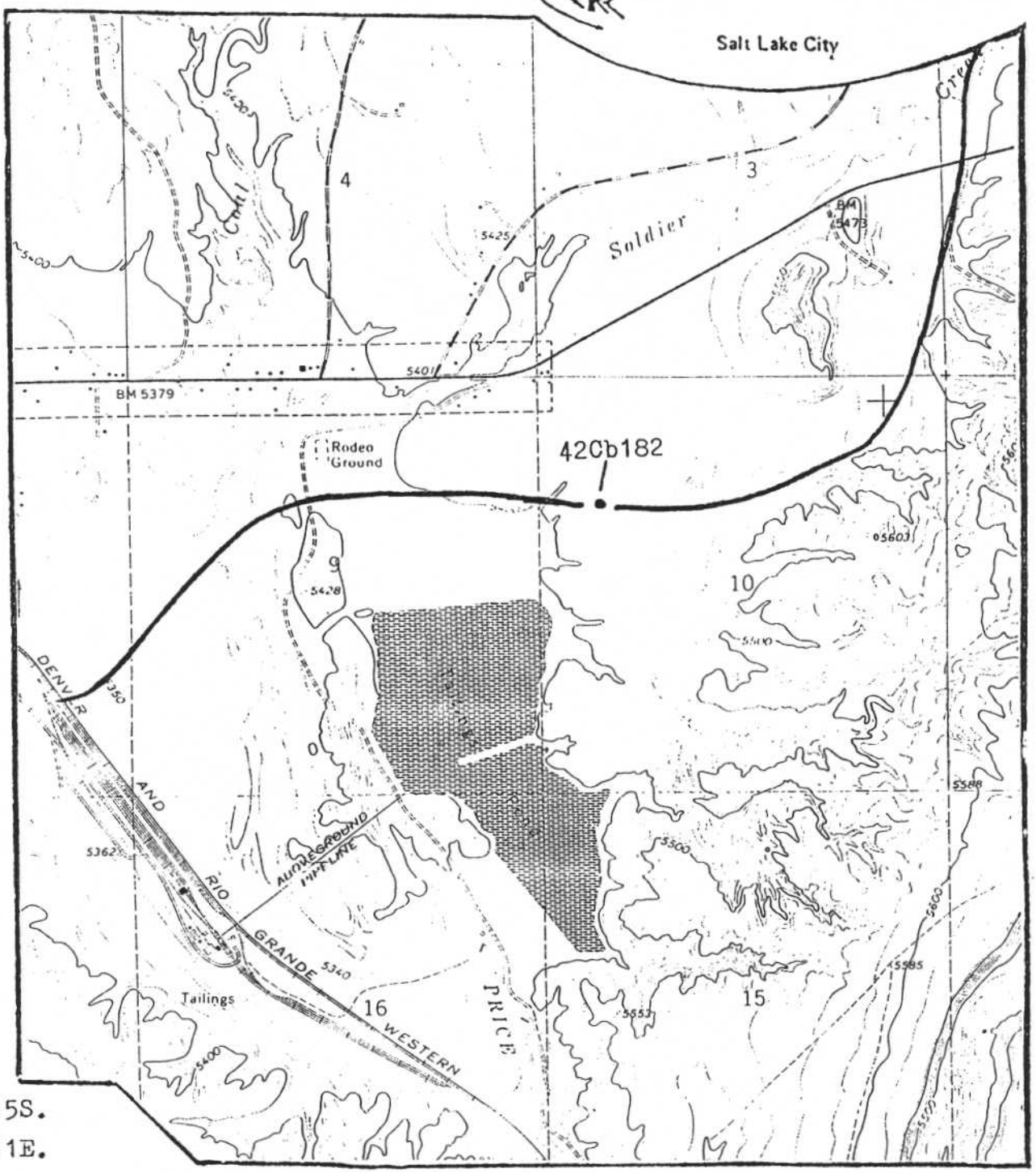
Archeological Site

0 .5 1

.5 0 .5 1 Km

N

ARCHEOLOGICAL-ENVIRONMENTAL
RESEARCH CORPORATION




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

Legend:

Corridor

Archeological Site

0 .5 1

.5 0 .5 1 Km

# 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

81-55

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. | | | - | | | | | | | 1 4 10

Report Acceptable Yes __ No __

Mitigation Acceptable Yes __ No __

Comments: _____

Report Title THREE COAL EXPLORATION DRILL HOLES (11–40)

Development Company Eureka Energy Company

Report Date 6 (MONTH) 22 1981 (YEAR) (41 42 43 46)

4. Antiquities Permit No. 81-Ut-179

Responsible Institution AERC (EREC-81-1) (47–61)

County Carbon

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

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

Resource Area PR (110 111) TWN (94–97) Range (98–101) Section(s) (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 i
V=Vernal Meridian
H=Half Township

Description of Examination Procedures:

Dennis G. Weder, AERC staff archeologist, examined each proposed drill locatio 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 (124–129) 2

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

10. Inventory Type I (130)

R=Reconnaisance
I=Intensive
S=Statistical Sample

. Description of Findings (attach appendices, if appropriate)

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

12. Number Sites Found: 0 (131) No sites=0

13. Collection: N (136) Y=Yes, N=N

. 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:

(Over)

. Signature and Title of Institutional Officer Responsible F R Hauck

F. R. Hauck, Ph.D.
President

Conclusions/Recommendations (cont'd.):

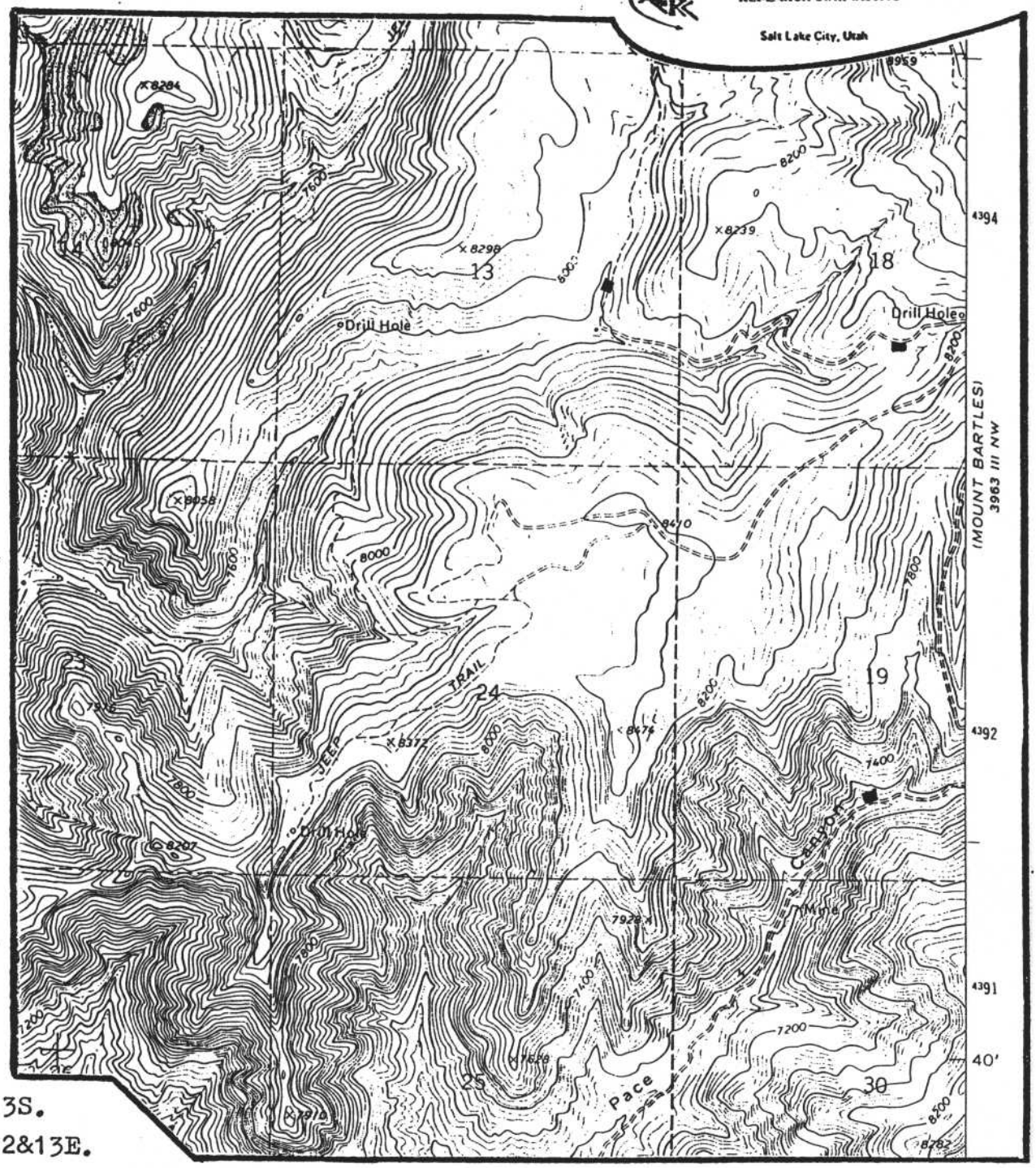
1. All vehicular traffic, personnel movement, and construction be confined to the locations examined and to access roads leading into these locations.

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.

ARCHEOLOGICAL - ENVIRONMENTAL RESEARCH CORPORATION

Salt Lake City, Utah




T. 13S.

R. 12&13E.

**Meridian:** Salt Lake B. & M.

**Quad:** Pine Canyon, Utah 7.5 Minute USGS

**Project:** EREC-81-1

**Series:** Central Utah

**Date:** 6-22-81

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

**Legend:**

Drill hole inventory area

0 .5 1 mi

.5 0 .5 1Km

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

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

Dear Charlie:

Enclosed please fine 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

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 1983 DRILL HOLES SAGEPT-DUGOUT CAN (11–40)

Development Company Sunedco Coal Company

Report Date 6 (MONTH, 41 42) 1983 (YEAR, 43 46)  4. Antiquities Permit No. 83-UT-049

Responsible Institution METCALF-ZIER (47–61)  County Carbon

Fieldwork Location: TWN 13 S (62–65) Range 12 E (66–69) Section(s) 10 (70 71), 13 (72 73), 14 (74 75), 23 (76 77)

TWN 13 S (78–81) Range 12 E (82–85) Section(s) 24 (86 87), (88 89), (90 91), (92 93)

Resource Area PR (110 111) TWN 13 S (94–97) Range 13 E (98–101) Section(s) 19 (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 if:
V=Vernal Meridian
H=Half Township

Description of Examination Procedures:

An approximate 100 ft radius around each drill hole location was examined by close interval pedestrian transects. Access routes received a single meandering transect for coverage of approximately a 100 ft. wideth. Survey was conducted during pre-site inspection and flagging by Michael D. Metcalf on June 13 and 14, 1983.

9. Linear Miles Surveyed and/or 2.6 (112–117)

Definable Acres Surveyed and/or (118–123)

*Legally Undefinable Acres Surveyed 9 (124–129)

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

10. Inventory Type I (130)

R=Reconnaisance
I=Intensive
S=Statistical Sample

11. Description of Findings (attach appendices, if appropriate)

One gray chert decortication flake (isolate-not collected) was found 100 ft east of Hole 19-1. No other cultural resources were located.

12. Number Sites Found: 0 (131–135) No sites=0

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

14. Actual/Potential National Register Properties Affected:

None

15. Literature Search, Location/Date:

Division of State History, 22 May 83. Pre-field conference-Anne Hummer-Blaine Miller Price

16. Conclusion/Recommendations:

No cultural resources were located which will be adversely effected by drill pad or access construction. Therefore, cultural resource clearance is recommended.

# 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

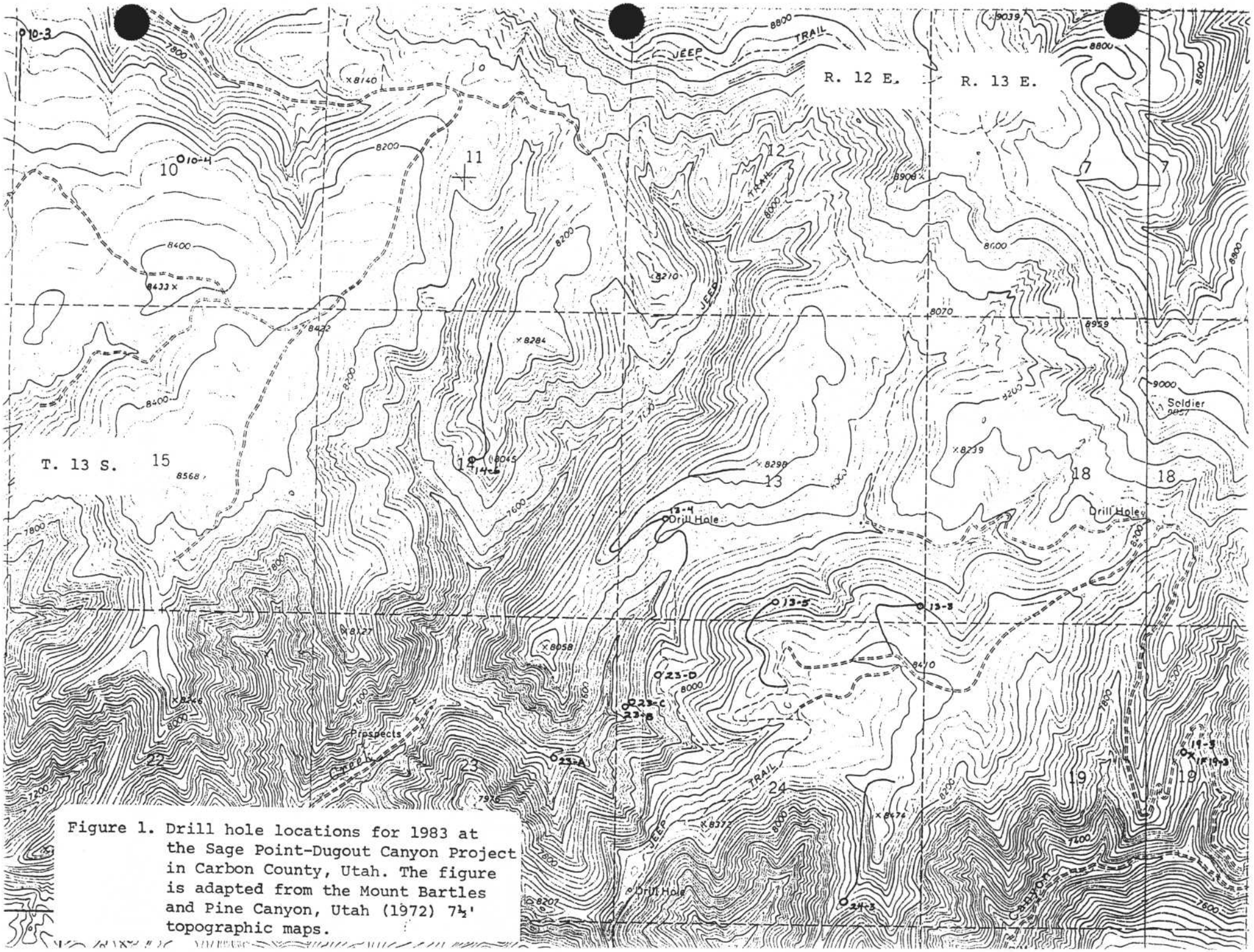



Figure 1. Drill hole locations for 1983 at the Sage Point-Dugout Canyon Project in Carbon County, Utah. The figure is adapted from the Mount Bartles and Pine Canyon, Utah (1972) 7½' topographic maps.

(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 reamins 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.

METCALF-ZIER ARCHAEOLOGISTS, INC. BOX 899 EAGLE, CO. 81631 (303) 328-6244

# ISOLATED FIND RECORD

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

LOCATION: T 13S R 13E Sec. 19, SW ¼ SW ¼ SE ¼ NE ¼; ____' 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 ripean 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.

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

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

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. 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
   - X Parts A and B or C
   - X IMACS Encoding Form
   - X Site Sketch Map
   - X Photographs
   - X Copy of USGS 7.5' Quad with Smithsonian site Number
4. X 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: (month) June (w) 20, (year) 2001

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=SanJuan
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=Reconnaisance
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. Hemlis

*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 ¾" 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 ¼ 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 ¼ 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.

## 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

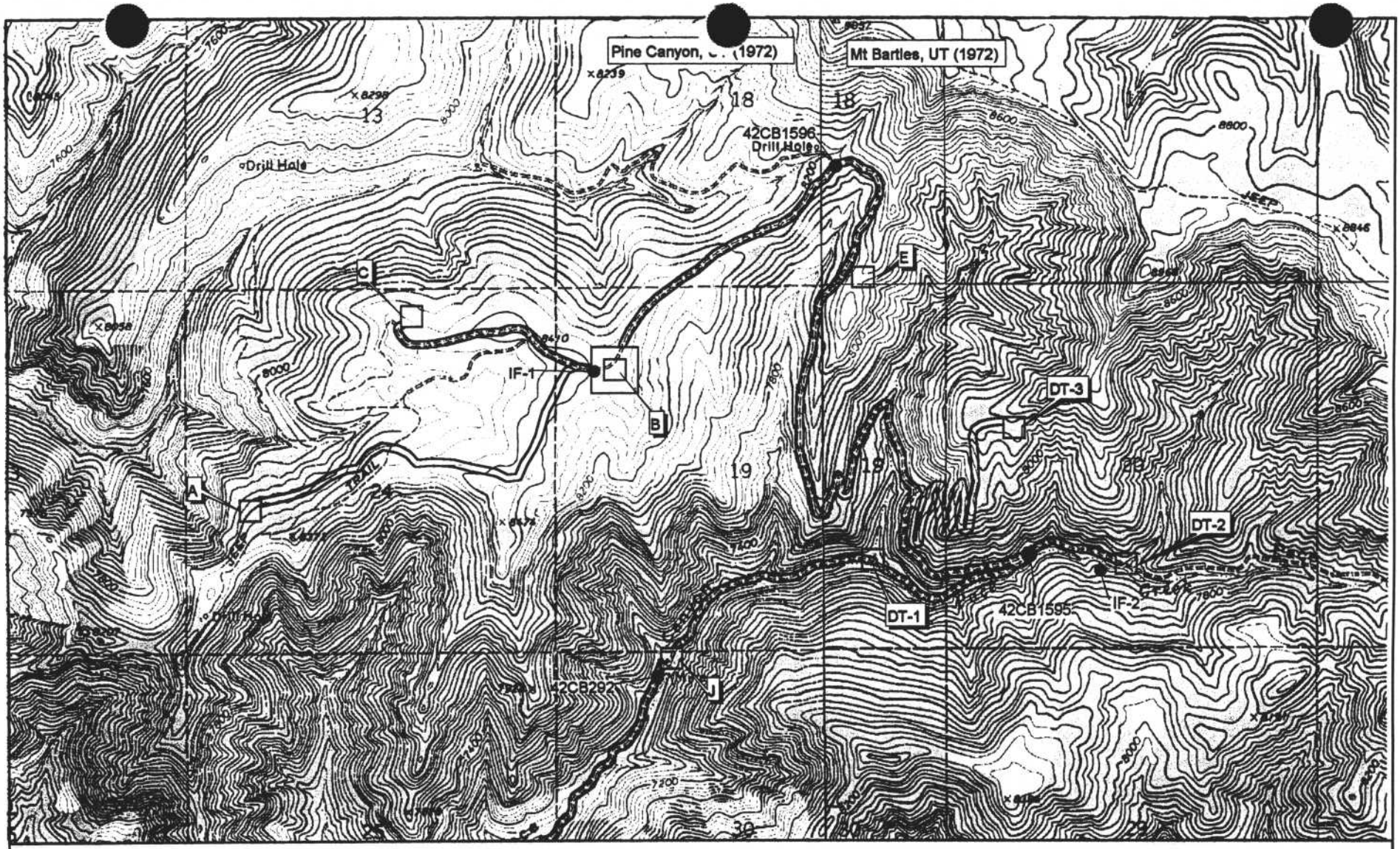
ranging in size from one by four to one by sixteen inches. The two courses of wood were separated by tarpaper. The roof is wood boards covered by asphalt strip roofing. There is an aluminum flashing for a stovepipe in the cabin and part of a pipe in the adjacent debris. The structure measures 13' 3" x 7' 4 ¾" 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 ¼ 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 ¼ 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

N

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.**

**4. State:** Utah **County** Carbon
**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 ¼ 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

BLM 8100-1
FS R-4 2300-2
3/90

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

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

*33. **Onsite Depositional Context**

| | | | |
|---|---|---|---|
| ☐ Fan (A) | ☐ Outcrop (Q) | ☐ Moraine (J) | ☐ Desert Pavement (P) |
| ☐ Talus (B) | ☐ Extinct Lake (F) | ☒ Flood Plain (K) | ☐ Stream Bed (R) |
| ☐ Dune (C) | ☐ Extant Lake (G) | ☐ Marsh (L) | ☐ Aeolian (S) |
| ☐ Stream Terrace (D) | ☐ Alluvial Plain (H) | ☐ Landslide/Slump (M) | ☐ None (T) |
| ☐ Playa (E) | ☐ Colluvium (I) | ☐ Delta (N) | ☐ 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**
- [x] None (A)
- [ ] Grab Sample (B)
- [ ] Designed Sample (C)
- [ ] Complete Collection (D)

**Sampling Method:**

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

**How Estimated:**
(If tested, show location of site map)

**8. Excavation Status**
- [ ] Excavated (A)
- [ ] Tested (B)
- [x] Unexcavated (C)

**Testing Method:**

**9. Summary of Artifacts and Debris**

| | | | | |
|---|---|---|---|---|
| [ ] Glass (GL) | [ ] Bone (BO) | [ ] Leather (LE) | [ ] Ammunition (AM) | [ ] Domestic Items (DI) |
| [ ] Metal (ME | [ ] Ceramics(CS) | [ ] Wire (WI) | [x] Wood (WD) | [ ] Kitchen Utensils (KU) |
| [ ] Nails (NC,NW) | [ ] Fabric (FA) | [ ] Tin Cans | [ ] Rubber (RB) | [ ] 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)**

- ☐ Trail/Road (TR)
- ☒ Tailings (MT, ML)
- ☐ Rock Alignment (RA)
- ☐ Dump (DU)
- ☐ Depression (DE)
- ☐ Cemetery/Burial (CB)
- ☐ Dam, Earthen (DA)
- ☐ Ditch (DI)
- ☐ Inscriptions (IN)
- ☐ Hearth/Campfire (HE)
- ☐ Quarry (QU)
- ☐ 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)*

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 42CB292 State Site Number

2 - Agency Site Number

6 Agency Report Number

10 7020 Elevation

11 Zone: 12 Easting: 542170 Northing: 4391244

12 1/4: NE 1/4: NW 1/4: NW Sec.: 30 T.: 13 S R.: 13 E

13 Merid.: 1

14 USGS Map: PINE CANYON, UTAH (1972)

17 Owner: PR

18 Forest: Dist./Park: J6

19 Loc. Cur. Materials

21 Cond.: D

22 Impacts: DM ER GR

23 N.R.: D

26 Organ.: SC

28 Survey Date: 06-05-01

29 Slope: 03 Aspect: 175

30 Water: distance/type: 0 B

31 Geog. Unit: CAC

32 Topographic Locatio 1st: E 2st: J

33 Dep.: K

34 Vegetation 1 2 3: Q H G

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 Historic Themes: MN

3 Culture/Dating Method: EA F EA I

4 Dates: 1900 1940

5 Area: 1500

6 Collect: A

7 Depth: A

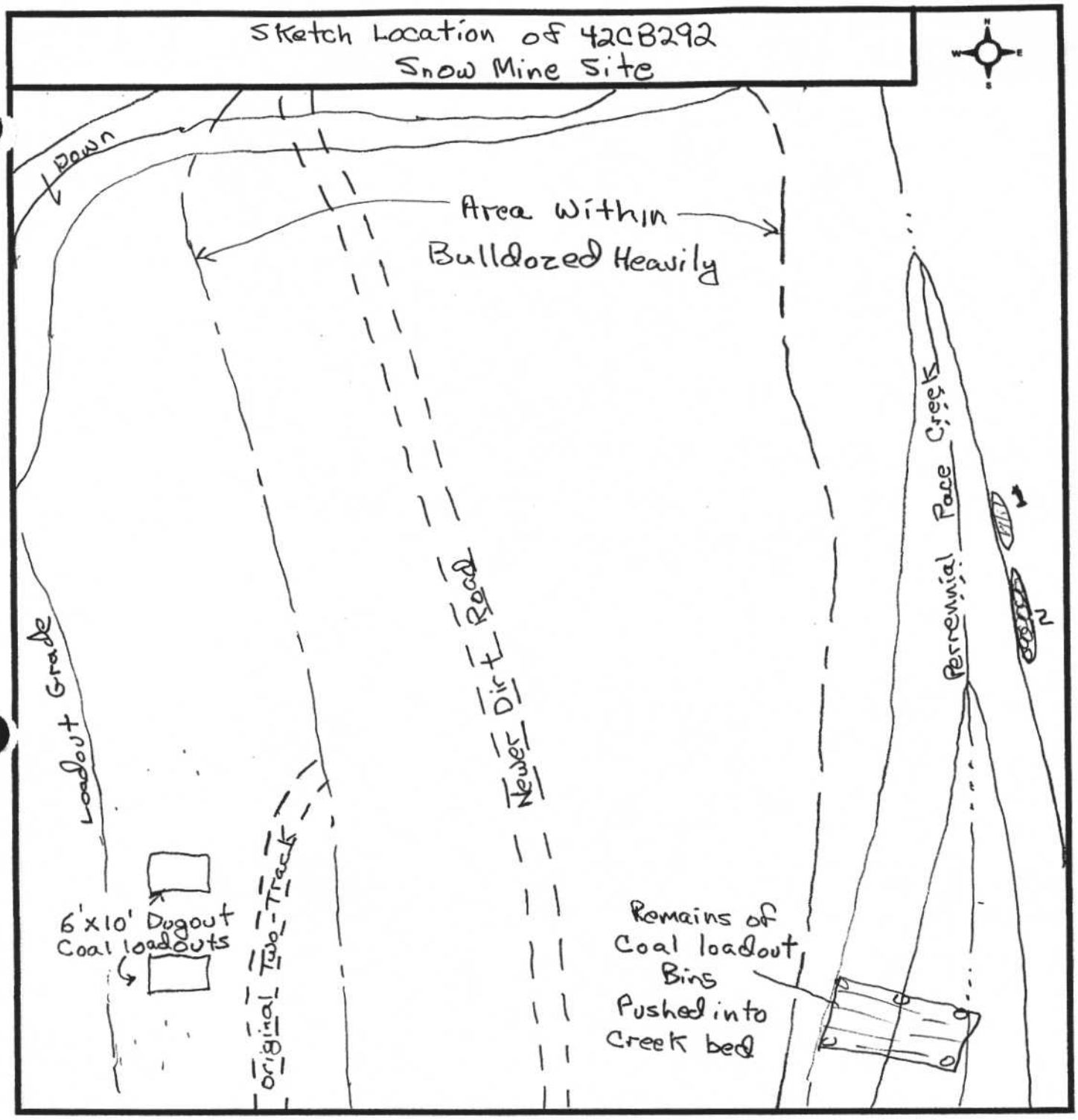
8 Excav. Status: C

9 Artifacts: WO

14 Features: # / type: 1 MT 1 RA 2 DE

15 Architecture: # / material / type: 2 I AK 1 B BG

ed on 3/5/01 7:12:40 AM




No Scale

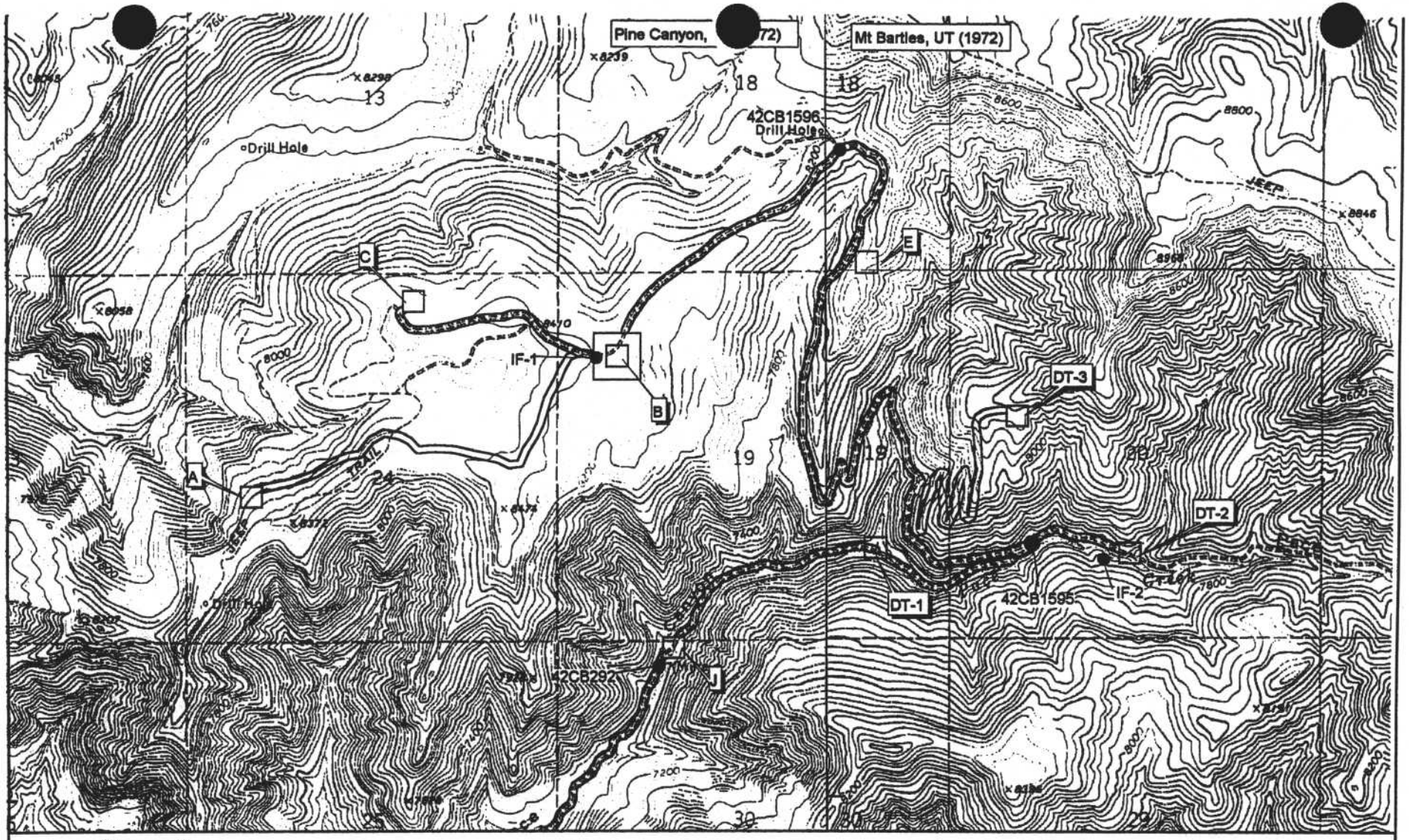
1. Closed Mine Adit
2. Dry laid stone (Erosion Control) wall

SENCO-PHENIX

42CB292

View Northeast over Demolished center of site

View Southeast of destroyed Loadout




SENCO-PHENIX

N

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.**

**4. State:** Utah **County** Carbon
**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 ¾" 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

BLM 8100-1
FS R-4 2300-2
3/90

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

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

*33. **Onsite Depositional Context**

| | | | |
|---|---|---|---|
| ☐ Fan (A) | ☐ Outcrop (Q) | ☐ Moraine (J) | ☐ Desert Pavement (P) |
| ☐ Talus (B) | ☐ Extinct Lake (F) | ☐ Flood Plain (K) | ☐ Stream Bed (R) |
| ☐ Dune (C) | ☐ Extant Lake (G) | ☐ Marsh (L) | ☐ Aeolian (S) |
| ☐ Stream Terrace (D) | ☒ Alluvial Plain (H) | ☐ Landslide/Slump (M) | ☐ None (T) |
| ☐ Playa (E) | ☐ Colluvium (I) | ☐ Delta (N) | ☐ 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:**

**1. Site Type:** Cabin site

**2. Historic Theme(s):** Farming Ranching

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

**Describe:** Cabin style

**4. Oldest Date:** 1950's **Recent Date:** 1960s

**How Determined:** History of area

**5. Site Dimensions:** 10 m X 8 m **Area:** 80 sq m

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

**Sampling Method:**

**7. Estimated Depth of Cultural Fill**
- ☒ Surface (A)
- ☐ 0-20 cm (B)
- ☐ 20-100 cm (C)
- ☐ 100 cm + (D)
- ☐ Fill noted but unknown (E)
- ☐ 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**

| | | | | |
|---|---|---|---|---|
| ☒ 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 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 rail embossed with "BS BO Steelton 1948." There is no domestic refuse at the site except for a metal bedspring and cot inside the cabin.

**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. 42CB1595
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)**

- ☐ Trail/Road (TR)
- ☐ Dump (DU)
- ☐ Dam, Earthen (DA)
- ☐ Hearth/Campfire (HE)
- ☐ Tailings (MT, ML)
- ☐ Depression (DE)
- ☐ Ditch (DI)
- ☐ Quarry (QU)
- ☐ Rock Alignment (RA)
- ☐ Cemetery/Burial (CB)
- ☐ Inscriptions (IN)
- ☐ Other (OT)

**Describe:**

**15. Buildings and Structures (locate on site map)**

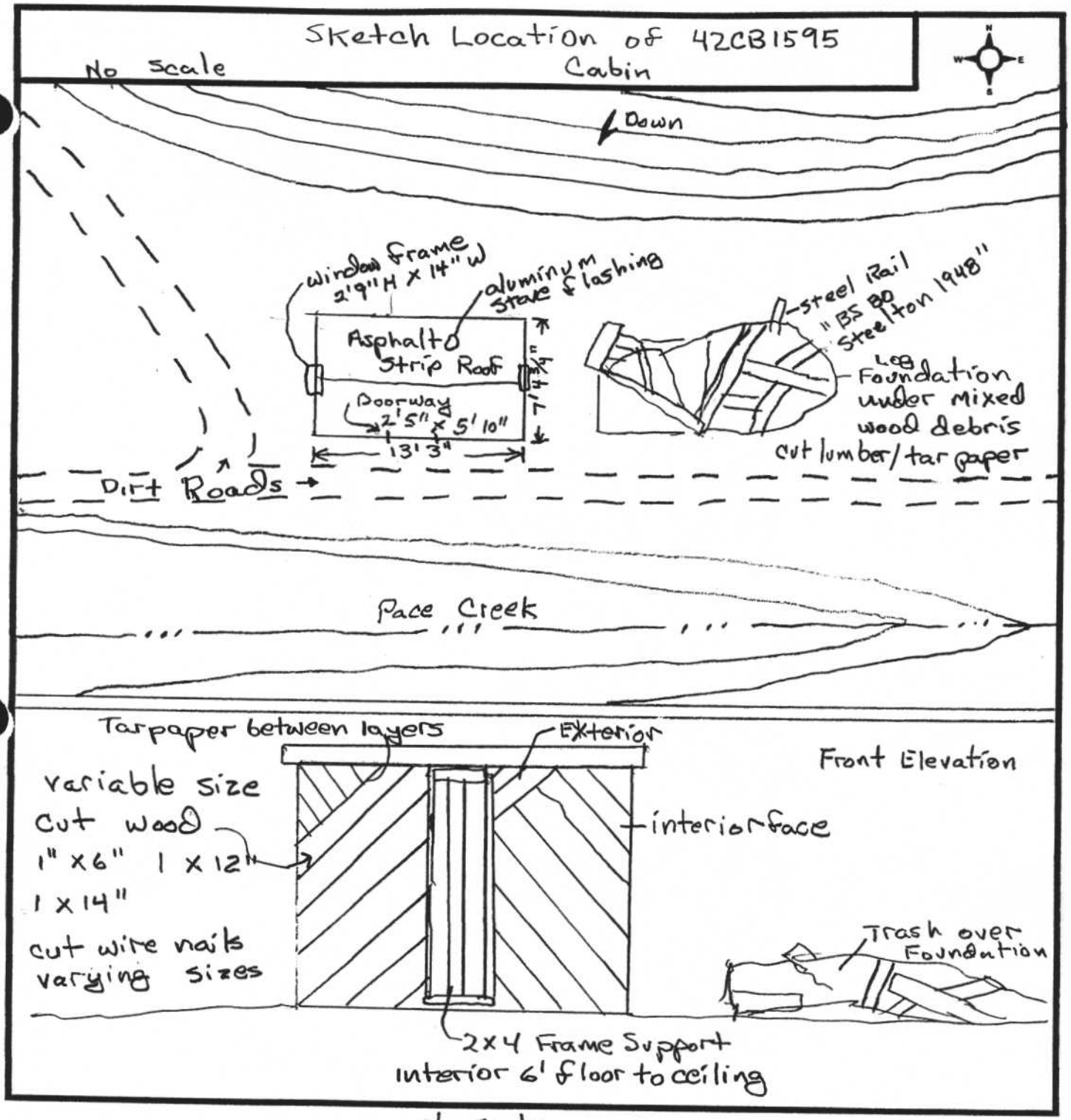
| # | Material | Type | # | Material | Type |
|---|---|---|---|---|---|
| 1 | Frame (K) | Single room structure | 1 | Log (P) | Foundation (BY) |

**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 ¾" 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



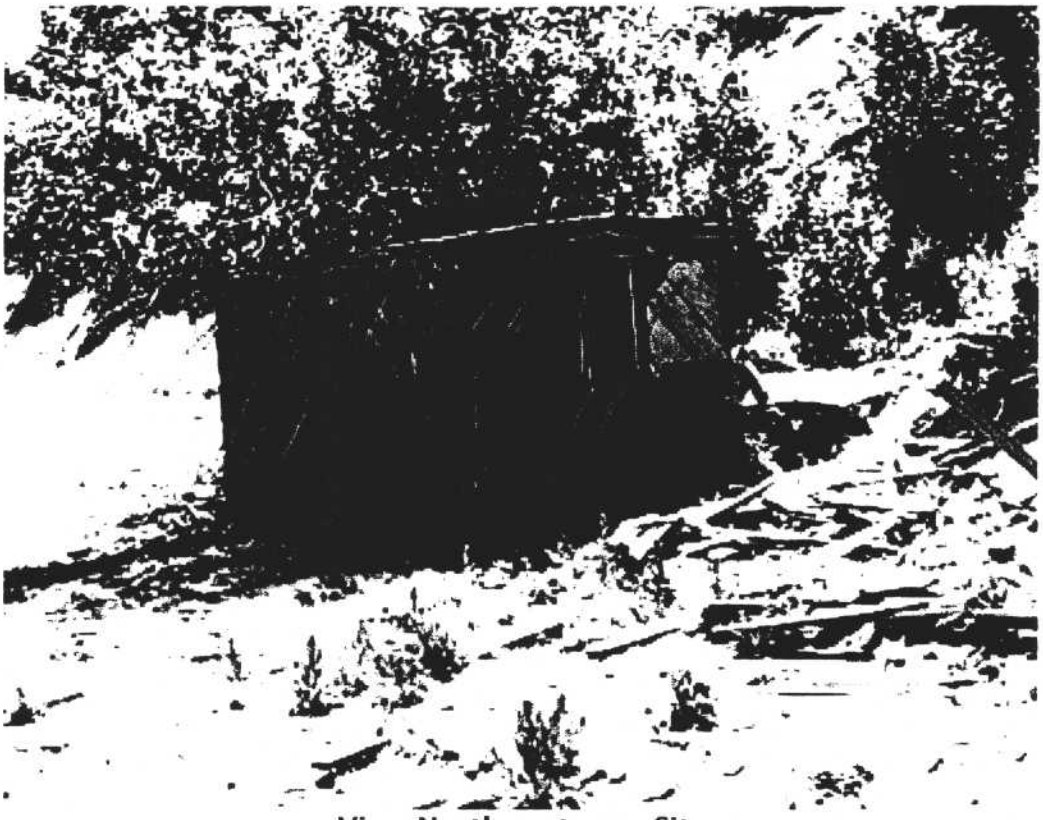

No Scale

Interior

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

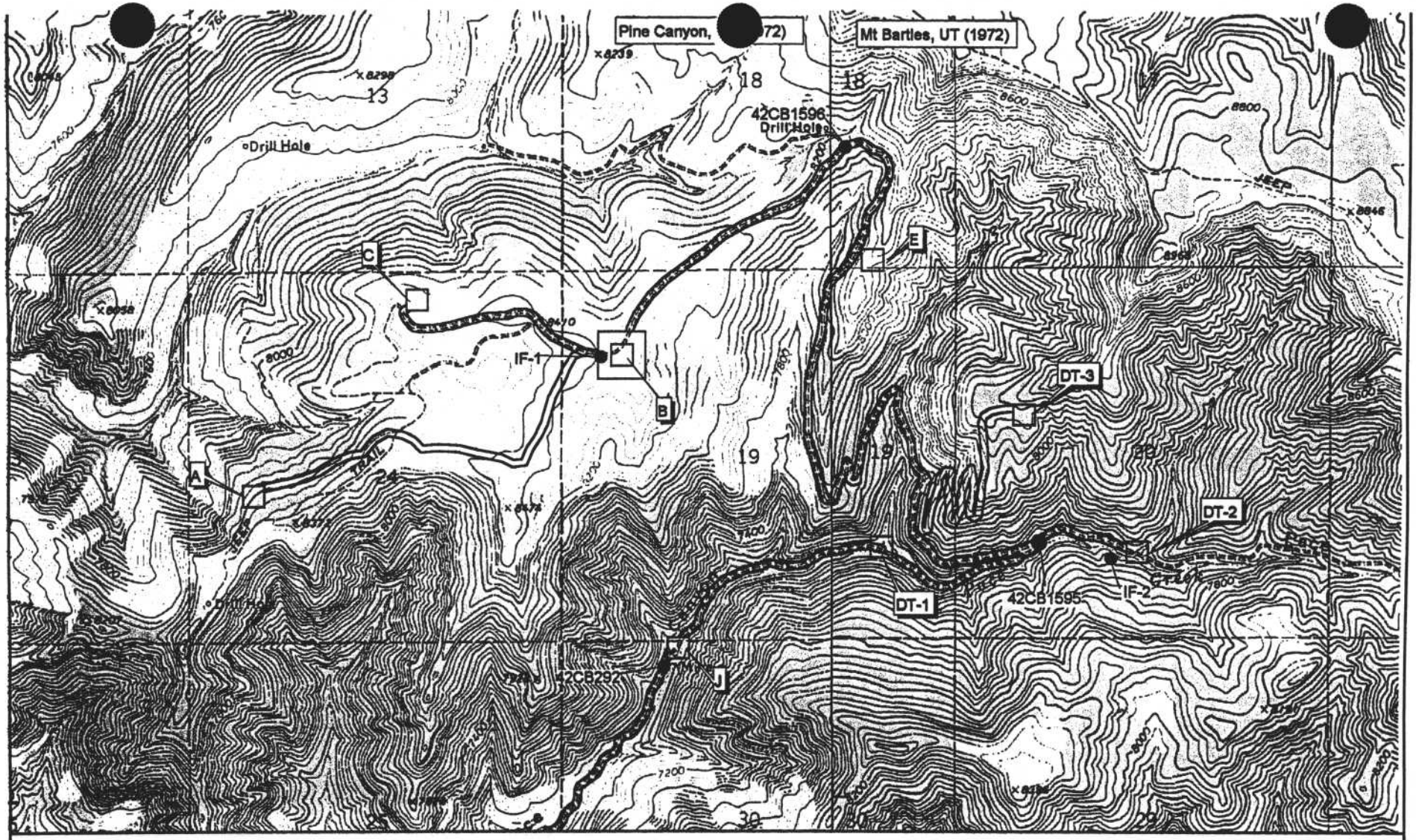
SENCO-PHENIX

42CB1595



View Northwest over Site

View North over Site



SENCO-PHENIX

N

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.**

**4. State:** Utah **County** Carbon
**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

BLM 8100-1
FS R-4 2300-2
3/90

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

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

*33. **Onsite Depositional Context**

| | | | |
|---|---|---|---|
| ☐ Fan (A) | ☐ Outcrop (Q) | ☐ Moraine (J) | ☐ Desert Pavement (P) |
| ☐ Talus (B) | ☐ Extinct Lake (F) | ☐ Flood Plain (K) | ☐ Stream Bed (R) |
| ☐ Dune (C) | ☐ Extant Lake (G) | ☐ Marsh (L) | ☐ Aeolian (S) |
| ☐ Stream Terrace (D) | ☒ Alluvial Plain (H) | ☐ Landslide/Slump (M) | ☐ None (T) |
| ☐ Playa (E) | ☐ Colluvium (I) | ☐ Delta (N) | ☐ 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)
- ☐ Grab Sample (B)
- ☐ Designed Sample (C)
- ☐ Complete Collection (D)

**Sampling Method:**

**7. Estimated Depth of Cultural Fill**
- ☒ Surface (A)
- ☐ 0-20 cm (B)
- ☐ 20-100 cm (C)
- ☐ 100 cm + (D)
- ☐ Fill noted but unknown (E)
- ☐ 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**

| | | | | |
|---|---|---|---|---|
| ☒ 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 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)**

- ☐ Trail/Road (TR)
- ☐ Dump (DU)
- ☐ Dam, Earthen (DA)
- ☐ Hearth/Campfire (HE)
- ☐ Tailings (MT, ML)
- ☐ Depression (DE)
- ☐ Ditch (DI)
- ☐ Quarry (QU)
- ☐ Rock Alignment (RA)
- ☐ Cemetery/Burial (CB)
- ☐ Inscriptions (IN)
- ☐ 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 SENULIS

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

1 42CB1596 State Site Number

2 - Agency Site Number

6 Agency Report Number

10 8180 Elevation

11 12 542935 4393487 Zone Easting Northing

12 SE NW SE 18 13 S 13 E
1/4 1/4 1/4 Sec. T. R.

13 1 Merid.

