Application for Permit Change
Detailed Schedule of Changes to the Permit

Title of Change: SUNNYSIDE COGENERATION ASSOCIATES

Permit submittal to address deficiencies listed in DOGM's TA dated May 30, 1995

Permit Number: ACT/007/035

Mine: Sunnyside Cogen. Assoc.

Permittee: Sunnyside Cogen. Assoc.

Provide a detailed listing of all changes to the mining and reclamation plan which will be required as a result of this proposed permit change. Individually list all maps and drawings which are to be added, replaced, or removed from the plan. Include changes of the table of contents, section of the plan, pages or other information as needed to specifically locate, identify and revise the exiting mining and reclamation plan. **Include page, section and drawing numbers as part of the description.**

			DESCRIPTION OF MAP, TEXT, OR MATERIALS TO BE CHANGED
☐ ADD	☒ REPLACE	☐ REMOVE	PERMIT TEXT - Chapter 4
☐ ADD	☒ REPLACE	☐ REMOVE	PERMIT TEXT - Chapter 5
☐ ADD	☒ REPLACE	☐ REMOVE	PERMIT TEXT - Chapter 7
☐ ADD	☒ REPLACE	☐ REMOVE	PERMIT TEXT - Chapter 9
☐ ADD	☒ REPLACE	☐ REMOVE	FIGURE 10-3 Pinyon/Juniper/ Sagebrush Seeding Schedule
☒ ADD	☐ REPLACE	☐ REMOVE	FIGURE 10-4 Hydrophytic Vegetation Seeding Schedule
☐ ADD	☒ REPLACE	☐ REMOVE	APPENDIX 4-5 A Stratified Archeological Sample Survey
☐ ADD	☒ REPLACE	☐ REMOVE	APPENDIX 7-4 Baseline Water Quality Data
☐ ADD	☒ REPLACE	☐ REMOVE	APPENDIX 7-8 Surface and Groundwater Monitoring
☐ ADD	☒ REPLACE	☐ REMOVE	Plates 3-1, 3-1A, 3-1B, 3-1C, 3-1D, 3-1E Pre-Law, Post-Law & Future Disturbed Areas
☐ ADD	☒ REPLACE	☐ REMOVE	Plates 5-1, 5-1A, 5-1B, 5-1C, 5-1D, 5-1E Surface Facilities
☐ ADD	☒ REPLACE	☐ REMOVE	Plate 7-1A Pasture Pond and Coal Pile Sediment Pond Drainages
☐ ADD	☒ REPLACE	☐ REMOVE	Plate 7-1B Old Coarse Refuse Road Sediment Pond Drainages
☐ ADD	☒ REPLACE	☐ REMOVE	Plate 7-15 Borrow Area Pond and Clearwater Pond X-Sections
☐ ADD	☒ REPLACE	☐ REMOVE	Plate 7-18 Coal Pile Sediment Pond and Cross Section
☐ ADD	☒ REPLACE	☐ REMOVE	Plate 9-7 Areas of Permanent Mining Activity
☐ ADD	☒ REPLACE	☐ REMOVE	Plates 10-3, 10-3A, 10-3B, 10-3C, 10-3D, 10-3E Final Recl. - Phasing Plan
☐ ADD	☒ REPLACE	☐ REMOVE	Plates 10-4, 10-4A, 10-4B, 10-4C, 10-4D, 10-4E Final Recl. - Grading Plan
☐ ADD	☒ REPLACE	☐ REMOVE	Plates 10-5, 10-5A, 10-5B, 10-5C, 10-5D, 10-5E Final Recl. - Drainage Areas & Diversions Plan
☐ ADD	☒ REPLACE	☐ REMOVE	Plate 10-7 Final Reclamation - Seeding Plan
☐ ADD	☐ REPLACE	☐ REMOVE	
☐ ADD	☐ REPLACE	☐ REMOVE	
☐ ADD	☐ REPLACE	☐ REMOVE	
☐ ADD	☐ REPLACE	☐ REMOVE	
☐ ADD	☐ REPLACE	☐ REMOVE	
☐ ADD	☐ REPLACE	☐ REMOVE	

Any other specific or special instructions required for insertion of this proposal into the Mining and Reclamation Plan?

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APPLICATION FOR PERMIT CHANGE

Title of Change: SUNNYSIDE COGENERATION ASSOCIATES Permit submittal to address deficiencies listed in DOGM's TA dated May 30, 1995	Permit Number: ACT/007/035 Mine: Sunnyside Cogen. Assoc. Permittee: Sunnyside Cogen. Assoc.

Description - include reason for change and timing required to implement: Permit submittal to address deficiencies listed in DOGM's TA dated May 30, 1995

☐ Yes	☒ No	1. Change in the size of the Permit Area? _____ acres ☐ increase ☐ decrease.
☐ Yes	☒ No	2. Change in the size of the Disturbed Area? _____ acres ☐ increase ☐ decrease.
☐ Yes	☒ No	3. Will permit change include operations outside the Cumulative Hydrologic Impact Area?
☐ Yes	☒ No	4. Will permit change include operations in hydrologic basins other than currently approved?
☐ Yes	☒ No	5. Does permit change result from cancellation, reduction or increase of insurance or reclamation bond?
☐ Yes	☒ No	6. Does permit change require or include public notice publication?
☒ Yes	☐ No	7. Permit change as a result of a Violation? Violation # 93-13-2-1
☐ Yes	☒ No	8. Permit change as a result of a Division Order? D.O. #
☐ Yes	☒ No	9. Permit change as a result of other laws or regulations? Explain:
☐ Yes	☒ No	10. Does permit change require or include ownership, control, right-of-entry, or compliance information?
☐ Yes	☒ No	11. Does the permit change affect the surface landowner or change the post mining land use?
☒ Yes	☐ No	12. Does permit change require or include collection and reporting of any baseline information?
☐ Yes	☒ No	13. Could the permit change have any effect on wildlife or vegetation outside the current disturbed area?
☐ Yes	☒ No	14. Does permit change require or include soil removal, storage or placement?
☐ Yes	☒ No	15. Does permit change require or include vegetation monitoring, removal or revegetation activities?
☐ Yes	☒ No	16. Does permit change require or include construction, modification, or removal of surface facilities?
☒ Yes	☐ No	17. Does permit change require or include water monitoring, sediment or drainage control measures?
☒ Yes	☐ No	18. Does permit change require or include certified designs, maps, or calculations?
☐ Yes	☒ No	19. Does permit change require or include underground design or mine sequence and timing?
☐ Yes	☒ No	20. Does permit change require or include subsidence control or monitoring?
☐ Yes	☒ No	21. Have reclamation costs for bonding been provided or revised for any change in the reclamation plan?
☐ Yes	☒ No	22. Is permit change within 100 feet of a public road or perennial stream or 500 feet of an occupied dwelling?
☐ Yes	☒ No	23. Is this permit change coal exploration activity ☐ inside ☐ outside of the permit area? N/A

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☒ Attached 3 complete copies of proposed permit change as it would be incorporated into the Mining and Reclamation Plan.