14 MOUNT BARTLES, UTAH (1972) USGS Map

17 PR Owner

18 Forest J6 Dist./Park

19 Loc. Cur. Materials

21 D Cond.

22 ER RD Impacts

23 D N.R.

26 SC Organ.

28 06 - 05 - 01 Survey Date

29 01 125 Slope Aspect

30 20 B Water: distance/type

31 CAC Geog. Unit

32 C R 1st 2st Topographic Locatio

33 H Dep.

34 E A H 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 FR Historic Themes

3 EA F Culture/Dating Method

4 1930 1990 Dates

5 600 Area

6 A Collect

7 A Depth

8 C Excav. Status

9 GL ME NW WI TC WD Artifacts

14 Features: # / type

15 1 W AJ Architecture: # / material / type

---

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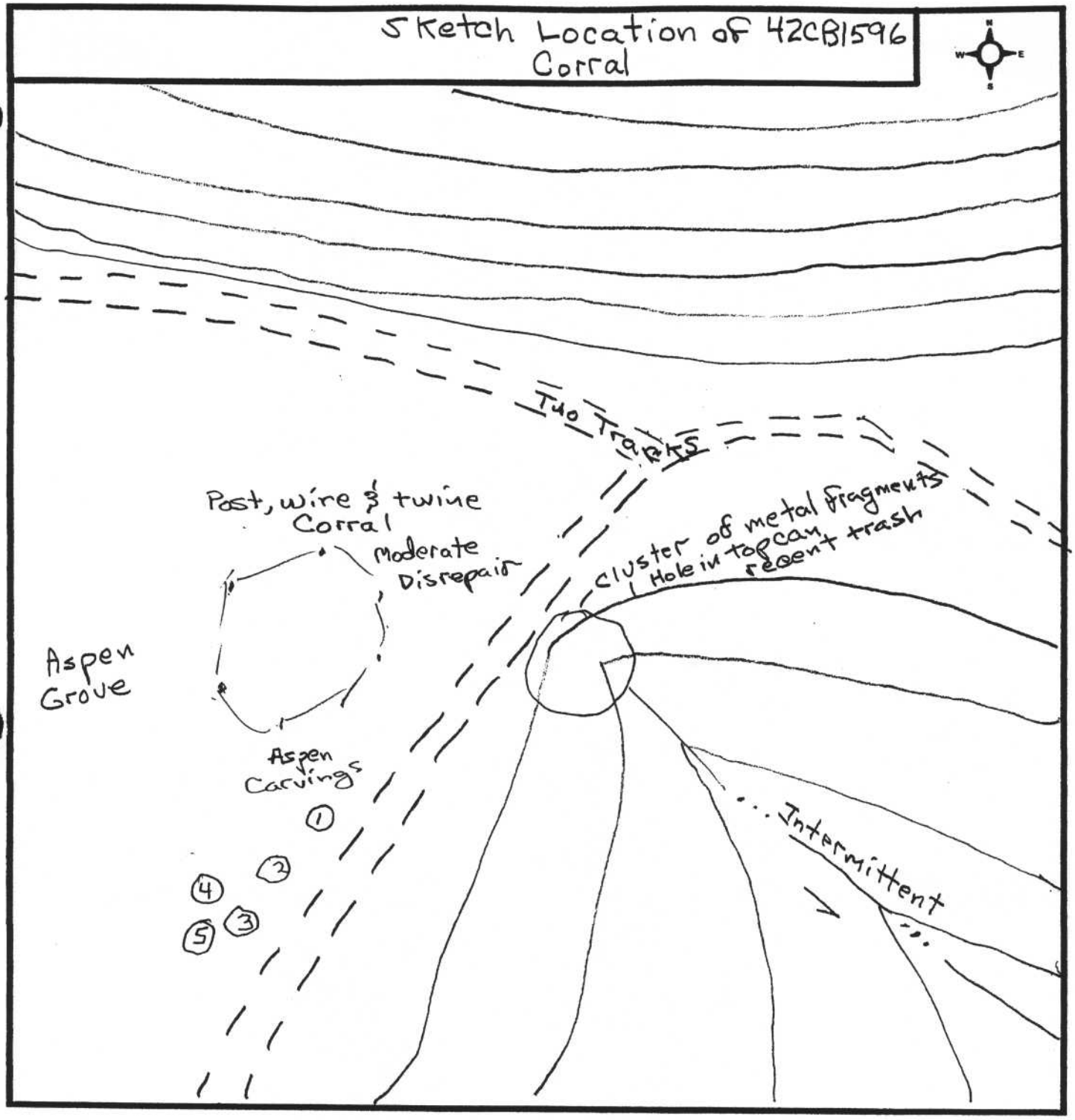
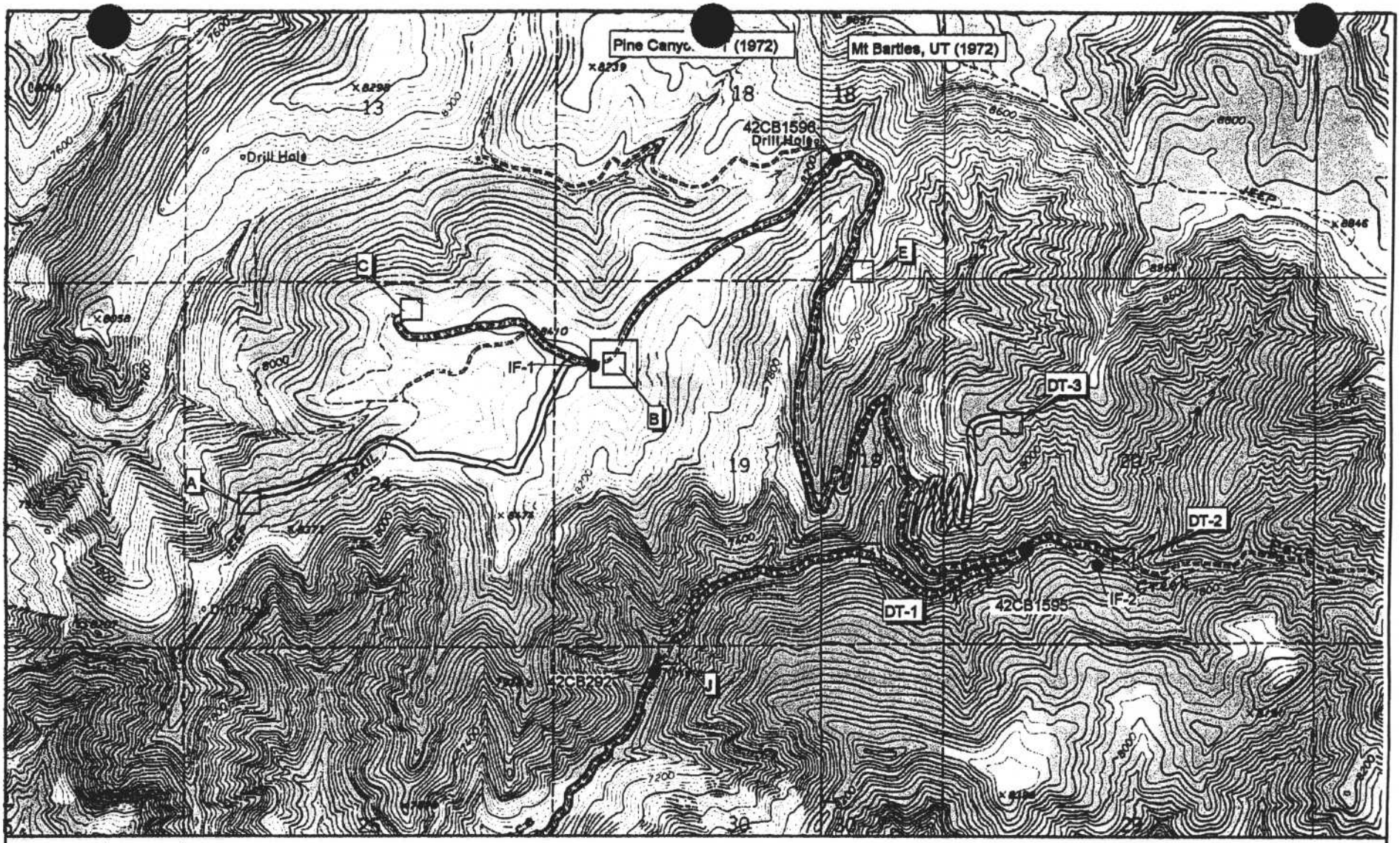


SENCO-PHENIX

Aspen Carvings

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




SENCO-PHENIX

N

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. 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
   - X Parts A and B or C
   - X IMACS Encoding Form
   - X Site Sketch Map
   - X Photographs
   - X Copy of USGS 7.5' Quad with Smithsonian site Number
4. X Completed Cover Sheet

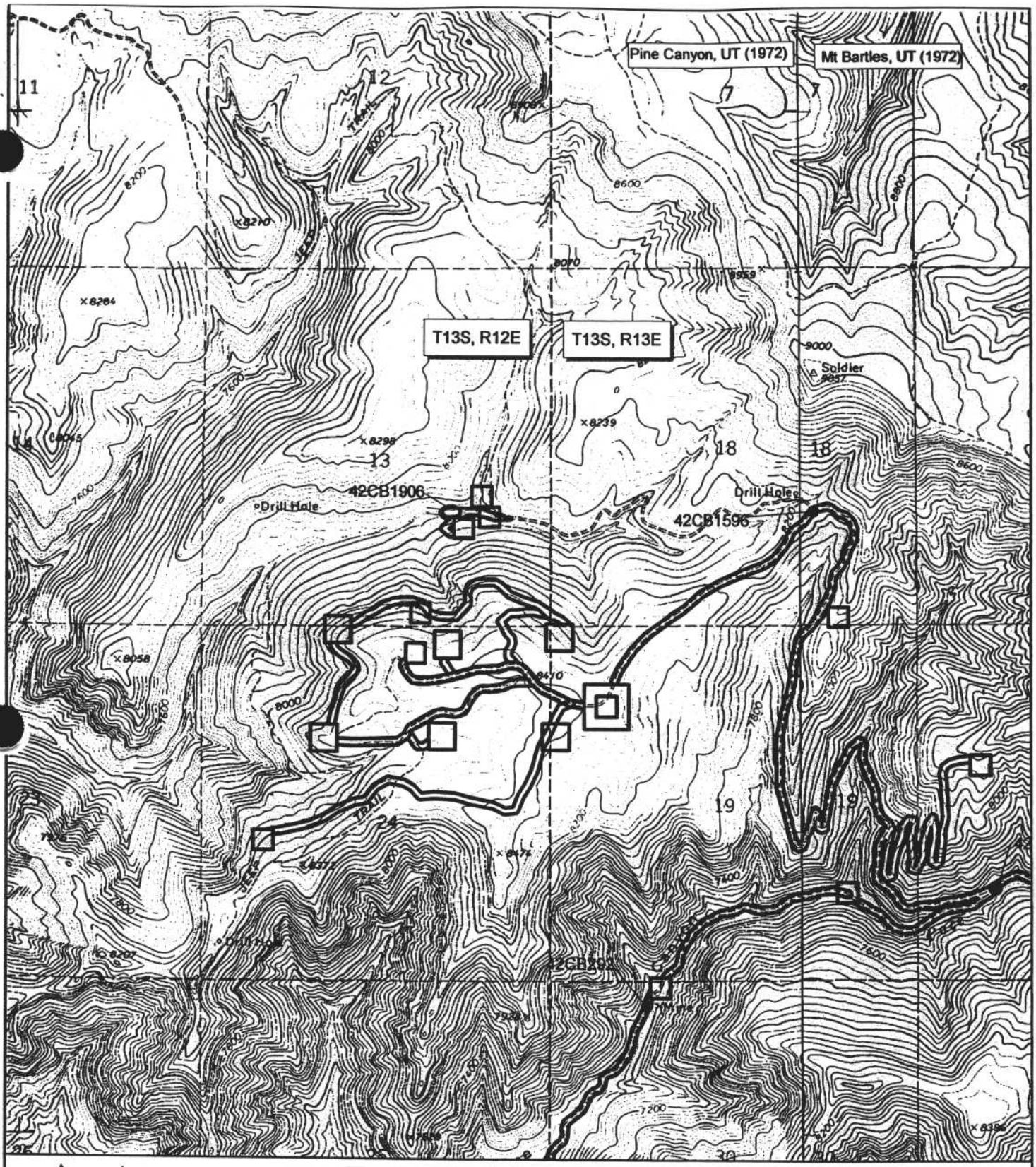
## Abstract

SENCO-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.




Current Survey

Previous Survey

Eligible Sites

Ineligible Sites

N

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

SENCO-PHENIX

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 ☒ Topo Map ☒ Photos ☐ Continuation Sheets
☒ Part C ☒ Site Sketch ☒ Artifact/Feature Sketch
☐ Part E ☐ Other

*Encoded data items

# Part A - Environmental Data

*29. **Slope:** 02 (Degrees) **Aspect:** 340 (Degrees) **Site No: 42CB1906**

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

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

*33. **Onsite Depositional Context**

| | | | |
|---|---|---|---|
| ☐ Fan (A) | ☐ Outcrop (Q) | ☐ Moraine (J) | ☐ Desert Pavement (P) |
| ☐ Talus (B) | ☐ Extinct Lake (F) | ☐ Flood Plain (K) | ☐ Stream Bed (R) |
| ☐ Dune (C) | ☐ Extant Lake (G) | ☐ Marsh (L) | ☐ Aeolian (S) |
| ☐ Stream Terrace (D) | ☒ Alluvial Plain (H) | ☐ Landslide/Slump (M) | ☐ None (T) |
| ☐ Playa (E) | ☐ Colluvium (I) | ☐ Delta (N) | ☐ 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)
- ☐ Grab Sample (B)
- ☐ Designed Sample (C)
- ☐ Complete Collection (D)

**Sampling Method:** N/A

**7. Estimated Depth of Cultural Fill**
- ☒ Surface (A)
- ☐ 0-20 cm (B)
- ☐ 20-100 cm (C)
- ☐ 100 cm + (D)
- ☐ Fill noted but unknown (E)
- ☐ 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)**

- ☒ Trail/Road (TR)
- ☐ Dump (DU)
- ☐ Dam, Earthen (DA)
- ☐ Hearth/Campfire (HE)
- ☐ Tailings (MT, ML)
- ☐ Depression (DE)
- ☐ Ditch (DI)
- ☐ Quarry (QU)
- ☐ Rock Alignment (RA)
- ☐ Cemetery/Burial (CB)
- ☐ Inscriptions (IN)
- ☒ 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-E.

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

1 42CB906 State Site Number

2 [ ] - [ ] Agency Site Number

6 [ ] Agency Report Number

10 7220 Elevation

11 Zone: 12, 12 Easting: 541228, 541310 Northing: 4393487, 4393487

## A

12 1/4: SW, NW, SE; Sec.: 13; T.: 13 S; R.: 12 E

13 Merid.: 1

14 USGS Map: PINE CANYON, UT (1972)

17 Owner: PR

18 Forest: [ ] Dist./Park: [ ]

19 Loc. Cur. Materials: [ ]

21 Cond.: D

22 Impacts: DM ER VA

23 N.R.: D

26 Organ.: SC

28 Survey Date: 06-10-03

29 Slope: 02 Aspect: 340

30 Water: distance/type: 001 B

31 Geog. Unit: CAC

32 Topographic Locatio: 1st C, 2st R

33 Dep.: H

34 Vegetation: 1 E, 2 G, 3 L

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 Historic Themes: LG FR

3 Culture/Dating Method: EAF

4 Dates: 1940s 1960s

5 Area: 1,885

6 Collect: A

7 Depth: A

8 Excav. Status: C

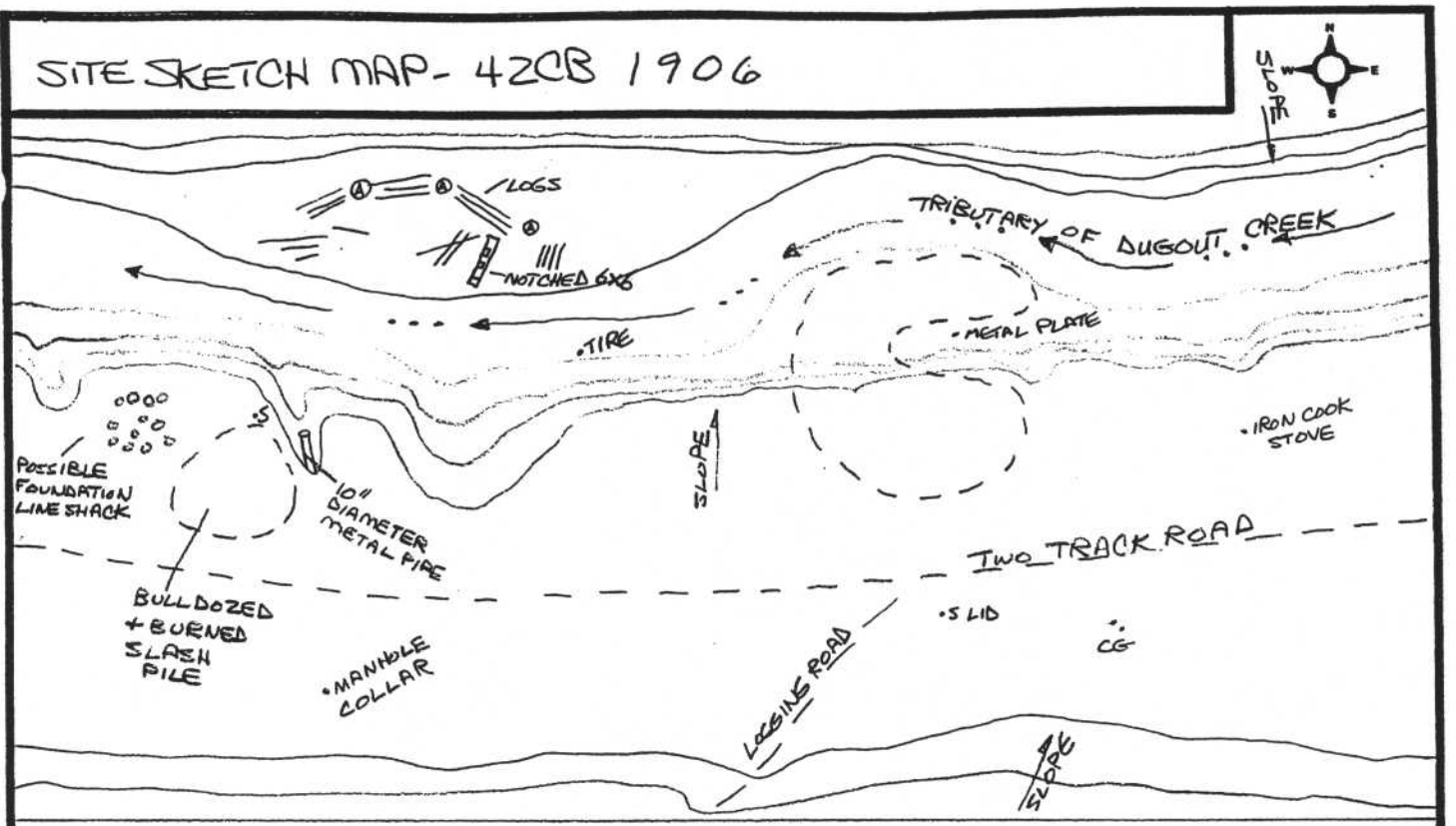
9 Artifacts: NW WD, WI DT, TC

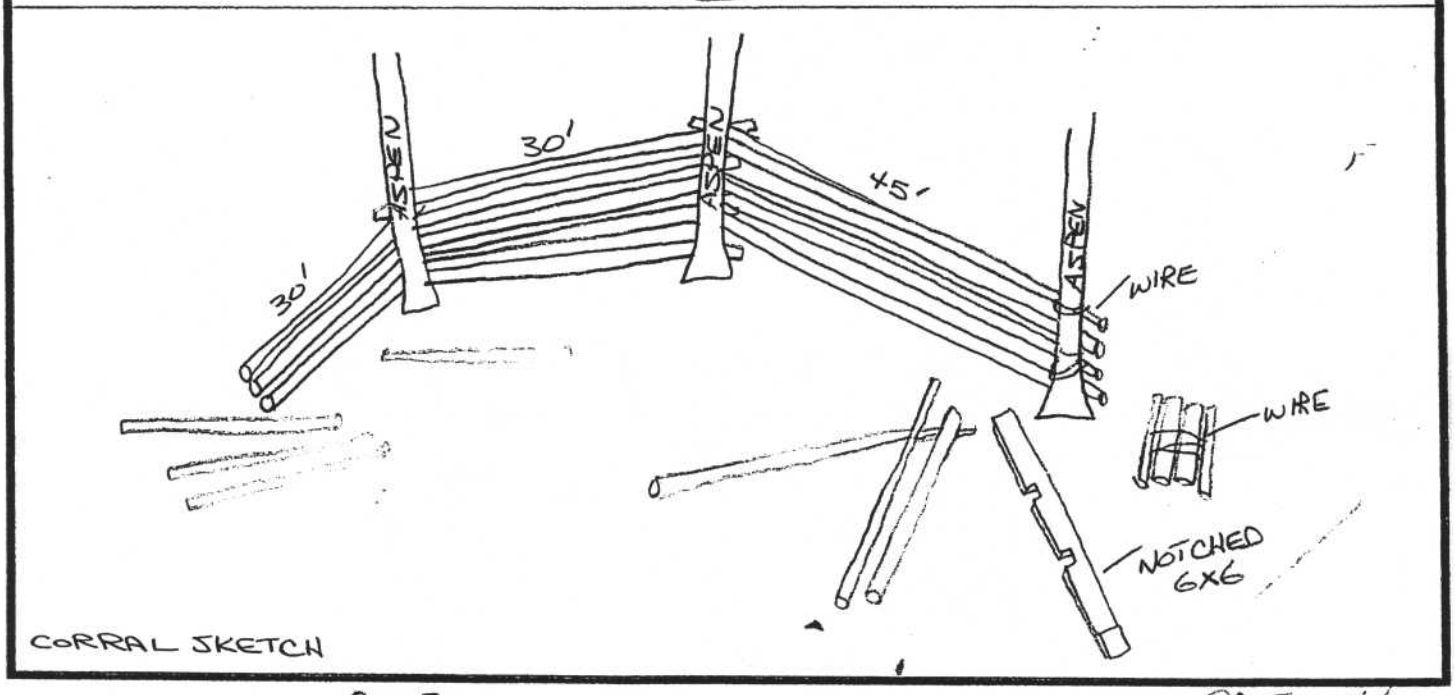
14 Features: # / type: 1 TR, 2 OT

15 Architecture: # / material / type: 1 B BY, 1 P AJ

Printed on 11/13/02 3:12:29 P

# SITE SKETCH MAP- 42CB 1906




CORRAL SKETCH

0 5 10 METER SITE SCALE

CD-E 6/11/03

Ⓐ - ASPEN TREE

S - SANITARY CAN

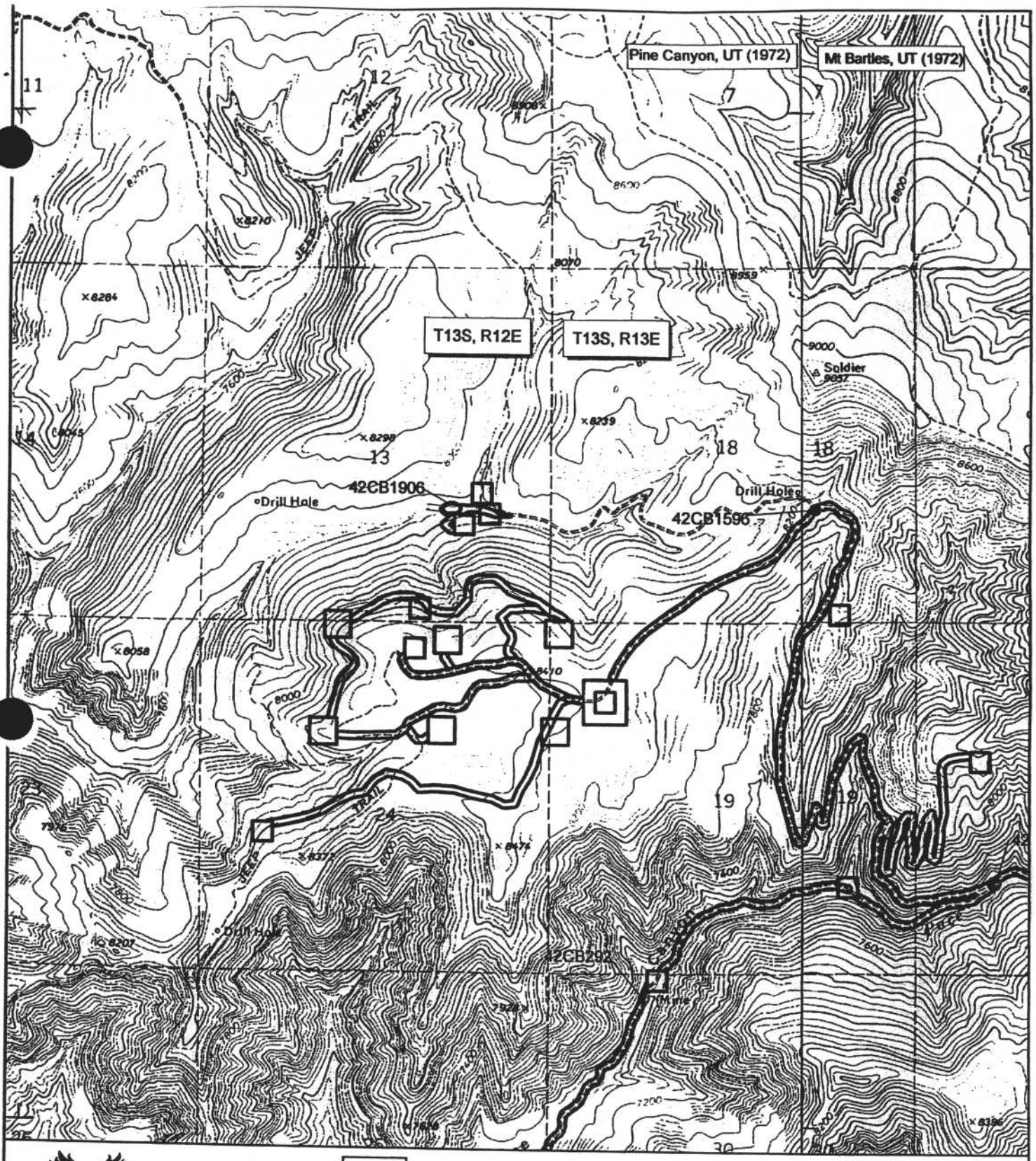
S LID - SANITARY CAN LID

CG - CLEAR GLASS

VEGETATION - COTTONWOOD, WILLOW, SERVICEBERRY, OAK, ASPEN, MIXED CONIFER GRASSES, FORBS

SOIL - LOOSE, TAN SANDY CLAY LOAM W/GRAVELS

SENCO-PHENIX




Current Survey

Previous Survey

Eligible Sites

Ineligible Sites

N

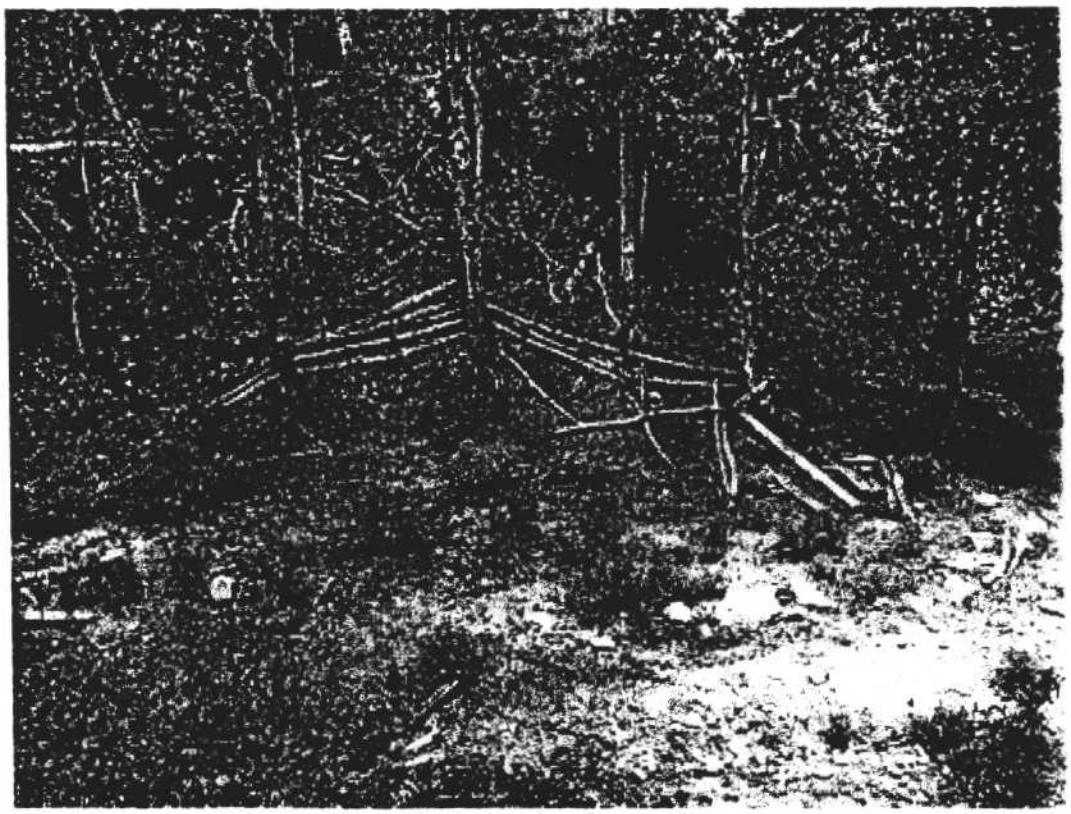
Scale 1:24,000
1"= 2,000'

SENCO-PHENIX

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 | |

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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
   - X Parts A and B or C
   - X IMACS Encoding Form
   - X Site Sketch Map
   - X Photographs
   - X Copy of USGS 7.5' Quad with Smithsonian site Number
4. X 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 2003 DUGOUT CANYON MINE PACE CANYON EXPLORATION DRILL HOLES BLOCK AREA AND ACCESS ROAD**

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

3. Report Date: October (month) 8, (W) 2003 (year)

4. Antiquities Permit: No.U03SC0841bp
BLM 03UT54633

5. Responsible Institution: SENCO-PHENIX County: Carbon

6. Fieldwork Location:

**Section 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=SanJuan
GR=Grand, SR=San Rafael, DM=Diamond Mountain

V=Vernal Meridian
H=Half Township

8. Description of Examination Procedures:

Literature Review

9. Linear Miles Surveyed: 0
and/or
Definable Acres Surveyed 0
and/or
Undefinable Acres Survey 0

10. Inventory Type: I

R=Reconnaisance
I=Intensive
S=Statistical Sample

11. Description of Findings (attach appendices, if appropriate) 12. Number of Sites: 2 13. Collection: N Y=Yes, N=No

Previously recorded 42CB292
Newly recorded: 42CB1998

14. Actual/Potential National Register Properties Affected:

None

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

September 19, 2003, Price River Field Office of the Bureau of Land Management.

16. Conclusions/Recommendations:

Archeological clearance

17. Signatures

Administrator:

Field Supervisor: John A. Senulis

*For extra locationals use additional 8100-3 forms.

UT 8100-3 (2/85)

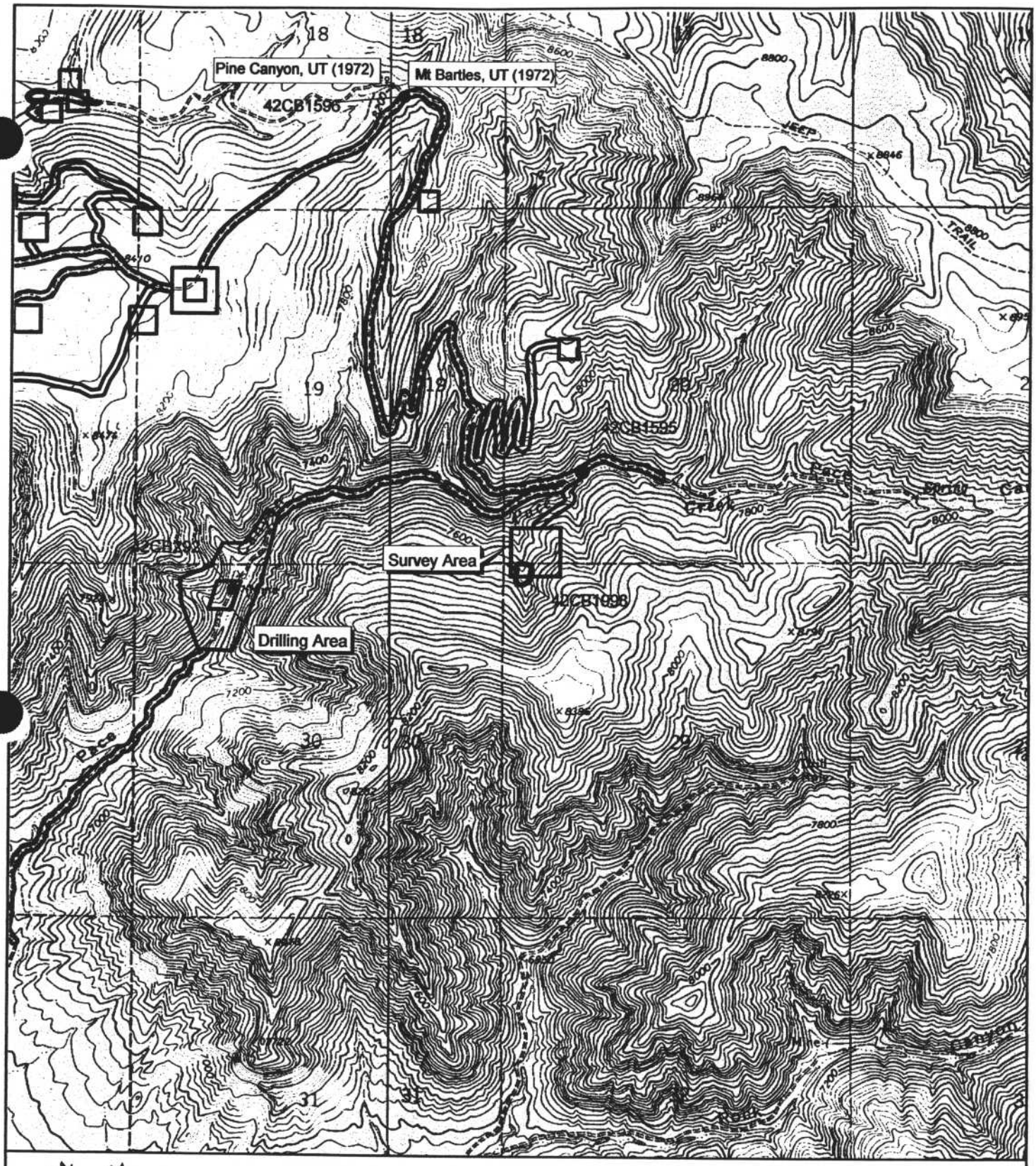
## Abstract

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 x8s. 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.

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

N

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 x8s. 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.

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

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 x8s. 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 ☒ 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) **Aspect:** 340 (Degrees) **Site No: 42CB1998**

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

**Describe:** The site is located on a terrace above a intermittent tributary of Pace Creek.

*33. **Onsite Depositional Context**

| | | | |
|---|---|---|---|
| ☐ Fan (A) | ☐ Outcrop (Q) | ☐ Moraine (J) | ☐ Desert Pavement (P) |
| ☐ Talus (B) | ☐ Extinct Lake (F) | ☐ Flood Plain (K) | ☐ Stream Bed (R) |
| ☐ Dune (C) | ☐ Extant Lake (G) | ☐ Marsh (L) | ☐ Aeolian (S) |
| ☐ Stream Terrace (D) | ☒ Alluvial Plain (H) | ☐ Landslide/Slump (M) | ☐ None (T) |
| ☐ Playa (E) | ☐ Colluvium (I) | ☐ Delta (N) | ☐ 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)
- ☐ Grab Sample (B)
- ☐ Designed Sample (C)
- ☐ Complete Collection (D)

**Sampling Method:** N/A

**7. Estimated Depth of Cultural Fill**
- ☒ Surface (A)
- ☐ 0-20 cm (B)
- ☐ 20-100 cm (C)
- ☐ 100 cm + (D)
- ☐ Fill noted but unknown (E)
- ☐ 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:** 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 x8s. 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 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)**

- ☒ Trail/Road (TR)
- ☐ Dump (DU)
- ☐ Dam, Earthen (DA)
- ☐ Hearth/Campfire (HE)
- ☐ Tailings (MT, ML)
- ☐ Depression (DE)
- ☐ Ditch (DI)
- ☐ Quarry (QU)
- ☐ Rock Alignment (RA)
- ☐ Cemetery/Burial (CB)
- ☐ Inscriptions (IN)
- ☒ 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 x8s. 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.

**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

| Zone | Easting | Northing |
|---|---|---|
| 12 | 534469 | 4391368 |
| 12 | 543480 | 4391279 |
| 12 | 543528 | 4391292 |
| 12 | 543537 | 4391362 |

## A

12 NW NW NW 29 13 S 13 E
1/4 1/4 1/4 Sec. T. R.

13 1 Merid.

14 MT BARTLES, UT (1972) USGS Map

17 PR Owner

18 [ ] Forest J6 Dist./Park

19 NA Loc. Cur. Materials

21 D Cond.

22 ER VA DM Impacts

23 D N.R.

26 SC Organ.

28 9 - 23 - 03 Survey Date

29 03 Slope 340 Aspect

30 4 B Water: distance/type

31 CAC Geog. Unit

32 E R 1st 2st Topographic Locatio

33 H Dep.

34 E G Q G 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 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

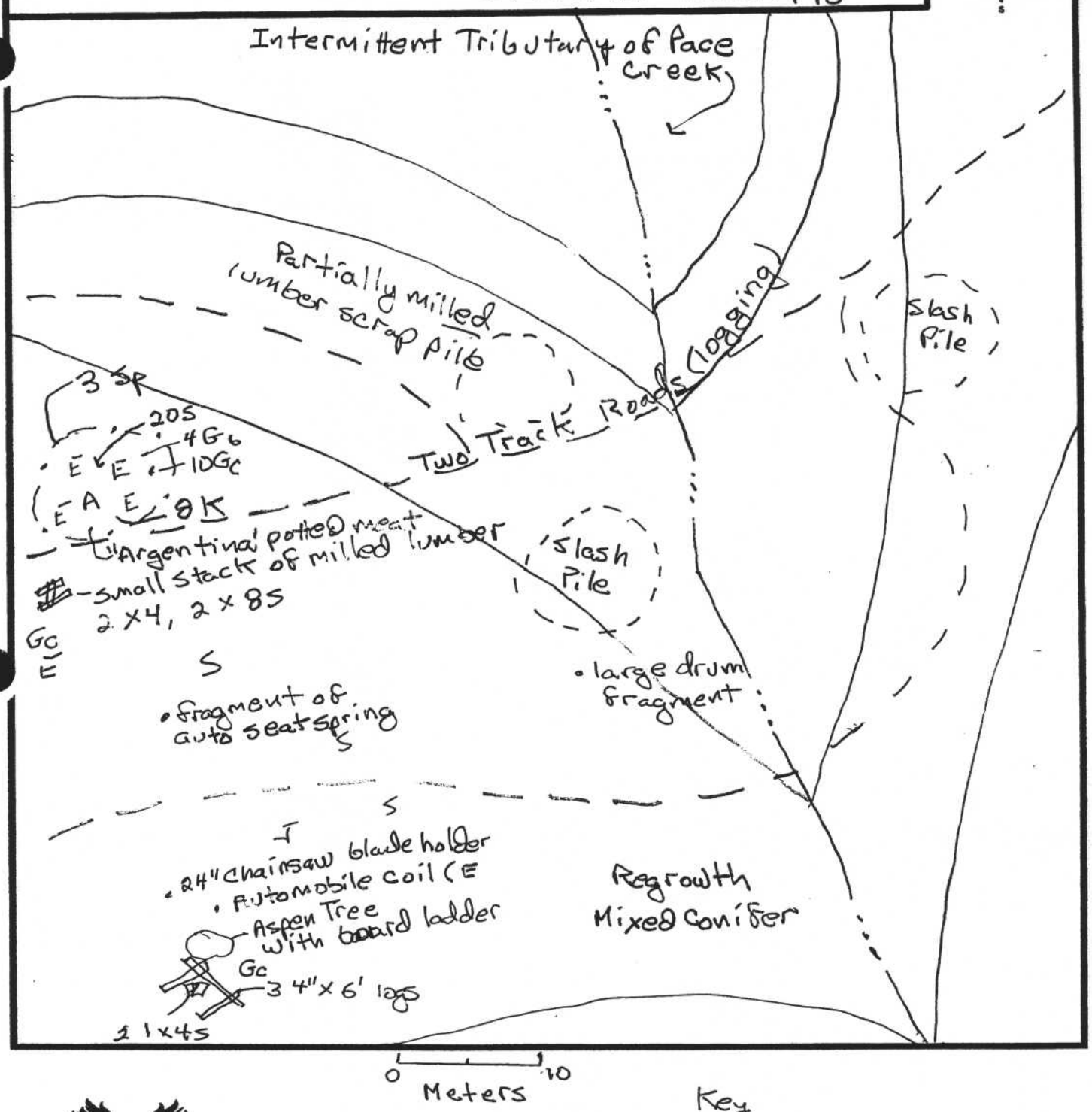
9 GL NC WI TC WD CR Artifacts

14 3 TR 1 DT Features: # / type

15 1 P BY 1 W Architecture: # / material / type

Printed on 11/13/02 3:12:29 P

# Sketch Location of 42CB1998




Key

Quart Paint Cans & lids Sp — S - Sanitary tin can - most cut around
E - Evaporated Milk can - punched opening
⊥ = 32oz Midgal Juice can
G = Glass: c = Clear, b = brown
K = Kerr glass canning jar frag
A = Aluminum Squeeze tube

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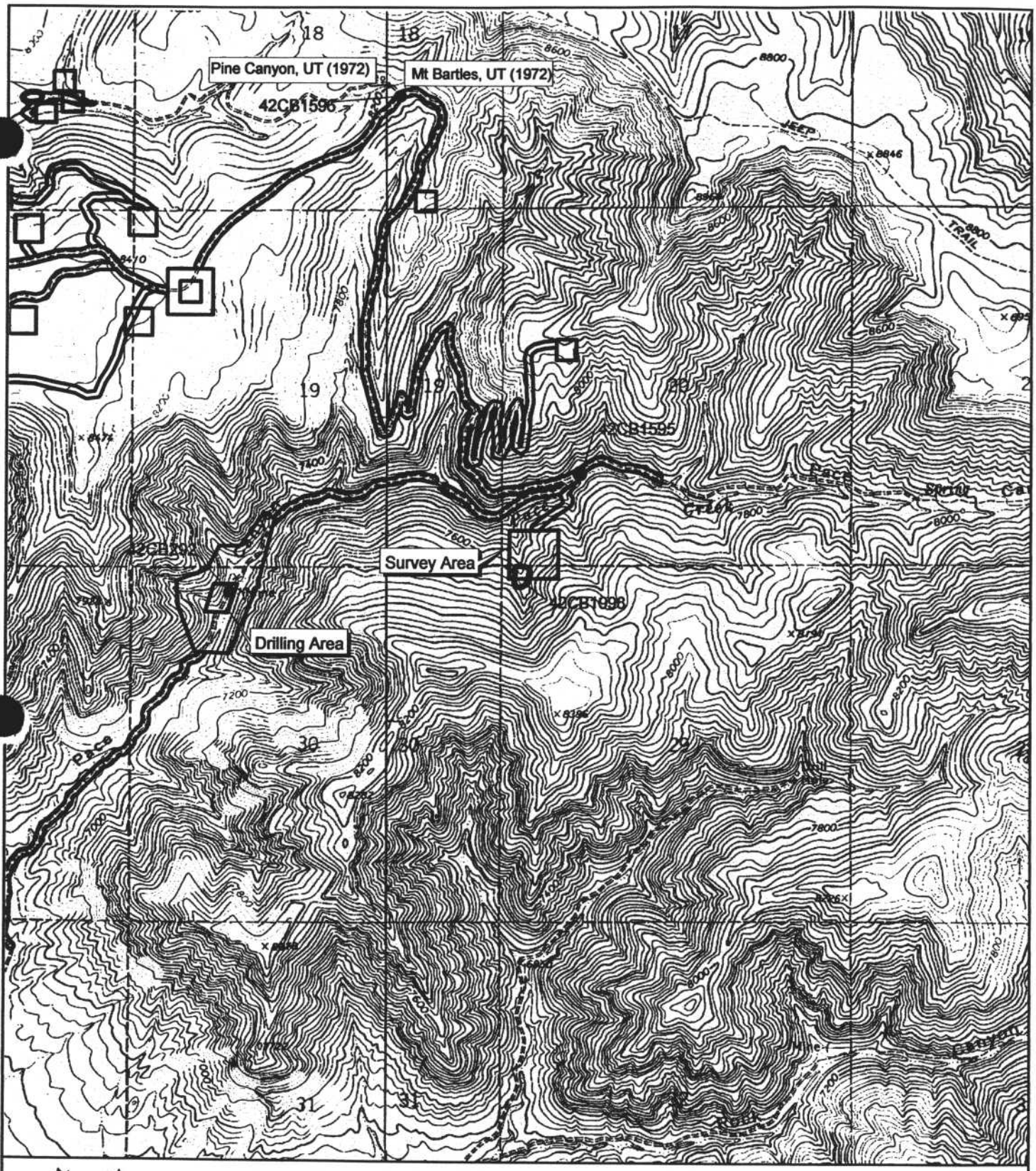



SENCO-PHENIX

N

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

**APPENDIX 4-3**

Cultural and Historical Studies

SITLA Lease and Adjacent Area

**Add to the back of existing data**

orange

SENCO-PHENIX

April 20, 2004

Mr. Kenny Wintch
SITLA Archeologist
675 East, 500 South, Suite 500
Salt Lake City, UT 84102-2818

RE: Dugout Canyon Permit Extension (U04SC0326)

Dear Kenny:

The Dugout Canyon Mine of Canyon Fuel LLC is proposing an extension of their mine permit area on SITLA land in Sections 17, 20, 21, 28, 29, 30, T13S, R13E, Carbon County, Utah. All of the disturbance will be subsurface. There are no surface disturbances planned within the permit extension area. A file search has been performed at the Price Field office of the BLM at various times, most recently April 20, 2004 for the permit extension and adjacent areas. The results of the file search are as follows:

- 1980, AERC surveyed several sample blocks in Sections 18, 19 and 30 T13S, R13E. They also surveyed the access road into the Snow Mine site. One archeological site was located: (80-69)
    - 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 Section 19, T13S, R13E. The only cultural resource located was an isolated prehistoric waste flake. (83-49)

- 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: (01-240)
    - 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.
- 2003a, SENCO-PHENIX surveyed several drill holes and an extensive series of roads. One cultural resource in the general project area was located.(03-477)
    - 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. 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.
- 2003b, SENCO-PHENIX surveyed a block area for drill holes and an access road. One cultural resource was located. (03-841)
    - 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 major portion of the site has been removed; there is little potential for further information. The site is not considered eligible for the NRHP. (03-841)

No sites eligible for nomination to the National Register of Historic Places (NRHP) have been found in or adjacent to the permit expansion area. It is very unlikely that future survey will reveal sites eligible for the NRHP. The permit extension area is in very steep mountainous terrain with narrow canyons. These areas were not favored by prehistoric

populations, which preferred the broader, more open areas of Nine Mile Canyon, north of the project area and Grassy Trail Creek, south of the project area. Historic populations used the narrow canyons for mining but the destroyed Snow Mine is the only known historic mine in the permit expansion area. Furthermore all activity will be underground with no surface disturbance. For these reasons a finding of "no effect on historic properties" is appropriate and archeological clearance without stipulations is recommended.

Sincerely,

John A. Senulis
Principal Investigator

Cc: Miller, Canyon Fuel; Dykman, Utah SHPO

## References Cited


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

1980 *Intensive Archeological Surface Evaluations of the Proposed Sage Point-Dugout Canyon Project in Carbon County, Utah.* Archeological-Environmental Research Corporation, Salt Lake City, Utah. (80-69)

Metcalf, Michael

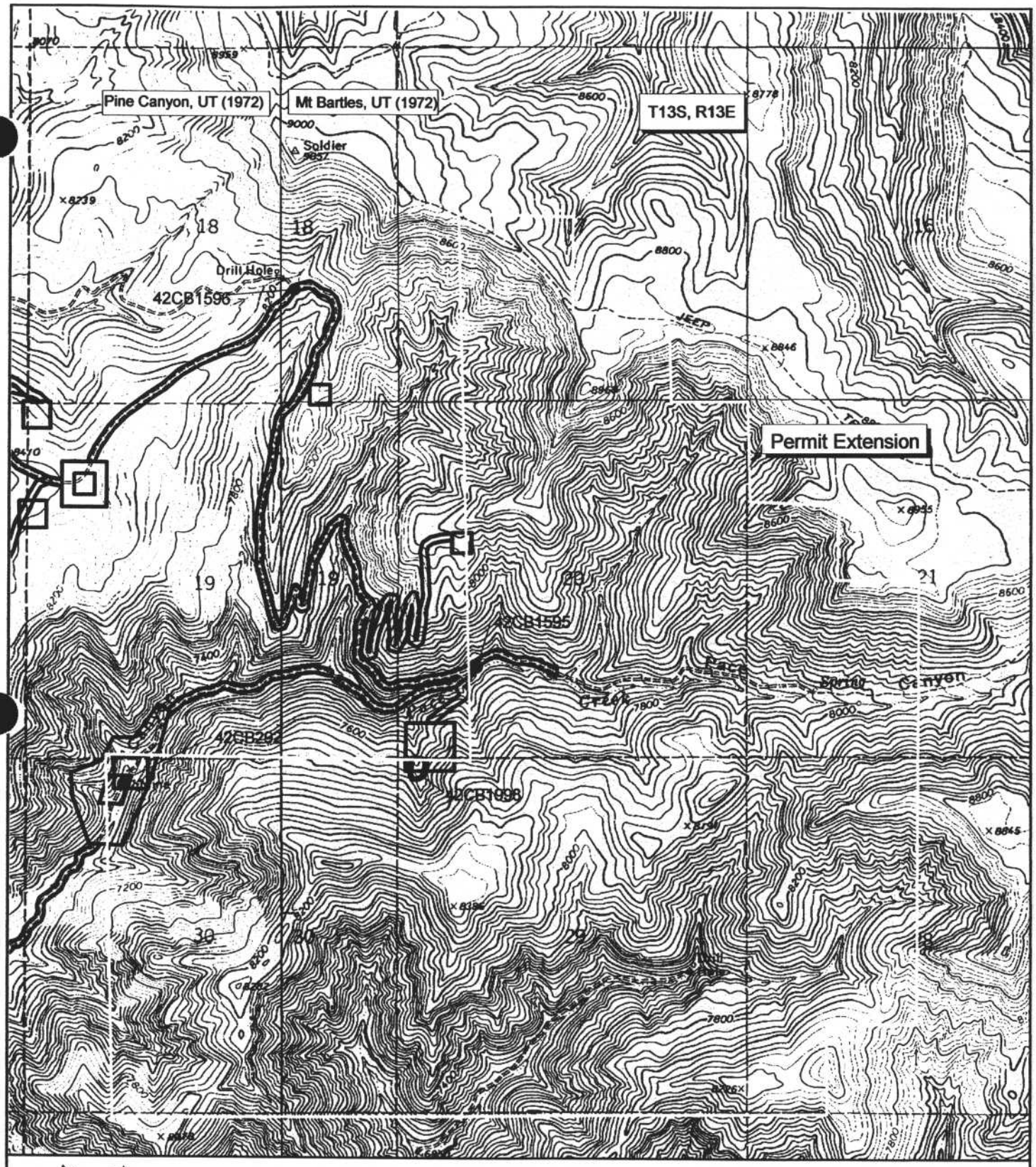
1983 *Cultural Resource Inventory of 1983 Drill Hole Locations at the Sage Point-Dugout Canyon Project, Carbon County,* Utah. Metcalf-Zier Archeologists, Inc., Eagle, Colorado. (83-49)

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. (01-240)

2003a *An Intensive Cultural Resource Survey and Inventory of the 2003 Dugout Canyon Mine Exploration Drill Holes and Access Roads,* SENCO-PHENIX Archeological Consultants, Price, Utah. (03-477)

2003b *An Intensive Cultural Resource Survey and Inventory of the 2003 Dugout Canyon Mine Pace Canyon Exploration Drill Holes Block Area and Access Roads,* SENCO-PHENIX Archeological Consultants, Price, Utah. (03-841)




SENCO-PHENIX

N

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

Current Survey

Previous Survey

Eligible Sites

Ineligible Sites

Dugout Canyon Mine Permit Extension
Dugout Mine of Canyon Fuel, LLC
Carbon County, Utah
Sections 17, 20, 21, 28, 29, 30,
T13S, R13E
April 2004
SPUT-468
(U04SC0326)

# CHAPTER 5

# ENGINEERING

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# CHAPTER 5
# ENGINEERING

## 510 INTRODUCTION

This chapter provides a discussion of general engineering aspects, an operation plan, a reclamation plan, design criteria, and performance standards related to the Dugout Canyon Mine. The proposed coal mining and reclamation activities associated with the mine have been or will be designed, located, constructed, maintained, and reclaimed in accordance with the operation and reclamation plans.

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.

### 511 General Requirements

This permit application includes descriptions of the proposed coal mining and reclamation operations together with the appropriate maps, plans, and cross sections. Potential environmental impacts as well as methods and calculations utilized to achieve compliance with the design criteria are also presented.

### 512 Certification

Where required by the regulations, cross sections and maps in this permit application have been prepared by or under the direction of, and certified by, qualified registered professional engineers or land surveyors. As appropriate, these persons were assisted by experts in the fields of hydrology, geology, biology, etc.

## 512.100 Cross Sections and Maps

**Previously Mined Areas.** A certified map showing the location of previously mined areas within the permit and adjacent areas is provided as Plate 5-1.

**Surface Facilities.** Underground development waste which is generated at the Dugout Canyon Mine will be disposed of either:

- Underground within the Dugout Canyon Mine (without bringing this waste to the surface), at the approved waste-rock disposal facility at the Dugout Canyon Mine;
- At the approved waste-rock disposal facility at the SUFCo Mine (a sister operation of SCM); or
- At the approved waste-rock disposal facility at the Skyline Mine (also a sister operation of SCM).

Copies of the Division correspondence approving the SUFCo and Skyline waste-rock disposal facilities for receipt of Dugout Canyon waste rock are provided in Appendix 5-2.

Certified maps and cross sections concerning the disposal of underground development waste at the SUFCo and Skyline Mines are provided in the respective Mining and Reclamation Plans (M&RPs) for those mines. A certified map showing the proposed location of coal storage and loading areas, and explosive storage and handling facilities, is provided as Plate 5-2. Cross sections of the proposed facilities area are provided on Plate 5-3.

A map of the existing topography prior to disturbance by SCM is provided as Plate 5-4. Also noted on Plate 5-4 is the area of disturbance which was mapped to exist at the site in 1980. Since mining ceased at the site in 1964 (as noted in section 521.100 of this M&RP), this boundary represents the area of pre-SMCRA disturbance. Plate 5-4 also shows areas of non-mining disturbance which

occurred after 1980 but prior to 1996. These disturbances were created by logging activities in the area and are not subject to the requirements of R645-301 through R645-302. No areas shown on Plate 5-4 are subject to the requirements of R645-200 through R645-203.

A certified map showing the location of the topsoil stockpile is provided as Plate 2-3.

The proposed location of the sedimentation pond is noted on Plate 5-2. No water treatment facilities will exist at the site other than the sedimentation pond.

The following facilities or activities will not exist or occur within the permit area:

- Coal preparation plant,
- Coal cleaning,
- Coal processing waste banks, dams, or embankments,
- Disposal of non-coal (non-waste rock) waste other than durable rock-type construction materials such as cinder block, and
- Air pollution control facilities.

Hence, certified maps or cross sections of these facilities are not provided in this plan. The durable rock-type construction materials will be disposed of in locations designated to receive underground development waste.

**Surface Configurations.** Certified maps and cross sections showing the proposed final (post-reclamation) surface configuration of the Dugout Canyon disturbed area are provided on Plates 5-5 and 5-6, respectively.

**Hydrology.** Certified maps and cross sections associated with the hydrology of the Dugout Canyon Mine area are provided in Chapter 7.

**Geology.** Certified maps and cross sections associated with the geology of the Dugout Canyon Mine area are provided in Chapter 6.

### 512.200 Plans and Engineering Designs

All plans and engineering designs presented in this M&RP were prepared by or under the direction of and certified by a qualified registered professional engineer.

**Excess Spoil.** No excess spoil will be generated from the permit area.

**Durable Rock Fills.** No durable rock fills will exist in the permit area.

**Coal Mine Waste.** The designs of the waste-rock facilities at the Dugout, SUFCo and Skyline Mines were certified by a qualified registered professional engineer. Information regarding these disposal facilities can be found in their respective M&RPs.

**Impoundments.** The only impoundment to be constructed for the mining and reclamation operation will consist of the sedimentation pond (see Plate 7-5). This impoundment has been designed under the direction of a professional engineer using current, prudent, engineering practices. These designs were certified by a qualified registered professional engineer.

**Primary Roads.** The design and construction of the primary road associated with the mine has been certified by a professional engineer as meeting the requirements of R645-301-534.200 and R645-301-742.420. This certification is presented in Figure 5-1.

**Variance From Approximate Original Contour.** No variance from the approximate original contour requirements of the regulations is being requested in this M&RP.

## 513 Compliance with MSHA Regulations and MSHA Approvals

### 513.100 Coal Processing Waste Dams and Embankments

No coal processing waste dams or embankments will exist within the permit area.

### 513.200 Impoundments and Sedimentation Ponds

No impoundments or sedimentation ponds in the permit area will meet the size criteria of 30 CFR 77.216(a).

### 513.300 Underground Development Waste, Coal Processing Waste, and Excess Spoil

No coal processing waste or excess spoil will be generated within the permit area. Disposal of underground development waste in underground mine workings is described in Section 536.500 of this M&RP.

### 513.400 Refuse Piles

Waste rock generated from the Dugout Canyon Mine may be temporarily stored on the surface of the mine site at the location shown on Plate 5-2. This storage will be for a short period of time prior to disposal . Refer to the "Refuse Pile Amendment, February 2003 for information pertaining to the Dugout Mine refuse pile. High-ash coal product may also be produced during mine construction and development. This material may also be transferred to Sunnyside Cogeneration Associates (ACT/007/035) or a similar permitted facility. Runoff from the surface-stored materials will drain to the site sedimentation pond or other appropriate sediment-control structures.

A representative sample will be collected of the waste rock removed from the mine at a rate of one sample per 2,000 cubic yards of waste-rock material. These samples will be analyzed in accordance

with Table 6 of the Division's topsoil and overburden guidelines (Leatherwood and Duce, 1988). Waste rock with acid- and toxic-forming characteristics will be handled in accordance with the permits associated with the disposal locations.

### 513.500 Underground Openings to the Surface

Upon abandonment, each opening to the surface from the underground will be capped, sealed, backfilled, or otherwise properly managed in accordance with 30 CFR 75.1771. Details regarding final abandonment of mine openings are provided in Section 542.700.

### 513.600 Discharges to Underground Mines

Water not meeting UPDES standards during sediment pond cleaning will be pumped into the sealed, abandoned "Gilson West - Old Workings".

### 513.700 Surface Coal Mining and Reclamation Activities

No surface coal mining and reclamation activities will occur in the permit area.

### 513.800 Coal Mine Waste Fires

If any coal mine waste fires occur within the permit area, these will be reported immediately to MSHA and the Division. Immediate remedial action will be taken as deemed necessary by SCM to protect public health and safety as well as the environment. Following initial remedial efforts, a long-term plan will be formulated in discussion with MSHA and the Division to extinguish any existing fires and prevent future fires.

SCM will utilize a program of prevention and suppression to minimize the potential for coal mine waste fires. An ongoing educational program will emphasize the need for attention to fire prevention. Prevention will be further enhanced by the short-term nature of the surface storage of both coal and

waste rock at the Dugout Canyon Mine. Suppression will occur by separating smoldering material and compacting the adjacent material (to minimize oxygen content in the adjacent material). The burning material will then be extinguished using appropriate methods (see Section 528.300 of this M&RP). No burning mine waste will be removed from the temporary storage area without a removal plan approved by the Division.

## 514 Inspections

### 514.100 Excess Spoil

Excess spoil will not be generated at the Dugout Canyon Mine.

### 514.200 Refuse Piles

The frequency and methods of inspections of the waste-rock areas at the SUFCo and Skyline Mines is discussed in their respective M&RPs. Refer to the "Refuse Pile Amendment, February 2003 for inspection information pertaining to the Dugout Mine refuse pile.

All activities performed at this area will be in accordance with the applicable MSHA permit.

### 514.300 Impoundments

Regular inspections will be made during construction of the sedimentation pond as well as upon completion of construction. These inspections will be made by or under the direction of a registered professional engineer experienced in the construction of similar earth and water structures.

Annual inspections of the sedimentation pond will continue until removal of the structure or release of the performance bond. A certified report of inspection will be prepared by a qualified registered professional engineer and submitted to the Division in the annual report. The report will discuss any appearances of instability, structural weakness or other hazardous conditions, depth and elevation

of any impounded waters, existing storage capacity, and existing or required monitoring procedures and instrumentation, and any other aspects of the structure affecting stability. A copy of this report will also be maintained at the mine site.

No impoundments are anticipated within the permit area that are subject to 30 CFR 77.216.

county road and a UP&L power distribution line. The existing county road enters the permit area in NE¼, SE¼ Sec. 22, T. 13 S., R. 12 E., extending within that section for approximately 500 feet within the permit area. The road then exits the permit area for approximately 1300 feet of road length, then reenters the permit area in the SW¼ NW¼ Sec. 23, where it ends approximately 300 feet northeast of the southwest edge of the proposed disturbed area boundary (i.e., at the BLM/State property boundary, near the upstream edge of the sedimentation pond). The county road lies on land owned by the entities shown on Plate 1-3. The date of its initial construction is unknown, but is presumed to have been prior to 1981. Other existing roads within the disturbed area and permit area are privately owned and maintained roads. The general locations of roads within and adjacent to the permit area are shown on Plate 5-7.

Plates 4-1 and 5-2 depict the location of an existing UP&L distribution line that will be improved and activated to provide electrical service to the mine. This distribution line, which is not classified as a major electric transmission line, will be owned and upgraded by UP&L. The date of its initial construction is unknown, but is presumed to have been prior to 1981.

Some debris remains within the disturbed area from previous mining operations. That which cannot be salvaged will be disposed of during the construction of the mining facilities. The final disposal location will be determined by the nature of the debris. Durable, rock-type debris may be incorporated into the construction fill if it does not compromise the integrity of the fill. Other debris will be salvaged or disposed of at a permitted off-site facility. All debris will be handled in accordance with applicable Federal, State, and local regulations.

As noted previously, waste rock which is generated at the Dugout Canyon Mine will be disposed of underground or in the approved waste-rock disposal areas at the Dugout Canyon, SUFCo and/or Skyline Mines. The location of the sedimentation pond within the permit area is shown on Plate 5-2. There will be no permanent water impoundments within the permit area.

Plans for mining in areas (leased or unleased) outside of the permit area are dependant upon economic feasibility and obtaining corresponding permits. New areas will be reviewed on a case by case basis.

**Land Surface Configuration.** Surface contours of undisturbed areas adjacent to proposed disturbed areas associated with the mine are shown on Plate 5-2. As stated in Section 521.100 of this M&RP, surface facilities have been in existence in the Dugout Canyon area since the mid-1920s. As a result, pre-mining topographic maps do not exist. However, the surface contours in undisturbed areas shown on Plate 5-2 are considered generally indicative of original land slopes in the vicinity of the mine.

A map showing topographic conditions prior to disturbance by SCM is provided as Plate 5-4. This map also shows the area of pre-SMCRA disturbance, as mapped in 1980, together with non-mining areas of disturbance which occurred after 1980 but prior to 1996. Plate 5-4 also shows topographic conditions in undisturbed areas extending at least 100 feet from the disturbed area.

**Surface Facilities.** Plate 5-2 shows the locations of the following surface facilities:

- Buildings, utility corridors, and facilities to be used, including:
  Water Tanks - two metal tanks on concrete pads,
  Water Well Pump House - metal building on concrete pad (Appendix 7-9),
  Fueling Station - metal structure and fueling equipment on concrete pad,
  Portals - see Section 529
  Transfer Building - see subsequent portions of this Section,
  Conveyor - see subsequent portions of this Section,
  Truck Loading Bin - metal structure on concrete pad (see Section 528),
  Fan - metal structure containing a fan,
  Substation - metal structure sitting on gravel and concrete pad,
  Small Substation - metal structure sitting on gravel and concrete pad,
  Temporary Waste Rock Storage Area - see Sections 514.200, and 536,
  Roads - see Sections 527.100 and 527.200,

Sedimentation Pond - see Chapter 7 and Appendix 7-8,
Office/Bath House/Shop - block and metal building on concrete pad
Parking Areas - gravel or asphalt pads
Storage Areas - gravel, asphalt, or soil pads
Crusher - metal structure on concrete pad/footings
Coal Sampler - Metal structure on skids, on concrete pad
Storage Building - Metal structure on concrete pad
Stoker Coal Storage Bin - concrete container

- The area of disturbance at the mine mouth,
- Coal storage and loading facilities, and
- The explosive storage and handling facility, which includes two metal magazines.

Once the office/bath house/warehouse/shop building was completed in late fall of 2002, the temporary facilities were either removed or relocated. Plate 5-2 reflects where the containers used for the temporary warehouse, storage and foreman facilities were moved following the completion of the new building. These containers were placed on either soil or a gravel pad.

Drainage facilities are shown on Plate 7-5, including the site sedimentation pond, culverts, and ditches.

Cross sections of the proposed surface facilities are provided on Plate 5-3 and Figure 7-9-2 (Appendix 7-9). The disturbed area shown on Plate 5-2 is the same as the land area for which a performance bond or other guarantee has been posted.

Under the currently approved construction plan, several areas within the existing disturbed area boundary will not be significantly disturbed during site construction. The first such area consists of 0.08 acres located on the hillside west of the portal pad, north of the substation access road, and east of the storage area adjacent to that road. The second such area consists of 0.13 acres located on the hillside above the mine haulage/manway portal. Each of the above areas is located on a hillside above the area of actual disturbance.

seam thickness, etc.) is provided in Chapter 6. In particular, Plate 6-1 provides a surficial geologic map of the permit and adjacent areas, Plate 6-2 shows the locations of the coal-seam outcrops in the vicinity of the proposed surface facilities, and Figure 6-1, Plate 6-3, 6-3A and 6-3B provide geologic cross sections based on data collected from drill holes in the area. Furthermore, information related to the physical conditions which may affect mining is presented in Sections 622 (a discussion of the cross sections), 624.100 (a discussion of stratigraphic and structural conditions), and 624.300 (a discussion of rock clay content), as well as Appendix 6-1 (drill-hole logs).

**Subsidence Control Measures.** Most of the land within the permit area will eventually be affected by subsidence. Anticipated areas of subsidence are shown on Plate 5-7. This subsidence boundary was projected to the surface based on an angle of draw of 30 degrees as measured from the vertical as required in R645-301-525.542. It is presumed that the actual angle of draw will be less, based upon results of mining and subsidence in the general area. Plate 5-7 illustrates the projected extent of subsidence based on a 30 degree angle of draw. The primary areas where future subsidence is not anticipated are the areas overlying the previous workings shown on Plate 5-1 (since these areas will not be re-mined). Plate 5-7 also illustrates a subsidence buffer zone that extends beyond the limits of Federal Lease U7064-027821 and State Lease ML-48435. This buffer zone does not suggest that CFC will mine outside of the lease boundaries, however, it does indicate the limit of projected subsidence.

**Subsidence Monitoring.** Numerous control points have been established within the permit and nearby areas to assist in subsidence surveys (see Plate 5-7). Coordinates and elevations of these control points (as established in January 1984) are provided in Table 5-2. The control points consist of traverse monuments, benchmark monuments, and survey stations (as indicated on Plate 5-7) which have been constructed generally as follows:

- Traverse and Benchmark Monuments - These monuments are constructed with a 3¼-inch diameter tap-on convex cap with a center punch mark and a 5-

**TABLE 5-2**

**SUBSIDENCE CONTROL POINT SURVEY DATA***

| STATION NAME | NORTHING | EASTING | PIN ELEVATION |
|---|---|---|---|
| Sage | 498254.15 | 2257232.34 | 8467.62 |
| Sage, Az. | 497324.93 | 2256623.81 | 8422.66 |
| Francis | 496611.07 | 2264094.03 | 8544.89 |
| Skaggs | 505868.76 | 2269371.61 | 8837.05 |
| McFarlen | 489283.24 | 2272314.34 | 8317.79 |
| Soldier | 498530.39 | 2281585.15 | 9053.75 |
| Sublett | 487882.23 | 2256822.75 | 6757.00 |
| Mosca | 494899.03 | 2258577.93 | 7303.60 |
| Oslund | 492074.41 | 2259135.38 | 7767.77 |
| Durrett | 490307.50 | 2262347.14 | 7474.79 |
| Semborski | 489694.42 | 2268293.47 | 7818.22 |
| Streeter | 493114.47 | 2264816.93 | 8239.50 |
| Doney | 494159.83 | 2267719.90 | 8096.61 |
| Ogden | 496576.39 | 2270095.01 | 7811.33 |
| Presset | 493596.17 | 2269951.00 | 7544.26 |
| Chi | 492119.67 | 2268718.50 | 7142.70 |
| Reynoso | 492837.37 | 2268611.30 | 7185.10 |
| Palmer | 488120.29 | 2266987.04 | 7712.80 |
| 3045 | 499635.34 | 2254210.70 | 8170.10 |
| 3048 | 500395.85 | 2264658.31 | 8419.59 |
| 3049 | 499585.59 | 2267096.57 | 8418.76 |
| 3052 | 491499.67 | 2276901.14 | 8455.63 |
| 3061 | 504632.44 | 2271891.63 | 8856.88 |

* Additional survey points are reported each year in the Annual Reports.

be visually evaluated during monitoring activities. Following an initial survey prior to the beginning of mining operations, future surveys will concentrate on areas which have been mined in the past or are anticipated to be mined within the upcoming year. Hence, the area of detailed survey may be expanded each progressive year.

Annual resurveys of the mine permit area will produce vertical control at the same sites as the previous year. Information on each site will be produced annually while the area underlying the site is being actively mined or is still potentially subsiding. The subsiding areas which show no change for two consecutive years will be considered stable and will be omitted from further annual surveys. If additional mining is anticipated within the stable areas, these areas will again be added to the annual surveys.

In addition to the ground surveys, aerial photogrammetric methods will be included in the surveys when the areas become too large to feasiblely handle with ground surveys. This method may be added to enhance the ground surveys and to cover larger areas as the mine expands. Visual checks for subsidence will be made during all surface activities, especially during water monitoring activities. These visual surveys will be used to detect surface irregularities and surface cracks.

**Anticipated Effects of Subsidence.** Based on experience in the region and the results of investigations performed by Dunrud (1976), future subsidence in the permit area is anticipated to result in the formation of tension cracks, with these cracks healing to some degree following formation. It is further anticipated that no substantial damage will occur to

technologically and economically feasible by restoring the land to a condition capable of maintaining the value and reasonably foreseeable uses which it was capable of supporting before the subsidence. In addition, SCM will notify the Division of any slide, rock fall, or other disturbance known to be caused by subsidence that will have an adverse effect on the environment.

**Protection of Significant Surface Resources.** None of the following exist within the area of potential subsidence associated with the Dugout Canyon Mine:

- Public buildings or facilities,
- Churches, schools, and hospitals,
- Impoundments with a storage capacity of 20 acre-feet or more or bodies of water with a volume of 20 acre-feet or more,
- Aquifers or bodies of water that serve as a significant water source for any public water supply system, or
- Urbanized areas, cities, towns, or communities.

Hence, no special control measures are required to preclude subsidence impacts to these resources.

Raptor nests and other wildlife resources which may be influenced by subsidence are presented on Plate 3-2. A discussion of protective measures associated with wildlife resources in the permit area is presented in Section 333.300 of this M&RP. Additional information pertaining to monitoring and mitigation for potential impacts due to subsidence is contained in Sections 332, 358, 724.100 and 731.200 of this M&RP.

### 525.300 Public Notice of Proposed Mining

Each owner of property or resident within the area above an underground mining block and adjacent area that may be affected by subsidence will be notified by mail at least 6 months prior to mining or within that period if approved by the Division. The notification will contain:

- Identification of specific areas in which mining will take place;
- Approximate dates the specific areas will be undermined; and
- The location or locations where the SCM subsidence control plan may be examined.

## 526 Mine Facilities

### 526.100 Mine Structures and Facilities

As stated in Section 521.100 of this M&RP, no buildings existed at the mine surface at the time construction was begun on the Dugout Canyon Mine. Nonetheless, Section 521.100 of this M&RP indicates that two "existing structures" are present within the permit area which were presumably "used in connection with or to facilitate coal mining and reclamation operations for which construction began prior to January 21, 1981" (see R645-100-200). These are the existing county road and a UP&L power distribution line.

A description of the location of the existing county road within the permit area is provided in Section 521.100 of this M&RP. It is unknown when this road was initially constructed. This road is currently a gravel road which will be modified by the County (see Section 527.200). As indicated in Section 521.100 of this M&RP, it is anticipated that the county road will not be relocated within the permit area.

Building construction will generally involve grading and preparation of foundation areas, excavation and installation of foundations, building erection, interior and exterior finish work, and connection of utilities. Storage areas will generally be open graded, providing outside storage for large supplies. Both building sites and storage areas will be graded to ensure effective drainage to disturbed-area ditches and culverts as noted on Plate 7-5. Operation and maintenance of support structures and facilities at the Dugout Canyon Mine will involve regular grading of facility areas, together with inspection, cleaning, and repairs as required.

No coal processing waste banks, dams, or embankments will exist in the permit area. Sediment that is periodically removed from the sedimentation pond will be disposed of with underground development waste generated from the mine or pumped back into the sealed, abandoned "Gilson West-Old Workings"

General refuse that is generated on site will be stored in a dumpster to be situated at a convenient location within the disturbed area. This waste will consist predominantly of old brattice cloth, ventilation tubing, broken timbers, wire, broken machinery parts, paper, cardboard, and miscellaneous garbage. This non-hazardous, non-toxic, non-coal, non-waste rock refuse will be disposed of periodically through Carbon County at a state-approved landfill. The agreement with Carbon County for disposal of this refuse is provided in Appendix 5-3.

During site construction, operation, and reclamation activities, any spilled petroleum products such as grease, hydraulic fluid, fuel, oil, joint coating, or other pollutants will be removed immediately with the associated contaminated soil and disposed of at a state-approved facility that is permitted to receive such waste. Adequate spill collection materials (including absorbents to stop or contain contaminants that may enter a stream) will be readily available at the site during these activities to contain any such spills.

a reclaim tunnel to the crusher and then via the loadout conveyor to the truck loadout bin. From the bin, the coal will be loaded onto trucks and transported from the site.

### 528.200 Overburden

No overburden will be removed, handled, stored, or transported within the permit area.

### 528.300 Spoil, Coal Processing Waste, Non-Coal Waste, and Mine Development Waste

**Excess Spoil.** No spoil will be generated at the Dugout Canyon Mine. Sediment removed from the sedimentation pond will be handled in accordance with Section 732.200 of this M&RP.

**Coal Processing Waste.** SCM will not process their coal at the Dugout Canyon Mine beyond crushing. Thus, no coal processing waste will be generated in the permit area.

**Burning and Burned Waste Utilization.** As noted below and in Section 536 of this M&RP, waste rock generated from the Dugout Canyon Mine will be permanently disposed of either underground or at permitted facilities located at the Dugout, SUFCo or Skyline. If coal mine waste fires occur at the permitted disposal/storage facilities, they will be controlled in the manner outlined in their respective permits.

Waste rock will only be temporarily stored at the surface of the Dugout Canyon Mine prior to ultimate disposal. If spontaneous combustion of this material does occur, the burning section will be removed from the remainder of the pile using a backhoe or other appropriate means. The affected waste rock will then be spread so that the material can cool and mixed with soil to extinguish the fire. The extinguished material will then be returned to the waste pile.

**Non-Coal Mine Waste.** Non-coal (non-waste rock) waste generated in the permit area will be temporarily stored in a dumpster to be situated at a convenient location within the disturbed area.

This waste will be disposed of periodically at a permitted landfill.

Liquid wastes such as oil and solvents will be contained and disposed of or recycled, in accordance with applicable State and Federal regulations, at facilities which are permitted to accept such wastes. Small quantities of such wastes (e.g., resulting from cleanup of small spills, etc.) may be contained onto absorbent pads prior to disposal. In all cases, disposal and/ or recycling will be only at sites which are permitted by appropriate regulatory authorities to accept such waste.