I hereby certify that I am a responsible official of the applicant and that the information contained in this application is true and correct to the best of my information and belief in all aspects with the laws of Utah in reference to commitments, undertakings, and obligations, herein.

Alane E. Boyd, Senior Eng. 8/15/95
Signed - Name - Position - Date

Subscribed and sworn to before me this 15th day of August, 19 95

Linda Ercanbrack
Notary Public

My Commission Expires: March 27, 1997
Attest: STATE OF Utah
COUNTY OF Salt Lake

LINDA ERCANBRACK
Notary Public
STATE OF UTAH
My Comm. Expires MAR 27, 1997
1121 E 3900 S C-100 SLC UT 84124

Received by Oil, Gas & Mining
AUG 16 1995
DIV. OF OIL, GAS & MINING

ASSIGNED PERMIT CHANGE NUMBER

SUNNYSIDE COGENERATION ASSOCIATES
Post Office Box 10
East Carbon, Utah 84520
(801) 888-4476
(801) 888-2538 Fax

95F

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AUG 16 1995
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August 15, 1995

Ms. Pamela Grubaugh-Littig
Division of Oil, Gas and Mining
3 Triad Center - Suite 350
Salt Lake City, UT 84180-1203

#2 & #5

RE: Permit No. ACT / 007 / 035 : Sunnyside Cogeneration Associates
Permit Submittal Associated with NOV 93-13-2-1

Copy Daron
Joe, Randy

Dear Pam,

This submittal responds to fifteen of the deficiencies listed in the Technical Analysis received by SCA in early June. Some of these issues are among those discussed with individual members of the DOGM technical staff regarding items which had already been submitted into the permit.

These deficiencies are addressed as follows:

R645-301-142 — The disturbed area maps have been updated to reflect the reclamation work performed in 1994 on the Old Coarse Refuse Road, and the area on the southern most portion of the West Slurry Cell embankment where SCC performed temporary reclamation in the early 1990's. See Plates 3-1, 3-1A, 3-1B, 3-1C, 3-1D, 3-1E which are submitted herewith.

R645-301-342.100 — Plate 10-7 has been revised to identify approximate areas in which Pinyon and Juniper tublings will be planted. Chapter nine has been revised to describe the rock piles' intended users, size, shape and placement.

R645-301-342.200 — The seed mixtures listed in Figures 10-3 and 10-4 have been revised as suggested in the TA and as discussed with Division staff to include additional plant species which will support wildlife.

R645-301-358.510 — Plates 5-1 (A-E) have been revised to identify ownership and control of all power lines which cross through the SCA permit area. All of these power lines are currently under the ownership and control of Pacificorp / Utah Power and Light. SCA is not aware of any specific power lines within their permit boundary that have been designated unsafe for raptors.

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R645-301-411

The current versions of Plate 3-1 and 3-1E show the location and extent of the coke ovens and the cemetery as well as identifying the fences or markers which are in place to reduce the potential for future disturbance. Several other plates throughout the permit show the locations of the cemetery and coke ovens.

R645-301-411

Appendix 4-5 has been added into the permit to include the entire cultural resource survey document from which some of the information previously included in Appendix 4-1 was extracted. This document was taken from the 1985 Kaiser permit and includes a survey of the entire Kaiser area at the time the survey was performed.

R645-301-724

Appendix 7-4 incorporates the Baseline Water Quality Data which was collected during 1993-1995 in accordance with the program described in Appendix 7-8. Appendix 7-8 has also been reformatted in accordance with comments received from Division staff and revised to propose a post mining monitoring program until bond termination.

R645-301-512

Plate 9-7 depicts the areas of permanent mining activity and is anticipated to be used in conjunction with the mine sequencing maps shown in Plates 9-4, 9-5, and 9-6. Plate 9-7 is not intended to be the disturbed area map. Please refer to Plates 3-1, 3-1A, 3-1B, 3-1C, 3-1D, and 3-1E for detailed boundaries of all areas proposed to be affected over the estimated total life of the coal mining and reclamation operations. The Reclamation Borrow Area located along the eastern side of the permit area is not currently disturbed beyond the limit shown. However, Plates 3-1 and 9-7 do show the entire area as future disturbed since this area is anticipated to be affected by the reclamation work.

R645-301-521.141

Plates 3-1, 3-1A, 3-1B, 3-1C, 3-1D, and 3-1E provide the boundaries of all areas proposed to be affected over the estimated total life of the coal mining and reclamation operations. A statement on these plates indicates specifically what the total number of acres proposed to be affected by surface mining and reclamation are. The Reclamation Borrow Area located along the eastern side of the permit area is not currently disturbed beyond the limit shown. However, Plates 3-1 and 9-7 do show the entire area as future disturbed since this area is anticipated to be affected by the reclamation work.

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R645-301-527

Chapter 5 has been revised to include text which identifies and describes the coal handling and crushing facilities which were incorporated into the permit area in 1994. This information has been in Chapter 4 since the area was incorporated. Chapter 4 has been revised to remove this text.

R645-301-728

Figure 7-1 was revised in July 1995 to include additional information concerning the use of the underground water right available to SCA for dust control purposes. Among the information included in July was a copy of the Contract for Surplus Water Use between SCA and East Carbon City. This contract provides documentation that East Carbon City will provide the water available from the Dragerton Well for use by SCA. In accordance with typical procedures for a change in the nature of use, the State Engineer has temporarily approved the change of use until December 1995. A permanent change application is being reviewed at this time and will be incorporated into this Figure 7-1 following approval.

R645-301-352

Plates 10-3 show the intended mine sequencing plan. Areas two acres or larger are identified as to the estimated time when they will no longer be needed to conduct mining activities. There are no additional areas beyond the Old Coarse Refuse Road which are anticipated to be reclaimed within the current permit term.

The TA suggested the possibility that the areas adjacent to the Clearwater Pond and the areas to the east of the slurry ponds could be considered for contemporaneous reclamation. These areas are not scheduled for reclamation during this permit term. The area around the Slurry Ponds is being considered for a potential additional excess spoil disposal area as suggested in the TA. Early reclamation of these areas would not be prudent until it can be determined that an additional excess spoil disposal area is not needed.

R645-301-353.200

The seed mixtures listed in Figures 10-3 and 10-4 have been revised as suggested in the TA and as discussed with Division staff to eliminate less desirable species from the seed mix and develop a mixture more compatible with the land use plan.

R645-301-553

Plates 10-3, 10-4, and 10-5 have been revised to correct a mis-labeled contour, and smooth out a depression which was not intended in the reclamation plan.

References in the mining plan which indicated that refuse material below

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the first bench (6290 ft) would not be eliminated over the life of the operations have been revised in previous submittals. SCA intends to recover all acceptable fuel materials from the refuse pile.

R645-301-732 Several comments from the TA Hydrologic Information section and from Technical Directive 003A have been used to make minor revisions to the text of Chapter 7 and to Plates 7-1A, 7-1B, 7-15, and 7-18 in order to more accurately reflect field conditions.

If you have any questions concerning, please feel free to call me at (801) 888-4476.

Sincerely,

AEB for Danny Mattingly

Danny Mattingly
SCA General Manager

cc: Bob Evans, NRG
Jim O'Donnell, NRG
Doug Burnham, B&W
Tom Eckstein, B&W
Alane E. Boyd, EWP
Brian Burnett, CNM
Bill Malencik, DOGM
Joe Helfrich, DOGM

Attachments

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Appendix 4-3, Historic and Cultural Site Listings - Letter from SHPO
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Appendix 4-5, A Stratified Archeological Sample Survey of Kaiser Steel Corporation Sunnyside Mine Lease, Carbon County, East Central Utah (from the Kaiser Steel 1985 Permit)

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CHAPTER FOUR
400 LAND USE AND AIR QUALITY

410 INTRODUCTION

Sunnyside Coal Company's (SCC) refuse disposal area has been acquired by Sunnyside Cogeneration Associates (SCA) to serve as a long-term supply of waste fuel for its coal mine waste-to-energy facility, located adjacent to the SCA Permit Area. SCA has contracted with SCC to provide alternative disposal for coal mine waste generated by SCC, both past and future. SCA's alternative energy project has been approved by the Federal Energy Regulatory Commission as a Qualifying Facility, based on the usage of coal mine waste as fuel in its fluidized-bed combustion boiler. SCA will use both "active waste", from the processing plant, and "accumulated waste", from the refuse pile, as sources of waste fuel for the facility. SCA's fueling plan will require excavation of coal mine waste from the existing refuse pile, beginning as early as January 1993 and continuing for approximately thirty years.

Based on SCA's contract for the sale of electricity to Utah Power and Light, handling coal mine waste to serve as an alternative energy fuel will be a consistent and continuous process. Coal mine waste that continues to be generated by SCC's preparation plant will also be factored into SCA's fueling strategy, which can allow direct acceptance of coal mine waste at the facility, or temporary placement within the refuse disposal area prior to utilization.

SCA will excavate coal mine waste from the refuse disposal area based on detailed sampling and analyses and a materials handling plan which will be continuously updated by SCA. Excavation of the coal mine waste will be considerate of material quality, pile and embankment stability, and mine operation. Over the life of SCA's facility, nearly all of the coal mine waste will be burned to generate electricity, resulting in significantly less material that will need final reclamation. Final reclamation of the refuse pile will be accomplished after all of the coal mine waste is either burned as a fuel, or repositioned within the refuse disposal area for final disposal, if determined to be non-combustible (i.e., ashes, rock).

Currently, there are activities that occur outside the Sunnyside Cogeneration Associates Permit Boundary that have significant bearing on the operations of the SCA Cogeneration facility and the SCA Permit Area. These activities occur in conjunction with the SCA permit site.

As discussed in other areas of the PAP, Sunnyside Coal Company's (SCC) refuse disposal area has been acquired by SCA to serve as a long-term supply of waste fuel for its coal mine waste-to-energy facility, located adjacent to the SCA Permit Area. SCA has contracted with SCC to provide alternative disposal for coal mine waste generated by SCC, both past and future. In order for SCA to acquire the quality and quantity of fuel for the cogeneration facility, coarse refuse is accepted from the SCC mine on a continual basis. The refuse is stockpiled in designated areas within the SCA permit site then mixed with existing refuse on the SCA permit site and transported to the cogeneration facility. These operations; acceptance of coarse refuse from the SCC mine and the transporting of coarse refuse to the cogeneration facility, requires access roads that extend beyond the limits of the SCA permit boundary. The main access for the transferring of coarse refuse from the SCC mine begins at the SCC mine and extends to the northeast side of the SCA Permit boundary. To transport coarse refuse from the SCA Permit Area to the cogeneration facility, the access roadway within the SCA permit boundary.

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In addition to the access roads mentioned above, there are access roads to the south of the SCA permit boundary that are utilized for the purposes of the SCA operations. These roads are utilized to access areas of the SCA permit site that are inaccessible from the north side of the permit area. They are used by authorized contractors of SCA for the purposes of such activities as: water quality monitoring, periodic inspections, and site maintenance as needed.

Activities that occur outside the SCA Permit Area also include watersheds outside the permit area that drain into contained areas within the permit area. Chapter Seven of the PAP outlines these watersheds and the areas to which they drain. Also included are detailed maps and calculations showing the amount of water from each watershed and the capacity of the drainages and ponds that were constructed to contain them. In some instances, a drainage commencing within the SCA Permit Area may extend beyond the limits of the SCA permit boundary. An example of this is the outlet of the Pasture Sediment Pond. In such a case, SCA commits to maintaining this drainage and providing the necessary information to the Division to show its adequacy to handle the required storm event. In the event that this occurs elsewhere within the permit area, SCA will handle each instance on a case-by-case basis and notify the DOGM of any proposed changes to the PAP.

It should be noted that the SCA operations encompass a number of entities that do not necessarily lie or operate within the permitted area. The activities that occur outside of the permitted area are done so in a controlled manner, under permits from other agencies, and have been incorporated into the entire design and plan of the SCA Cogeneration facility. SCA understands the implications of utilizing entities outside of the permitted area. SCA commits to maintaining the applicable Permit Areas in accordance with DOGM requirements.

This chapter includes descriptions of the premining and proposed postmining land use(s) in accordance with the applicable regulations. It should be noted that EWP Engineering has compiled and relied on data and maps from previously approved permits for the SCC mines. In this Permit Application where the "permit area" is referred to, the SCA Permit Area is to be assumed unless the larger overall area for the SCC mines is specifically referred to in the text as the "original SCC permit area."

411 ENVIRONMENTAL DESCRIPTION

Premining Land-Use Information

The land within the SCA Permit Area has been confined to fish and wildlife habitats. Historically, the land within the SCA Permit Area has not been used for croplands because of the mountainous terrain, steep slopes, and rocky surfaces. Farming in the surrounding area is limited to small areas on canyon bottoms. About four acres of alfalfa, irrigated with mine water, has been farmed in the past adjacent to the SCA Permit Area. Plate 4-1 outlines the boundaries of ownership of the areas within and adjacent to the SCA Permit Area.