No non-coal (non-waste rock) waste will be permanently disposed of within the permit area other than, potentially, some durable rock-type construction materials such as cinder block, which may be disposed of underground. Non-coal (non-waste rock) waste will be temporarily stored at the site prior to permanent off-site disposal either in a dumpster or in the temporary waste-rock storage area. Off-site disposal will be only at sites which are permitted by appropriate regulatory authorities to accept such waste.

It is currently anticipated that no non-coal waste that is defined as hazardous under 40 CFR 261 will be generated at the mine. If such waste is generated in the future, it will be handled in accordance with the requirements of Subtitle C of the Resource Conservation and Recovery Act and any implementing regulations.

**Underground Development Waste.** Underground development waste which is generated at the Dugout Canyon Mine will be disposed of either:

- Underground within the Dugout Canyon Mine (without bringing this waste to the surface);
- At the approved temporary waste-rock storage site at the Banning Loadout;
- At the approved waste-rock disposal facility at the Dugout Canyon Mine, SUFCo Mine and Skyline Mine.

Descriptions of the waste-rock disposal facilities at the Dugout Canyon Mine (Refuse Pile Amendment, February 2003), SUFCo Mine and the Skyline Mines are provided in their respective M&RPs. A

discussion of the disposal of underground development waste in the underground workings of the Dugout Canyon Mine is provided in Section 536.500 of this M&RP.

**Minimization of Acid, Toxic, and Fire Hazards.** Data presented in Chapter 6 indicate that neither acid- nor toxic-forming materials are present in the overburden, underburden, or coal. These conclusions are supported by the data contained in Appendix 5-7, which provides the results of analyses of waste-rock materials. Should an acid- or toxic-forming problem with the waste rock be identified during future sample collection, those materials so identified will be buried within 30 days after the material is exposed at the mine site.

As noted previously in this section, temporary storage of debris generated at the mine will be in a dumpster. As a result, this debris will be protected from the wind and other elements. Because debris that is generated at the mine site will be only temporarily stored at the mine prior to off-site disposal, there is no significant potential for this debris to spontaneously combust. Fire extinguishers will be kept on mobile equipment in the mine yard to extinguish any fires should combustion of the waste materials occur. No waste materials that constitute a fire hazard will be accumulated in the permit area. No hazardous materials, as defined in 40 CFR, will be disposed of underground. These materials will be disposed of in accordance with all applicable state and federal regulations.

**Road Surfacing.** The county road which accesses the mine site will be surfaced with a non-rutting asphalt concrete. This surface will be designed to account for the anticipated volume of traffic as well as the weight and speed of vehicles using the road.

**Road Maintenance.** The county road will be maintained by Carbon County.

**Road Culverts.** All culverts along the county road will be designed, installed, and maintained by Carbon County. Culverts to be installed within the surface facilities have been designed in accordance with the hydrologic criteria discussed in Section 742.300. These culverts will be installed in accordance with manufacturer's recommendations to sustain the vertical soil pressure, the passive resistance of the foundation, and the weight of vehicles using the road.

### 535 Spoil

No spoil will be generated in the permit area. No valley fills or head-of-hollow fills will be created for the disposal of spoil material. Furthermore, no excess spoil will be disposed of in pre-existing benches.

### 536 Coal Mine Waste

Coal mine waste resulting from mining activities at the Dugout Canyon Mine will be disposed of either in the underground workings within the permit area or at the approved waste-rock disposal facilities operated at the Dugout Canyon Mine, SUFCo Mine or at the Skyline Mine waste-rock storage facilities. Descriptions of the aforementioned facilities are presented in the respective M&RPs.

The coal mine waste generated from the Dugout Canyon Mine may be temporarily stored on the surface of the Dugout Canyon Mine facilities at the location shown on Plate 5-2 prior to ultimate disposal. Coal mine waste which is temporarily stored on the surface at the mine site will be removed from the temporary waste-rock storage area and placed in its final disposal area at the frequency noted in Section 513.400 of this M&RP. Runoff from the temporary waste-rock storage area will report

to the mine-site sedimentation pond and be treated accordingly.

### 536.100 Design

The waste-rock disposal facilities were designed to achieve minimum long-term static safety factors of at least 1.5. These designs and the associated evaluations were based on the results of detailed foundation and laboratory analyses of soils at the sites of the disposal facilities.

Due to the temporary nature of the waste-rock storage area shown on Plate 5-2, the long-term static safety factor of this material has not been evaluated. Foundation conditions beneath the pad on which the waste rock will be temporarily stored are discussed in Chapter 2 and Appendix 5-4 of this M&RP.

### 536.200 Waste Emplacement

Waste rock from the Dugout Canyon Mine that is to be hauled to the Dugout, SUFCo or Skyline Mines disposal sites will be emplaced in accordance with the respective M&RPs. This waste will be placed in a controlled manner to ensure the mass stability of the waste piles and prevent mass movement during and after construction. The waste rock will be covered periodically to minimize public hazards and the potential for spontaneous combustion. Waste rock that is disposed of in underground workings will be emplaced in accordance with Section 536.500 of this M&RP.

Waste rock will be emplaced in the temporary storage areas at the Dugout Canyon Mine using front-end loaders and other appropriate earth-moving equipment. Due to the temporary nature of this storage, mass movement, public hazards, and spontaneous combustion of the material will not occur prior to its ultimate disposal.

### 536.300 Excess Spoil Fills

No excess spoil fills will exist in the permit area.

### 536.400 Impounding Structures Constructed of Coal Mine Waste

No impounding structures will be constructed of coal mine waste in the permit area.

### 536.500 Disposal of Coal Mine Waste in Special Areas

Coal mine waste generated at the Dugout Canyon Mine will be disposed of at either the approved facility, or in underground workings within the permit area. The source of this material will be primarily waste rock resulting from partings and splits in the coal seam. As indicated in Chapter 6, neither acid- nor toxic-forming materials are present in the overburden, underburden, or coal (i.e., the material that will comprise the waste rock that will be generated from the Dugout Canyon Mine). Prior to the disposal of underground development waste within the permit-area mine workings, approval for such disposal will be obtained from MSHA.

- Descriptions of plans for stockpiling topsoil at the waste-rock disposal sites; and
- Discussions of the suitability of the material for reclamation.

### 536.700 Coal Processing Waste

No coal processing waste will be generated within the permit area.

### 536.800 Coal Processing Waste Banks, Dams, and Embankments

No coal processing waste banks, dams, or embankments will exist within the permit area.

### 536.900 Refuse Piles

A detailed description of the waste-rock disposal/storage sites at the Dugout Canyon Mine (Refuse Pile Amendment, February 2003), SUFCo and Skyline Mines is provided in their respective M&RPs. These M&RPs provide:

- A description of pre-disturbance soils at the sites;
- Certification of the design and plans;
- Compliance with applicable MSHA regulations;
- A description of proposed inspection activities;
- A description of the design, stability, operation, and reclamation of the waste-rock sites; and
- A discussion of runoff- and sediment-control plans associated with the sites.

The suitability of the waste rock to be generated from the Dugout Canyon Mine for reclamation is discussed in Chapters 2 and 6 of this M&RP.

### 541.200 Surface Coal Mining and Reclamation Activities

No surface coal mining and reclamation activities will be conducted in the permit area.

### 541.300 Underground Coal Mining and Reclamation Activities

All surface equipment, structures, or other facilities not required for continued underground mining activities and monitoring, unless approved by the Division as suitable for the post-mining land use or environmental monitoring, will be removed and the affected lands reclaimed following permanent cessation of mining operations.

### 541.400 Environmental Protection Performance Standards

The plan presented herein is designed to meet the requirements of R645-301 and the environmental protection performance standards of the State Program.

## 542 Narratives, Maps, and Plans

### 542.100 Reclamation Timetable

A timetable for the completion of each major step in the reclamation plan is presented in Figure 5-3.

### 542.200 Plan for Backfilling, Soil Stabilization, Compacting, and Grading

The regrading plans for the waste rock disposal facilities at the Dugout Canyon Mine (Refuse Pile Amendment, February 2003), SUFCo and Skyline Mines are presented in their respective M&RPs. The Dugout Canyon regrading plan was designed to meet the objectives of balancing cut and fill quantities, maintaining a geotechnically stable base. The primary features of this plan are:

**Disposal of Coal Mine Waste.** All coal mine waste generated at the Dugout Canyon Mine will be disposed of either underground or at the waste-rock disposal sites associated with the Dugout Canyon Mine (Refuse Pile Amendment, February 2003), SUFCo and/or Skyline Mines. Coal mine waste that is temporarily stored on the surface at the Dugout Canyon Mine prior to off-site disposal will be removed from the Dugout Canyon Mine prior to reclamation. Information regarding disposal practices and reclamation plans for these off-site disposal facilities is provided in their respective M&RPs.

**Disposal of Non-Coal Mine Wastes.** All non-coal (non-waste rock) waste generated from mining and reclamation operations will be disposed of as outlined in Sections 526.100 and 528.300. Following cessation of mining activities, non-coal mine waste that is still temporarily stored at the site will be removed and disposed of as outlined in Section 528.300. Non-coal waste that is generated during the course of reclamation that cannot be salvaged will be disposed of at an off-site permitted facility.

### 542.800 Estimated Cost of Reclamation

The existing bond, together with the estimated cost to reclaim the Dugout Canyon Mine surface facilities as modified by this submittal, is provided in Appendix 5-6.

## 550 RECLAMATION DESIGN CRITERIA AND PLANS

### 551 Casing and Sealing of Underground Openings

Each underground opening to the mine will be sealed and backfilled when no longer needed for monitoring or other use approved by the Division upon a finding of no adverse environmental or health and safety effects. Permanent closure measures will be as described in Section 542.700. This closure method has been designed to prevent access to the mine workings by people, livestock, fish and wildlife, and machinery. The closures have also been

In an effort to eliminate pre-existing highwalls at the site following reclamation, soil may be replaced during reclamation at slopes of up to 1.5H:1V. The steepness of these slopes will be reduced at their base, providing a concave slope. As noted above, these slopes will be geotechnically stable. Dozers will be used during placement of the topsoil or substitute topsoil on these steep slopes, taking care to achieve a reasonably uniform thickness of the final soil cover. Following placement and prior to seeding, all areas with a slope steepness of 3H:1V or steeper will be deep gouged using a trackhoe. The final surface will consist of mounds and depressions capable of holding runoff and difficult to walk on. Refer to Sections 355 and 341 regarding erosion-control matting and revegetation.

Although the gouging will extend below the depth of the final topsoil layer, information presented in Section 222.400 of this M&RP indicates that the subsoils will be of acceptable chemical and physical quality, with the possible exception of the percentage of rock fragments. Hence, the surface will still be capable of sustaining an adequate vegetative cover, further minimizing long-term erosion of the slopes.

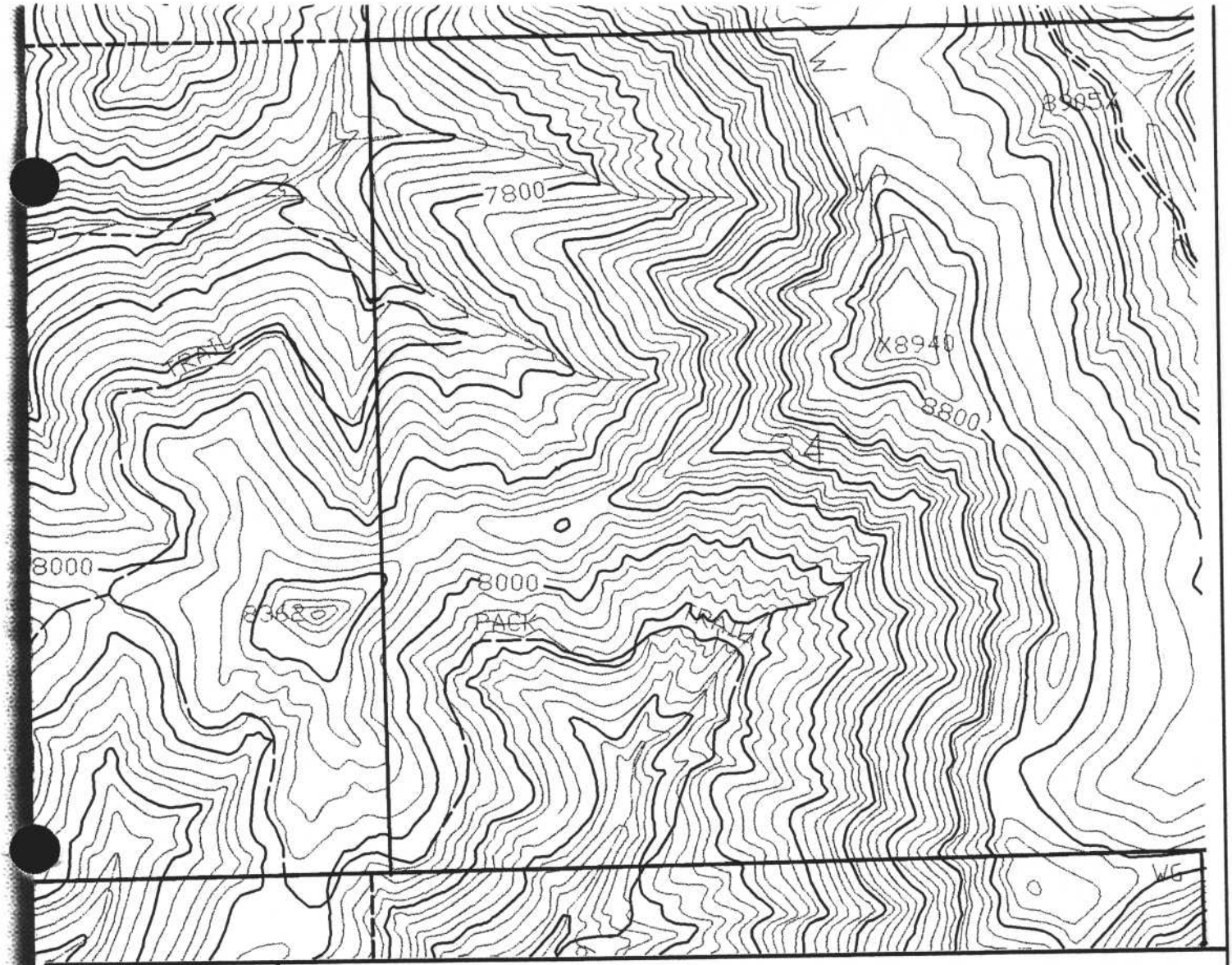
**Post-Mining Land Use.** The disturbed area will be backfilled and regraded in a manner that supports the approved post-mining land use.

### 553.200 Spoil and Waste

**Spoil.** No spoil will be generated within the permit area.

**Refuse Piles.** Details regarding the design, operation, final surface configuration, and final grading of the waste-rock disposal sites at the Dugout Canyon Mine, SUFCo and Skyline Mines are provided in their respective M&RPs. Refuse generated from the Dugout Canyon Mine will be disposed of only at sites that have been approved to accept material from the mine.

**Coal Processing Waste.** No coal processing waste will be generated within the permit area.




| REVISION | |
|---|---|
| DATE | BY |
| 11-15-99 | JLP |
| 01-09-04 | RR |

Canyon Fuel Company, LLC

Soldier Canyon & Dugout Canyon Mines

RED

# PROPOSED MINE SEQUENCE AND PLANNED SUBSIDENCE BOUNDARY

## Dugout Canyon Mine

| | | |
|---|---|---|
| DRAWN BY: JLP | DATE: MAY 13, 1999 D459.PCP | SCALE: 1"=1000' |
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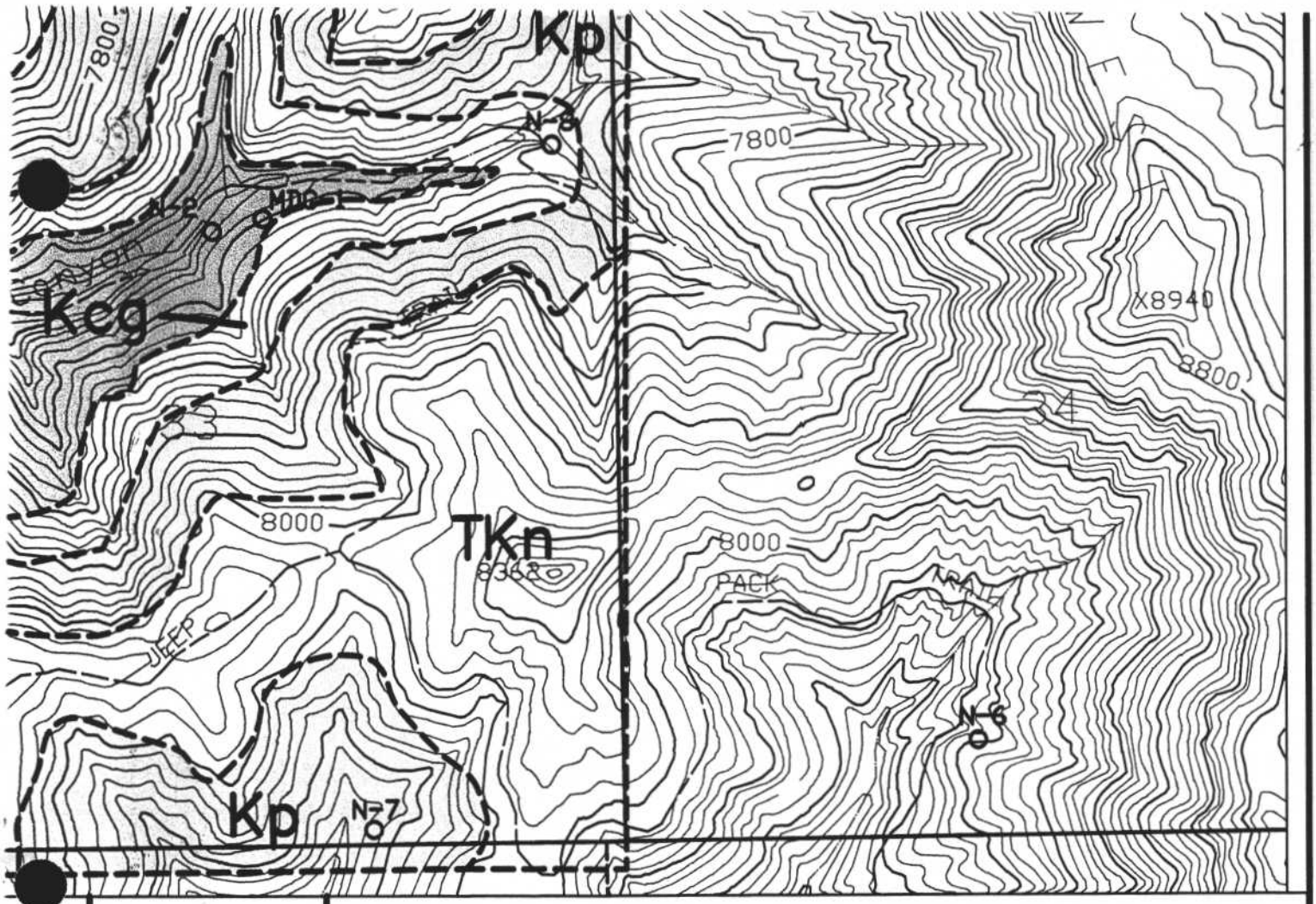


| REVISION | |
|---|---|
| DATE | BY |
| 12/29/03 | RR |

**Canyon Fuel Company, LLC**
Soldier Canyon & Dugout Canyon Mines

# GEOLOGY OF DUGOUT CANYON MINE PERMIT AREA

RED

## Dugout Canyon Mine

| | | |
|---|---|---|
| DRAWN BY: JLP | DATE: MAY 7, 1999 D-444.PCP | SCALE: 1" = 1000' |
| APPROVED BY: MWS | FILE NAME: X\DOGM\Working Files\Dugout\Sitla\Plate 6-1.dwg | DRAWING OR MAP NUMBER PLATE 6-1 |

| REVISION | |
|---|---|
| DATE | BY |
| 12/31/03 | RR |

Canyon Fuel Company, LLC
Soldier Canyon & Dugout Canyon Mines

RED

# ROCK CANYON SEAM OVERBURDEN THICKNESS

## Dugout Canyon Mine

| | | |
|---|---|---|
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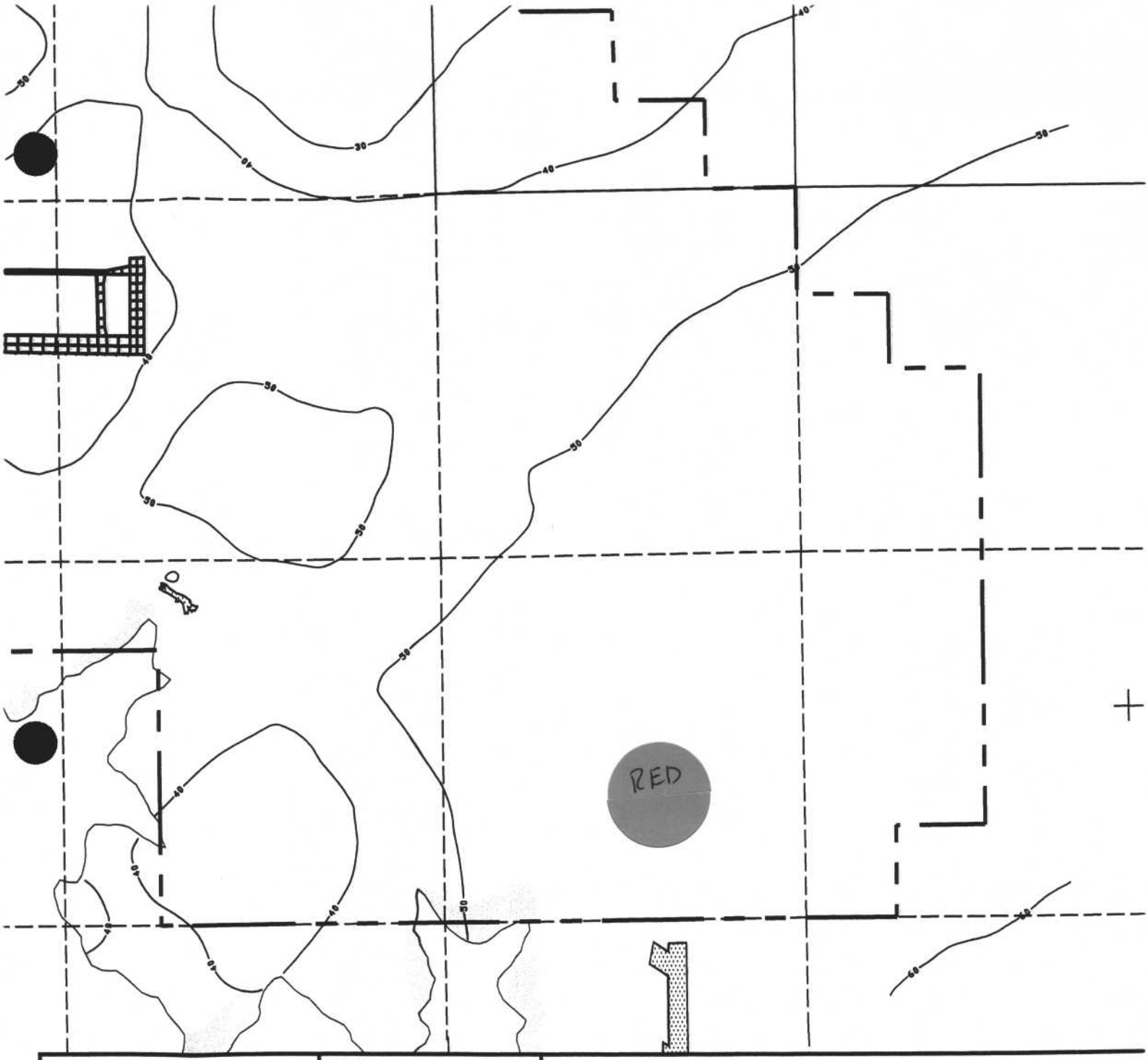


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|---|---|---|---|---|
| NO. | DATE | BY | DESIGNED BY: | |
| | 11/08/02 | MAS | DRAWN BY: | JLP |
| | 12/22/03 | RR | CHECKED BY: | |
| | | | | |
| | | | | |
| | | | SCALE: 1" = 2000' | |

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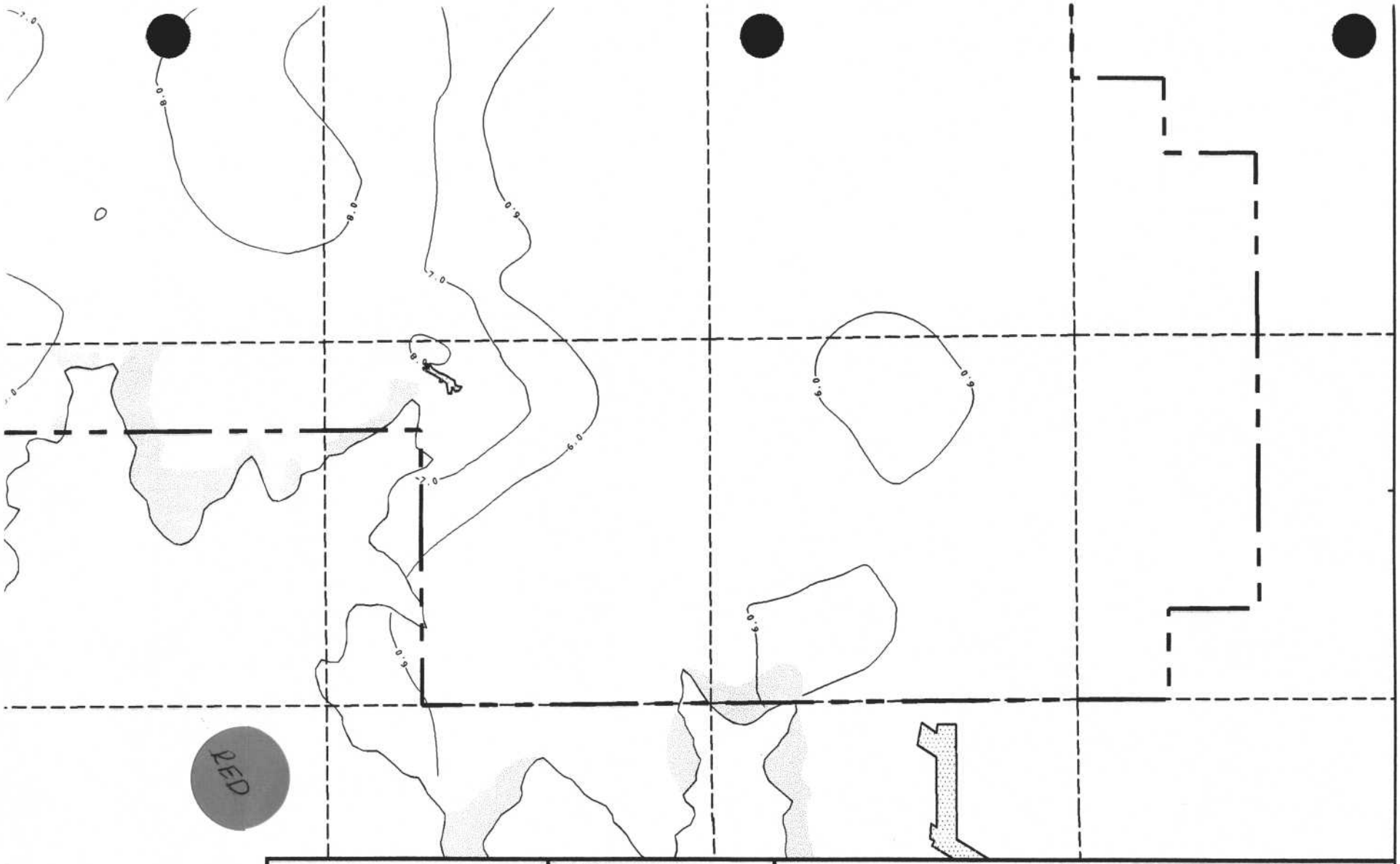
Canyon Fuel Company, LLC
Soldier Canyon Mine / Dugout Canyon Mine

# ROCK CANYON SEAM / GILSON SEAM INTERBURDEN MAP

P.O BOX 1029
WELLINGTON, UTAH 84542

DRAWING OR MAP NUMBER PLATE 6-5

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Soldier Canyon Mine / Dugout Canyon Mine

# ROCK CANYON SEAM ISOPACH MAP "CONFIDENTIAL"

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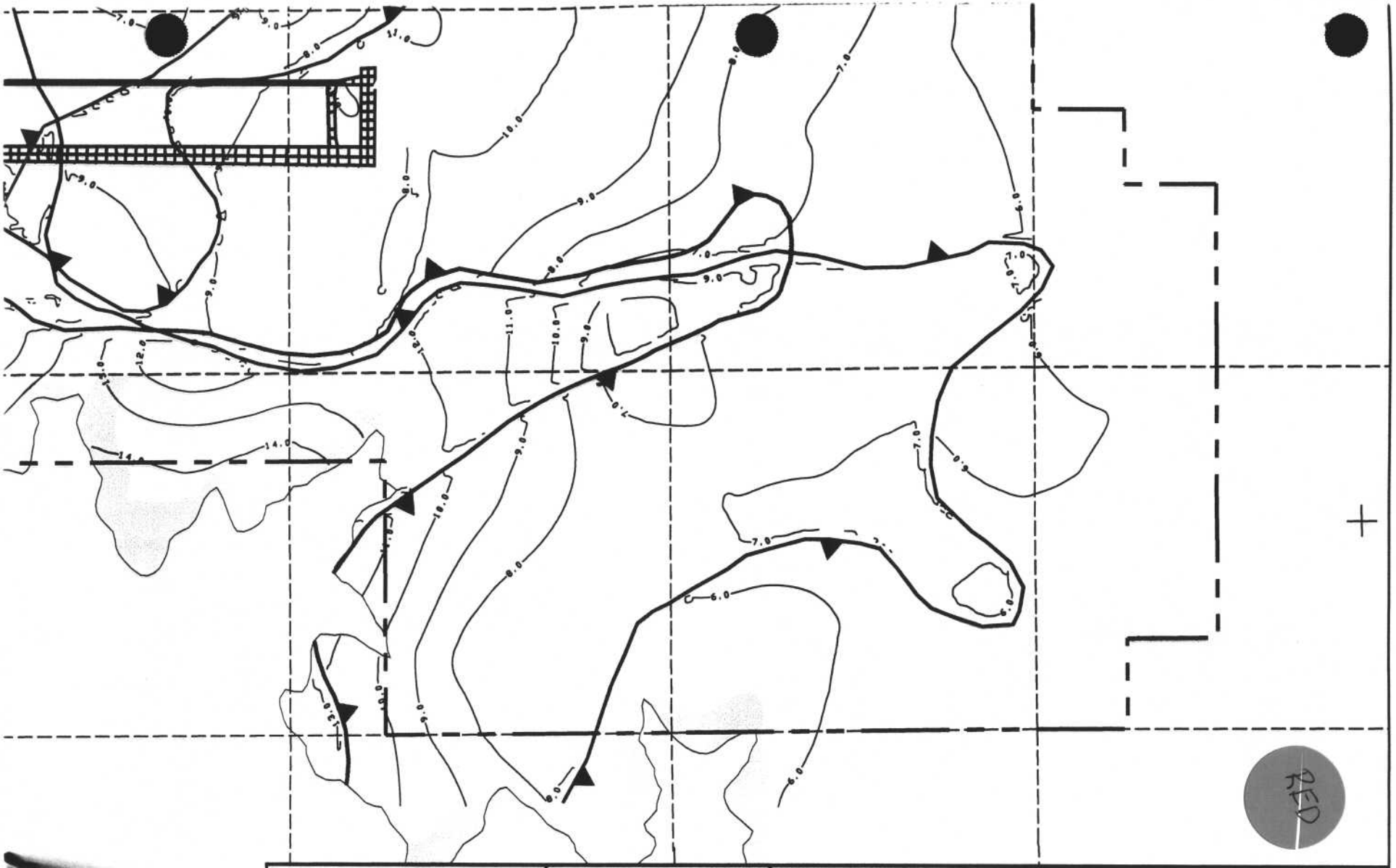
WELLINGTON, UTAH 84542

DRAWING OR MAP NUMBER PLATE 6-6



| REVISIONS OR UP-DATES | | | DATE: 04/20/98 | |
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| NO. | DATE | BY | DESIGNED BY: | |
| | 11/08/02 | MAS | DRAWN BY: | JLP |
| | 12/22/03 | RR | CHECKED BY: | |
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| | | | SCALE: 1" = 2000' | |

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Canyon Fuel Company, LLC
Soldier Canyon Mine / Dugout Canyon Mine

# GILSON SEAM THICKNESS ISOPACH MAP "CONFIDENTIAL"

P.O BOX 1029
WELLINGTON, UTAH 84542

DRAWING OR MAP NUMBER PLATE 6-7

# CHAPTER 7

# HYDROLOGY

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# CHAPTER 7
# HYDROLOGY

## 710 INTRODUCTION

### 711 General Requirements

This chapter presents a description of:

- Existing hydrologic resources within the permit and adjacent areas;
- Proposed operations and the potential impacts to the hydrologic balance;
- Methods of compliance with design criteria and the calculations utilized to show compliance;
- Applicable hydrologic performance standards; and
- Hydrologic reclamation plans for the Dugout Canyon Mine.

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.

### 712 Certification

All maps, plans, and cross sections presented in this chapter have been certified by a qualified, registered professional engineer.

### 713 Inspection

Impoundments associated with the mining and reclamation operations will be inspected as described in Section 514.300 of this M&RP.

## TABLE 7-1

## OBSERVATION WELL COMPLETION SUMMARY[a]

| Well Number | Total Drilled Depth (ft) | Elev. Top of Casing (ft) | Casing ID (in) | Length of Perf. (ft) | Formation Monitored |
|---|---|---|---|---|---|
| GW-5-1 | 1,826 | 7,186.4 | 5 | 22 | Blackhawk |
| GW-6-1 | 2,180 | 7,724.7 | 5 | 200 | Blackhawk |
| GW-10-2 | 2,084 | 7,727.4 | 5 | 250 | Castlegate |
| GW-11-2 | 2,399 | 8,203.8 | 5 | 175 | Price River |
| GW-19-1 | 2,050 | 8,258.2 | 4 | 364 | North Horn, Price River, Castlegate, Blackhawk |
| GW-24-1* | 1,706 | 8,422.0 | 4 | 100 | Castlegate |
| GW-32-1 | 2,360 | 7,152.1 | 2.5 | 50 | Blackhawk |
| G-58.5 | 3,177 | 7,398 | 8.5 | 5 | Blackhawk |

(a) See Plate 7-1 for well locations.

* Monitoring discontinued 4th Quarter 2004 due to blockage.

M&RP. All groundwater use (seeps and springs) within the permit and adjacent areas is confined to wildlife and stock watering.

Table 7-2 provides a summary of the period of record and selected additional information regarding groundwater sources that have been monitored within the permit area and the nearby vicinity. These sources include wells, springs, and mine-water inflows from the Soldier Canyon Mine. The geologic source for the springs presented in Table 7-2 was determined by comparing Plates 6-1 and 7-1. These data have been collected from over 100 locations within the permit and adjacent areas beginning as early as 1976 and extending through the present, as indicated in the data base contained in Appendix 7-2.

The data provided in Appendix 7-2 were obtained from multiple sources, including (but not limited to) the Soldier Creek Coal Company M&RP and annual reports, U.S. Geological Survey publications, the Sage Point-Dugout Canyon permit application filed by Eureka Energy Company in 1980, Appendix 7-3 of this M&RP, and various consultant reports. Since not all monitoring parties were responsible to adhere to UDOGM or SMCRA rules, the laboratory parameters varied between reports. However, the data are still considered valid and appropriate for determining baseline conditions within the permit and adjacent areas. It should be noted that much of the manganese data presented in Appendix 7-3 represent total (as opposed to dissolved) concentrations. Additional baseline and operational data for sampling sites within the SITLA tract addition to the Dugout Mine permit is also available on the Division's Electron Water Monitoring Database.

A hydrologic evaluation of the area was published by Mayo and Associates (1996). This evaluation, which is presented in Appendix 7-3 of this M&RP was used together with published reports of the area and the extensive data base contained in Appendix 7-2, to prepare this description of baseline hydrologic conditions within the permit and adjacent areas. While the Mayo report does not specifically include the SITLA tract area, the geologic and hydrogeologic conditions within the tract are similar enough to the area studied by Mayo to assume the conclusions reached by Mayor would apply to the SITLA tract.

### Groundwater Systems

Geologic conditions in the permit and adjacent areas are described in detail in Chapter 6 of this M&RP. Formal aquifer names have not been applied to any groundwater system in the permit and adjacent areas because the geometry, continuity, boundary conditions, and flow paths of the groundwater systems in the area are not fully understood. However, the data do suggest

groundwaters in the Flagstaff and North Horn Formations, and 2) the exposed recharge area of the Price River Formation is limited primarily to areas of steep cliff faces.

Wahler Associates (1982) indicate that monitoring well GW-11-2 (Plate 7-1) is completed within the Price River Formation. Data collected from this well (Appendix 7-4) indicate that water levels varied by approximately 8 feet during the period of December 1979 through November 1982, but showed no consistent trend. A measurement collected in September 1995 indicated that the water level was 1.2 feet lower than the last time it was measured nearly 13 years earlier. Hence, although a slight decline in water levels has occurred during the period of record, this decline is not considered significant.

Castlegate Sandstone. The Castlegate Sandstone consists of a fine- to medium-grained sandstone that is cemented with clay and calcium carbonate. The outcrops of this sandstone form prominent cliffs in the area.

Data presented in Table 7-2 and Appendix 7-2 indicate that only two springs (SC-80 and SC-81) have been found issuing from the Castlegate Sandstone within the permit and adjacent areas. Therefore, this formation is not considered to be a significant aquifer. The flow of these springs was 1 gpm or less in September 1995, with no measurable flow being observed in October 1995. Based on specific conductance measurements collected from these springs, the TDS concentration of water issuing from the Castlegate Sandstone varies from about 360 to 430 mg/l. The water is slightly alkaline, with a pH of 7.7 to 8.0.

Wahler Associates (1982) indicate that monitoring wells GW-10-2 and GW-24-1 (Plate 7-1) are completed in the Castlegate Sandstone. With the exception of early measurements which were likely influenced by the presence of drilling fluids prior to perforation of the casing (Waddell et al., 1986), data collected from GW-24-1 indicate that water levels varied by 4.5 feet during the period of March 1980 through November 1982 (Appendix 7-4), but no consistent trend was noted. The cap could not be removed from this well for a water-level measurement in September 1995. During the Winter of 1999-2000, Monitoring Well 24-1 became blocked. The water level in the well has been inaccessible since that time and was permanently removed from monitoring after the 4th Quarter of 2004.

Data collected from GW-10-2 indicate that water levels have declined approximately 20 feet during the 15-year period of record following an initial stabilization of drilling fluids after casing perforation (January 1980 through September 1995). The rate of this decline has been gradual.

The potentiometric surface of groundwater flow in the Castlegate Sandstone is to the north-northwest at an average gradient of 0.024 ft/ft based on measurements reported by Wahler Associates (1982) for November 1982. The datum reported for GW-11-2, under the assumption that the Price River Formation is in hydraulic connection with the Castlegate Sandstone was also used to determine the potentiomentric gradient.

Groundwater recharge to the Castlegate Sandstone is from precipitation and snowmelt. However, as evidenced by the fact that the surface exposure of the Castlegate within the permit and adjacent areas is generally limited to steep cliffs within minimal horizontal surface area, total recharge is probably low. Recharge to the Castlegate Sandstone is further limited by the lack of significant developed soil resources over the formation to encourage infiltration and the presence of low-permeability shales in the overlying Price River Formation (see Waddell et al., 1981).

Discharge from the Castlegate Sandstone probably occurs mainly as springs along the outcrop and as through-flow to the underlying Blackhawk Formation. As indicated above, spring flow from the unit is limited in flow and in occurrence. Besides the monitoring wells completed in the Castlegate Sandstone, no known wells are completed in the formation.

Blackhawk Formation. The Blackhawk Formation underlies the Castlegate Sandstone and consists of interbedded sandstone, siltstone, shale, and coal. The Rock Canyon coal seam, to be mined by SCM, is located in the lower portion of the Blackhawk Formation.

Only three springs have been identified as issuing from the Blackhawk Formation (SC-61, SC-62, and G-100 - see Table 7-2). Springs SC-61 and SC-62 issue near a stream channel in a tributary of Dugout Canyon. Limited data collected from these springs (Appendix 7-2) indicate

rise in water level elevation between June 3, 1993 and August 24, 1993 which corresponded to mine development in the vicinity of the well. This rise in water level can be explained by the redistribution of vertical stress acting on the nearby coal (see Appendix 7-3). Following completion of the 1993 development, a sustained moist area was identified on the floor of the Soldier Canyon Mine No. 5 entry, adjacent to GW-5-1. Furthermore, subsequent monitoring of the water level in the well indicated that, between August 24, 1993 and November 1, 1995, the average rate of water level decline increased to approximately 0.09 ft/day (an increase of about 4.5 times the previously observed rate). This decline was likely due to dewatering of the Blackhawk Formation in the immediate vicinity of the monitoring well.

Wahler Associates (1982) calculated a transmissivity of 0.009 gpd/ft ($1.2x10^{-3}$ $ft^2$/day) from the falling-head slug test which they performed in GW-5-1. Sergent, Hauskins & Beckwith (1986) reported transmissivities of $2.3x10^{-3}$ to $6.7x10^{-4}$ $cm^2$/s ($2.1x10^{-1}$ to $6.2x10^{-2}$ $ft^2$/day) for slug tests conducted in holes drilled into the Blackhawk Formation from within the Soldier Canyon Mine. Based on monitored thicknesses of 22 feet in GW-5-1 (Table 7-1) and 120.8 feet in each of the in-mine holes (Sergent, Hauskins & Beckwith, 1986), the hydraulic conductivity of the Blackhawk Formation is calculated to vary from $5.5x10^{-5}$ to $1.7x10^{-3}$ ft/day, with a median of $5.1x10^{-4}$ ft/day.

Well GW-6-1 is perforated over a 200-foot long interval which includes the Sunnyside seam (see Table 7-1). Initial water level measurements collected from this well are believed to be associated with residual water remaining from drilling and casing operations and are, therefore, probably not representative of natural conditions. Water levels declined between November 1989 and August 1991 (Figure 7-7). From August 1991 through August 1993, water levels in GW-6-1 remained relatively stable at a depth of approximately 425 feet. Monitoring on June 3, 1994 found the well to be dry and plugged at a depth of approximately 470 feet. All subsequent attempts to monitor this well have found the plugged/dry condition unchanged.

Monitoring well GW-32-1 is perforated in the Blackhawk Formation immediately above the Sunnyside seam (see Table 7-1) in a location which is down dip of Soldier Canyon Mine workings. Water level monitoring information shows a fairly consistent rise in water elevation.

From November 1994 through August 1995, the water level appears to have stabilized at a depth of approximately 291 feet (Figure 7-7). There is no information at this time that would suggest that underground mining activities in the nearby Soldier Canyon Mine are effecting the water levels observed to date.

Monitoring well G-58.5 was completed by Mountain Fuel Supply Company into the Blackhawk Formation in 1979. Waddell et al. (1986) reported a depth-to-water in March 1980 in this well of 502.8 feet. Waddell et al. (1982) reported depths to water of 501.7 to 502.4 feet in April and September 1880. No additional water-level data are available for this well.

Attempts for this M&RP to construct a potentiometric surface for the Blackhawk Formation in the Soldier Canyon area based on data collected from GW-5-1, GW-6-1, and GW-32-1 proved fruitless.

The difficulty in preparing this potentiometric surface may have been due to the influence of outcropping in the adjacent Soldier Canyon, the influence of mining in the nearby Soldier Canyon Mine, and/or varying lengths and stratigraphic locations of the perforated sections of the monitoring wells within the discontinuous strata which comprise most of the Blackhawk Formation. However, based on water-level data collected from one of the existing Dugout Canyon portals and from monitoring wells GW-5-1 and G-58.5, Waddell et al. (1986) concluded that the flow of groundwater in the Blackhawk Formation within the permit and adjacent areas is to the north away from the face of the cliffs (i.e., down dip as generally seen in the Castlegate Sandstone ~~on Plate 7-3~~). They estimated the hydraulic gradient in the Blackhawk Formation to be 42 feet per mile (0.008 ft/ft). Waddell et al. (1986) indicate that the coal bearing zone to be mined in the Dugout Canyon operations will probably be saturated in most areas and will require dewatering during mining. However, since mining was initiated at the Dugout Mine, saturated coal zones have not been encountered. The majority of the water encountered during mining both the Rock Canyon and Gilson seams has entered the mine through the roof and discharges from isolated sandstone channels within the Blackhawk Formation.

Recharge to the Blackhawk Formation is of limited magnitude, due primarily to the limited area of exposure on steep outcrops and the presence of low-permeability units in overlying formations. Data presented in Appendix 7-3 indicate that Blackhawk Formation groundwater which discharges into the Soldier Canyon Mine is of ancient meteoric origin (greater than 20,000 years), thereby supporting the conclusion that the rate of recharge to the formation is minimal. Mayo and Associates (1996) concluded that the old groundwater age and the isotopic compositions of water encountered in the Soldier Canyon Mine are evidence that the groundwaters are not part of actively flowing, shallow groundwater systems. The groundwater ages also demonstrate that the hydraulic connection between these old groundwaters and the overlying active (and younger) groundwater systems in the Flagstaff and North Horn Formations is very limited or does not exist.

The quality of groundwater in the Blackhawk Formation has been evaluated by Mayo and Associates (1996) based on data collected from leakage into the Soldier Canyon Mine (see Appendix 7-3). These data indicate that Blackhawk Formation groundwater has a mean TDS concentration of about 750 mg/l and is of the sodium-bicarbonate type (Figure 7-6). These waters are chemically distinct from groundwater in overlying groundwater systems. The solute compositions of mine groundwaters suggest a complex series of rock-water and gas-water reactions (Mayo and Associates, 1996).

The dissolved iron concentration of groundwater flowing into the Soldier Canyon Mine has historically been less than 0.5 mg/l and is generally less than 0.1 mg/l (see Appendix 7-2). The total iron concentration of this water has historically been less than 2.0 mg/l and generally less than 0.5 mg/l. The total manganese concentration of Blackhawk Formation water (as measured in the Soldier Canyon Mine) has historically been less than 0.5 mg/l and is typically less than 0.1 mg/l (see Appendix 7-2).

Four exploration holes (DUG0104, 0204, 0101, and 0201) were drilled within or immediately adjacent to the SITLA Lease area and completed in the Blackhawk formation. All holes were completed below the Gilson Coal Seam. No water was encountered in any of the exploration holes per personal communication with Mike Stevenson, Project Geologist, Ark Land Company, November 22, 2004.

| Exploration Hole Number | Location (approximate) | Year Drilled |
|---|---|---|
| DUG0104 | T13S, R13E, Section 20, NW1/4SE1/4 | 2004 |
| DUG0204 | T13S, R13E, Section 19, SE1/4NE1/4 | 2004 |
| DUG0101 | T13S, R13E, Section 30, NE1/4NW1/4 | 2001 |
| DUG0201 | T13S, R13E, Section 19, SE1/4SE1/4 | 2001 |

Star Point Sandstone. In those locations where the Star Point Sandstone exists within the permit and adjacent areas, it consists of a fine-grained calcareous sandstone with layers of siltstone and mudstone. In keeping with regional practice (see Lines, 1985), the Star Point Sandstone and Blackhawk Formation are considered to be hydraulically connected. However, only one spring (SC-64) has been discovered issuing from the Star Point Sandstone within the permit and adjacent areas. The near absence of springs in this formation suggests that the Star Point does not receive appreciable annual recharge and that it does not support active groundwater systems in the area.

Recharge to the Star Point Sandstone probably occurs via leakage from the overlying Blackhawk Formation. Hence, this water is likely of ancient origin.

Data collected from SC-64 indicated that the discharge of this spring declined from 2 gpm to 0.5 gpm in the period of September 1995 to October 1995 (see Appendix 7-2). The TDS of this water, as estimated from the specific conductance data, is approximately 700 mg/l, with a pH of about 7.5.

Mancos Shale. The Mancos Shale is exposed south of the permit area. This formation is a relatively impermeable marine shale and is not considered to be a regional or local aquifer. Groundwater samples collected from four monitoring wells located approximately 2 miles south of Soldier Canyon Mine have a mean TDS concentration of approximately 10,000 mg/l and is of the sodium-sulfate-chloride type (Appendix 7-3). Chemical compositions are consistent with the dissolution of halite and gypsum as well as cation exchange.

### Recharge and Discharge Relations

Recharge within the permit area occurs primarily on the exposed upland outcrops of the Flagstaff Formation and the North Horn Formation. Waddell et al. (1986) estimated that the annual recharge

to the Flagstaff Formation is 9 percent of the total annual precipitation. Recharge is probably greatest where surface fractures intersect the topographic highs where the Flagstaff and North Horn Formations outcrop. Recharge to the Blackhawk Formation and the Star Point Sandstone probably occurs primarily from vertical movement of water through the overlying formations. The rate of recharge to the Blackhawk Formation and the Star Point Sandstone is very slow, as evidenced by the ancient age of groundwater within those formations (see Appendix 7-3).

Assuming mass-balance and stable hydrologic conditions, recharge will equal discharge over the long term. The relatively young age of groundwater discharging from the Flagstaff and North Horn Formations as compared with the underlying Blackhawk Formation suggests that the stratigraphically-higher water discharges rapidly and is not hydraulically connected with the Blackhawk Formation. Waddell et al. (1986) conclude that the perched nature of the Flagstaff Formation protects it from the influence of dewatering of the coal-bearing zone unless the upper zone is influenced by subsidence.

Waddell et al. (1986) performed seepage studies in Pine Canyon (located immediately north of the permit area) and found that significant increases in the flow of Pine Canyon occur near the contact of the North Horn Formation and the overlying Flagstaff Formation. They concluded that downward percolation from the Flagstaff Formation is impeded by the claystones and mudstones of the North Horn Formation, forcing the water to move laterally and emerge along the outcrop in the canyon bottom.

Mining Impacts to Subsurface Water Resources

As presented previously, exploration drilling in the SITLA tract has not encountered significant volume of water in the Gilson seam or overlying strata. As discussed in previous paragraphs, the formations that overlie the coal seams do not include extensive units of rock that would form large aquifers. The Blackhawk Formation can discharges water from isolated channel sandstones in the roof of the mine. However, very few springs have been found on the surface in the Dugout Canyon Mine area that discharge from Blackhawk units. Springs that do discharge from the Blackhawk Formation typically have very low flows. In-mine flows that are encountered as a result of mining typically discharge from the roof, are initially much less than 100 gpm, and have flow rates that decrease rapidly as mining progresses. The sandstone channels that hold water in the Blackhawk are typically lenticular, have low to moderately low transmissivity rates, of limited areal extent, and contain waters older than 50 years and typically older than a few thousand years. Since the Blackhawk Formation in the Dugout Canyon Mine area, including the SITLA Tract, is very similar throughout, it is unlikely that mining will encounter large volumes of water as coal is removed from the Gilson seam in the permit area as a whole.

The Price River and Castlegate Sandstone formations are also poor aquifers in the mine area as described in the previous sections. Only two springs have been found within the Dugout Mine area, including the SITLA tract, issuing from these formations. These formations do not conduct water readily, do not contain extensive aquifers, and do not appear to be saturated. Subsidence of these

formations will not cause significant changes to subsurface water resources since these resources are apparently not present.

Water bearing strata within the North Horn and Flagstaff Formations (the contact between the two formations is indistinguishable in most of the SITLA tract) should not be significantly affected. Subsiding these formations may result in locally increased hydraulic conductivity within the strata but water loss to the underlying formations will be minimal, if at all. The fine grained units (siltstones and shales) that perch the aquifers within the North Horn/Flagstaff Formations should easily seal subsidence induced fractures and limit downward migration of water from the isolated aquifers. Additionally, the Price River Formation consists of interbedded mudstone, siltstone, and fine-grained sandstones. The finer-grained siltstone and mudstones would seal fractures within the formation and inhibit downward movement or loss of water from the North Horn/Flagstaff aquifers.

### 724.200 Surface Water Information

Water Quantity

The permit area exists within portions of the Dugout Creek, Soldier Creek, Pace Creek, and Rock Creek watersheds. Major tributaries of Soldier Creek whose watersheds extend into the permit area include Fish Creek and Pine Canyon. Based on observations and flow data obtained during the collection of water-quality samples within the permit and adjacent areas, portions of Dugout, Fish Creek, and Pace Creek are considered perennial within the permit area. Pine Canyon appears to be perennial in its upper reaches near the northern border of the permit area. Rock Creek appears to be perennial in its upper reaches above the Castlegate Sandstone and only intermittent below the formation. Several smaller tributaries of these streams within the permit and adjacent areas, are ephemeral.

Waddell et al. (1981) estimated that the average flow of Dugout Creek is approximately 7 cubic feet per second (5,100 acre-feet per year) and that up to 70 percent of the streamflow occurs during the period of May through July each year. The seasonal record of a stream gaging station which was installed on Dugout Creek during the period of October 1, 1979 through October 2, 1981 suggest that this estimate of the seasonal variation is correct (see Appendix 7-5). The location of this stream gaging station (DC-1) is noted on Plate 7-1.

During the 1980 water year, Waddell et al. (1986) estimated that the total flow of Dugout Creek at station DC-1 (referred by them as station S60) was 1,900 acre-feet. They further estimated that 53 percent of this flow (1,000 acre-feet) was contributed by springs issuing from the Flagstaff Formation, 10 percent (200 acre-feet) was contributed by springs issuing from the Blackhawk and other formations, and 37 percent (700 acre-feet) was contributed as surface runoff.

The average flow of Soldier Creek has been estimated by Waddell et al. (1981) to be approximately 8 cubic feet per second (5,800 acre-feet per year). This flow is expected to vary seasonally in a

manner similar to that reported for Dugout Creek (i.e., the majority of the flow occurring during the late spring and early summer months in response to snowmelt runoff).

During the 1980 water year, Waddell et al. (1986) estimated that the total flow of Soldier Creek at station G-5 was 4,200 acre-feet. The source of this runoff was estimated to be as follows:

- 43 percent (1,800 acre-feet) from springs issuing from the Flagstaff Formation;
- 24 percent (1,000 acre-feet) from springs issuing from the Blackhawk and other formations; and
- 33 percent (1,400 acre-feet) as surface runoff.

Hence, the relative contribution of the Flagstaff Formation to streamflow in Soldier Creek is lower than that in Dugout Creek, while the contribution of the Blackhawk and other formations to Dugout Creek is lower than that to Soldier Creek.

Seasonal fluctuations in the discharge of streams in the area are readily apparent in the hydrographs of Solider Creek (Figure 7-8) and Dugout Creek (Figure 7-9). Locations of these stations are noted on Plate 7-1. As indicated, the discharge of local streams is greatest in the late spring and early summer months when influenced predominantly by snowmelt runoff.

Waddell et al. (1986) performed seepage measurements along Pine Canyon and Soldier Creek in the autumns of 1979 and 1980, in an effort to evaluate the effects of bedrock formations on the baseflow of the creeks. The seepage measurements demonstrated significant inflow to Pine Canyon occurs from the Flagstaff Formation near the contact with the underlying North Horn Formation. In Soldier Creek, the investigation found that 1) base flow more than tripled as Soldier Creek crossed the North Horn Formation, 2) base flow decreased about 20 to 30 percent as the creek crossed the Price River Formation and Castlegate Sandstone, and 3) base flow increased 10 to 25 percent as the creek crossed the Blackhawk Formation.

Figure 7-10 presents semilog plots of streamflow in Soldier Creek (station G-5) and Dugout Creek (station DC-1) for the latter portion of 1980, as reported by Waddell et al. (1986). Included in this figure are plots of discharge rates for springs issuing from the Flagstaff Formation and from the underlying Blackhawk Formation, Castlegate Sandstone, and Price River and North Horn Formations (Waddell et al., 1986). At Soldier Creek, the curves are approximately parallel for streamflow and the composite flows issuing from the Flagstaff Formation through August. Thereafter, the recession curve for the streamflow flattens, while that for the Flagstaff Formation continues to decrease. Based on this condition, Waddell et al. (1986) concluded that the discharge of Soldier Creek is controlled predominantly by seepage from the Flagstaff Formation during the spring and early summer and by seepage from the underlying formations (Blackhawk, Castlegate, Price River, and North Horn) during the late summer and fall.

The data presented in Figure 7-10 indicate that discharge from the Flagstaff Formation dominates the flow of Dugout Creek throughout the year. Seepage from the underlying formations may slightly influence the flow of Dugout Creek during the autumn months, but this influence appears to be minimal. The lack of seepage from the Blackhawk and immediately-overlying formations to Dugout Creek supports the conclusion presented in Section 724.100 that the flow of groundwater within the permit and adjacent areas is to the north-northwest (i.e., away from Dugout Canyon).

Limited flow data is available from monitoring points within Pace Canyon and Rock Canyon Creeks. However, the data included in Appendix 7-7 suggests that flow within Pace Canyon Creek varies seasonally. Data collected at points PC-1A and PC-2 since June 1999, which are included in the Division's water database and in the updated spreadsheets found in Appendix 7-7, supports this determination. Flows in spring/early summer are typically several times greater than in late summer/fall. Also, it is interesting to note that in 2002 and 2003 there have been periods when there is no flow at station PC-2 and flows measured in late summer/fall at PC-1A have been significantly less than in previous years. The drop in flow is undoubtedly related to the prolonged drought the area has been suffering through since 1999. Base flow within this drainage appears to originate from springs discharging from the Castlegate Sandstone, Price River, Flagstaff/North Horn, and Colton Formations. The majority of the flow appears to originate from springs within the North Horn and Flagstaff Formations. Rock Canyon Creek base flow in its upper reaches appears to originate from springs discharging from the Northhorn Formation. Flow data from monitoring site RC-1 indicates the lower sections of Rock Creek generally flow in response to spring runoff and after summer precipitation events.

Surface flows measured at monitoring point RC-1 near the mouth of Rock Canyon indicate that the stream is intermittant and also fluctuates in flow volume seasonally. In 2002 and 2003, flow was measured at RC-1 only flowed after a significant precipitation event. Again, the lack of flow in this creek is most likely related to the drought conditions that appear to have begun in the area in 1999.

No streamflow data are available for ephemeral drainages in the permit and adjacent areas. When it does occur, ephemeral runoff in the area is expected to occur predominantly in the months of April and May in response to snowmelt runoff and in the months of August and September as a result of thunderstorm activity. Snowmelt may result in flow durations of a few weeks, while thunderstorms are expected to result in runoff with a short duration and high intensity.

Several small impoundments have been constructed in the permit and adjacent areas to capture water for stock watering. Those impoundments where water rights applications have been filed are located as shown on Plate 7-2. The impoundments capture water either from an adjacent spring or from snowmelt.

A UPDES permit application has been issued by the Utah Division of Water Quality as indicated in Appendix 7-6. This application applies to discharge from the sedimentation pond. Discharge from this point occurs only infrequently as a result of pond dewatering or after significant precipitation events. The application also applies to discharges from the underground mine workings.

Surface-water quality samples have been periodically collected in the permit and adjacent areas from stations located on Soldier Creek, Dugout Creek, Pine Canyon, Pace Creek, and Rock Canyon Creek (Plate 7-1). Analytical data from these sources are summarized in Appendix 7-7. These data were obtained from multiple sources, including (but not limited to) the Soldier Creek Coal Company M&RP and annual reports, U.S. Geological Survey publications, the Sage Point-Dugout Canyon permit application filed by Eureka Energy Company in 1980, Appendix 7-3 of this M&RP, and various consultant reports. Since not all monitoring parties were responsible to adhere to UDOGM or SMCRA rules, the laboratory parameters varied between reports. However, the data are still considered valid and appropriate for determining baseline conditions within the permit and adjacent areas. It should be noted that most of the manganese data presented in Appendix 7-3 represent total (as opposed to dissolved) concentrations.

In general, TDS concentrations of surface waters in the permit and adjacent areas vary inversely with the discharge rate. These concentrations also tend to increase in the downstream direction (Waddell et al., 1986). Total suspended solids concentrations in the local surface waters tend to vary directly with the flow rate (Waddell et al., 1986).

The data presented in Appendix 7-7 indicate that the dominant ions in surface water during high-flow periods are calcium and bicarbonate, whereas the dominant ions in the low-flow periods are sodium, magnesium, sulfate, and bicarbonate. During high-flow periods, runoff is rapid and most surface waters only interact chemically with the uppermost regions of the soil zone. Thus, they are dominated by calcium and bicarbonate ions. Furthermore, groundwater contributions from the Flagstaff Formation (where calcium and bicarbonate are the primary ions) dominate the chemical quality of surface water during high-flow periods (see Figure 7-10).

quickly fill, recreating pre-subsidence stream channel conditions. Thus, the potential impact to sediment yield from subsidence in the permit area would be minor and of short duration.

Various sediment-control measures will be implemented during reclamation as the vegetation becomes established. As discussed in Section 542.200 of this M&RP, these measures will include installation of silt fences and straw-bale dikes in appropriate locations to minimize potential contributions of sediment to Dugout Creek. These measures will reduce the amount of erosion from the reclaimed areas, thereby precluding adverse impacts to the environment.

**Acidity, Total Suspended Solids, and Total Dissolved Solids.** Probable impacts of mining and reclamation operations on the acidity and total suspended solids concentrations of surface and groundwater in the permit and adjacent areas were addressed previously in this section.

Data presented in Appendix 7-2 and summarized in Section 724.100 of this M&RP indicate that the average TDS concentration of water in the Blackhawk Formation (as measured in inflow to the nearby Soldier Canyon Mine) is approximately 750 mg/l and is of the sodium-bicarbonate type. As noted in Section 724.200, the TDS concentration of water in Dugout Creek ranges from 350 to 500 mg/l. The dominant ions in this water are calcium and bicarbonate during high-flow periods, whereas the dominant ions during low-flow periods are sodium, magnesium, sulfate, and bicarbonate.

These data suggest that the TDS concentration of water in Dugout Creek can be expected to increase if water is discharged from the mine to the Creek. During periods of low streamflow, the dominant ions in the Blackhawk Formation water and Dugout Creek should be similar. However, during periods of high streamflow, the dominant cation will be sodium in the Blackhawk water and calcium in Dugout Creek. It should be noted that it is anticipated that the Dugout Canyon Mine will use powdered limestone or dolomite (i.e., calcium-magnesium-carbonate) for rock dust. It is not anticipated that gypsum rock dust (calcium-sulfate) will be used in the mine. Hence, dissolution of rock dust by water in the mine should not influence the chemical type of water in Dugout Creek if mine water is discharged to the creek.

Typical iron and manganese concentrations in the Blackhawk Formation and Dugout Creek (as summarized in previous sections) are:

| | Blackhawk Formation | Dugout Creek |
|---|---|---|
| Dissolved iron | <0.1 mg/l | <0.01 mg/l |
| Total iron | <0.5 mg/l | <1.0 mg/l |

| | | |
|---|---|---|
| Dissolved manganese | -- | <0.01 mg/l |
| Total manganese | <0.1 mg/l | <0.1 mg/l |

These data indicate that the concentration of iron and manganese in Dugout Creek should not be significantly affected by discharges from the mine.

Dugout Creek, as part of the lower Price River basin, is classified according to Section R317-2-13 of the Utah Administrative Code (Standards of Quality for Waters of the State) as a class 2B (secondary contact recreation use), 3C (nongame fish and other aquatic life use), and 4 (agricultural use) water. No TDS standards exist for class 2B and 3C water. The TDS standard for class 4 water is 1,200 mg/l.

It should also be noted that the dissolved iron standard for class 3C water is 1.0 mg/l. No dissolved iron standard exists for class 2B or 4 waters. The data presented above indicate that potential discharge water from the mine will not exceed the dissolved iron standard of Dugout Creek. No standards exist in the R317 regulations for total iron, dissolved manganese, or total manganese. However, the data presented above indicate that potential discharges from the mine to Dugout Creek will meet the effluent limitations of 40 CFR 434.

Mining in the Gilson seam on the east side of the Right Fork of Dugout Creek resulted in the operator draining the flooded old Knight Ideal Mine working in August 2002 and again in May 2003 to prevent catastrophic flooding of the current Dugout Canyon Mine operations. The old workings contained water with total iron in excess of 1 mg/l and this water was discharged to Dugout Creek at a rate that at times reached 1117 gpm. As a result of draining the old workings, the water discharged to Dugout Creek did have a total iron concentration in excess of the UPDES permit limit of 1mg/l for a short period of time. It appears that water will be continuously drained from the Knight Ideal Mine for the foreseeable future to maintain safe underground working conditions but at a discharge rate expected to be much less than 100 gpm.

No hydrologic impacts have been noted at the adjacent Soldier Canyon Mine nor at the Dugout Canyon Mine due to subsidence. Although tension cracks may locally divert water into deeper formations, resulting in increased leaching of the formation and increased TDS concentrations, the potential of this occurring is considered minimal. This conclusion is based on experience at the Soldier Canyon Mine and on the fact that the shale content of the North Horn Formation, the Price River Formation, and the Blackhawk Formation should cause these subsidence cracks to heal quickly where they are saturated by groundwater flow. Thus, potential impacts on TDS concentrations would be minor and not of significant concern. To date (January 2004), mining and subsidence within the Dugout permit area has not resulted in the loss of surface flows in the Dugout Creek drainage or impacts to ground water discharge rates at the monitored seeps and springs.

**Flooding or Streamflow Alteration.** Runoff from all disturbed areas will flow through a sedimentation pond or other sediment-control device prior to discharge to Dugout Creek. Three factors indicate that these sediment-control devices will minimize or preclude flooding impacts to downstream areas as a result of mining operations:

1. The sedimentation pond has been designed and will be constructed to be geotechnically stable. Thus, the potential is minimized for breaches of the sedimentation pond to occur that could cause downstream flooding.
2. The flow routing that occurs through the sedimentation pond and other sediment-control devices reduces peak flows from the disturbed areas. This precludes flooding impacts to downstream areas.
3. By retaining sediment on site in the sediment-control devices, the bottom elevations of Dugout Creek downstream from the disturbed area will not be artificially raised. Thus, the hydraulic capacity of the stream channel will not be altered.

The volume of streamflow will increase in Dugout Creek if water is discharged from the mine to the creek. Potential impacts to the creek channel could include the displacement of fines on the channel bottom, and minor widening of the channel. However, the degree of widening will likely be minimized by the increased vigor and quantity of vegetation which will be sustained along the stream channel by the increased availability of water. In particular, it is anticipated that the deciduous streambank vegetative community (see Section 321.100) will increase in density and vigor as a result of mine-water discharges. This effect will occur for the distance downstream that surface flows can be sustained above channel transmission losses. Care will be taken during discharge of this water to avoid flooding of downstream areas. Once mining ceases, the mine will be sealed and no discharges will occur. The streamflow in Dugout Creek will then return to pre-mining discharge levels.

Following reclamation, stream channels which have been altered by mining operations will be returned to a stable state (see Section 762.100). The reclamation channels have been designed to safely pass the peak flow resulting from the 10-year, 6-hour or the 100-year, 6-hour precipitation event as appropriate for the channel and in accordance with the R645 regulations (Appendix 7-11). Thus, flooding in the reclaimed areas will be minimized. Interim sediment-control measures and maintenance of the reclaimed areas during the post-mining period will preclude deposition of significant amounts of sediment in downstream channels following reclamation, thus maintaining the hydraulic capacity of the channels and precluding adverse, off-site flooding impacts.

Subsidence tension cracks that appear on the surface will increase the secondary porosity of the formations overlying the Dugout Canyon Mine. During the period prior to healing of these cracks, this increased percolation will decrease runoff during the high-flow season (when the water would have rapidly entered the stream channel rather than flowing into the groundwater system). During

low-flow periods, the result of this increased percolation will be an increase in the base flow of the stream. Hence, the net result will be a decrease in the flooding potential of the affected stream.

Subsidence under the main fork of Dugout Creek will occur in areas where overburden ranges from 600 to 1200 feet thick. The area of the least amount of overburden, approximately 600 feet, occurs in the southern half of Section 14, Township 13 South Range 12 East. Additionally, subsidence on the right hand fork of Dugout Creek will occur where overburden ranges from 500 feet to 2000 feet. The least amount of overburden on this fork of the creek occurs in the northeast quarter of Section 23, Township 13 South, Range 12 East. In both areas where the least amount of overburden occurs, the stream channels are lined with several feet of soils and fine grained sediments. Also, the upper Blackhawk Formation, which consists of interbedded shale, mudstone, siltstone, and sandstone, is exposed at the surface in a portion of these low overburden areas. The Castlegate Sandstone is present in the two low overburden areas but is rarely exposed in the channel floors.

The current mine plans include mining gate roads and entries under several sections of Pace Creek. However only limited subsidence will occur under Pace Creek in portions of Section 20, Township 13 South, Range 13 East where a longwall panel is projected to be mined (Plate 5-7). The stream channel in this area is lined with several feet of soils and fine grained sediments. Additionally, if surface cracks do occur in the sediments due to subsidence, it is likely any cracks will quickly fill with fine grained material and restrict the water from entering the fractures. The upper units of the Price River Formation which consists of sandstone, and the lower units of the North Horn Formation which consist of interbedded sandstone and mudstone, underlie the stream in this area. The overburden above the Gilson seam where subsidence will occur under Pace Creek will be at least 1000 feet thick or more. As mining progresses to the east, the overburden becomes thicker due to changes in topographic elevation and the dip of the coal beds. Current mine plans do not include subsiding any perennial portion of Rock Canyon Creek.

A subsidence study performed at Burnout Canyon, a perennial stream drainage subsided by long wall mining at the Canyon Fuel Company, LLC Skyline Mines, suggests that thick fine grained soil mantles overlying bedrock appear to prevent noticeable stream flow losses to the bedrock (Rocky Mountain Research Station, 1998). Though the climatic regime and regional stratigraphy are not identical to the Burnout Canyon area, enough similarities exists to suggest that the bedrock, soils, and channel floors should react to subsidence in a similar fashion. As discussed in preceding sections, fractures related to subsidence within the fine grained sediments of the upper Blackhawk Formation in the Soldier Canyon Mine area tend to heal relatively rapidly. Also, fractures within the channel floor would be expected to fill quickly with fine grained sediments and become relatively impermeable. Therefore, the loss of stream flow to the mine is highly unlikely and losses to bedrock beneath the channel, or in the limited areas where bedrock is exposed in the channel floor, would be short lived.

**Groundwater and Surface Water Availability.** Potential impacts to the availability of surface and groundwater from the Dugout Canyon Mine operations include both decreased and increased stream flows and spring discharges caused by mine-related subsidence, bedrock fracturing, and aquifer dewatering. These potential impacts are discussed below.

Potential for Decreased Spring and Stream Flows

To date, limited surface subsidence has been identified as a result of coal mining in the nearby Soldier Canyon Mine. However, bedrock fracturing routinely occurs in the rock units overlying the mined coal seams. Given the limited number of springs and limited groundwater resources of the Blackhawk, Castlegate, and Price River Formations in the permit and adjacent areas, subsidence or fracturing would affect the hydrologic balance in the area only if zones of increased vertical hydraulic conductivity were created which extended through the Price River Formation into the North Horn and Flagstaff Formations.

Several lines of evidence suggest that mining-related subsidence and bedrock fracturing have not resulted in decreased stream flows or groundwater discharge in the vicinity of the nearby Soldier Canyon Mine. For instance, although spring SP-10 is likely the result of the upwelling of deep groundwater, it is significant to note that the spring discharge rate has not been affected by mining operations, even though mining has cut through the fracture zone at depths. Furthermore, although considerable seasonal and climatic variability are noted in the hydrographs of springs in the permit and adjacent areas, data for both Soldier Creek and springs which overly the Soldier Canyon Mine workings do not show discharge declines which may be attributed to either subsidence or bedrock fracturing (see Appendix 7-3).

As of December 2003, none of the spring monitoring sites had been undermined and subsided at Dugout Canyon Mine. Therefore, impacts to springs due to subsidence at this mine cannot be fully studied at this time but should have similar effects to ground water as mining at the Soldier Canyon Mine. Ephemeral portions of Fish Creek and Dugout Creek drainages have been subsided and no significant adverse effects to those drainages have been noted to Dugout Creek.
Active groundwater systems in the Flagstaff and North Horn Formations are separated from the Blackhawk groundwater system by the Price River Formation. As discussed in Section 724.100, this formation contains very few springs and is not considered to be a major groundwater resource. Past mining in the Soldier Canyon Mine has not increased the rate of spring discharge from the Price River Formation, indicating that groundwater is not being diverted into this formation. The absence of increased saturation in the Price River Formation due to coal mining indicates that vertical zones of artificially-increased hydraulic conductivity do not extend into the Price River Formation and from thence into the active groundwater systems of the North Horn and Flagstaff Formations.

Data presented in Appendix 7-3 and summarized in Section 724.100 indicate that the Blackhawk groundwater system, in the vicinity of mined coal seams, contains ancient groundwater which is compartmentalized both vertically and horizontally. Coal mining locally dewaters overlying rock layers in the Blackhawk Formation but does not appear to draw additional recharge from overlying or underlying groundwater systems (see Appendix 7-3).

The strong vertical gradients in Blackhawk Formation rock layers underlying actively mined coal seams in the Soldier Canyon Mine and the absence of significant discharge into the mine from these layers indicates that mining does not draw groundwater from the underling Mancos Shale. Additionally, the distinctive solute composition of Mancos Shale groundwater has not been observed inside the Soldier Canyon Mine (see Appendix 7-3).

From the above discussion, it appears that the Soldier Canyon Mine has not decreased groundwater discharge in overlying or underlying groundwater systems. Hence, it is unlikely that coal mining will effect the discharges of any spring as a result of mining in the Dugout Canyon permit and adjacent areas.

Potential for Increased Stream Flows

If sufficient water is encountered in the Dugout Canyon Mine workings to require discharge of that water to the surface, the flow of Dugout Creek will be increased. To estimate the potential quantity of inflow to the Dugout Canyon Mine, the investigation of Lines (1985) was reviewed. In this investigation, Lines (1985) evaluated groundwater conditions in the Trail Mountain Area, located in the hydrogeologically-similar Wasatch Plateau approximately 23 miles southwest of the proposed Dugout Canyon Mine permit area. Using a finite-difference model, Lines (1985) evaluated potential inflows into a hypothetical coal mine in the Blackhawk Formation assuming hydraulic conductivities of 0.01 ft/day for the Blackhawk Formation and 0.02 ft/day for the Star Point Sandstone. He further assumed hydraulic gradients which varied from 0.041 ft/ft to 0.098 ft/ft. Results of these evaluations are presented in Figure 7-11.

As noted in Section 724.100, the median hydraulic conductivity of the Blackhawk Formation in the vicinity of the permit area is $5.1 \times 10^{-4}$ ft/day, a factor of 20 lower than the values assumed by Lines (1985). As also noted in Section 724.100, the average hydraulic gradient of the Blackhawk Formation is 0.008 ft/ft, a factor of 5 lower than the lowest values assumed by Lines (1985). Since an increase in the hydraulic conductivity and the hydraulic gradient would tend to increase the inflow to the mine, using the evaluation of Lines (1985) should result in an overestimate of potential inflows to the Dugout Canyon Mine.

According to Plate 5-7 of this M&RP, the planned area of mining west of the proposed North Mains within the Rock Canyon seam will have a length of approximately 10,000 feet and an average width of about 3,000 feet. The planned area of mining within the Gilson seam west of the North Mains will have an average length of 6,000 feet and an average width of 3,000 feet. Similarly, the mine area within the Gilson seam in the vicinity of the Southeast Mains can be divided into two sections; one section having an approximate length of 10,000 feet and an approximate width of 4,000 feet and the other having an average length of 8,500 feet and an average width of 2,000 feet.

Using the above data and Figure 7-11, these mine "segments" can be expected to have steady-state inflows as follows:

- Rock Canyon seam 10,000-foot long and 3,000-foot wide mine segment can have a steady-state inflow of approximately 0.13 cfs (58 gpm),
- Gilson seam (west) 6,000-foot long and 3,000-foot wide mine segment can have a steady-state inflow of approximately 0.09 cfs (40 gpm),
- Gilson seam (east) 10,000-foot long and 4,000-foot wide mine segment can have a steady-state inflow of approximately 0.15 cfs (67 gpm), and
- Gilson seam (east) 8,500-foot long and 2,000-foot wide mine segment can have a steady-state inflow of approximately 0.11 cfs (49 gpm).

Totaling the one mine segment within the Rock Canyon seam and the three segments within the Gilson seam, the mine could be expected to produce approximately 214 gpm.

It should be re-emphasized that this estimate is considered to be conservatively high. Not only do site conditions indicate lower hydraulic conductivities and lower hydraulic gradients, but each section of the mine is being treated in the above analysis as though it was hydraulically isolated. Since there would be significant overlap between the cones of depression created by each section, the inflow to the mine would be further reduced below that estimated above.

The amount of water which will be discharged from the mine will equal the inflow minus that which is consumed in the mining operation (dust suppression and evaporation). Based on experience at the Soldier Canyon Mine, the rate of water to be consumed in the Dugout Canyon Mine is estimated to be 15,000,000 gallons per year (approximately 30 gpm). The remaining 190 gpm (306 acre-feet per year) is the maximum estimated discharge to Dugout Creek. This represents an increase of 6 percent in the estimated average annual flow of Dugout Creek of 5,100 acre-feet (see Section 724.200).

Section 3.1.2.1 of Appendix 7-3 estimates that the maximum discharge from both the Dugout Canyon Mine and a potential mine in the Alkali Creek tract located west of the Soldier Canyon Mine will be 800 gpm. This estimate is based on the assumption that "groundwater discharge rates into mined areas are approximately proportional to mining rates." No specific data are presented in Appendix 7-3 in support of this assumption.

Appendix 7-3 predicts that approximately 400 gpm of the 800 gpm estimated maximum discharge can be attributed to the Alkali Creek tract, leaving an estimated maximum discharge from the Dugout Canyon Mine of 400 gpm. If this maximum rate of 400 gpm could be sustained for a period of one year, this would represent an increase of 13 percent in the estimated average annual flow of Dugout Creek of 5,100 acre-feet (see Section 724.200). Hence, discharges from the Dugout Canyon Mine may result in increases in the flow of Dugout Creek of 6 percent (under steady-state conditions) to 13 percent (under maximum transient conditions).

**Potential Hydrocarbon Contamination.** Diesel fuel, oils, greases, and other hydrocarbon products will be stored and used at the site for a variety of purposes. Diesel and oil stored in above-ground tanks at the mine surface facilities may spill onto the ground during filling of the storage tank, leakage of the storage tank, or filling of vehicle tanks. Similarly, greases and other oils may be spilled during use in surface and underground operations.

The probable future extent of the contamination caused by diesel and oil spillage is expected to be small for three reasons. First, because the tanks will be located above ground, leakage from the tanks will be readily detected and repaired. Second, spillage during filling of the storage or vehicle tanks will be minimized to avoid loss of an economically valuable product.

Finally, the Spill Prevention Control and Countermeasure Plan which will be developed for the site will provide inspection, training, and operation measures to minimize the extent of contamination resulting from the use of hydrocarbons at the site. This plan is not required to be submitted. However, a copy will be maintained at the mine site as required by the Utah Division of Water Quality.

**Road Salting.** No salting of roads will occur within the permit area. Hence, this impact is not a significant concern.

**Coal Haulage.** Coal will be hauled over the county road from the mine portal area to the Soldier Creek Road and thence to its ultimate destination. In the event of an accident which causes coal to spill from the trucks, residual coal following cleanup of the spill may wash into local streams

during a runoff event. Possible impacts to the surface water are increased total suspended solids concentrations and turbidity from the fine coal particulates. The probability of a spill occurring in an area sufficiently close to a stream channel to introduce coal to the stream bed is considered small.

In addition to spills, wind may carry coal dust or small pieces of coal from the open top of the coal trucks into creeks near the roads. The impact from fugitive coal dust is considered to be insignificant due to the small amounts lost during haulage in the permit and adjacent areas.

**Water Replacement**

The water consumed in operating underground equipment, dust suppression, and evaporation is obtained from ground water sources. These underground water sources are not connected to the surface waters in the area. Research has been performed by the mine to verify that water currently entering the mine is not coming from the surface or depleting surface waters. Continued monitoring by the mine of the surface waters and seeps and springs flows in the permit and adjacent areas have shown no discernable impacts due to mining activities. It is the operator's position that the water consumed in operating Dugout Canyon Mine is not depleting surface water sources. In fact, there is an overall net gain to local river systems discharging to the Colorado River as a result of the mine's discharge.

The Permittee will replace the water supply of any land owner if such a water supply proves to be contaminated, diminished or interrupted as a result of the mining operations. First, a determination will be made by the Division in accordance with R645 - 301- 731.800 as to whether or not material damage has occurred. Then, in accordance with Regulation R645-301-525.510, Dugout Canyon Mine will correct any material damage resulting from subsidence caused to surface lands (which includes water rights), to the extent technologically and economically feasible, by restoring the land to a condition capable of maintaining the value and reasonably foreseeable uses that it was capable of supporting before subsidence damage. Negotiations will be held with the water right holders to determine the best plan of action and implementation of water replacement.

### 729 Cumulative Hydrologic Impact Assessment (CHIA)

A Cumulative Hydrologic Impact Assessment to include the permit and adjacent areas is to be prepared by the Division.

# 730 OPERATION PLAN

## 731 General Requirements

This permit application includes an operation plan which addresses the following:

- Groundwater and Surface Water Protection and Monitoring Plan;
- Design Criteria and Plans;
- Performance Standards; and
- Reclamation Plan.

### 731.100 Hydrologic-Balance Protection

**Groundwater Protection.** To protect the hydrologic balance, coal mining and reclamation operations will be conducted to handle earth materials and runoff in a manner that minimizes acidic, toxic, or other harmful infiltration to the groundwater system. Additionally, the permittee will manage excavations and disturbances to prevent or control discharges of pollutants to the groundwater.