Premining land-use information is further outlined in the following sections. The descriptions include cultural and historic resources information, complete narratives of the land-use capabilities, and descriptions of the existing land uses and land-use classifications under local law as required by regulations R645-301-411.120 through R645-301-411.140.

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Maps and Narratives Describing Existing Land Uses

The information on land status and land use has been obtained primarily from SCC's records and internal sources as well as from Carbon County records. Currently the site is mostly disturbed. The Disturbed Area Map, Plate 3-1, outlines pre and post-law disturbed areas within the SCA Permit Area.

Information on regional land use and socioeconomic considerations has been derived impart from the "Final Environment Statement, Development of Coal Resources in Central Utah" by the U.S. Geological Survey (1978) and from the Utah Office of Planning and Budget's Report "1990 Statistical Abstract of Utah" which covers quite fully the subject matter for the area of interest. It is assumed that the socioeconomic conditions of the area have not changed dramatically over the past decade and that the SCA activities will have much of the same impact as the SCC mines to the surrounding communities.

Land Use Narrative

Regionally, about 76% of the surface lands are Federal. Only a small part of the total acreage is irrigated farmland. Prime farmland has not been identified within the SCA Permit Area. Figure 2-1 is a current letter from the Soil Conservation Service stating that there is no prime or important farmland within or adjacent to the SCA Permit Area. The SCA Permit Area land use is dominated by a refuse pile. It is estimated that approximately 57% of the SCA Permit Area has been disturbed by mining operations. The disturbed areas contained mostly Pinyon-Juniper/Grass and Atriplex/Grass type vegetation.

The SCA cogeneration operations constitute a major factor in the local economy. The operations are of significant importance to the socioeconomic well being of the area. The "1990 Statistical Abstract of Utah" provides figures showing that mining accounts for 17.14% of all non-agricultural jobs and pays the highest of all non-agricultural fields in Carbon County. These figures are presented in Figure 4-2.

Local Laws Regarding Land Use Classifications

The Permit Area and adjacent areas fall within the jurisdiction of East Carbon City, Sunnyside City, and Carbon County. All three entities have zoning and land-use ordinances which allow the types of activities associated with the SCA facilities. Selected zoning information available from these entities is found in Appendix 4-4.

Cultural and Historic Resources Information

Appendix 4-5 incorporates a copy of "A Stratified Archeological Sample Survey of Kaiser Steel Corporation Sunnyside Mine Lease, Carbon County, East Central Utah." This document was obtained from the Kaiser Steel 1985 Permit on file with the Utah DOGM. This document was prepared, under contract to Kaiser Steel Corporation, by the Consulting Services Branch, Antiquities Section of the Utah Division of State History who also conducted the field survey. The survey included the entire Kaiser area in the early 1980's. The SCA permit area was a portion of the Kaiser area at that time and was included in the survey.

A cultural resource survey of the SCA Permit Area was completed by the Utah Historical Society Preservation Office Survey and Planning staff in the fall of 1993 (Appendix 4-3). There are two sites potentially eligible for nomination with the National Register within the SCA Permit Area and adjacent area: the coke ovens located on Site 42Cb325 (within the SCA Permit Area) and a cemetery located on Site 42Cb538 (adjacent to the SCA Permit Area). Site descriptions for each site are included in Appendix 4-1. Plate 4-2 shows the

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location of the coke ovens, the cemetery, and other sites adjacent to the SCA Permit Area which are mentioned in the following paragraphs. It should also be noted that no prehistoric sites were recorded prior to this study.

Located in Section 6, Township 15 South, Range 14 East are approximately 26 coke ovens remaining from the original 800. Coal from the mine was brought down by rail into the top of the coke ovens, and the oven was given a "charge" through a hole in the top. After 72 hours, the coked coal was removed from an opening on the side and loaded onto another rail car. These coke ovens are the only physical remains from the era when Sunnyside coke was used widely throughout the western United States for smelting.

The site containing the cemetery consists of a badly disturbed cemetery located in the approximate center of the SCA cogeneration power plant site. It is completely riddled with prairie dog holes and vandals have been quite active, tipping over headstones. An unknown number of graves are present. The few headstones present (ca. 20, including fragments) appear to be handmade out of a variety of substances (cement, wood, wrought iron). No complete death notices are present and most of the headstones are weathered beyond recognition. What few are partially readable appear to be Hispanic names with deaths during the first decade of this century. Several graves are enclosed by bedsteads and commercial wrought iron fencing material. SCA has erected a chain-link fence around the perimeter of the cemetery to protect it from disturbance.

There are two other sites that are listed as non-significant by the National Register and consequently, are not considered to be potentially eligible for registration as Historical Places. The first of these consists of a diffuse, non-patterned scatter of plus or minus 50 interior and secondary flakes and one possible biface fragment (Site 42Cb539) located above the head and north of Icelander Creek. The second site consists of an extensive distribution of burned coal slag and clinkers and domestic and industrial trash situated on a broad sage covered flat (Site 42Cb540). This site is located on the outskirts of East Carbon City.

Cultural and Historic Resources Sites

As stated previously, the only historic site within the SCA Permit Area is the coke ovens site which is located in Site 42Cb325. The coke ovens are located about 400 meters east of Sunnyside on the edge of the refuse pile (see Plate 4-2). At the present time, twenty-six of the ovens remain. Several have been destroyed in the north end to accommodate the expansion of the refuse pile. The ovens are beehive-shaped with level roofs for "charging". The door openings, which all face east, are large enough to walk into a cavern about 2.3 meters high and 3 meters in diameter. Varying amounts of vandalism has occurred to the ovens and they remain in uncertain states of stability.

Within the SCA Permit Area, there are no units of the National System of Trails or the Wild and Scenic Rivers System.

Projected Impacts and Preventative Measures to Cultural and Historical Resources

The identified sites have coexisted with the Sunnyside mines for over ninety years. All sites have been affected by past activities.

There are three potential types of impacts that could affect the cultural resources in the SCA Permit Area. The first type includes naturally occurring events such as erosion, flooding, fire, landslides, earthquakes, etc. No mitigation efforts are planned for these naturally occurring impacts.

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The second type of impact is vandalism. This occurs in the form of illegal excavations (relic hunting), destroying standing walls, defacing rock art or architecture with paint, target practice, etc., or illegally removing surface artifacts. Vandalism cannot be totally prevented, but can be curbed. SCA will be constantly on the alert for, and remove people from, the sites that are on the National Register. SCA has erected a chain-link fence around the cemetery to protect it from vandalism. SCA will also enclose the area surrounding the coke ovens with stakes and flags. See Plate 3-1 for the location of these markers. No construction activity will be permitted to occur within this marked area.

A third type of impact results from construction, gaining access to specific area (roads and trails), or any other human related ground disturbance. SCA will either avoid the National Register quality sites or undergo specific mitigation procedures prior to the impact of the site. At the present time, planned ground disturbance within the SCA Permit Area will not impact any known cultural resources.

Sensitivity Zones

The application of predictive models to develop sensitivity maps for cultural resource management has been completed for the original SCC Permit Area. The long term purpose of such maps is to release some areas from further requirement under federal cultural resource laws while concentrating concern on high probability areas (Reed and Nickens 1980). The result of such an attempt for this project is shown on Plate 4-3.

Three zones are outlined on Plate 4-3. The zones are designated as "high", "medium", or "low". The high density areas are limited to the primary canyon bottom and the first or second contour (12 to 13 meters) above the canyon floor, plus the valley pediment. High sensitivity areas have deep soils, open sage parks, and are at least 30-40 meters wide. Site density is about 1.12 sites per square mile. Medium sensitivity areas are limited to high altitude (2280 meter a.s.l.) flat benches. Medium sensitivity areas average about .85 sites per square mile. The remaining area is classified as low density and includes the talus/cliff slopes and the narrow (30 meters or less) secondary canyons. Average site density are less than .10 sites per square mile.

The entire SCA Permit Area is located within a high sensitivity zone. The majority of the land surrounding the SCA Permit Area lies within low sensitivity zones with the exception of a few small areas that are characterized by high altitude flat benches, consequently lying in medium sensitivity zones.

Based on the existing data, the following future management programs will be implemented in order to preserve the land within the SCA Permit Area:

1. All sites listed as eligible for nomination to the National Register of Historic Places be protected from impacts by the SCA cogeneration project. As described earlier, the areas have been fenced or will be identified with stakes and flagging so that the areas are not disturbed.

2. For eligible sites threatened by future mining impacts, SCA will instigate a program of adequate mitigation prior to impact as negotiated with the State Historic Preservation Officer.

Previous Mining Activity

The SCA Permit Area has not, and will not be used for subsurface mining operations. The SCA Permit Area that is being addressed in this report is associated only with operations related to coal mine waste disposal and excavation.

411.210 TYPE OF MINING METHODS USED

Details on mining methods can be found in Chapter Nine, Mining Plan. Additional operational information is included in Chapter Five.

~~WASTE COAL HANDLING SYSTEM DESCRIPTION~~

~~The following sections discuss operations involving the use of the crushing facility. The crushing system utilizes the following units:~~

1. ~~Waste coal receiving hopper (Truck Dump);~~
2. ~~Transfer conveyors;~~
3. ~~Primary and Secondary Crusher System;~~
4. ~~Product Transfer/Stacking Conveyors/ Screen Station~~
5. ~~Silo Storage/Transfer Conveyors; (Not in Permit Area)~~
6. ~~Live-Storage Silos (Not in Permit Area).~~

~~The SCA Permit Area was enlarged to include the crushing units on May 16, 1994. The items 5 and 6 are not within the permit area. These facilities are associated only with the power plant operation and are not part of the mining process. The SCA crushing unit exists solely to appropriately size all material utilized in the SCA plant. This sizing is required regardless of the origination of the fuel. All material, whether it be run of mine ("ROM") coal or waste coal, will be run through the receiving hopper and crushed and sized accordingly.~~

~~It is anticipated that the SCA project will, in the best of circumstances, be required to purchase six to seven thousand tons of ROM coal per year. This coal will typically be utilized when the waste fines have been frozen and are less accessible. There may be other circumstances when ROM coal will be utilized by the SCA facility.~~

~~Plate 4-5 shows the location of the crushing facility in relation to the SCA Permit Site. Material to be burned in the plant is run through the crushing and conveyor system and stored in the silos based on the B.T.U. values, etc. Then, material is fed from the silos through a conveyor system into the power plant and the boiler. The fluidized bed boiler requires material to be crushed to a certain specification. Therefore, it is important the SCA crushing unit size the material correctly.~~

~~The waste coal pile owned by SCA represents approximately 23 years of fuel supply on the ground. If the SCC mine were to cease operation today, SCA could be required to transport material to its site, either mixing ROM coal with its current waste coal supply to extend the life of the pile, or purchasing additional waste materials from other sites. All these materials must go through the crushing system that SCA has on site to meet boiler specifications for fuel.~~

~~It is important to know that no matter where material is obtained, whether it be from SCA's DOGM permitted area, ROM coal, or waste material from another site, this material is all directly fed into the waste coal receiving hopper and sized and crushed accordingly. SCA is not unique in this process. All coal fired power plants have crushing units on site to prepare fuel for boiler specifications.~~

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~~The following paragraphs include a detailed description of the waste coal handling system for the SCA cogeneration facility.~~

~~The handling system provides for receiving Waste Coal from two independent sources, including screening the material according to size, with the oversize material being crushed to a 1/4" top size, and storage in segregated, enclosed silo systems, (1,800 tons total capacity), according to Btu content, (high or low), for reclamation in a proportioned blend by the plant operating system (provided by others).~~

~~The system also provides for: weighing incoming material as it is received, with printed record; removal of metals via electro-magnet, with backup metal detection of the final product; and, the ability to segregate crushed product into an open, dead-storage pile for emergency reclamation, if needed. Dust control features of the system include totally enclosed live-storage silos and transfer points, covered conveyor systems and a water-spray type dust suppression system at transfer points, as needed.~~

~~Waste Coal Receiving Hopper~~

~~Material from the Waste Coal piles will be received in an 100 ton capacity, ramped, drive-over Waste Coal Receiving Hopper designed with slope angles to ensure the flowability of wet, sticky coal.~~

~~The hopper slopes are lined with high molecular weight plastic sheeting ("slick sheet") to enhance flowability as well as to act as a replaceable wear surface. Air cannons are provided in the lower hopper walls to provide for flow activation for the fine pond material. The hopper is open, above grade, on one side to provide a "push-in slot" for receiving coal by dozer when needed.~~

~~Dust control is accomplished with a water-type suppression system to "fog" the hopper volume during unloading of dry gob materials.~~

~~Transfer Conveyors~~

~~Waste coal flows from the Waste Coal Receiving Hopper on a slow-speed, troughing conveyor (200 tph effective capacity) which feeds a transfer conveyor (250 tph effective capacity) that feeds the Primary Crusher. The Receiving Hopper conveyor belt is a heavy duty 3-ply belt to resist bruising and tears at this high impact point of loading.~~

~~A self-cleaning electro-magnet is mounted on the transfer conveyor to remove metals. A metal detector is mounted over the transfer conveyor downstream of the magnet as a protection element for the screening/crushing system. Additionally, a belt scale system (± 1/4% accuracy) weighs all incoming material, with printed record.~~

~~Primary and Secondary Crushers~~

~~The Primary Crusher receives material from the transfer conveyor and sizes it to a nominal 1.5" size. Crushed material from the Primary Crusher is deposited on the next conveyor which then feeds the Secondary Crusher. Dust control for the Primary Crusher is a water-type suppression system.~~