As indicated in Section 728.300, it is anticipated that an average of approximately 190 gallons per minute of groundwater encountered in the mine will eventually be discharged to Dugout Creek. This water will be discharged in a controlled manner, in accordance with an approved UPDES permit, via a pipeline from the mine to the creek. The discharge point is anticipated to be located at the upstream inlet to the Dugout Canyon culvert, UC-5. If the discharge occurs to a point outside of the culvert, riprap will be placed at the outlet of the pipe to prevent erosion. Any erosion that occurs at the point of discharge will be repaired as soon as practical.

**Surface Water Protection.** To protect the hydrologic balance, coal mining and reclamation operations will be conducted to handle earth materials and runoff in a manner that minimizes acidic or toxic drainage, prevents, to the extent possible, additional contributions of suspended solids to streamflow outside the permit area, and otherwise prevents water pollution. Additionally, SCM will maintain adequate runoff- and sediment-control facilities to protect local surface waters.

During initial construction to develop the surface facilities, and prior to installation of all runoff- and sediment-control facilities as outlined in Section 732 of this M&RP, silt fences will be installed along the top bank of Dugout Creek and its eastern tributary in areas prior to disturbance. These silt fences will be installed in accordance with Figure 5-4. If required for control of local erosion, straw-bale dikes may also be installed at the site during initial construction. These dikes will also be

installed in accordance with Figure 5-4. The silt fences and straw-bale dikes will be periodically inspected, and accumulated sediment will be removed as needed to maintain functionality. Once the sedimentation pond, ditches, and culverts are installed, the silt fences and straw-bale dikes may be removed.

Once the runoff- and sediment-control facilities outlined in Section 732 have been installed, these structures will prevent additional contributions of suspended solids to streamflow outside the permit area. A description of sediment control following reclamation is presented in Sections 540 and 760 of this M&RP.

### 731.200 Water Monitoring

**Groundwater Monitoring.** Groundwater monitoring to be conducted in the permit and adjacent areas will consist of data collection from monitoring wells, springs, and mine-water discharges. Locations of wells and springs to be monitored are noted on Plate 7-1. The groundwater monitoring plans presented herein were developed based on information presented in the PHC determination, the baseline hydrologic data, and the geologic data presented in Chapter 6 of this M&RP.

Monitoring wells included in the groundwater monitoring program are GW-10-2, GW-11-2, and GW-24-1. The remaining monitoring wells in the general vicinity are either too remote from the permit area to be indicative of impacts occurring from the Dugout Canyon operations (i.e., GW-5-1, GW-6-1, GW-32-1, and G-58.5) or are completed across multiple aquifers (i.e., GW-19-1), making data interpretation difficult.

The monitoring wells are all completed in the Price River Formation or the underlying Castlegate Sandstone. Because the Castlegate Sandstone immediately overlies the Blackhawk Formation, data collected from these wells allow hydrologic impacts of mining to be evaluated in groundwater systems which overlie the mine workings but underlie the Flagstaff and North Horn groundwater systems.

Water-level measurements will be collected on a quarterly basis when the wells are accessible. Given the ages of the wells and the probable deterioration of the casing materials, no attempts will be made to collect water-quality data from the monitoring wells.

The springs to be included in the operational and post-mining groundwater monitoring program are:

All groundwater monitoring data will be submitted to the Division by the end of the quarter following sampling. If analyses of any groundwater sample indicates noncompliance with the permit conditions, the permittee will promptly notify the Division and take immediate appropriate actions. UPDES reporting requirements will be met for the mine-water discharge point. The Snotel data used to determine "wet" or "dry" years, as described previously in this section, will be submitted with the first quarter water monitoring data beginning in the year 2001.

Equipment, structures and other devices used in conjunction with monitoring the quality and quantity of groundwater in the permit and adjacent areas have been or will be installed, maintained, and operated in accordance with accepted procedures. Where feasible, this equipment will be removed or properly abandoned by the permittee when no longer needed.

**Surface Water Monitoring.** Surface water monitoring to be conducted in the permit and adjacent areas will consist of data collection from streams and sedimentation pond discharges. Locations of streams to be monitored are noted on Plate 7-1. The surface water monitoring plans presented herein were developed based on information presented in the PHC determination, the baseline hydrologic data, and the geologic data presented in Chapter 6 of this M&RP.

Station DC-1 will be monitored to evaluate surface-water conditions downstream from the proposed surface facilities. Stations DC-2 and DC-3 will provide data concerning background surface-water conditions immediately upstream from the proposed surface facilities. Stations DC-4 and DC-5 will be located at the Castlegate Sandstone-Blackhawk Formation contact and will provide data that will be used to determine the relationship between the Blackhawk Formation and the base flow of Dugout Creek.

PC-1a and PC-2 are located on Pace Creek and will be monitored to evaluate surface-water conditions up gradient and down gradient, respectively, of the permit area. RC-1 has also been established as monitoring point to obtain baseline data for future mine expansion. Baseline data will be obtained from the aforementioned three sites for three years prior to initiating operational sampling.

Protocols for surface-water monitoring within the permit and adjacent areas are:

- DC-1 - Quarterly data collection in accordance with Table 7-5 (operational parameters). This table is the same as that presented in Coal Regulatory Program Directive Tech-004, with the exception that total hardness and total alkalinity are not

Equipment, structures and other devices used in conjunction with monitoring the quality and quantity of surface water in the permit and adjacent areas have been or will be installed, maintained, and operated in accordance with accepted procedures. Where feasible, this equipment will be removed or properly abandoned by SCM when no longer needed.

Monitoring and Mitigation Plan Pace Creek

Dugout Canyon Mine plans to leave a barrier under the majority of Pace Creek within the permit boundary. The stretches of Pace Creek (10/04 mine map) which are planned for undermining are above entry development, not longwall panels. There is approximately 1000 feet of stream channel having over 500 feet of cover planned for mining in 2007, 400 feet has approximately 900 feet of cover planned for mining in 2008 and approximately 100 feet has 1250 feet of cover planned for mining in 2008-2009. A surface water monitoring and mitigation program will be initiated in this area prior to potential subsidence occurring. This monitoring program will include conducting a pre-mining subsidence video tape survey of the stream channel from surface water monitoring location PC1A to where Pace Creek leaves the SW1/4SW14 Section 22, T13S, R13E. The purpose of the video will be to provide a visual record of the stream channel prior to mining disturbance. Five sites will be identified within the video taped portion of Pace Creek where the monitoring of surface ground water flows, channel width and general geomorpholgy will occur. The video taping of Pace Creek and the selection of monitoring sites will be done in the Spring of 2006 and submitted as part of the 2006 annual report.

The surface water flows and channel width at these stations will be monitored on a monthly basis, when accessible, while mining is occurring within the 15 degree angle-of-draw of the stream channel. The Division will be notified if the area is inaccessible due to road or climatic conditions and the monitoring could not be accomplished. Once mining has been completed within the angle-of draw, the sites will be monitored annually for up two years following undermining. A report on the subsidence related impacts, if any, to the surface water flows, will be provided monthly to the Division during monthly monitoring and annually during annual monitoring.

Mitigation will implement the Best Technology Currently Available in association with the repair of damage to the Pace Creek stream channel. The repairs may include the use of bentonite/soil mixes to fill persistant cracks that appear to be diverting water. Bentonite may also be used to line portions of the creek floor where leakage appears to be occurring. Other methods or chemicals, if environmentally safe and available, may be employed if bentonite and/or bentonite/soil mixes are ineffectual.

### 731.300 Acid- and Toxic-Forming Materials

Analyses presented in Chapter 6 of this M&RP indicate that acid- and toxic-forming materials are not present within the permit area. Parameters defining acid- and toxic-forming materials will periodically be monitored as described in Chapter 6 of this M&RP. In the event that acid- or toxic-forming materials are identified, they will be disposed of in appropriate waste-rock disposal facilities as described in Chapter 5 of this M&RP.

### 731.400 Transfer of Wells

Before final release of bond, exploration or monitoring wells will be sealed in a safe and environmentally sound manner in accordance with R645-301-631, R645-301-738, and R645-301-765. Ownership of wells will be transferred only with prior approval of the Division. The conditions of such a transfer will comply with State and local laws. The permittee will remain responsible for the management of the wells until bond release in accordance with R645-301-529, R645-301-551, R645-301-631, R645-301-738, and R645-301-765.

### 731.500 Discharges

**Discharges into an Underground Mine.** No discharges of surface water will be made to an underground mine in the permit and adjacent areas.

**Gravity Discharges from an Underground Mine.** No gravity discharges will be made from an underground mine in the permit and adjacent areas.

### 731.600 Stream Buffer Zones

The surface facilities for the Dugout Canyon Mine will be constructed within 100 feet of Dugout Creek (a perennial stream). However, surface runoff- and sediment-control facilities designed for the site (as discussed in subsequent sections of this chapter) will ensure that coal mining and reclamation operations will not cause or contribute to the violation of applicable Utah or federal water standards and will not adversely affect the water quantity and quality or other environmental resources of the stream.

**Stream Channel Diversions.** Temporary or permanent stream channel diversions will comply with R645-301-742.300.

**Buffer Zone Designation.** The area surrounding the streams that is not to be disturbed will be designated as a buffer zone, and SCM will mark those zones as specified in Section 521.200 of this M&RP.

### 731.700 Cross Sections and Maps

The locations of water rights for current users of surface water flowing into, out of, and within the permit and adjacent areas is provided on Plate 7-2. The locations of each water diversion, collection, conveyance, treatment, storage, and discharge facility to be used in the Dugout Canyon area is presented on Plate 7-5 or in Addendum A to Appendix 7-9.

Locations and elevations of each station to be used for water monitoring during coal mining and reclamation operations are presented on Plate 7-1. The design details and cross sections for the sedimentation pond are provided on Plate 7-4. Other relevant cross sections or maps are presented and discussed in Chapter 5 of this M&RP.

### 731.800 Water Rights and Replacement

No surface mining will occur in the Dugout Canyon Mine permit area.

## 732 Sediment Control Measures

The sediment control measures within the permit area have been designed to prevent additional contributions of sediment to streamflow or to runoff outside the permit area. In addition, they have been designed to meet applicable effluent limitations, and minimize erosion to the extent possible.

The structures to be used for the runoff-control plan for the permit area include disturbed and undisturbed area diversion channels, a sedimentation pond, containment berms, silt fences, and road diversions and culverts.

### 732.100 Siltation Structures

The siltation structure within the permit area will be a sedimentation pond as described in Section 732.200.

### 732.200 Sedimentation Ponds

There will be a single sedimentation pond operating at the mine facility located at the southwest end of the disturbed area. The sedimentation pond topography and cross sections are presented on Plate 7-4 of this M&RP. Details regarding sedimentation pond design are presented in Appendix 7-8. The staff gauge in the pond will be marked to indicate the 60% clean-out elevation as defined in Section 742. The sedimentation pond is defined as a Class A pond in accordance with TR-60 (U.S. Soil Conservation Service, 1976).

If sediment has accumulated to the 60% clean-out elevation, the pond will be cleaned. The sediment will be transported and either stored at the Banning Loadout or disposed of at the approved waste rock disposal sites as described in Chapter 5 of this M&RP or pumped back into the sealed, abandoned "Gilson West - Old Workings".

The sedimentation pond is within the disturbed area boundary and is subject to final reclamation. The area is included in the calculation of the disturbed area subject to bonding and in the calculation of final reclamation costs.

**Compliance Requirements.** The sedimentation pond will be maintained until removal in accordance with the reclamation plan (see Section 540 of this M&RP). When the pond is removed, the land will be revegetated in accordance with the reclamation plan defined in Section 540.

The sedimentation pond was designed to contain 0.40 acre-foot of sediment accumulation before being cleaned out. The sedimentation pond will fully contain the runoff from the 10-year, 24-hour storm event in addition to sediment accumulation. The primary spillway for the sedimentation pond will adequately pass the peak flow resulting from the 25-year, 6-hour precipitation event. The pond has also been designed with an emergency spillway to release water from the pond in the event that the primary spillway becomes blocked.

Additional design standards for the pond are presented in Section 742.

**MSHA Requirements.** MSHA requirements defined in 30 CFR 77.216 are not applicable since the sedimentation pond will not impound water or sediment to an elevation of 20 feet or more above the upstream toe of the structure. The pond will also store a volume less than 20 acre-feet.

### 732.300 Diversions

The objective of the runoff control plan is to isolate, to the maximum degree possible, runoff from disturbed areas from that of undisturbed areas. This is accomplished by:

- Allowing all upstream runoff in Dugout Creek to bypass the disturbed area through the use of culverts;
- Routing runoff from the adjacent undisturbed areas above the facilities through culverts and diversion ditches where feasible to bypass the disturbed area; and
- Routing any runoff from undisturbed areas which enters the disturbed area into the sediment control system.

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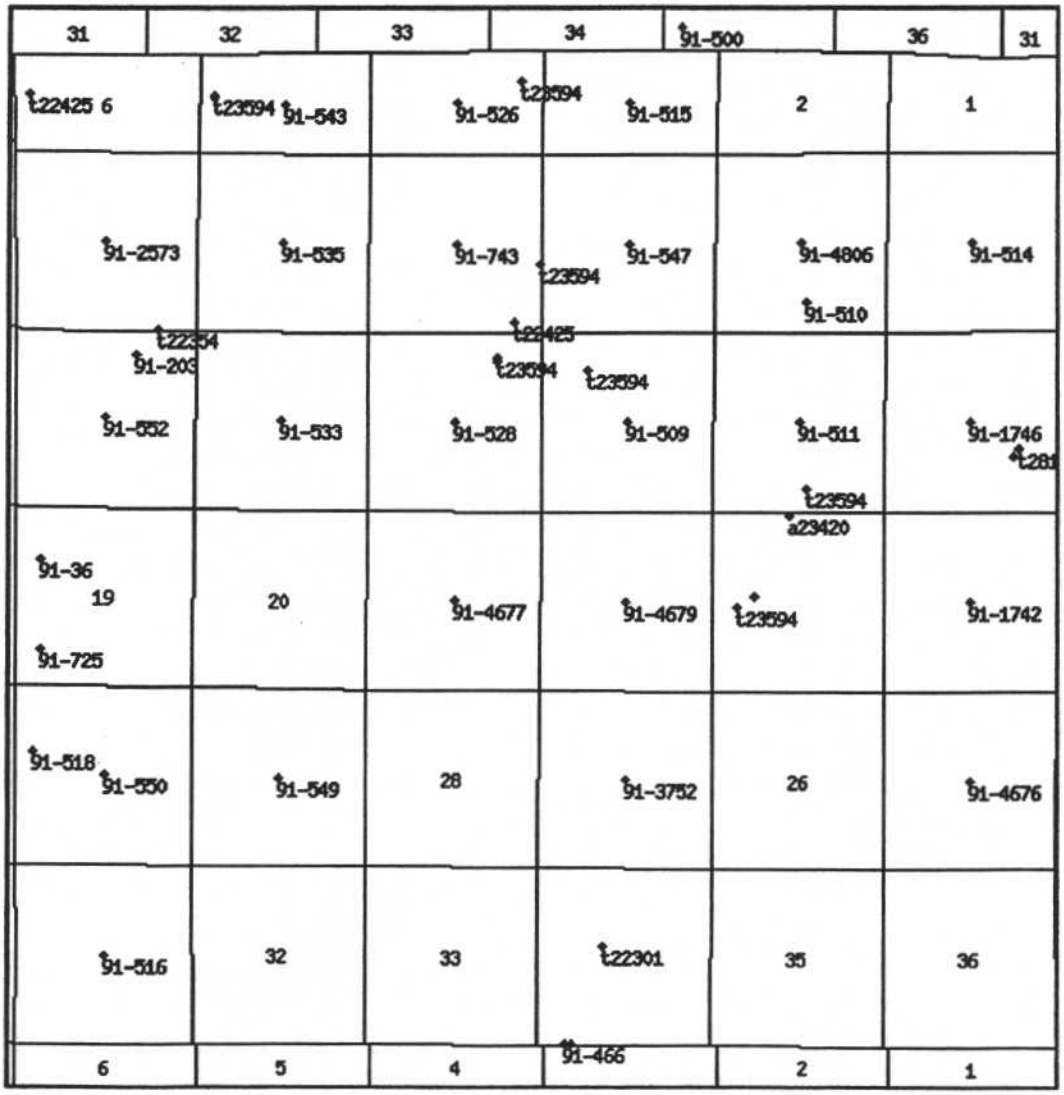
UTAH DIVISION OF WATER RIGHTS

## WRPLAT Program Output Listing

**Version: 2003.10.25.00 Rundate: 10/30/2003 06:53 AM**

**Search of Township 13S, Range 12E, SL b&m Criteria:wrtypes=W,C,E podtypes=all status=U,A,P usetypes=all**




0 0.4 0.8 1.2 1.6 mi

**Water Rights**

RED

| WR Number | Diversion Type/Location | Well Log | Status | Priority | Uses | CFS | ACFT | Owne |
|---|---|---|---|---|---|---|---|---|
| 91-203 | Underground<br>S780 E900 N4 18 13S 12E SL | | P | 19540506 | O | 0.250 | 0.000 | Canyon Fuel Com<br>CityPlace One Sui |
| 91-36 | Surface<br>N1040 E730 W4 19 13S 12E SL | | P | 19170926 | DI | 0.000 | 0.000 | Canyon Fuel Com<br>CityPlace One Sui |
| 91-427 | Surface<br>N50 E1030 SW 34 13S 12E SL | | P | 19020000 | S | 0.000 | 0.000 | Canyon Fuel Com<br>CityPlace One Sui |
| 91-466 | Surface<br>N50 E860 SW 34 13S 12E SL | | P | 19010000 | | 0.000 | 0.000 | Canyon Fuel Com<br>CityPlace One Sui |
| 91-496 | Surface<br>N700 E530 W4 30 13S 12E SL | | P | 18900000 | I | 4.000 | 0.000 | Canyon Fuel Com<br>CityPlace One Sui |
| 91-497 | Surface<br>N1040 E740 SW 19 13S 12E SL | | P | 18900000 | IS | 4.000 | 0.000 | Canyon Fuel Com<br>CityPlace One Sui |
| 91-510 | Surface<br>N900 E200 S4 11 13S 12E SL | | P | 19020000 | S | 0.022 | 0.000 | Canyon Fuel Com<br>CityPlace One Sui |
| 91-518 | Surface<br>N700 E530 W4 30 13S 12E SL | | P | 18900000 | I | 4.000 | 0.000 | Canyon Fuel Com<br>CityPlace One Sui |
| 91-519 | Surface<br>N1040 E740 SW 19 13S 12E SL | | P | 18900000 | IS | 4.000 | 0.000 | Canyon Fuel Com<br>CityPlace One Sui |
| 91-529 | Surface<br>S850 W1380 NE 16 13S 12E SL | | P | 19020000 | | 0.022 | 0.000 | Canyon Fuel Com<br>CityPlace One Sui |
| 91-725 | Surface<br>N1040 E730 SW 19 13S 12E SL | | P | 19170926 | DI | 0.000 | 0.000 | Canyon Fuel Com<br>CityPlace One Sui |
| a23420 | Underground<br>S125 E2307 NW 23 13S 12E SL | well info | A | 19990615 | OX | 0.000 | 245.000 | Canyon Fuel Com<br>City Place One Su |
| t21359 | Surface<br>S1250 E400 NW 05 13S 12E SL | | A | 19970725 | O | 0.000 | 1.000 | Canyon Fuel Com<br>6955 Union Park |
| t22301 | Surface<br>S2500 E1230 NW 23 13S 12E SL | | A | 19980612 | O | 0.000 | 19.000 | Nielson Construct<br>P.O. Box 620 |
| t22301 | Surface | | A | 19980612 | O | 0.000 | 19.000 | Nielson Construct |

| | | | | | |
|---|---|---|---|---|---|
| | S2300 E2010 NW 34 13S 12E SL | | | | P.O. Box 620 |
| t22354 | Surface | A | 19980630 OX | 0.250 84.000 | Canyon Fuels Cor |
| | N30 W1140 SE 07 13S 12E SL | | | | 6955 Union Park |
| t22425 | Surface | A | 19980803 O | 0.000 2.000 | Canyon Fuel Com |
| | N2190 W650 SE 04 13S 12E SL | | | | 6955 Union Park |
| t22425 | Surface | A | 19980803 O | 0.000 2.000 | Canyon Fuel Com |
| | N1680 E460 SW 06 13S 12E SL | | | | 6955 Union Park |
| t22425 | Surface | A | 19980803 O | 0.000 2.000 | Canyon Fuel Com |
| | N310 W860 SE 09 13S 12E SL | | | | 6955 Union Park |
| t22425 | Surface | A | 19980803 O | 0.000 2.000 | Canyon Fuel Com |
| | S1100 E1400 NW 15 13S 12E SL | | | | 6955 Union Park |
| t22425 | Surface | A | 19980803 O | 0.000 2.000 | Canyon Fuel Com |
| | S150 E710 W4 23 13S 12E SL | | | | 6955 Union Park |
| t23594 | Surface | A | 19990726 O | 0.000 2.000 | Canyon Fuel Com |
| | N2190 W650 SE 04 13S 12E SL | | | | 6955 Union Park |
| t23594 | Surface | A | 19990726 O | 0.000 2.000 | Canyon Fuel Com |
| | N1680 E460 SW 05 13S 12E SL | | | | 6955 Union Park |
| t23594 | Surface | A | 19990726 O | 0.000 2.000 | Canyon Fuel Com |
| | N2000 W50 SE 09 13S 12E SL | | | | 6955 Union Park |
| t23594 | Surface | A | 19990726 O | 0.000 2.000 | Canyon Fuel Com |
| | N700 W2400 SE 14 13S 12E SL | | | | 6955 Union Park |
| t23594 | Surface | A | 19990726 O | 0.000 2.000 | Canyon Fuel Com |
| | S1100 E1400 NW 15 13S 12E SL | | | | 6955 Union Park |
| t23594 | Surface | A | 19990726 O | 0.000 2.000 | Canyon Fuel Com |
| | S750 W1400 NE 16 13S 12E SL | | | | 6955 Union Park |
| t23594 | Surface | A | 19990726 O | 0.000 2.000 | Canyon Fuel Com |
| | S150 E710 W4 23 13S 12E SL | | | | 6955 Union Park |
| t28162 | Surface | A | 20030807 O | 0.000 2.500 | Canyon Fuel Com |
| | N1600 W1325 SE 13 13S 12E SL | | | | 6955 Union Park |
| t28162 | Surface | A | 20030807 O | 0.000 2.500 | Canyon Fuel Com |
| | N1850 W1120 SE 13 13S 12E SL | | | | 6955 Union Park |

| | | | | | |
|---|---|---|---|---|---|
| 91-1738 | Point to Point<br>0 0 24 13S 12E SL | P | 18690000 | 0.000 0.000 | Thayn, George M |
| 91-1741 | Point to Point<br>0 0 24 13S 12E SL | P | 19020000 | 0.011 0.000 | Thayn, George M |
| 91-1742 | Point to Point<br>0 0 24 13S 12E SL | P | 18690000 | 0.000 0.000 | Thayn, George M |
| 91-1743 | Point to Point<br>0 0 13 13S 12E SL | P | 18690000 | 0.011 0.000 | Thayn, George M |
| 91-1744 | Point to Point<br>0 0 13 13S 12E SL | P | 18690000 | 0.011 0.000 | Thayn, George M |
| 91-1745 | Point to Point<br>0 0 13 13S 12E SL | P | 18690000 S | 0.000 0.000 | Thayn, George M |
| 91-1746 | Point to Point<br>0 0 13 13S 12E SL | P | 18690000 | 0.011 0.000 | Thayn, George |
| 91-2573 | Point to Point<br>0 0 07 13S 12E SL | P | 18690000 S | 0.000 0.000 | USA Bureau of L<br>(Price Field Office<br>125 South 600 W |
| 91-2574 | Point to Point<br>0 0 18 13S 12E SL | P | 18690000 S | 0.000 0.000 | USA Bureau of L<br>(Price Field Office<br>125 South 600 W |
| 91-3752 | Point to Point<br>0 0 27 13S 12E SL | P | 18690000 S | 0.000 0.000 | USA Bureau of L<br>(Price Field Office<br>125 South 600 W |
| 91-4544 | Point to Point<br>0 0 21 13S 12E SL | P | 18690000 OS | 0.015 0.000 | USA Bureau of L<br>(Price Field Office<br>125 South 600 W |
| 91-4676 | Point to Point<br>0 0 25 13S 12E SL | P | 18690000 OS | 0.000 0.000 | USA Bureau of L<br>(Price Field Office<br>125 South 600 W |
| 91-4677 | Point to Point<br>0 0 21 13S 12E SL | P | 18690000 OS | 0.000 0.000 | USA Bureau of L<br>(Price Field Office<br>125 South 600 W |
| 91-4678 | Point to Point<br>0 0 31 13S 12E SL | P | 18690000 OS | 0.000 0.000 | USA Bureau of L<br>(Price Field Office<br>125 South 600 W |
| 91-4679 | Point to Point<br>0 0 22 13S 12E SL | P | 18690000 OS | 0.000 0.000 | USA Bureau of L<br>(Price Field Office<br>125 South 600 W |
| 91-4806 | Point to Point<br>0 0 11 13S 12E SL | P | 18690000 S | 0.000 0.000 | Canyon Fuel Com<br>CityPlace One Sui |
| 91-499 | Point to Point<br>S400 W900 E4 10 13S 12E SL | P | 19020000 | 0.000 0.000 | Canyon Fuel Com<br>CityPlace One Sui |

| | | | | | |
|---|---|---|---|---|---|
| 91-501 | Point to Point<br>0 0 10 13S 12E SL | P | 18690000 | 0.000 0.000 | Canyon Fuel Com<br>CityPlace One Sui |
| 91-502 | Point to Point<br>0 0 10 13S 12E SL | P | 18690000 | 0.022 0.000 | Canyon Fuel Com<br>CityPlace One Sui |
| 91-503 | Point to Point<br>0 0 10 13S 12E SL | P | 18690000 | 0.022 0.000 | Canyon Fuel Com<br>CityPlace One Sui |
| 91-504 | Point to Point<br>S250 E300 W4 10 13S 12E SL | P | 19020000 | 0.000 0.000 | Canyon Fuel Com<br>CityPlace One Sui |
| 91-505 | Point to Point<br>N630 E110 W4 10 13S 12E SL | P | 19020000 | 0.022 0.000 | Canyon Fuel Com<br>CityPlace One Sui |
| 91-506 | Point to Point<br>S900 W100 N4 15 13S 12E SL | P | 19020000 | 0.000 0.000 | Canyon Fuel Com<br>CityPlace One Sui |
| 91-507 | Point to Point<br>0 0 15 13S 12E SL | P | 19020000 | 0.022 0.000 | Canyon Fuel Com<br>CityPlace One Sui |
| 91-508 | Point to Point<br>0 0 15 13S 12E SL | P | 18690000 | 0.022 0.000 | Canyon Fuel Com<br>CityPlace One Sui |
| 91-509 | Point to Point<br>N200 E200 SW 15 13S 12E SL | P | 19020000 | 0.000 0.000 | Canyon Fuel Com<br>CityPlace One Sui |
| 91-511 | Point to Point<br>0 0 14 13S 12E SL | P | 18690000 | 0.000 0.000 | Canyon Fuel Com<br>CityPlace One Sui |
| 91-512 | Point to Point<br>0 0 12 13S 12E SL | P | 18690000 | 0.022 0.000 | Canyon Fuel Com<br>CityPlace One Sui |
| 91-513 | Point to Point<br>0 0 12 13S 12E SL | P | 18690000 | 0.022 0.000 | Canyon Fuel Com<br>CityPlace Once Su |
| 91-514 | Point to Point<br>0 0 12 13S 12E SL | P | 18690000 | 0.022 0.000 | Canyon Fuel Com<br>CityPlace One Sui |
| 91-515 | Point to Point<br>0 0 03 13S 12E SL | P | 19020000 S | 0.022 0.000 | Canyon Fuel Com<br>CityPlace One Sui |
| 91-516 | Point to Point<br>0 0 31 13S 12E SL | P | 18730000 | 0.000 0.000 | Canyon Fuel Com<br>CityPlace One Sui |
| 91-524 | Point to Point<br>0 0 04 13S 12E SL | P | 18690000 | 0.000 0.000 | Canyon Fuel Com<br>CityPlace One Sui |
| 91-525 | Point to Point<br>0 0 04 13S 12E SL | P | 18690000 S | 0.022 0.000 | Canyon Fuel Com<br>CityPlace One Sui |
| 91-526 | Point to Point<br>N2150 W910 S4 04 13S 12E SL | P | 18690000 | 0.022 0.000 | Canyon Fuel Com<br>CityPlace One Sui |
| 91-527 | Point to Point<br>N290 W530 E4 16 13S 12E SL | P | 19020000 | 0.022 0.000 | Canyon Fuel Com<br>CityPlace One Sui |

| | | | | | |
|---|---|---|---|---|---|
| 91-528 | Point to Point<br>N660 W2580 E4 16 13S 12E SL | P | 19020000 | 0.022 0.000 | Canyon Fuel Com<br>CityPlace One Sui |
| 91-530 | Point to Point<br>N500 W860 E4 09 13S 12E SL | P | 19020000 | 0.000 0.000 | Canyon Fuel Com<br>CityPlace One Sui |
| 91-531 | Point to Point<br>S1000 E1250 NW 09 13S 12E SL | P | 19020000 | 0.000 0.000 | Canyon Fuel Com<br>CityPlace One Sui |
| 91-532 | Point to Point<br>S1600 E2320 NW 09 13S 12E SL | P | 19020000 | 0.011 0.000 | Canyon Fuel Com<br>CityPlace One Sui |
| 91-533 | Point to Point<br>S650 W750 NE 17 13S 12E SL | P | 19020000 | 0.022 0.000 | Canyon Fuel Com<br>CityPlace One Sui |
| 91-534 | Point to Point<br>S210 W1500 E4 08 13S 12E SL | P | 19020000 | 0.022 0.000 | Canyon Fuel Com<br>CityPlace One Sui |
| 91-535 | Point to Point<br>N1800 W540 S4 08 13S 12E SL | P | 18690000 | 0.022 0.000 | Canyon Fuel Com<br>CityPlace One Sui |
| 91-536 | Point to Point<br>0 0 30 13S 12E SL | P | 18730000 | 0.000 0.000 | Canyon Fuel Com<br>CityPlace One Sui |
| 91-543 | Point to Point<br>0 0 05 13S 12E SL | P | 18690000 | 0.000 0.000 | Canyon Fuel Com<br>CityPlace One Sui |
| 91-547 | Point to Point<br>N780 W440 E4 10 13S 12E SL | P | 19020000 | 0.000 0.000 | Canyon Fuel Com<br>CityPlace One Sui |
| 91-549 | Point to Point<br>S850 E470 W4 29 13S 12E SL | P | 19020000 S | 0.000 0.000 | Olsen, Hattie<br>305 South Carbor |
| 91-550 | Point to Point<br>0 0 30 13S 12E SL | P | 18730000 S | 0.000 0.000 | Olsen, Hattie<br>305 South Carbor |
| 91-552 | Point to Point<br>0 0 18 13S 12E SL | P | 18690000 | 0.000 0.000 | Sampinos, Sam<br>228 North Carbor |
| 91-743 | Point to Point<br>S100 W300 E4 09 13S 12E SL | P | 19020000 | 0.000 0.000 | Canyon Fuel Com<br>CityPlace One Sui |

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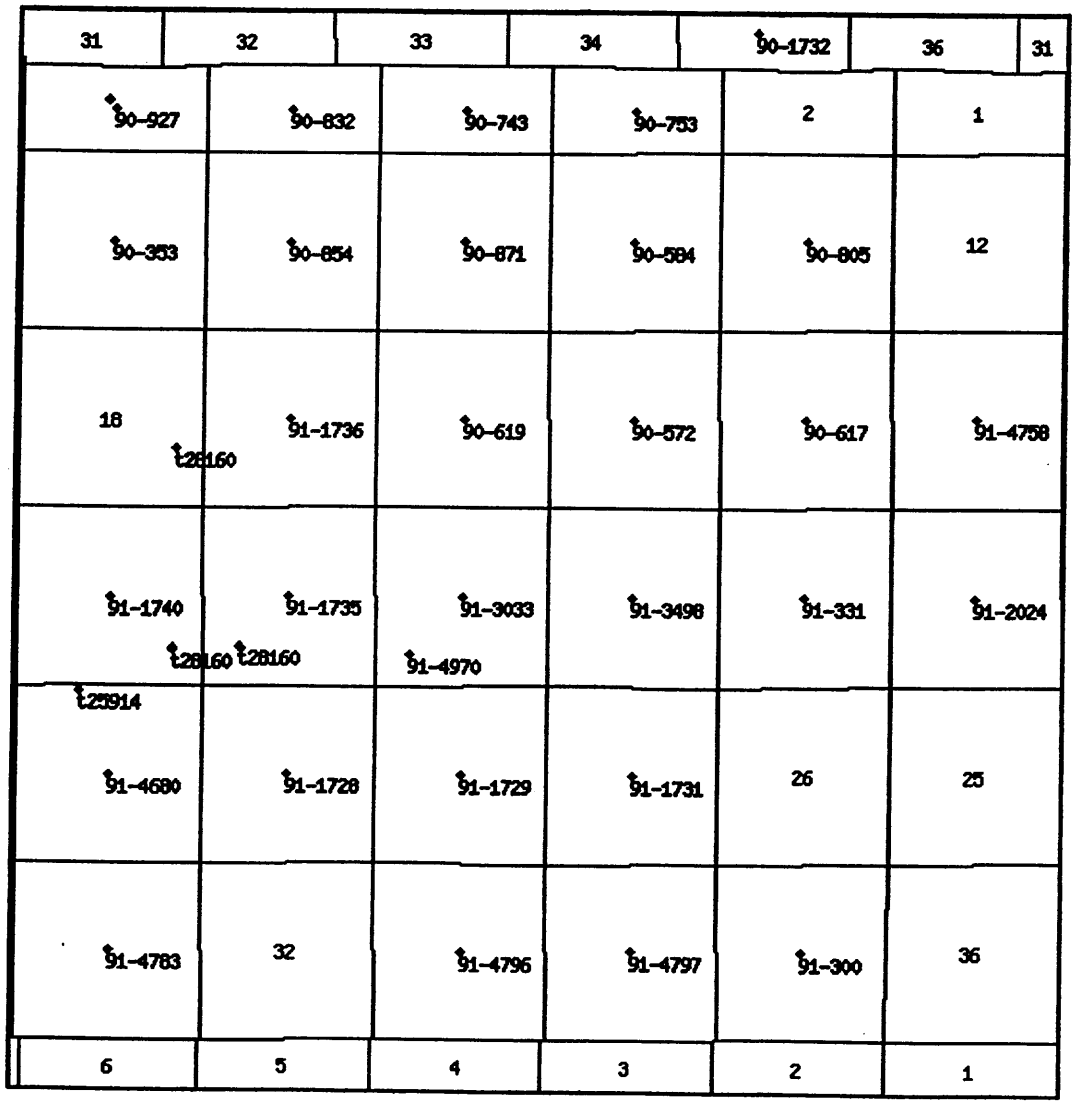
UTAH DIVISION OF WATER RIGHTS

## WRPLAT Program Output Listing

**Version: 2003.10.25.00 Rundate: 10/30/2003 06:55 AM**

**Search of Township 13S, Range 13E, SL b&m Criteria:wrtypes=W,C,E podtypes=all status=U,A,P usetypes=all**




Water Rights

| WR Number | Diversion Type/Location | Well Log | Status | Priority | Uses | CFS | ACFT | Owne |
|---|---|---|---|---|---|---|---|---|
| 91-495 | Surface<br>S1000 W200 N4 06 13S 13E SL | | P | 18800000 IS | | 2.500 | 0.000 | Canyon Fuel Comp<br>CityPlace One Suit |
| 91-4970 | Surface<br>N950 E1050 SW 21 13S 13E SL | | P | 18690000 S | | 0.009 | 0.000 | Thayn, George M.<br>Sunnyside Star Ro |
| 91-607 | Surface<br>S1000 W200 N4 06 13S 13E SL | | P | 18800000 IS | | 2.500 | 0.000 | Canyon Fuel Comp<br>CityPlace One Suit |
| t25914 | Surface<br>N1150 W950 SE 19 13S 13E SL | | A | 20010820 O | | 0.000 | 2.500 | Canyon Fuel Comp<br>P.O. Box 1029 |
| t25914 | Surface<br>N1150 E1200 SW 20 13S 13E SL | | A | 20010820 O | | 0.000 | 2.500 | Canyon Fuel Comp<br>P.O. Box 1029 |
| t25914 | Surface<br>S150 E1850 NW 30 13S 13E SL | | A | 20010820 O | | 0.000 | 2.500 | Canyon Fuel Comp<br>P.O. Box 1029 |
| t27967 | Surface<br>N1090 W950 SE 19 13S 13E SL | | A | 20030612 O | | 0.000 | 0.100 | Canyon Fuel Comp<br>HC 35 Box 380 |
| t28160 | Surface<br>N1090 W950 SE 19 13S 13E SL | | A | 20030806 O | | 0.000 | 2.500 | Canyon Fuel Comp<br>HC 35 Box 380 |
| t28160 | Surface<br>N1735 W850 NE 19 13S 13E SL | | A | 20030806 O | | 0.000 | 2.500 | Canyon Fuel Comp<br>HC 35 Box 380 |
| t28160 | Surface<br>N1160 E1140 SW 20 13S 13E SL | | A | 20030806 O | | 0.000 | 2.500 | Canyon Fuel Comp<br>HC 35 Box 380 |
| 90-1011 | Point to Point<br>0 0 07 13S 13E SL | | P | 18850000 S | | 0.000 | 0.000 | Thayn, George Mil |
| 90-1012 | Point to Point<br>0 0 17 13S 13E SL | | P | 18850000 S | | 0.000 | 0.000 | Thayn, George Mil |
| 90-1013 | Point to Point<br>0 0 21 13S 13E SL | | P | 18850000 S | | 0.000 | 0.000 | Thayn, George Mil |
| 90-1068 | Point to Point<br>0 0 04 13S 13E SL | | P | 18850000 | | 0.011 | 0.000 | USA Bureau of La<br>(Price Field Office)<br>125 South 600 We |
| 90-1240 | Point to Point<br>0 0 14 13S 13E SL | | P | 18850000 S | | 0.011 | 0.000 | USA Bureau of La<br>(Price Field Office)<br>125 South 600 We |
| 90-1241 | Point to Point | | P | 18850000 S | | 0.000 | 0.000 | USA Bureau of La |

| | | | | | |
|---|---|---|---|---|---|
| | 0 0 11 13S 13E SL | | | | 125 South 600 We |
| ~~90-1247~~ | ~~Point to Point~~ | ~~P~~ | ~~18850000~~ | ~~0.000 0.000~~ | ~~USA Bureau of La (Price Field Office)~~ |
| | 0 0 09 13S 13E SL | | | | 125 South 600 We |
| 90-1248 | Point to Point | P | 18850000 | 0.011 0.000 | USA Bureau of La (Price Field Office) |
| | 0 0 09 13S 13E SL | | | | 125 South 600 We |
| 90-348 | Point to Point | P | 18850000 S | 0.000 0.000 | Thayn, Albert |
| | 0 0 05 13S 13E SL | | | | Route #1 |
| 90-350 | Point to Point | P | 18850000 | 0.000 0.000 | Thayn, Albert |
| | 0 0 07 13S 13E SL | | | | Route #1 |
| 90-351 | Point to Point | P | 18850000 | 0.000 0.000 | Thayn, Albert |
| | 0 0 07 13S 13E SL | | | | Route #1 |
| 90-352 | Point to Point | P | 18850000 | 0.011 0.000 | Thayn, Albert |
| | 0 0 07 13S 13E SL | | | | Route No 1 |
| 90-353 | Point to Point | P | 18850000 | 0.011 0.000 | Thayn, Albert |
| | 0 0 07 13S 13E SL | | | | Route #1 |
| 90-469 | Point to Point | P | 18850000 S | 0.150 0.000 | Pagano, Jay |
| | 0 0 11 13S 13E SL | | | | |
| 90-470 | Point to Point | P | 18850000 S | 0.000 0.000 | Pagano, Jay |
| | 0 0 11 13S 13E SL | | | | |
| 90-493 | Point to Point | P | 18850000 S | 0.022 0.000 | Conover, J. M. |
| | 0 0 04 13S 13E SL | | | | |
| 90-494 | Point to Point | P | 18850000 | 0.022 0.000 | Conover, Ione S. |
| | 0 0 04 13S 13E SL | | | | |
| 90-495 | Point to Point | P | 18850000 | 0.022 0.000 | Conover, Clyde |
| | 0 0 04 13S 13E SL | | | | |
| 90-496 | Point to Point | P | 18850000 | 0.022 0.000 | Conover, Harry |
| | 0 0 04 13S 13E SL | | | | |
| 90-497 | Point to Point | P | 18850000 | 0.022 0.000 | Conover, Elden |
| | 0 0 04 13S 13E SL | | | | |
| 90-498 | Point to Point | P | 18850000 | 0.022 0.000 | Conover, Elaine |
| | 0 0 04 13S 13E SL | | | | |
| 90-499 | Point to Point | P | 18850000 | 0.022 0.000 | Snow, Emily Cono |
| | 0 0 04 13S 13E SL | | | | |
| 90-500 | Point to Point | P | 18850000 | 0.022 0.000 | Conover, Reed |
| | 0 0 04 13S 13E SL | | | | |
| 90-501 | Point to Point | P | 18850000 | 0.022 0.000 | Conover, Wallace |
| | 0 0 04 13S 13E SL | | | | |