~~The Secondary Crusher receives material from the Primary Crusher and sizes it to a nominal 1/4" size. A dust collection system is provided for the Secondary Crusher.~~

~~**Product Transfer/Stacking Conveyors/Screen Station**~~

~~Sized material from the Secondary Crusher flows onto a 36" Product Transfer conveyor (250 tph effective capacity) which transfers it to a 36" Radial Stacking Conveyor (250 tph effective capacity). The product is then conveyed either, to the Screen Station, to an open-pile for placement in dead storage, or to the Silo Storage Conveyor for transfer to the live-storage silos.~~

~~The single deck Screen Station separates the crushed product at 1/4". A 60" transfer conveyor takes the minus 1/4" product to the Transfer/Loader Hopper.~~

~~A 36" conveyor takes the plus 1/4" product from the screen to a temporary stockpile. This product is then transported to the Waste Coal Receiving Hopper (Truck Dump) to be reprocessed. A closed loop return conveyor is proposed to transfer this material directly to be recrushed in the Secondary Crusher without the need for the temporary stockpile.~~

~~A proposed 24" Transfer Conveyor and a 30" Radial Stacker will transfer a portion of the screened product from the Screen Station to an open pile for dead storage.~~

~~Dust Control for the Product Transfer and Stacking Conveyors and the Screen Station is a water-type suppression system and is applied as follows: immediately following the Secondary Crusher, at the transfer point between the 36" Product Transfer Conveyor and the 36" Radial Stacker, and at the outlet of the Screen Station.~~

~~The Transfer/Loader Hopper is mounted above the Silo Storage Conveyor. The Transfer/Loader Hopper is lined with slick sheet.~~

~~**Silo Storage/Transfer Conveyors**~~

~~The Silo Storage/Transfer Conveyors are located adjacent to the Permit Area and are associated with the power plant operation. The Silo Storage Conveyor is a stationary, troughing conveyor (250 tph effective capacity), which conveys product which has either been transferred directly from the Radial Stacking Conveyor, or reclaimed from the dead storage pile, to a transfer point on top of the first of three Live-Storage Silos.~~

~~Transfer points on top of each silo are semi-enclosed, with Y-gate chutes on the first two silos to direct the product into the silo, or onto the Silo Transfer Conveyors which connect to adjacent silos. The chutework is lined with slick sheet to enhance flowability.~~

~~**Live-Storage Silos**~~

~~The Live-Storage Silos are not located within the Permit Area. They are not associated with the mining operations. The three Live-Storage Silos are steel, totally enclosed cylindrical silos with cone hoppers (23,950 cubic feet total capacity each). Hopper angles are a minimum 60 degrees to ensure free flow of material during reclamation. A manually-operated, positive shut-off gate is included at the hopper outlet to provide for maintenance of adjacent mechanical equipment (to be provided by others).~~

~~Other silo features include bin level indicators and air-cannon flow activators. The silos are mounted with the outlets at the appropriate level, near grade, to provide for transfer of material by feeder systems onto the plant~~

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~~feed conveyor (to be provided by others).~~

Coal Seams or Other Mineral Strata Mined

SCA is excavating a waste coal refuse pile rather than mining an underground coal seam.

Approximate Dates of Past Mining

The original SCC permit area has been mined continuously since the late 1890's. Over sixty million tons of coal has been extracted during this period. Kaiser Steel Corporation leased the No. 2 Mine from Utah Fuel Company in 1942 to provide coking coal to the newly constructed steel mill at Fontana, California. In 1950, Kaiser Steel purchased the entire property. Recently, ownership has changed hands to SCC and a small portion, for which this Permit Application applies, is now owned by SCA. Plate 4-1 shows the boundaries and ownership of the areas surrounding the SCA Permit Area. It should be noted that there are no underground mines within the SCA Permit Area. All the underground mines lie within areas outside of the SCA Permit Area and are run by operations set forth by SCC.

412 RECLAMATION PLAN

Postmining Land-Use Plan

Reclamation essentially commences with the first ton of coal mine waste removed and used as an alternative energy fuel. Practices will be limited to excavation and handling of coal mine waste to segregate non-combustibles and redisposing of such materials in a controlled manner. SCA's operating plan for its adjacent alternative energy power plant is designed to substantially reduce the final quantity of coal mine waste which will ultimately remain within the existing refuse disposal area. Reclamation will be a continuous process over the life of the power plant, ultimately grading, covering and revegetating any remaining non-combustible materials.

Details on contemporaneous reclamation can be found in Chapter Nine, Mining Plan. Chapter Ten, Reclamation Plan outlines components of the final reclamation plan.

The following sections outline the proposed use of the SCA Permit Area, capacity of the reclaimed land to support a variety of alternative uses, and the relationship of the proposed use to existing land-use policies and plans.

Existing land-use adjacent to the SCA Permit Area is primarily fish and wildlife habitat, limited grazing, and minimal cropland. The land-use picture has not changed significantly and is not expected to deviate in the future. Post project land use will be fish and wildlife habitat.

Soil Suitability

Several borrow areas have been identified for use as topsoil in future reclamation (Plate 5-1). A discussion of the suitability of the soils and their capability to support the post-mining land use is included in R645-301-231, section titled "Suitability of Topsoil Substitutes."

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Control Measures to Mitigate Impact

Control measures to mitigate impacts on present land-use include steps to protect surface waters, soil resources, vegetation, and fish and wildlife. Additional information can be found in Chapter Two (Soils), Three (Biology), and Seven (Hydrology) which detail mitigation measures.

Regional Land Use

Regional land use has been fully discussed in the U.S. Geological Survey's "Final Environmental Statement, Development of Coal Resources in Central Utah, Part 1 - Regional Analysis" (1979).

In the seven-county region, Federal lands, including those of the National Forest and National Park systems, account for 76% of the land surface, while only about 7% was irrigated farm acreage. A current letter from the SCS states that there is no prime farmland within the original SCC permit area (see Figure 2-1).

The livestock industry, mostly cattle and sheep grazing, has been part of the region's historical economy. The timber industry has only a few small saw mills still operating mostly to supply fence posts, and lumber.

Land Owner or Surface Manager Comments

SCA owns the small portion of land (approximately 320 acres) containing the refuse pile and slurry ponds which comprise the SCA Permit Area. A letter from the owner is included in Figure 4-3. This letter contains comments from David Pearce, Vice President of Sunnyside Cogeneration Associates, as to the proposed post-mine land use.

Mineral Ownership, Mines and Wells

Within the SCA Permit Area, there are not any operating mines nor are there any oil producing or gas wells.

Socioeconomic Considerations

Carbon County, with its low population density and isolation from Utah's urban centers, is historically an important coal-producing area in the State. The local economy is dependent upon conditions of the coal market.