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|---|---|---|---|---|---|
| | 0 0 04 13S 13E SL | | | | |
| 90-502 | Point to Point<br>0 0 04 13S 13E SL | P | 18850000 | 0.022 0.000 | Conover, J. Georg |
| 90-517 | Point to Point<br>0 0 10 13S 13E SL | P | 18850000 | 0.033 0.000 | Conover, J. M. |
| 90-518 | Point to Point<br>0 0 10 13S 13E SL | P | 18850000 | 0.033 0.000 | Conover, Ione S. |
| 90-519 | Point to Point<br>0 0 10 13S 13E SL | P | 18850000 | 0.033 0.000 | Conover, Clyde |
| 90-520 | Point to Point<br>0 0 10 13S 13E SL | P | 18850000 | 0.033 0.000 | Conover, Harry |
| 90-521 | Point to Point<br>0 0 10 13S 13E SL | P | 18850000 | 0.033 0.000 | Conover, Elden |
| 90-522 | Point to Point<br>0 0 10 13S 13E SL | P | 18850000 | 0.033 0.000 | Conover, Elaine C. |
| 90-523 | Point to Point<br>0 0 10 13S 13E SL | P | 18850000 | 0.033 0.000 | Snow, Emily C. |
| 90-524 | Point to Point<br>0 0 10 13S 13E SL | P | 18850000 | 0.033 0.000 | Conover, Reed |
| 90-525 | Point to Point<br>0 0 10 13S 13E SL | P | 18850000 | 0.033 0.000 | Conover, Wallace |
| 90-526 | Point to Point<br>0 0 10 13S 13E SL | P | 18850000 | 0.033 0.000 | Conover, J. Georg |
| 90-528 | Point to Point<br>0 0 10 13S 13E SL | P | 18850000 | 0.022 0.000 | Conover, J. M. |
| 90-529 | Point to Point<br>0 0 10 13S 13E SL | P | 18850000 | 0.022 0.000 | Conover, Ione S. |
| 90-530 | Point to Point<br>0 0 10 13S 13E SL | P | 18850000 | 0.022 0.000 | Conover, Clyde |
| 90-531 | Point to Point<br>0 0 10 13S 13E SL | P | 18850000 | 0.022 0.000 | Conover, Harry |
| 90-532 | Point to Point<br>0 0 10 13S 13E SL | P | 18850000 | 0.022 0.000 | Conover, Elden |
| 90-533 | Point to Point<br>0 0 10 13S 13E SL | P | 18850000 | 0.022 0.000 | Conover, Elaine C. |
| 90-534 | Point to Point<br>0 0 10 13S 13E SL | P | 18850000 | 0.022 0.000 | Snow, Emily C. |
| 90-535 | Point to Point<br>0 0 10 13S 13E SL | P | 18850000 | 0.022 0.000 | Conover, Reed |

| | | | | | |
|---|---|---|---|---|---|
| 90-536 | Point to Point<br>0 0 10 13S 13E SL | P | 18850000 | 0.022 0.000 | Conover, Wallace |
| 90-537 | Point to Point<br>0 0 10 13S 13E SL | P | 18850000 | 0.022 0.000 | Conover, J. Georg |
| 90-538 | Point to Point<br>0 0 15 13S 13E SL | P | 18850000 | 0.022 0.000 | Conover, J. M. |
| 90-539 | Point to Point<br>0 0 15 13S 13E SL | P | 18850000 | 0.022 0.000 | Conover, Ione S. |
| 90-540 | Point to Point<br>0 0 15 13S 13E SL | P | 18850000 | 0.022 0.000 | Conover, Clyde |
| 90-541 | Point to Point<br>0 0 15 13S 13E SL | P | 18850000 | 0.022 0.000 | Conover, Harry |
| 90-542 | Point to Point<br>0 0 15 13S 13E SL | P | 18850000 | 0.022 0.000 | Conover, Elden |
| 90-543 | Point to Point<br>0 0 15 13S 13E SL | P | 18850000 | 0.022 0.000 | Conover, Elaine |
| 90-544 | Point to Point<br>0 0 15 13S 13E SL | P | 18850000 | 0.022 0.000 | Snow, Emily C. |
| 90-545 | Point to Point<br>0 0 15 13S 13E SL | P | 18850000 | 0.022 0.000 | Conover, Reed |
| 90-546 | Point to Point<br>0 0 15 13S 13E SL | P | 18850000 | 0.022 0.000 | Conover, Wallace |
| 90-547 | Point to Point<br>0 0 15 13S 13E SL | P | 18850000 | 0.022 0.000 | Conover, J. Georg |
| 90-548 | Point to Point<br>0 0 22 13S 13E SL | P | 18850000 | 0.250 0.000 | Conover, J. M. and |
| 90-549 | Point to Point<br>0 0 22 13S 13E SL | P | 18850000 | 0.250 0.000 | Conover, J. Georg |
| 90-550 | Point to Point<br>0 0 22 13S 13E SL | P | 18850000 | 0.250 0.000 | Conover, Wallace |
| 90-551 | Point to Point<br>0 0 22 13S 13E SL | P | 18850000 | 0.250 0.000 | Conover, Elaine C. |
| 90-552 | Point to Point<br>0 0 22 13S 13E SL | P | 18850000 | 0.250 0.000 | Conover, Harry |
| 90-553 | Point to Point<br>0 0 22 13S 13E SL | P | 18850000 | 0.250 0.000 | Conover, Clyde |
| 90-554 | Point to Point<br>0 0 22 13S 13E SL | P | 18850000 | 0.250 0.000 | Snow, Emily Cono |
| 90-555 | Point to Point | P | 18850000 | 0.044 0.000 | Conover, J. M. and |

| | | | | | |
|---|---|---|---|---|---|
| 90-555 | Point to Point<br>0 0 22 13S 13E SL | P | 18850000 | 0.044 0.000 | Conover, J. M. and |
| 90-556 | Point to Point<br>0 0 22 13S 13E SL | P | 18850000 | 0.044 0.000 | Conover, J. George |
| 90-557 | Point to Point<br>0 0 22 13S 13E SL | P | 18850000 | 0.044 0.000 | Conover, Wallace |
| 90-558 | Point to Point<br>0 0 22 13S 13E SL | P | 18850000 | 0.044 0.000 | Conover, Elaine |
| 90-559 | Point to Point<br>0 0 22 13S 13E SL | P | 18850000 | 0.044 0.000 | Conover, Harry |
| 90-560 | Point to Point<br>0 0 22 13S 13E SL | P | 18850000 | 0.044 0.000 | Conover, Clyde |
| 90-561 | Point to Point<br>0 0 22 13S 13E SL | P | 18850000 | 0.044 0.000 | Snow, Emily Cono |
| 90-562 | Point to Point<br>0 0 22 13S 13E SL | P | 18850000 | 0.044 0.000 | Conover, Reed |
| 90-563 | Point to Point<br>0 0 15 13S 13E SL | P | 18850000 | 0.066 0.000 | Conover, J. M. |
| 90-564 | Point to Point<br>0 0 15 13S 13E SL | P | 18850000 | 0.066 0.000 | Conover, Ione |
| 90-565 | Point to Point<br>0 0 15 13S 13E SL | P | 18850000 | 0.066 0.000 | Conover, Clyde |
| 90-566 | Point to Point<br>0 0 15 13S 13E SL | P | 18850000 | 0.066 0.000 | Conover, Harry |
| 90-567 | Point to Point<br>0 0 15 13S 13E SL | P | 18850000 | 0.066 0.000 | Conover, Elden |
| 90-568 | Point to Point<br>0 0 15 13S 13E SL | P | 18850000 | 0.066 0.000 | Conover, Elaine |
| 90-569 | Point to Point<br>0 0 15 13S 13E SL | P | 18850000 | 0.066 0.000 | Snow, Emily C. |
| 90-570 | Point to Point<br>0 0 15 13S 13E SL | P | 18850000 | 0.066 0.000 | Conover, Reed |
| 90-571 | Point to Point<br>0 0 15 13S 13E SL | P | 18850000 | 0.066 0.000 | Conover, Wallace |
| 90-572 | Point to Point<br>0 0 15 13S 13E SL | P | 18850000 | 0.066 0.000 | Conover, George J |
| 90-573 | Point to Point<br>0 0 22 13S 13E SL | P | 18850000 | 0.250 0.000 | Conover, Reed |
| 90-574 | Point to Point | P | 18850000 | 0.000 0.000 | Conover, J. M. |

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|---|---|---|---|---|---|---|
| | 0 0 08 13S 13E SL | | | | | |
| 90-575 | Point to Point | P | 18850000 | 0.022 | 0.000 | Conover, J. M. |
| | 0 0 10 13S 13E SL | | | | | |
| 90-576 | Point to Point | P | 18850000 | 0.022 | 0.000 | Conover, Ione S. |
| | 0 0 10 13S 13E SL | | | | | |
| 90-577 | Point to Point | P | 18850000 | 0.022 | 0.000 | Conover, Clyde |
| | 0 0 10 13S 13E SL | | | | | |
| 90-578 | Point to Point | P | 18850000 | 0.022 | 0.000 | Conover, Harry |
| | 0 0 10 13S 13E SL | | | | | |
| 90-579 | Point to Point | P | 18850000 | 0.022 | 0.000 | Conover, Elden |
| | 0 0 10 13S 13E SL | | | | | |
| 90-580 | Point to Point | P | 18850000 | 0.022 | 0.000 | Conover, Elaine |
| | 0 0 10 13S 13E SL | | | | | |
| 90-581 | Point to Point | P | 18850000 | 0.022 | 0.000 | Snow, Emily C. |
| | 0 0 10 13S 13E SL | | | | | |
| 90-582 | Point to Point | P | 18850000 | 0.022 | 0.000 | Conover, Reed |
| | 0 0 10 13S 13E SL | | | | | |
| 90-583 | Point to Point | P | 18850000 | 0.022 | 0.000 | Conover, Wallace |
| | 0 0 10 13S 13E SL | | | | | |
| 90-584 | Point to Point | P | 18850000 | 0.022 | 0.000 | Conover, J. Georg |
| | 0 0 10 13S 13E SL | | | | | |
| 90-586 | Point to Point | P | 18850000 | 0.000 | 0.000 | Conover, J. M. and |
| | 0 0 08 13S 13E SL | | | | | |
| 90-587 | Point to Point | P | 18850000 | 0.000 | 0.000 | Conover, J. Georg |
| | 0 0 08 13S 13E SL | | | | | |
| 90-588 | Point to Point | P | 18850000 | 0.000 | 0.000 | Conover, Wallace |
| | 0 0 08 13S 13E SL | | | | | |
| 90-589 | Point to Point | P | 18850000 | 0.000 | 0.000 | Conover, Harry L. |
| | 0 0 08 13S 13E SL | | | | | |
| 90-590 | Point to Point | P | 18850000 | 0.000 | 0.000 | Conover, Clyde |
| | 0 0 08 13S 13E SL | | | | | |
| 90-591 | Point to Point | P | 18850000 | 0.000 | 0.000 | Conover, Reed |
| | 0 0 08 13S 13E SL | | | | | |
| 90-592 | Point to Point | P | 18850000 | 0.000 | 0.000 | Conover, Elaine |
| | 0 0 08 13S 13E SL | | | | | |
| 90-593 | Point to Point | P | 18850000 | 0.000 | 0.000 | Snow, Emily Cono |
| | 0 0 08 13S 13E SL | | | | | |
| 90-594 | Point to Point | P | 18850000 | 0.022 | 0.000 | Conover, J. M. |
| | 0 0 04 13S 13E SL | | | | | |

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| | 0 0 04 13S 13E SL | | | | |
| 90-595 | Point to Point | P | 18850000 | 0.022 0.000 | Conover, Ione |
| | 0 0 04 13S 13E SL | | | | |
| 90-596 | Point to Point | P | 18850000 | 0.022 0.000 | Conover, Clyde |
| | 0 0 04 13S 13E SL | | | | |
| 90-597 | Point to Point | P | 18850000 | 0.022 0.000 | Conover, Harry |
| | 0 0 04 13S 13E SL | | | | |
| 90-598 | Point to Point | P | 18850000 | 0.022 0.000 | Conover, Elden |
| | 0 0 04 13S 13E SL | | | | |
| 90-599 | Point to Point | P | 18850000 | 0.022 0.000 | Conover, Reed |
| | 0 0 04 13S 13E SL | | | | |
| 90-615 | Point to Point | P | 18850000 | 0.011 0.000 | Thayn, Albert |
| | 0 0 06 13S 13E SL | | | | Route 1 |
| 90-616 | Point to Point | P | 18850000 | 0.011 0.000 | Thayn, Albert |
| | 0 0 06 13S 13E SL | | | | Route #1 |
| 90-617 | Point to Point | P | 18850000 S | 0.011 0.000 | USA Bureau of La (Price Field Office) |
| | 0 0 14 13S 13E SL | | | | 125 South 600 We |
| 90-618 | Point to Point | P | 18850000 S | 0.000 0.000 | Utah School and Ir Lands Admin. |
| | 0 0 16 13S 13E SL | | | | 675 East 500 Sout |
| 90-619 | Point to Point | P | 18850000 S | 0.000 0.000 | Utah School and Ir Lands Admin. |
| | 0 0 16 13S 13E SL | | | | 675 East 500 Sout |
| 90-712 | Point to Point | P | 18850000 | 0.022 0.000 | Conover, Wallace |
| | 0 0 04 13S 13E SL | | | | |
| 90-713 | Point to Point | P | 18850000 | 0.022 0.000 | Conover, J. Georg |
| | 0 0 04 13S 13E SL | | | | |
| 90-714 | Point to Point | P | 18850000 | 0.022 0.000 | Conover, Elaine |
| | 0 0 04 13S 13E SL | | | | |
| 90-715 | Point to Point | P | 18850000 | 0.022 0.000 | Snow, Emily Cono |
| | 0 0 04 13S 13E SL | | | | |
| 90-716 | Point to Point | P | 18850000 | 0.000 0.000 | Conover, J. M. |
| | 0 0 04 13S 13E SL | | | | |
| 90-717 | Point to Point | P | 18850000 | 0.000 0.000 | Conover, Ione |
| | 0 0 04 13S 13E SL | | | | |
| 90-718 | Point to Point | P | 18850000 | 0.000 0.000 | Conover, Clyde |
| | 0 0 04 13S 13E SL | | | | |
| 90-719 | Point to Point | P | 18850000 | 0.000 0.000 | Conover, Harry L. |
| | 0 0 04 13S 13E SL | | | | |
| 90-720 | Point to Point | P | 18850000 | 0.000 0.000 | Conover, Elden |
| | 0 0 04 13S 13E SL | | | | |
| 90-721 | Point to Point | P | 18850000 | 0.000 0.000 | Conover, Reed |
| | 0 0 04 13S 13E SL | | | | |
| 90-722 | Point to Point | P | 18850000 | 0.000 0.000 | Conover, Wallace |

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|---|---|---|---|---|---|---|
| | 0 0 04 13S 13E SL | | | | | |
| 90-723 | Point to Point | P | 18850000 | 0.000 | 0.000 | Conover, J. Georg |
| | 0 0 04 13S 13E SL | | | | | |
| 90-724 | Point to Point | P | 18850000 | 0.000 | 0.000 | Conover, Elaine |
| | 0 0 04 13S 13E SL | | | | | |
| 90-725 | Point to Point | P | 18850000 | 0.000 | 0.000 | Snow, Emily Cono |
| | 0 0 04 13S 13E SL | | | | | |
| 90-726 | Point to Point | P | 18850000 | 0.000 | 0.000 | Conover, J. M. |
| | 0 0 04 13S 13E SL | | | | | |
| 90-728 | Point to Point | P | 18850000 | 0.000 | 0.000 | Conover, Clyde |
| | 0 0 04 13S 13E SL | | | | | |
| 90-729 | Point to Point | P | 18850000 | 0.000 | 0.000 | Conover, Harry |
| | 0 0 04 13S 13E SL | | | | | |
| 90-730 | Point to Point | P | 18850000 | 0.000 | 0.000 | Conover, Elden |
| | 0 0 04 13S 13E SL | | | | | |
| 90-731 | Point to Point | P | 18850000 | 0.000 | 0.000 | Conover, Reed |
| | 0 0 04 13S 13E SL | | | | | |
| 90-732 | Point to Point | P | 18850000 | 0.000 | 0.000 | Conover, Wallace |
| | 0 0 04 13S 13E SL | | | | | |
| 90-733 | Point to Point | P | 18850000 | 0.000 | 0.000 | Conover, J. Georg |
| | 0 0 04 13S 13E SL | | | | | |
| 90-734 | Point to Point | P | 18850000 | 0.000 | 0.000 | Conover, Elaine |
| | 0 0 04 13S 13E SL | | | | | |
| 90-735 | Point to Point | P | 18850000 | 0.000 | 0.000 | Snow, Emily Cono |
| | 0 0 04 13S 13E SL | | | | | |
| 90-736 | Point to Point | P | 18850000 | 0.000 | 0.000 | Conover, J. Georg |
| | 0 0 04 13S 13E SL | | | | | |
| 90-737 | Point to Point | P | 18850000 | 0.000 | 0.000 | Conover, J. M. |
| | 0 0 04 13S 13E SL | | | | | |
| 90-738 | Point to Point | P | 18850000 | 0.000 | 0.000 | Conover, Clyde |
| | 0 0 04 13S 13E SL | | | | | |
| 90-739 | Point to Point | P | 18850000 | 0.000 | 0.000 | Conover, Harry |
| | 0 0 04 13S 13E SL | | | | | |
| 90-740 | Point to Point | P | 18850000 | 0.000 | 0.000 | Conover, Reed |
| | 0 0 04 13S 13E SL | | | | | |
| 90-741 | Point to Point | P | 18850000 | 0.000 | 0.000 | Conover, Wallace |
| | 0 0 04 13S 13E SL | | | | | |
| 90-742 | Point to Point | P | 18850000 | 0.000 | 0.000 | Conover, Elaine |
| | 0 0 04 13S 13E SL | | | | | |

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| | 0 0 04 13S 13E SL | | | | |
| 90-743 | Point to Point<br>0 0 04 13S 13E SL | P | 18850000 | 0.000 0.000 | Snow, Emily |
| 90-744 | Point to Point<br>0 0 03 13S 13E SL | P | 18850000 | 0.000 0.000 | Conover, J. M. |
| 90-745 | Point to Point<br>0 0 03 13S 13E SL | P | 18850000 | 0.000 0.000 | Conover, Ione S. |
| 90-746 | Point to Point<br>0 0 03 13S 13E SL | P | 18850000 | 0.000 0.000 | Conover, Clyde |
| 90-747 | Point to Point<br>0 0 03 13S 13E SL | P | 18850000 | 0.000 0.000 | Conover, Harry L. |
| 90-748 | Point to Point<br>0 0 03 13S 13E SL | P | 18850000 | 0.000 0.000 | Conover, Elden |
| 90-749 | Point to Point<br>0 0 03 13S 13E SL | P | 18850000 | 0.000 0.000 | Conover, Elaine |
| 90-750 | Point to Point<br>0 0 03 13S 13E SL | P | 18850000 | 0.000 0.000 | Snow, Emily C. |
| 90-751 | Point to Point<br>0 0 03 13S 13E SL | P | 18850000 | 0.000 0.000 | Conover, Reed |
| 90-752 | Point to Point<br>0 0 03 13S 13E SL | P | 18850000 | 0.000 0.000 | Conover, Wallace |
| 90-753 | Point to Point<br>0 0 03 13S 13E SL | P | 18850000 | 0.000 0.000 | Conover, J. Georg |
| 90-754 | Point to Point<br>0 0 17 13S 13E SL | P | 18850000 | 0.044 0.000 | Conover, J. M. and |
| 90-755 | Point to Point<br>0 0 17 13S 13E SL | P | 18850000 | 0.044 0.000 | Conover, J. Georg |
| 90-756 | Point to Point<br>0 0 17 13S 13E SL | P | 18850000 | 0.044 0.000 | Conover, Wallace |
| 90-757 | Point to Point<br>0 0 17 13S 13E SL | P | 18850000 | 0.044 0.000 | Conover, Harry |
| 90-758 | Point to Point<br>0 0 17 13S 13E SL | P | 18850000 | 0.044 0.000 | Snow, Emily C. |
| 90-759 | Point to Point<br>0 0 17 13S 13E SL | P | 18850000 | 0.044 0.000 | Conover, Clyde |
| 90-760 | Point to Point<br>0 0 17 13S 13E SL | P | 18850000 | 0.044 0.000 | Conover, Reed |
| 90-761 | Point to Point<br>0 0 17 13S 13E SL | P | 18850000 | 0.044 0.000 | Conover, Elaine |

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|---|---|---|---|---|---|
| 90-762 | Point to Point<br>0 0 17 13S 13E SL | P | 18850000 | 0.044 0.000 | Conover, J. M. and |
| 90-763 | Point to Point<br>0 0 17 13S 13E SL | P | 18850000 | 0.044 0.000 | Conover, J. George |
| 90-764 | Point to Point<br>0 0 17 13S 13E SL | P | 18850000 | 0.044 0.000 | Conover, Wallace |
| 90-765 | Point to Point<br>0 0 17 13S 13E SL | P | 18850000 | 0.044 0.000 | Conover, Harry |
| 90-766 | Point to Point<br>0 0 17 13S 13E SL | P | 18850000 | 0.044 0.000 | Snow, Emily C. |
| 90-767 | Point to Point<br>0 0 17 13S 13E SL | P | 18850000 | 0.044 0.000 | Conover, Clyde |
| 90-768 | Point to Point<br>0 0 17 13S 13E SL | P | 18850000 | 0.044 0.000 | Conover, Reed |
| 90-769 | Point to Point<br>0 0 17 13S 13E SL | P | 18850000 | 0.044 0.000 | Conover, Elaine |
| 90-790 | Point to Point<br>0 0 17 13S 13E SL | P | 18850000 | 0.250 0.000 | Conover, J. M. and |
| 90-791 | Point to Point<br>0 0 17 13S 13E SL | P | 18850000 | 0.250 0.000 | Conover, J. George |
| 90-792 | Point to Point<br>0 0 17 13S 13E SL | P | 18850000 | 0.250 0.000 | Conover, Wallace |
| 90-793 | Point to Point<br>0 0 17 13S 13E SL | P | 18850000 | 0.250 0.000 | Conover, Harry |
| 90-794 | Point to Point<br>0 0 17 13S 13E SL | P | 18850000 | 0.250 0.000 | Snow, Emily C. |
| 90-795 | Point to Point<br>0 0 17 13S 13E SL | P | 18850000 | 0.250 0.000 | Conover, Reed |
| 90-796 | Point to Point<br>0 0 17 13S 13E SL | P | 18850000 | 0.250 0.000 | Conover, Elaine |
| 90-797 | Point to Point<br>0 0 17 13S 13E SL | P | 18850000 | 0.250 0.000 | Conover, Clyde |
| 90-798 | Point to Point<br>0 0 11 13S 13E SL | P | 18850000 | 0.088 0.000 | Martinez, Paul B.<br>205 300 North |
| 90-799 | Point to Point<br>0 0 11 13S 13E SL | P | 18850000 | 0.088 0.000 | Martinez, Paul B.<br>205 300 North |
| 90-800 | Point to Point<br>0 0 11 13S 13E SL | P | 18850000 | 0.088 0.000 | Martinez, Paul B.<br>205 300 North |
| 90-801 | Point to Point | P | 18850000 | 0.088 0.000 | Martinez, Mary Ann |

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| 90-801 | Point to Point | P | 18850000 | 0.088 0.000 | Martinez, Marc Ar |
| | 0 0 11 13S 13E SL | | | | 162 W. Geneva Dr |
| 90-802 | Point to Point | P | 18850000 | 0.088 0.000 | Martinez, Marc A. |
| | 0 0 11 13S 13E SL | | | | 162 West Geneva I |
| 90-803 | Point to Point | P | 18850000 | 0.088 0.000 | Martinez, Marc Ar |
| | 0 0 11 13S 13E SL | | | | 162 W. Geneva Dr |
| 90-804 | Point to Point | P | 18850000 | 0.088 0.000 | Martinez, Marc A. |
| | 0 0 11 13S 13E SL | | | | 162 W. Geneva Dr |
| 90-805 | Point to Point | P | 18850000 | 0.088 0.000 | Martinez, Joe D. |
| | 0 0 11 13S 13E SL | | | | P. O. Box 103 |
| 90-806 | Point to Point | P | 18850000 | 0.000 0.000 | Conover, J. M. anc |
| | 0 0 17 13S 13E SL | | | | |
| 90-807 | Point to Point | P | 18850000 | 0.000 0.000 | Conover, J. Georg |
| | 0 0 17 13S 13E SL | | | | |
| 90-808 | Point to Point | P | 18850000 | 0.000 0.000 | Conover, Wallace |
| | 0 0 17 13S 13E SL | | | | |
| 90-809 | Point to Point | P | 18850000 | 0.000 0.000 | Conover, Harry |
| | 0 0 17 13S 13E SL | | | | |
| 90-810 | Point to Point | P | 18850000 | 0.000 0.000 | Snow, Emily C. |
| | 0 0 17 13S 13E SL | | | | |
| 90-811 | Point to Point | P | 18850000 | 0.000 0.000 | Conover, Clyde |
| | 0 0 17 13S 13E SL | | | | |
| 90-812 | Point to Point | P | 18850000 | 0.000 0.000 | Conover, Reed |
| | 0 0 17 13S 13E SL | | | | |
| 90-813 | Point to Point | P | 18850000 | 0.000 0.000 | Conover, Elaine |
| | 0 0 17 13S 13E SL | | | | |
| 90-814 | Point to Point | P | 18850000 | 0.000 0.000 | Conover, J. Georg |
| | 0 0 05 13S 13E SL | | | | |
| 90-815 | Point to Point | P | 18850000 | 0.000 0.000 | Conover, J. M. |
| | 0 0 05 13S 13E SL | | | | |
| 90-816 | Point to Point | P | 18850000 | 0.000 0.000 | Conover, Harry |
| | 0 0 05 13S 13E SL | | | | |
| 90-817 | Point to Point | P | 18850000 | 0.000 0.000 | Conover, Reed |
| | 0 0 05 13S 13E SL | | | | |
| 90-818 | Point to Point | P | 18850000 | 0.000 0.000 | Conover, Elaine |
| | 0 0 05 13S 13E SL | | | | |
| 90-819 | Point to Point | P | 18850000 | 0.000 0.000 | Conover, Wallace |
| | 0 0 05 13S 13E SL | | | | |
| 90-821 | Point to Point | P | 18850000 | 0.000 0.000 | Snow, Emily Cono |

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| | 0 0 05 13S 13E SL | | | | |
| 90-822 | Point to Point | P | 18850000 | 0.000 0.000 | Conover, Clyde |
| | 0 0 05 13S 13E SL | | | | |
| 90-823 | Point to Point | P | 18850000 | 0.000 0.000 | Conover, J. M. |
| | 0 0 05 13S 13E SL | | | | |
| 90-824 | Point to Point | P | 18850000 | 0.000 0.000 | Conover, Ione |
| | 0 0 05 13S 13E SL | | | | |
| 90-825 | Point to Point | P | 18850000 | 0.000 0.000 | Conover, Clyde |
| | 0 0 05 13S 13E SL | | | | |
| 90-826 | Point to Point | P | 18850000 | 0.000 0.000 | Conover, Harry |
| | 0 0 05 13S 13E SL | | | | |
| 90-827 | Point to Point | P | 18850000 | 0.000 0.000 | Conover, Elden |
| | 0 0 05 13S 13E SL | | | | |
| 90-828 | Point to Point | P | 18850000 | 0.000 0.000 | Conover, Elaine |
| | 0 0 05 13S 13E SL | | | | |
| 90-829 | Point to Point | P | 18850000 | 0.000 0.000 | Conover, Reed |
| | 0 0 05 13S 13E SL | | | | |
| 90-830 | Point to Point | P | 18850000 | 0.000 0.000 | Snow, Emily C. |
| | 0 0 05 13S 13E SL | | | | |
| 90-831 | Point to Point | P | 18850000 | 0.000 0.000 | Conover, Wallace |
| | 0 0 05 13S 13E SL | | | | |
| 90-832 | Point to Point | P | 18850000 | 0.000 0.000 | Conover, J. Georg |
| | 0 0 05 13S 13E SL | | | | |
| 90-840 | Point to Point | P | 18850000 | 0.000 0.000 | Conover, J. Georg |
| | 0 0 08 13S 13E SL | | | | |
| 90-841 | Point to Point | P | 18850000 | 0.000 0.000 | Conover, Wallace |
| | 0 0 08 13S 13E SL | | | | |
| 90-842 | Point to Point | P | 18850000 | 0.000 0.000 | Conover, Harry |
| | 0 0 08 13S 13E SL | | | | |
| 90-843 | Point to Point | P | 18850000 | 0.000 0.000 | Conover, Clyde |
| | 0 0 08 13S 13E SL | | | | |
| 90-844 | Point to Point | P | 18850000 | 0.000 0.000 | Conover, Reed |
| | 0 0 08 13S 13E SL | | | | |
| 90-845 | Point to Point | P | 18850000 | 0.000 0.000 | Conover, Elaine |
| | 0 0 08 13S 13E SL | | | | |
| 90-846 | Point to Point | P | 18850000 | 0.000 0.000 | Snow, Emily Cono |
| | 0 0 08 13S 13E SL | | | | |
| 90-847 | Point to Point | P | 18850000 | 0.000 0.000 | Conover, J. M. and |
| | 0 0 08 13S 13E SL | | | | |

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| | 0 0 08 13S 13E SL | | | | |
| 90-848 | Point to Point<br>0 0 08 13S 13E SL | P | 18850000 | 0.000 0.000 | Conover, J. Georg |
| 90-849 | Point to Point<br>0 0 08 13S 13E SL | P | 18850000 | 0.000 0.000 | Conover, Wallace |
| 90-850 | Point to Point<br>0 0 08 13S 13E SL | P | 18850000 | 0.000 0.000 | Snow, Emily C. |
| 90-851 | Point to Point<br>0 0 08 13S 13E SL | P | 18850000 | 0.000 0.000 | Conover, Harry |
| 90-852 | Point to Point<br>0 0 08 13S 13E SL | P | 18850000 | 0.000 0.000 | Conover, Clyde |
| 90-853 | Point to Point<br>0 0 08 13S 13E SL | P | 18850000 | 0.000 0.000 | Conover, Elaine |
| 90-854 | Point to Point<br>0 0 08 13S 13E SL | P | 18850000 | 0.000 0.000 | Conover, Reed |
| 90-856 | Point to Point<br>0 0 09 13S 13E SL | P | 18850000 | 0.022 0.000 | Conover, J. M. |
| 90-857 | Point to Point<br>0 0 09 13S 13E SL | P | 18850000 | 0.022 0.000 | Conover, J. Georg |
| 90-858 | Point to Point<br>0 0 09 13S 13E SL | P | 18850000 | 0.022 0.000 | Conover, Elaine |
| 90-859 | Point to Point<br>0 0 09 13S 13E SL | P | 18850000 | 0.022 0.000 | Conover, Clyde |
| 90-860 | Point to Point<br>0 0 09 13S 13E SL | P | 18850000 | 0.022 0.000 | Conover, Harry |
| 90-861 | Point to Point<br>0 0 09 13S 13E SL | P | 18850000 | 0.022 0.000 | Conover, Reed |
| 90-862 | Point to Point<br>0 0 09 13S 13E SL | P | 18850000 | 0.022 0.000 | Snow, Emily C. |
| 90-863 | Point to Point<br>0 0 09 13S 13E SL | P | 18850000 | 0.022 0.000 | Conover, Wallace |
| 90-864 | Point to Point<br>0 0 09 13S 13E SL | P | 18850000 | 0.022 0.000 | Snow, Emily C. |
| 90-865 | Point to Point<br>0 0 09 13S 13E SL | P | 18850000 | 0.022 0.000 | Conover, Wallace |
| 90-866 | Point to Point<br>0 0 09 13S 13E SL | P | 18850000 | 0.022 0.000 | Conover, Reed |
| 90-867 | Point to Point<br>0 0 09 13S 13E SL | P | 18850000 | 0.022 0.000 | Conover, Harry |

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| 90-868 | Point to Point<br>0 0 09 13S 13E SL | P | 18850000 | 0.022 0.000 | Conover, Clyde |
| 90-869 | Point to Point<br>0 0 09 13S 13E SL | P | 18850000 | 0.022 0.000 | Conover, Elaine |
| 90-870 | Point to Point<br>0 0 09 13S 13E SL | P | 18850000 | 0.022 0.000 | Conover, J. M. |
| 90-871 | Point to Point<br>0 0 09 13S 13E SL | P | 18850000 | 0.022 0.000 | Conover, J. Georg |
| 90-927 | Point to Point<br>0 0 06 13S 13E SL | P | 18850000 | 0.022 0.000 | Iriart, Bernard<br>403 East 1st North |
| 91-1661 | Point to Point<br>0 0 23 13S 13E SL | P | 18690000 | 0.000 0.000 | Day, W. Lavon & |
| 91-1662 | Point to Point<br>0 0 27 13S 13E SL | P | 18690000 | 0.011 0.000 | Day, W. Lavon & |
| 91-1664 | Point to Point<br>0 0 27 13S 13E SL | P | 18700000 S | 0.011 0.000 | Day, W. Lavon & |
| 91-1665 | Point to Point<br>0 0 35 13S 13E SL | P | 18690000 | 0.000 0.000 | Day, W. Lavon & |
| 91-1666 | Point to Point<br>0 0 22 13S 13E SL | P | 18690000 S | 0.000 0.000 | Day, W. Lavon & |
| 91-1667 | Point to Point<br>0 0 34 13S 13E SL | P | 18690000 | 0.011 0.000 | Day, W. Lavon & |
| 91-1668 | Point to Point<br>0 0 23 13S 13E SL | P | 18690000 | 0.000 0.000 | Day, W. Lavon & |
| 91-1669 | Point to Point<br>0 0 27 13S 13E SL | P | 18690000 | 0.011 0.000 | Day, W. Lavon & |
| 91-1671 | Point to Point<br>0 0 27 13S 13E SL | P | 18690000 | 0.011 0.000 | Day, W. Lavon & |
| 91-1672 | Point to Point<br>0 0 35 13S 13E SL | P | 18690000 | 0.000 0.000 | Day, W. Lavon & |
| 91-1673 | Point to Point<br>0 0 22 13S 13E SL | P | 18690000 | 0.000 0.000 | Day, W. Lavon & |
| 91-1674 | Point to Point<br>0 0 34 13S 13E SL | P | 18690000 | 0.011 0.000 | Day, W. Lavon & |
| 91-168 | Point to Point<br>0 0 22 13S 13E SL | P | 19480907 | 0.001 0.000 | Thayn, George M. |
| 91-1682 | Point to Point<br>0 0 23 13S 13E SL | P | 18690000 | 0.000 0.000 | Day, W. Lavon & |
| 91-1683 | Point to Point | P | 18690000 | 0.011 0.000 | Day, W. Lavon & |

| | | | | | |
|---|---|---|---|---|---|
| 91-1683 | Point to Point<br>0 0 27 13S 13E SL | P | 18690000 | 0.011 0.000 | Day, W. Lavon & |
| 91-1685 | Point to Point<br>0 0 27 13S 13E SL | P | 18690000 | 0.011 0.000 | Day, W. Lavon & |
| 91-1686 | Point to Point<br>0 0 35 13S 13E SL | P | 18690000 | 0.000 0.000 | Day, W. Lavon & |
| 91-1687 | Point to Point<br>0 0 22 13S 13E SL | P | 18690000 | 0.000 0.000 | Day, W. Lavon & |
| 91-1688 | Point to Point<br>0 0 34 13S 13E SL | P | 18690000 | 0.011 0.000 | Day, W. Lavon & |
| 91-1689 | Point to Point<br>0 0 23 13S 13E SL | P | 18690000 | 0.000 0.000 | Day, W. Lavon & |
| 91-1690 | Point to Point<br>0 0 27 13S 13E SL | P | 18690000 | 0.011 0.000 | Day, W. Lavon & |
| 91-1692 | Point to Point<br>0 0 27 13S 13E SL | P | 18690000 | 0.011 0.000 | Day, W. Lavon & |
| 91-1693 | Point to Point<br>0 0 35 13S 13E SL | P | 18690000 | 0.000 0.000 | Day, W. Lavon & |
| 91-1694 | Point to Point<br>0 0 22 13S 13E SL | P | 18690000 | 0.000 0.000 | Day, W. Lavon & |
| 91-1695 | Point to Point<br>0 0 34 13S 13E SL | P | 18690000 | 0.011 0.000 | Day, W. Lavon & |
| 91-1703 | Point to Point<br>0 0 23 13S 13E SL | P | 18690000 | 0.000 0.000 | Day, W. Lavon & |
| 91-1704 | Point to Point<br>0 0 27 13S 13E SL | P | 18690000 | 0.011 0.000 | Day, W. Lavon & |
| 91-1706 | Point to Point<br>0 0 27 13S 13E SL | P | 18690000 | 0.011 0.000 | Day, W. Lavon & |
| 91-1707 | Point to Point<br>0 0 35 13S 13E SL | P | 18690000 | 0.000 0.000 | Day, W. Lavon & |
| 91-1708 | Point to Point<br>0 0 22 13S 13E SL | P | 18690000 | 0.000 0.000 | Day, W. Lavon & |
| 91-1709 | Point to Point<br>0 0 34 13S 13E SL | P | 18690000 | 0.011 0.000 | Day, W. Lavon & |
| 91-1717 | Point to Point<br>0 0 34 13S 13E SL | P | 18690000 | 0.000 0.000 | Wells, Glen<br>P. O. Box 52 |
| 91-1719 | Point to Point<br>0 0 33 13S 13E SL | P | 18690000 | 0.011 0.000 | Wells, Glen<br>P. O. Box 52 |
| 91-1720 | Point to Point | P | 18690000 S | 0.000 0.000 | Wells, Glen |

| | | | | | |
|---|---|---|---|---|---|
| | 0 0 33 13S 13E SL | | | | P. O. Box 52 |
| 91-1721 | Point to Point | P | 18690000 | 0.000 0.000 | Wells, Glen |
| | 0 0 33 13S 13E SL | | | | P. O. Box 52 |
| 91-1722 | Point to Point | P | 18690000 | 0.000 0.000 | Stevenson, Ralph |
| | 0 0 34 13S 13E SL | | | | P. O. Box 52 |
| 91-1724 | Point to Point | P | 18690000 | 0.011 0.000 | Stevenson, Ralph |
| | 0 0 33 13S 13E SL | | | | P. O. Box 52 |
| 91-1725 | Point to Point | P | 18690000 | 0.000 0.000 | Wells, Glen |
| | 0 0 33 13S 13E SL | | | | P. O. Box 52 |
| 91-1726 | Point to Point | P | 18690000 | 0.000 0.000 | Stevenson, Ralph |
| | 0 0 33 13S 13E SL | | | | P. O. Box 52 |
| 91-1728 | Point to Point | P | 18690000 | 0.011 0.000 | Thayn, George M. |
| | 0 0 29 13S 13E SL | | | | |
| 91-1729 | Point to Point | P | 18690000 | 0.011 0.000 | Thayn, George M. |
| | 0 0 28 13S 13E SL | | | | |
| 91-1730 | Point to Point | P | 18690000 | 0.011 0.000 | Thayn, George M. |
| | 0 0 27 13S 13E SL | | | | |
| 91-1731 | Point to Point | P | 18690000 | 0.000 0.000 | Thayn, George M. |
| | 0 0 27 13S 13E SL | | | | |
| 91-1732 | Point to Point | P | 18690000 | 0.011 0.000 | Thayn, George |
| | 0 0 21 13S 13E SL | | | | |
| 91-1733 | Point to Point | P | 18690000 | 0.011 0.000 | Thayn, George M. |
| | 0 0 20 13S 13E SL | | | | |
| 91-1734 | Point to Point | P | 18690000 | 0.011 0.000 | Thayn, George M. |
| | 0 0 20 13S 13E SL | | | | |
| 91-1735 | Point to Point | P | 18690000 | 0.000 0.000 | Thayn, George |
| | 0 0 20 13S 13E SL | | | | |
| 91-1736 | Point to Point | P | 18690000 | 0.000 0.000 | Thayn, George M. |
| | 0 0 17 13S 13E SL | | | | |
| 91-1737 | Point to Point | P | 18690000 | 0.000 0.000 | Thayn, George M. |
| | 0 0 30 13S 13E SL | | | | |
| 91-1739 | Point to Point | P | 18690000 | 0.011 0.000 | Thayn, George M. |
| | 0 0 19 13S 13E SL | | | | |
| 91-1740 | Point to Point | P | 18690000 | 0.011 0.000 | Thayn, George M. |
| | 0 0 19 13S 13E SL | | | | |
| 91-1747 | Point to Point | P | 18690000 | 0.011 0.000 | Thayn, George M. |
| | 0 0 22 13S 13E SL | | | | |
| 91-1993 | Point to Point | P | 18690000 | 0.011 0.000 | Liddell, Frank |
| | 0 0 24 13S 13E SL | | | | Post Office Box 1C |
| 91-2012 | Point to Point | P | 18690000 S | 0.000 0.000 | Liddell, Frank |
| | 0 0 23 13S 13E SL | | | | Post Office Box 1C |
| 91-2013 | Point to Point | P | 18690000 | 0.000 0.000 | Liddell, Frank |
| | N2120 W340 S4 23 13S 13E SL | | | | Post Office Box 1C |

| | | | | | |
|---|---|---|---|---|---|
| 91-2023 | Point to Point<br>0 0 34 13S 13E SL | P | 18690000 | 0.000 0.000 | Pagano, Jay |
| 91-2024 | Point to Point<br>0 0 24 13S 13E SL | P | 18690000 S | 0.000 0.000 | Pagano, Jay |
| 91-2033 | Point to Point<br>0 0 35 13S 13E SL | P | 18690000 | 0.000 0.000 | Pagano, Jay |
| 91-2034 | Point to Point<br>0 0 35 13S 13E SL | P | 18690000 | 0.011 0.000 | Pagano, Jay |
| 91-2035 | Point to Point<br>0 0 35 13S 13E SL | P | 18690000 | 0.011 0.000 | Pagano, Jay |
| 91-2036 | Point to Point<br>0 0 35 13S 13E SL | P | 18690000 | 0.011 0.000 | Pagano, Jay |
| 91-2037 | Point to Point<br>0 0 35 13S 13E SL | P | 18690000 | 0.000 0.000 | Pagano, Jay |
| 91-2175 | Point to Point<br>0 0 22 13S 13E SL | P | 18690000 | 0.000 0.000 | Thayn, George M. |
| 91-300 | Point to Point<br>0 0 35 13S 13E SL | P | 18690000 | 0.000 0.000 | Pagano, Jay |
| 91-3033 | Point to Point<br>0 0 21 13S 13E SL | P | 18690000 | 0.011 0.000 | Thayn, George M. |
| 91-331 | Point to Point<br>0 0 23 13S 13E SL | P | 19060000 DX | 0.033 1.820 | Utah Oil & Wax C<br>PO Box 13 |
| 91-3474 | Point to Point<br>0 0 34 13S 13E SL | P | 18690000 | 0.011 0.000 | Day, W. Lavon & |
| 91-3475 | Point to Point<br>0 0 34 13S 13E SL | P | 18690000 | 0.011 0.000 | Day, W. Lavon & |
| 91-3476 | Point to Point<br>0 0 34 13S 13E SL | P | 18690000 | 0.011 0.000 | Day, W. Lavon & |
| 91-3477 | Point to Point<br>0 0 34 13S 13E SL | P | 18690000 | 0.011 0.000 | Day, W. Lavon & |
| 91-3478 | Point to Point<br>0 0 34 13S 13E SL | P | 18690000 | 0.011 0.000 | Day, W. Lavon & |
| 91-3479 | Point to Point<br>0 0 34 13S 13E SL | P | 18690000 | 0.011 0.000 | Day, W. Lavon & |
| 91-3480 | Point to Point<br>0 0 34 13S 13E SL | P | 18690000 | 0.011 0.000 | Day, W. Lavon & |
| 91-3481 | Point to Point<br>0 0 34 13S 13E SL | P | 18690000 | 0.011 0.000 | Day, W. Lavon & |
| 91-3482 | Point to Point | P | 18690000 | 0.011 0.000 | Day, W. Lavon & |