Utah Department of Employment Security data indicates that in 1991, Carbon County had a total non-agricultural employment of 7,624 of which 4.03% were engaged in manufacturing; 17.14% in mining; 1.95% in contract construction; 5.72% in transportation, communications, and public utilities; 25.2% in trade; 1.82% in finance, insurance, and real estate; 26.55% in government and the remaining 17.58% in service related fields. Statistics also show that in 1988, the average monthly payroll wages for mining in Carbon County were $2,820.00 which are the highest of all the non-agricultural fields in Carbon County. This data is from the "1990 Statistical Abstract of Utah" and is included as Figure 4-2.

The SCA operations contribute a substantial share of employment, with the cogeneration operations and, indirectly, in other business. Its continued operation is of significant importance to the socioeconomic well being of the area.

Suitability and Compatibility

Land use during operation will continue to be as a fuel source for SCA's cogeneration facility and as a disposal site for SCC's slurry and coarse refuse. The effect of this operation on land use is minimal and is not expected to change during the permit period. Industrial waste from the SCA cogeneration facility will not be disposed of in the SCA Permit Area, therefore these operations should have a minimal effect on the SCA Permit Area.

The final grading will be suitable for reclamation and revegetation and will be compatible with the natural surroundings and the approved postmining land use.

413 PERFORMANCE STANDARDS

Postmining land use will be the same as premining land use. The reclamation activities following mining are designed to allow the area to revert to the type of activity that occurred prior to mining. All disturbed areas will be restored in a timely manner to conditions that are capable of supporting land uses or higher or better uses.

The coke ovens which are located on the Northeast corner of the SCA Permit Boundary will be offered to the City of Sunnyside or another suitable organization dedicated to the preservation of historic sites, upon the completion of SCA's cogeneration activities. SCA has begun the process of determining potential interest among organizations which would be willing to accept responsibility for the coke ovens. Applicable correspondence concerning the final disposition of the coke ovens will be incorporated into an appendix of the permit as it is received from various organizations.

The postmining land uses will be the same as the premining land uses. The postmining land uses will be practical and reasonable, they will be consistent with applicable land-use policies or plans and they will not cause or contribute to violation of federal, Utah, or local law.

414 ALTERNATIVE POSTMINING LAND-USE REQUEST

Not applicable.

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420 AIR QUALITY

421 thru 423 AIR QUALITY PERMIT

SCA will continue its programs in the permit area to comply with the requirements of the Clean Air Act and other applicable air quality laws and regulations, as well as health and safety standards. SCA has not violated any air quality laws to date. A copy of the SCA's Air Quality Permit is included in Appendix 4-2.

A weather station is located at the Sunnyside Town Hall, but no air quality monitoring devices are currently in use. Air pollution sources come from fugitive dust from the coarse refuse stockpiles and unpaved roads.

424 FUGITIVE DUST CONTROL PLAN

Effects of Mining Operations on Air Quality

Most of the region around the SCA Permit Area has been designated a Class II area for purposes of determining any significant amounts of air quality deterioration. Deterioration of the air quality is not expected during the permit period with the exception of short high wind periods when sand and smaller grained particles will be picked up outside of the SCA Permit Area and added to the air in the permit area.

The haul road used by the refuse trucks is unpaved. To control fugitive dust, roads will be maintained in accordance with SCA's Air Quality Permit (see Appendix 4-2) and as specified in Chapter Five, Sections 527 and 534.

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APPENDIX 4-5

A Stratified Archeological Sample Survey
Kaiser Steel Corporation Sunnyside Mine Lease
Carbon County, East Central Utah

(Extracted from the Kaiser Steel 1985 Permit)

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A STRATIFIED ARCHEOLOGICAL SAMPLE SURVEY OF KAISER STEEL CORPORATION SUNNYSIDE MINE LEASE, CARBON COUNTY, EAST CENTRAL UTAH.

Prepared for
Kaiser Steel Corporation, Oakland, California

by
Asa S. Nielson
David Merril
Jack Oviatt

Dr. David B. Madsen
Principal Investigator

Manuscript Prepared
by
Consulting Services Branch
Antiquities Section
Utah Division of State History

BLM Antiquities Permit

81-Ut-031

Contract RD-G-0135

March 9, 1981

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CHAPTER V

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Brigham Young University
Cultural Resource Management Services

Mr. Hon C. Lee
Kaiser Steel Corporation
P.O. Box 58
Oakland, California 94604

13 July 1983

Mr. Lee:

I would like to respond to your phone inquiry of this date concerning snow conditions during our survey of February 1981. At that time, Utah was still in a minor drought period. There was no snow anywhere in the mine property while we completed the higher elevations. Snow flurries did occur on the upper benches on the final day of our survey, February 28, but we were in the lower canyon area at the time and there were no snow accumulations on the canyon floor. Ground visibility was excellent at all times. Incidentally, there is an error in the text of our report - February 27-31 should read February 27-28.

I hope this helps to answer your question. I will be glad to respond further to any additional questions or comments you may have.

Sincerely,

Asa S. Nielson
Director - CRMS/BYU

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940 Kimball Tower Brigham Young University Provo, Utah 84602 (801) 378-4783, 378-5435

HON LEE
KB 23

Brigham Young University
Cultural Resource Management Services

Dr. Hon C. Lee
Sunnyside Mine
Kaiser Steel Corporation
Sunnyside, Utah 84539

25 August 1983

Dr. Lee:

This letter is intended to help clarify the points made by the OSM review of the cultural/historical section of the Sunnyside Mine report.

First, Sunnyside has not been nominated to the National Register of Historic Places, although it certainly qualifies.

Second, It may have caused some confusion by giving various parts of Sunnyside site numbers, instead of referring to them as components. All prehistoric sites, the tramway, the asphalt mine and the small hunting or herding sites above Sunnyside should be separate sites. The coke kilns, mine portals, residences etc. associated with the historic mine activity should be considered one site. In retrospect, that may have avoided some of the confusion.

Third, as noted in our earlier communication, there was no snow cover at the time of our survey during January or February, due to a severe drought condition at the time.

I hope these minor clarifications will help to expedite your permit application. If you have any further concerns, please contact us at any time.

Sincerely,

Asa S. Nielson
Director - CRMS/BYU

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Permit Application

for

Kaiser Steel Corporation
Sunnyside Mines
Sunnyside, Utah

Chapter V

HISTORICAL AND CULTURAL RESOURCES

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NOTE

This chapter on historical and cultural resources was prepared, under contract to Kaiser Steel Corporation, by the Consulting Services Branch, Antiquities Section of the Utah Division of State History who also conducted the field survey.