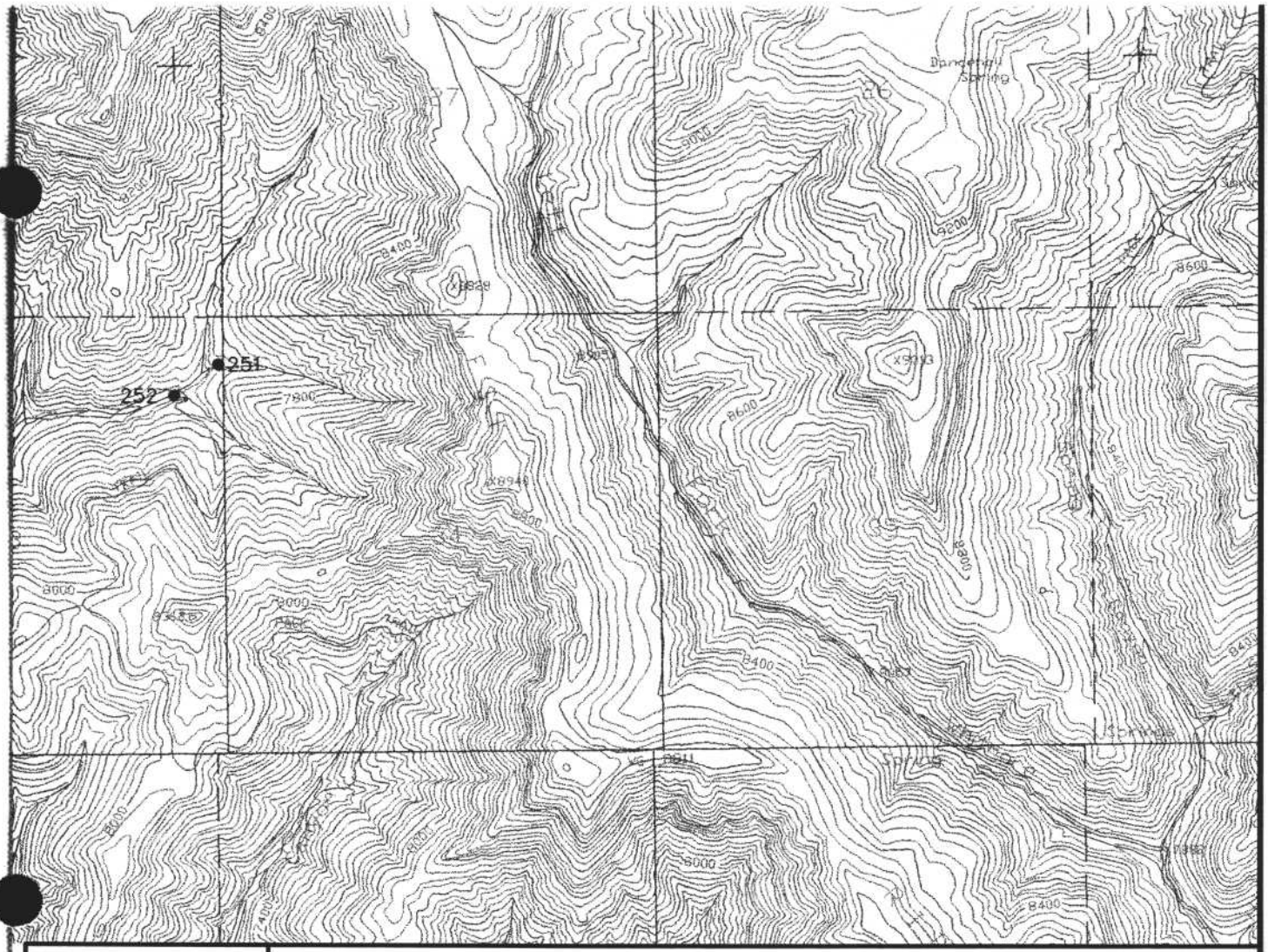
| | | | | | |
|---|---|---|---|---|---|
| 91-3482 | Point to Point<br>0 0 34 13S 13E SL | P | 18690000 | 0.011 0.000 | Day, W. Lavon & |
| 91-3483 | Point to Point<br>0 0 34 13S 13E SL | P | 18690000 | 0.011 0.000 | Day, W. Lavon & |
| 91-3484 | Point to Point<br>0 0 22 13S 13E SL | P | 18690000 | 0.011 0.000 | Day, W. Lavon & |
| 91-3485 | Point to Point<br>0 0 22 13S 13E SL | P | 18690000 | 0.011 0.000 | Day, W. Lavon & |
| 91-3486 | Point to Point<br>0 0 22 13S 13E SL | P | 18690000 | 0.011 0.000 | Day, W. Lavon & |
| 91-3487 | Point to Point<br>0 0 22 13S 13E SL | P | 18690000 | 0.011 0.000 | Day, W. Lavon & |
| 91-3488 | Point to Point<br>0 0 22 13S 13E SL | P | 18690000 | 0.011 0.000 | Day, W. Lavon & |
| 91-3489 | Point to Point<br>0 0 22 13S 13E SL | P | 18690000 | 0.011 0.000 | Day, W. Lavon & |
| 91-3490 | Point to Point<br>0 0 22 13S 13E SL | P | 18690000 | 0.011 0.000 | Day, W. Lavon & |
| 91-3491 | Point to Point<br>0 0 22 13S 13E SL | P | 18690000 | 0.011 0.000 | Day, W. Lavon & |
| 91-3492 | Point to Point<br>0 0 22 13S 13E SL | P | 18690000 | 0.011 0.000 | Day, W. Lavon & |
| 91-3493 | Point to Point<br>0 0 22 13S 13E SL | P | 18690000 | 0.011 0.000 | Day, W. Lavon & |
| 91-3494 | Point to Point<br>0 0 22 13S 13E SL | P | 18690000 | 0.011 0.000 | Day, W. Lavon & |
| 91-3495 | Point to Point<br>0 0 22 13S 13E SL | P | 18690000 | 0.011 0.000 | Day, W. Lavon & |
| 91-3496 | Point to Point<br>0 0 22 13S 13E SL | P | 18690000 | 0.011 0.000 | Day, W. Lavon & |
| 91-3497 | Point to Point<br>0 0 22 13S 13E SL | P | 18690000 | 0.011 0.000 | Day, W. Lavon & |
| 91-3498 | Point to Point<br>0 0 22 13S 13E SL | P | 18690000 | 0.011 0.000 | Day, W. Lavon & |
| 91-4680 | Point to Point<br>0 0 30 13S 13E SL | P | 18690000 OS | 0.000 0.000 | USA Bureau of La<br>(Price Field Office)<br>125 South 600 We |
| 91-4758 | Point to Point<br>0 0 13 13S 13E SL | P | 18690000 OS | 0.000 0.000 | USA Bureau of La<br>(Price Field Office)<br>125 South 600 We |
| 91-4775 | Point to Point<br>0 0 33 13S 13E SL | P | 18690000 OS | 0.000 0.000 | USA Bureau of La<br>(Price Field Office)<br>125 South 600 We |
| 91-4783 | Point to Point | P | 18690000 OS | 0.000 0.000 | USA Bureau of La<br>(Price Field Office) |

| | | | | | |
|---|---|---|---|---|---|
| | 0 0 31 13S 13E SL | | | | 125 South 600 We |
| 91-4795 | Point to Point | P | 18690000 S | 0.000 0.000 | Stevenson, Ralph |
| | 0 0 33 13S 13E SL | | | | P.O. Box 52 |
| 91-4796 | Point to Point | P | 18690000 S | 0.000 0.000 | Stevenson, Ralph |
| | 0 0 33 13S 13E SL | | | | P.O. Box 52 |
| 91-4797 | Point to Point | P | 18690000 S | 0.000 0.000 | Stevenson, Ralph |
| | 0 0 34 13S 13E SL | | | | P.O. Box 52 |

| Site | Flow gpm | pH SU | Cond. umhos | Temp. C | TSS mg/l | TDS mg/l | Ca mg/l | Mg mg/l | Na mg/l | K mg/l | HCO3 mg/l | CO3 mg/l | SO4 mg/l | CL mg/l | SiO2 mg/l | Air Temp. C | Diss. Ox. ppm | Al mg/l | As mg/l | Ba mg/l | B mg/l | Cd mg/l |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PC-1A | | | | | | | | | | | | | | | | | | | | | | |
| March 30, 1999 | No Access | | | | | | | | | | | | | | | | 8.00 | <0.03 | <0.001 | | 0.04 | <0.0005 |
| June 21, 1999 | 79.62 | 8.29 | 728.00 | 10.30 | 34.00 | 480.00 | 71.80 | 52.40 | 29.30 | 2.00 | <2 | <2 | 90.00 | 9.20 | | | | | | | | |
| September 21, 1999 | 15.00 | 8.43 | 716.00 | 14.50 | 28.00 | 470.00 | 74.50 | 51.90 | 32.10 | 2.60 | <2 | <2 | 100.00 | 3.00 | | | 6.00 | 0.03 | <0.001 | | 0.05 | <0.0005 |
| June 14, 2000 | 67.30 | 8.28 | 721.00 | 17.00 | 34.00 | 480.00 | 71.80 | 52.40 | 29.30 | 2.00 | <2 | <2 | 90.00 | 9.20 | | | 7.00 | <0.03 | <0.001 | | 0.04 | <0.0005 |
| September 26, 2000 | 15.00 | 8.40 | 730.00 | 2.00 | <5 | 510.00 | 75.10 | 57.20 | 32.20 | 2.20 | <2 | <2 | 100.00 | <2 | | | 8.00 | <0.03 | <0.001 | | 0.05 | <0.0005 |
| June 20, 2001 | 15.00 | 8.40 | 560.00 | 9.00 | <5 | 440.00 | 69.10 | 47.30 | 25.50 | 2.10 | <2 | <2 | 70.00 | 3.00 | | | 8.00 | <0.03 | <0.0005 | | 0.04 | <0.0005 |
| September 25, 2001 | 9.20 | 8.60 | 630.00 | 9.00 | <5 | 500.00 | 77.20 | 55.70 | 30.50 | 2.50 | <2 | 12.00 | 90.00 | 3.00 | | | 8.00 | <0.03 | 0.0005 | | 0.04 | <0.0005 |
| April 9, 2002 | 20.00 | 7.48 | 499.00 | 4.00 | 1.11 | 388.00 | 64.80 | 46.60 | 26.90 | 2.10 | <2 | <2 | 90.00 | 3.00 | | | 6.00 | | | | | |
| August 7, 2002 | 5.50 | 7.92 | 1039.00 | 14.00 | 28.00 | 463.00 | 68.90 | 54.50 | 32.70 | 2.50 | <2 | <2 | 90.00 | 3.00 | | | 6.00 | | | | | |
| October 17, 2002 | 2.30 | 7.86 | 1099.00 | 1.00 | <5 | 480.00 | 76.80 | 54.90 | 29.90 | 2.00 | <2 | <2 | 100.00 | 3.00 | | | 5.00 | | | | | |
| June 26, 2003 | 38.00 | 8.72 | 856.00 | 12.00 | <5 | 451.00 | 71.50 | 51.00 | 29.50 | 2.20 | <2 | <2 | 90.00 | 3.00 | | | 5.50 | | | | | |
| August 14, 2003 | 4.00 | 8.80 | 741.00 | 15.00 | 8.00 | 490.00 | 74.70 | 53.60 | 31.00 | 2.30 | | 40.00 | 100.00 | 3.00 | | | 5.50 | | | | | |
| October 1, 2003 | 1.10 | 8.49 | 761.00 | 5.00 | 10.00 | 466.00 | 73.60 | 51.10 | 28.40 | 1.80 | <2 | <2 | 90.00 | 3.00 | | | 6.00 | | | | | |
| PC-2 | | | | | | | | | | | | | | | | | | | | | | |
| March 30, 1999 | 198.50 | 8.83 | 816.00 | 11.60 | 18.00 | 560.00 | 52.40 | 66.20 | 45.20 | 2.90 | <2 | <2 | 170.00 | 8.00 | | | 6.00 | 0.06 | <0.001 | | 0.06 | <0.0005 |
| June 21, 1999 | 54.39 | 8.54 | 869.00 | 4.50 | 12.00 | 570.00 | 70.60 | 71.10 | 47.40 | 2.90 | <2 | 10.00 | 170.00 | 7.00 | | | 8.00 | <0.03 | <0.001 | | 0.06 | <0.0005 |
| September 21, 1999 | 132.57 | 8.90 | 809.00 | 14.80 | 16.00 | 560.00 | 66.50 | 62.70 | 47.90 | 4.00 | <2 | <2 | 170.00 | 7.00 | | | 6.00 | <0.03 | <0.001 | | 0.07 | <0.0005 |
| November 30, 1999 | 74.68 | 7.52 | 897.00 | 5.40 | <5 | 620.00 | 71.30 | 71.70 | 43.50 | 2.90 | <2 | 4.00 | 200.00 | 8.00 | | | 9.00 | <0.03 | <0.001 | | 0.06 | <0.0005 |
| June 19, 2000 | 177.28 | 8.57 | 969.00 | 6.00 | <5 | 560.00 | 60.20 | 72.60 | 49.50 | 3.10 | <2 | 41.00 | 180.00 | 7.00 | | | 7.00 | <0.03 | <0.001 | | 0.06 | <0.0005 |
| September 26, 2000 | 66.78 | 8.10 | 660.00 | 3.30 | <5 | 650.00 | 69.20 | 72.00 | 47.90 | 3.70 | <2 | 7.00 | 210.00 | 9.00 | | | 8.00 | <0.03 | <0.001 | | 0.06 | <0.0005 |
| June 20, 2001 | 577.90 | 8.80 | 690.00 | 15.50 | 6.00 | 530.00 | 52.70 | 63.70 | 44.00 | 2.60 | <2 | 5.00 | 150.00 | 8.00 | | | 8.00 | <0.03 | 0.0005 | | 0.07 | <0.0005 |
| September 25, 2001 | 15.00 | 8.80 | 720.00 | 8.50 | <5 | 610.00 | 60.30 | 74.80 | 48.30 | 3.60 | <2 | 25.00 | 210.00 | 8.00 | | | 8.00 | <0.03 | 0.0006 | | 0.07 | <0.0005 |
| April 9, 2002 | 19.00 | 7.94 | 706.00 | 7.00 | <5 | 579.00 | 69.60 | 70.00 | 42.50 | 3.20 | <2 | <2 | 230.00 | 11.20 | | | 5.00 | | | | | |
| August 7, 2002 | No Flow | | | | | | | | | | | | | | | | - | | | | | |
| October 11, 2002 | 15.00 | 7.94 | 910.00 | 10.00 | <5 | 745.00 | 74.40 | 85.20 | 53.80 | 4.40 | <2 | <2 | 260.00 | 10.00 | | | 5.50 | | | | | |
| March 25, 2003 | 6.60 | 8.35 | 1298.00 | 0.00 | | | | | | | | | | | | | | | | | | |
| June 26, 2003 | 95.00 | 8.80 | 1138.00 | 11.00 | <5 | 586.00 | 56.80 | 68.90 | 49.50 | 3.50 | <2 | 25.00 | 210.00 | 7.00 | | | 6.00 | | | | | |
| August 14, 2003 | No Flow | | | | | | | | | | | | | | | | | | | | | |
| October 1, 2003 | No Flow | | | | | | | | | | | | | | | | | | | | | |
| RC-1 | | | | | | | | | | | | | | | | | | | | | | |
| March 30, 1999 | No Flow | | | | | | | | | | | | | | | | | | | | | |
| June 21, 1999 | No Flow | | | | | | | | | | | | | | | | | | | | | |
| September 21, 1999 | 3.59 | 7.00 | 1537.00 | 13.90 | <5 | 955.00 | 135.00 | 150.00 | 74.20 | 8.50 | <2 | <2 | 590.00 | 16.00 | | | 4.00 | <0.03 | <0.001 | | 0.116 | <0.0005 |
| June 14, 2000 | No Flow | | | | | | | | | | | | | | | | | | | | | |
| September 26, 2000 | 15.00 | 8.00 | 1120.00 | 9.44 | <5 | 860.00 | 81.20 | 92.80 | 70.70 | 4.60 | <2 | <2 | 330.00 | 12.00 | | | 6.00 | <0.03 | <0.001 | | 0.11 | <0.0005 |
| June 20, 2001 | 12.00 | 8.40 | 890.00 | 11.00 | | | | | | | | | | | | | 6.00 | | | | | |
| September 25, 2001 | 0.44 | 8.30 | 1050.00 | 9.50 | <5 | 860.00 | 82.80 | 96.80 | 76.60 | 4.70 | <2 | <2 | 360.00 | 12.00 | | | 6.00 | <0.03 | 0.005 | | 0.11 | <0.0005 |
| April 9, 2002 | No Flow | | | | | | | | | | | | | | | | | | | | | |
| August 5, 2002 | No Flow | | | | | | | | | | | | | | | | | | | | | |
| October 11, 2002 | 0.03 | 7.77 | 2130.00 | 8.00 | 6.00 | 1160.00 | 125.00 | 138.00 | 63.90 | 8.00 | <2 | <2 | 530.00 | 18.00 | | | 5.00 | 0.03 | <0.001 | | 0.14 | <0.0005 |
| March 25, 2003 | No Flow | | | | | | | | | | | | | | | | | | | | | |
| June 26, 2003 | No Flow | | | | | | | | | | | | | | | | | | | | | |
| August 14, 2003 | No Flow | | | | | | | | | | | | | | | | | | | | | |
| October 1, 2003 | No Flow | | | | | | | | | | | | | | | | | | | | | |

RED

| Site | Cr mg/l | F mg/l | Fe Diss. mg/l | Fe (T) mg/l | Pb mg/l | Mn mg/l | Hg mg/l | Mo mg/l | Ni mg/l | NO2 mg/l | NO3 mg/l | Oil & G mg/l | Acidity mg/l | PO4 mg/l | Se mg/l | Sulfide mg/l | Zn mg/l | Sr mg/l | Li mg/l |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PC-1A | | | | | | | | | | | | | | | | | | | |
| March 30, 1999 | | | <0.01 | 0.92 | <0.04 | 0.011 | | <0.01 | | <0.03 | 0.44 | <2 | | <0.05 | <0.001 | | <0.01 | | |
| June 21, 1999 | | | | | | | | | | | | | | | | | | | |
| September 21, 1999 | | | <0.01 | 0.43 | <0.04 | 0.039 | | <0.01 | | <0.03 | 0.07 | | | <0.05 | <0.001 | | <0.01 | | |
| June 14, 2000 | | | <0.01 | 0.92 | <0.04 | 0.011 | | <0.01 | | <0.03 | 0.44 | <2 | | <0.05 | <0.001 | | <0.01 | | |
| September 26, 2000 | | | <0.01 | 1.88 | <0.0001 | 0.024 | <0.001 | <0.01 | | <0.03 | 0.22 | <2 | | <0.05 | <0.001 | | <0.01 | | |
| June 20, 2001 | | | <0.01 | 0.33 | <0.0001 | 0.022 | | <0.01 | | <0.03 | 0.44 | | | <0.05 | <0.001 | | <0.01 | | |
| September 25, 2001 | | | <0.01 | 0.18 | <0.0001 | 0.024 | | <0.01 | | <0.03 | 0.18 | | | <0.05 | <0.001 | | <0.01 | | |
| April 9, 2002 | | | 0.01 | 6.72 | | 0.116 | | | | | | | | | | | | | |
| August 7, 2002 | | | <0.01 | 0.59 | | 0.025 | | | | | | | | | | | | | |
| October 17, 2002 | | | <0.01 | 0.10 | | 0.023 | | | | | | | | | | | | | |
| June 26, 2003 | | | <0.01 | 0.14 | | 0.011 | | | | | | | | | | | | | |
| August 14, 2003 | | | 0.13 | 0.17 | | 0.007 | | | | | | | | | | | | | |
| October 1, 2003 | | | <0.02 | 0.39 | | 0.014 | | | | | | | | | | | | | |
| PC-2 | | | | | | | | | | | | | | | | | | | |
| March 30, 1999 | | | 0.10 | 0.63 | <0.04 | 0.020 | | <0.01 | | <0.03 | 0.73 | | | 0.08 | <0.001 | | <0.01 | | |
| June 21, 1999 | | | <0.01 | 0.17 | <0.04 | 0.007 | | <0.01 | | <0.01 | 0.20 | <2 | | 0.05 | 0.001 | | <0.01 | | |
| September 21, 1999 | | | <0.01 | 0.22 | <0.04 | 0.007 | | <0.01 | | <0.03 | 0.06 | | | <0.05 | <0.001 | | <0.01 | | |
| November 30, 1999 | | | <0.01 | 0.03 | <0.04 | <0.005 | | <0.01 | | <0.03 | 0.76 | | | <0.05 | 0.002 | | <0.01 | | |
| June 19, 2000 | | | <0.01 | 0.87 | <0.04 | 0.029 | | <0.01 | | <0.03 | 0.49 | | | <0.05 | 0.001 | | <0.01 | | |
| September 26, 2000 | | | <0.01 | 0.02 | <0.0001 | 0.039 | | <0.01 | | <0.03 | 0.04 | <2 | | <0.05 | <0.001 | | <0.01 | | |
| June 20, 2001 | | | <0.01 | 0.18 | <0.0001 | 0.008 | | <0.01 | | <0.03 | 0.73 | | | 0.08 | 0.001 | | <0.01 | | |
| September 25, 2001 | | | <0.01 | 0.05 | <0.0001 | 0.006 | | <0.01 | | <0.03 | <0.03 | | | <0.05 | <0.001 | | <0.01 | | |
| April 9, 2002 | | | <0.01 | <0.01 | | 0.006 | | | | | | | | | | | | | |
| August 7, 2002 | | | | | | | | | | | | | | | | | | | |
| October 11, 2002 | | | 0.02 | 0.02 | | 0.007 | | | | | | | | | | | | | |
| March 25, 2003 | | | | | | | | | | | | | | | | | | | |
| June 26, 2003 | | | <0.01 | 0.02 | | <0.005 | | | | | | | | | | | | | |
| August 14, 2003 | | | | | | | | | | | | | | | | | | | |
| October 1, 2003 | | | | | | | | | | | | | | | | | | | |
| RC-1 | | | | | | | | | | | | | | | | | | | |
| March 30, 1999 | | | | | | | | | | | | | | | | | | | |
| June 21, 1999 | | | | | | | | | | | | | | | | | | | |
| September 21, 1999 | | | 0.02 | 0.02 | <0.0001 | 0.074 | | <0.01 | | <0.03 | 0.31 | <2 | | <0.05 | 0.004 | | <0.01 | | |
| June 14, 2000 | | | | | | | | | | | | | | | | | | | |
| September 26, 2000 | | | 0.03 | 0.15 | <0.0001 | 0.047 | <0.001 | <0.01 | | <0.03 | 0.04 | <2 | | <0.05 | 0.002 | | <0.01 | | |
| June 20, 2001 | | | | | | | | | | | | | | | | | | | |
| September 25, 2001 | | | <0.01 | 0.01 | <0.0002 | <0.005 | | <0.01 | | <0.03 | <0.03 | <2 | | <0.05 | <0.001 | | <0.01 | | |
| April 9, 2002 | | | | | | | | | | | | | | | | | | | |
| August 5, 2002 | | | | | | | | | | | | | | | | | | | |
| October 11, 2002 | | | 0.08 | 0.13 | 0.0001 | 0.023 | | <0.01 | | | 0.04 | <2 | | 8.00 | <0.001 | | <0.01 | | |
| March 25, 2003 | | | | | | | | | | | | | | | | | | | |
| June 26, 2003 | | | | | | | | | | | | | | | | | | | |
| August 14, 2003 | | | | | | | | | | | | | | | | | | | |
| October 1, 2003 | | | | | | | | | | | | | | | | | | | |




| REVISION | |
|---|---|
| DATE | BY |
| 11-15-04 | LDJ/VSM |

**Canyon Fuel Company, LLC**

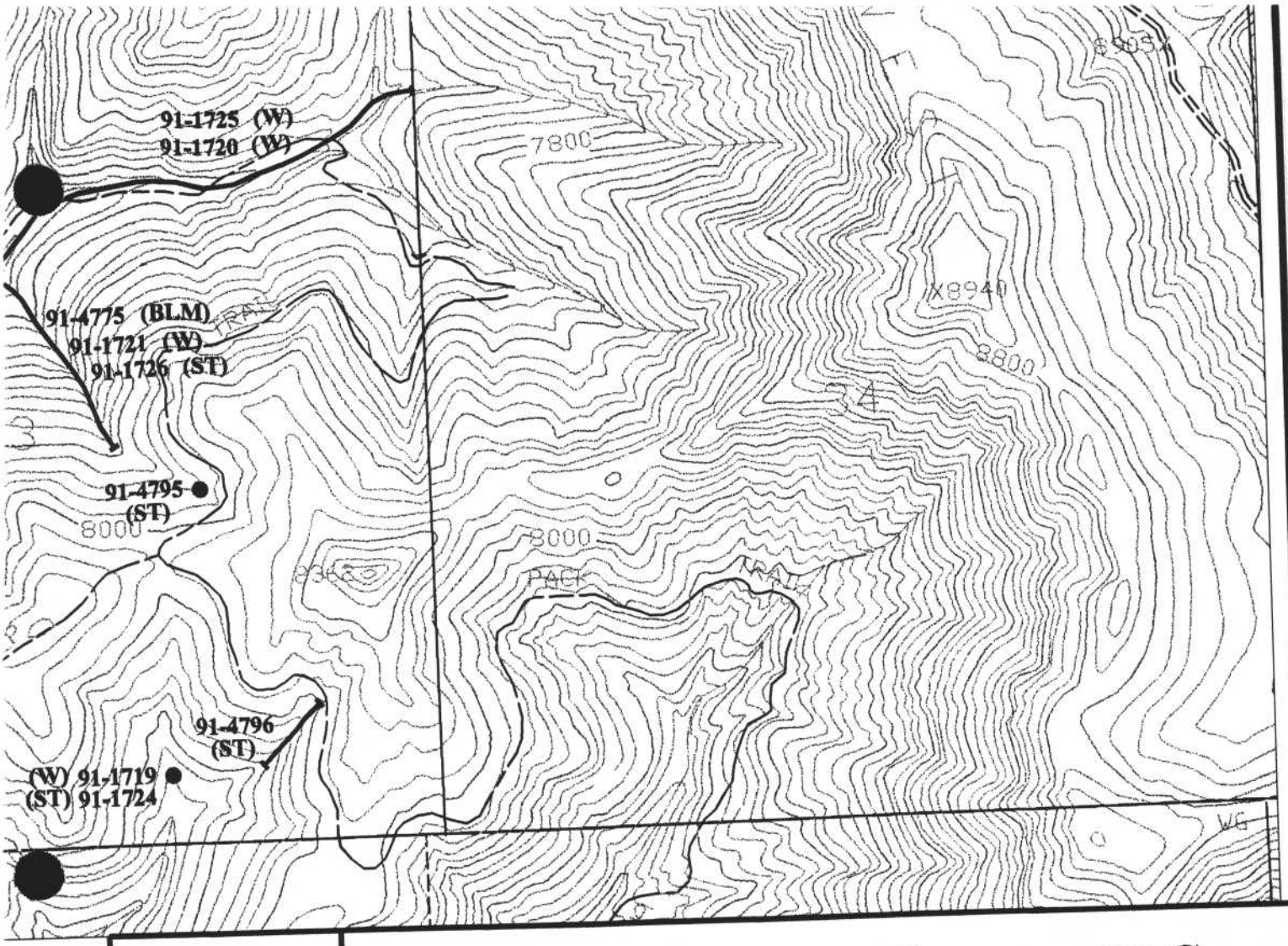
**Soldier Canyon & Dugout Canyon Mines**

# HYDROLOGIC MONITORING STATIONS

Blue

## Dugout Canyon Mine

| | | |
|---|---|---|
| DRAWN BY: JLP | DATE: MAY 13, 1999 | SCALE: 1" = 2000' |
| APPROVED BY: LDJ | FILE NAME: G:\UC801\07\PERMIT DWG\SITLA \PLATE7-1.DWG\11-19-04 | DRAWING OR MAP NUMBER **PLATE 7-1** |




| REVISIONS | |
|---|---|
| DATE | BY |
| 8/20/01 | JCB |
| 11/8/01 | JCB |
| 12/31/03 | RR |

# Canyon Fuel Company, LLC

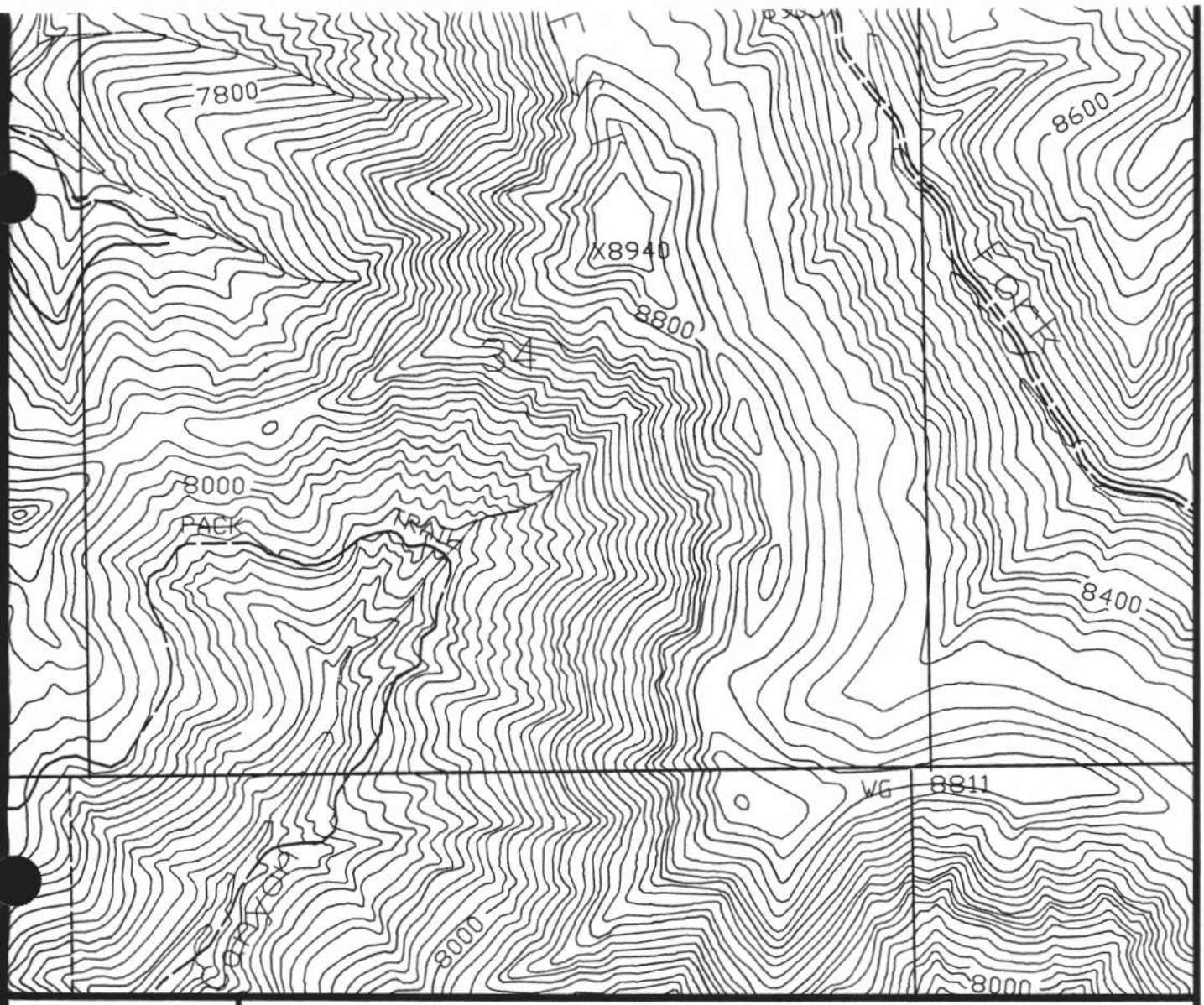
## Soldier Canyon & Dugout Canyon Mines

RED

# WATER RIGHTS

## Dugout Canyon Mine

| | | |
|---|---|---|
| DRAWN BY: JLP | DATE: MAY 8, 1999 | SCALE: 1" = 1000' |
| APPROVED BY: DGS | FILE NAME: X\DOGM\Working Files\Dugout\Sitla\Plate 7-2.dwg | DRAWING OR MAP NUMBER PLATE 7-2 |




| REVISIONS | |
|---|---|
| DATE | BY |
| 12/18/03 | RR |

**Canyon Fuel Company, LLC**
**Soldier Canyon & Dugout Canyon Mines**

Remove

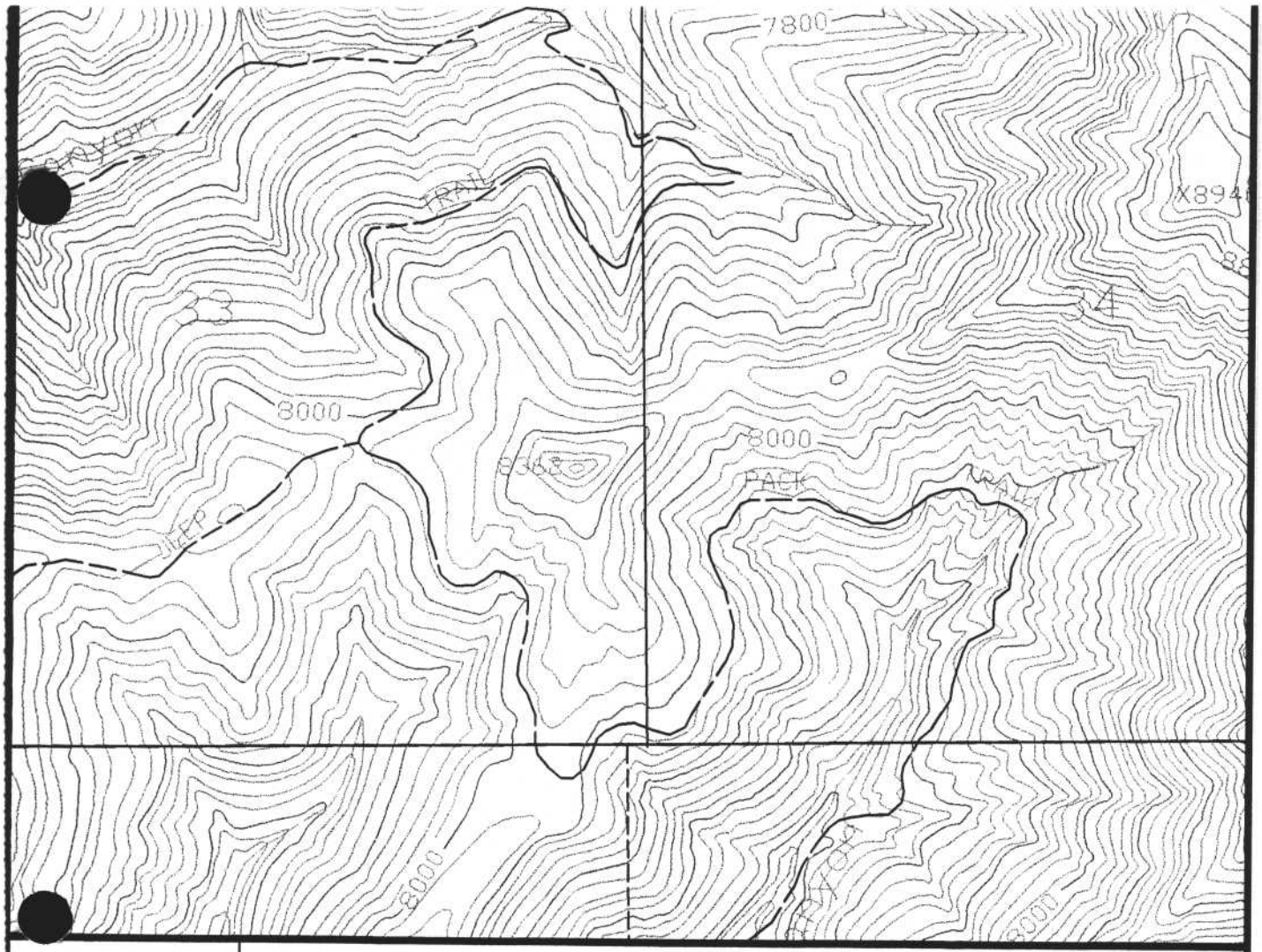
# CASTLEGATE POTENTIOMETRIC SURFACE

11/29/04 PER TASK # 1915

RED

## Dugout Canyon Mine

| | | |
|---|---|---|
| DRAWN BY: JLP | DATE: MAY 5, 1999 | SCALE: 1" = 1000' |
| APPROVED BY: DGS | FILE NAME: X\DOGM\Working Files\Dugout\Sitla\Plate 7-3.dwg | DRAWING OR MAP NUMBER PLATE 7-3 |




| REVISION | |
|---|---|
| DATE | BY |
| 12/18/03 | RR |

# Canyon Fuel Company, LLC

**Soldier Canyon & Dugout Canyon Mines**

# DUGOUT CREEK WATERSHED UPSTREAM FROM SURFACE FACILITIES

RED

## Dugout Canyon Mine

| | | |
|---|---|---|
| DRAWN BY: SWF | DATE: MAY 10, 1999 | SCALE: 1" = 1000' |
| APPROVED BY: RBW | FILE NAME: X\DOGM\Working Files\Dugout\Sitla\Plate 7-6.dwg | DRAWING OR MAP NUMBER **PLATE 7-6** |