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Chapter V HISTORICAL AND CULTURAL RESOURCES

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5.1. Scope

5.1.1. Introduction

The Consulting Services Branch of the Antiquities Section, Division of State History, conducted a cultural resource inventory for Kaiser Steel Corporation of Oakland, California. The survey is part of the requirements a mine permit application required by the Department of Natural Resources Division of Oil, Gas and Mining, State of Utah (hereafter D.O.G.M.). The mine permit application is for the Sunnyside Coal Mine Lease Area, near Sunnyside, Carbon County, Utah, (Figure V-1). The survey consisted of a 10% stratified, random sampling of the lease area and three site specific examinations of future mine surface expansion locations. This document includes the results of the Class I litrature search of all prehistoric and historic cultural resource values, historic windshield survey, the Class II (10% sample) and the Class III intensive (site specific) survey. The format followed is a modified version of the Permit Applications-General Guidelines For Organizational Format and Content, revised November 3, 1980, published by D.O.G.M. The modification was necessary in order to adequately section all of the requirements of D.O.G.M. and of the Federal Office of Surface Mining in Denver. Historical and Cultural Resources is Chapter 5 of the permit application and hence, this document is organized under Chapter 5 and its appropriate sub-sections.

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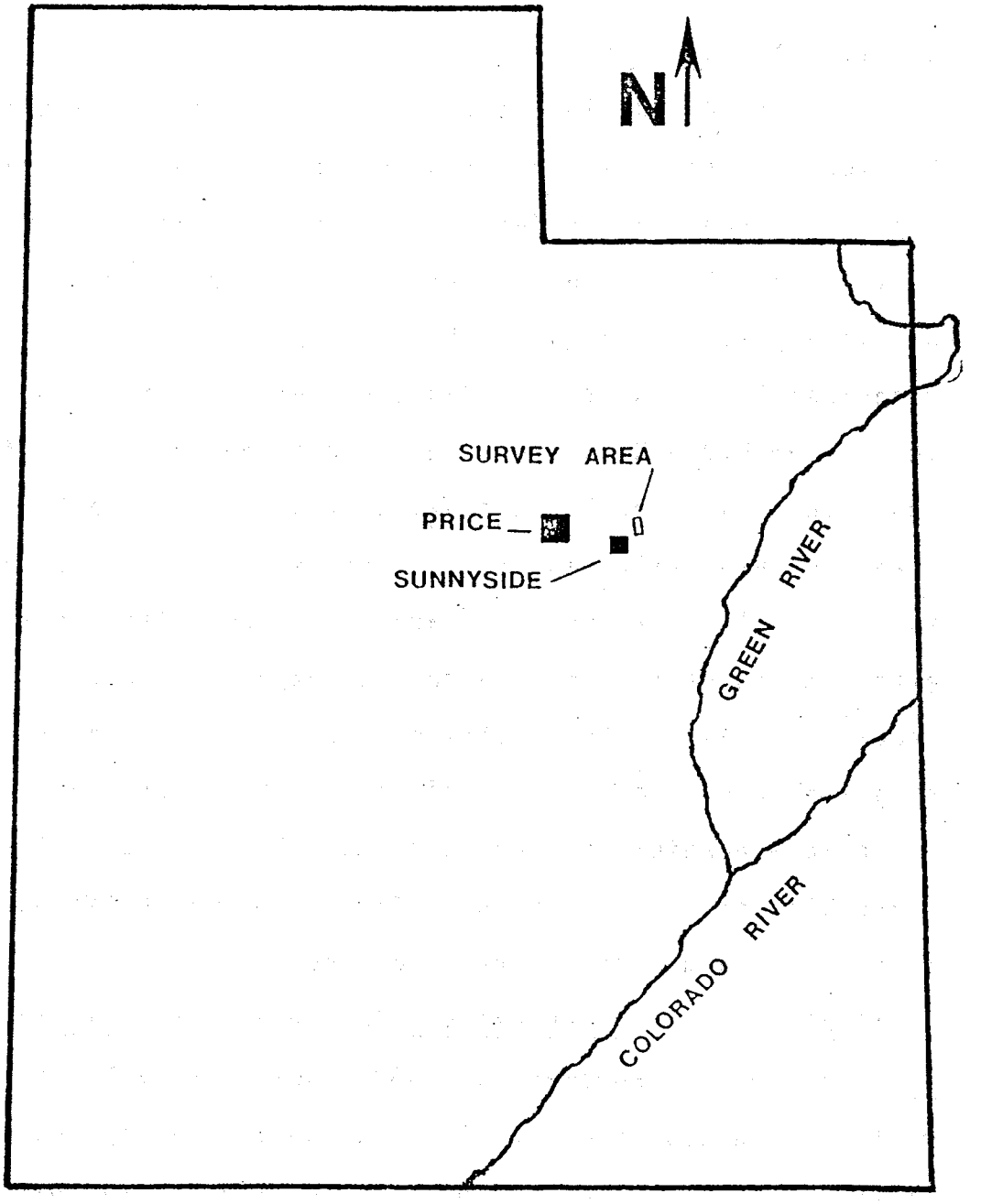

1 INCH; APPROX. 51 MILES

Figure V-1. Survey Location.

5.1.2. General Information and Legal Background

The Consulting Services Branch was contracted by Dr. Hon C. Lee, Manager of Mineral Processing, of Kaiser Steel Corporation. Contract negotiations were finalized on December 30, 1980. Field work was carried out during January 19-24, 1981, and February 27-28, 1981. The literature search and the field survey was organized and conducted under the direction of Asa S. Nielson, Director of the Consulting Services Branch. Mr. Nielson was assisted in the field and in the report production by Jack Oviatt, David A. Merril and James Kirkman. A total of 36 person days was required for the field work. The field work was completed under a Bureau of Land Management (B.L.M.) Antiquities Permit (81-Ut-013) which expires October 6, 1981. Bruce Hawkins, staff historic archeologist of the Antiquities Section examined and identified the historic artifacts collected during the survey. The drafting and photography were accomplished by Toni Ray, Debbie Truell-Seward and James Kirkman. The report was typed by Amy Pringle, Rachael Olschewski, and Renae Hendry. The staff of the Sunnyside Mine, Lynn Huntsman, Manager of Engineering, John Huefner and Doug Pearce, staff engineers, provided invaluable maps, field access information and numerous important documents for the report.

All field and literature notes, correspondance, maps and site data are on file at the Antiquities Section in Salt Lake City. The artifacts collected during the survey were analized at the

Section and are being curated at the Museum of Natural History, University of Utah, in Salt Lake City. This report, site records and maps is being distributed to Kaiser Steel Corporation and all appropriate state and federal agencies. To our knowledge, this is the first cultural resource study conducted on the Kaiser Steel, Sunnyside Mine Lease Area. The study is required for Kaiser Steel Corporation to comply with pertinent government legislation. First, the study particularly fulfills requirements of the Utah Coal Mining and Reclaimation Act of 1979. The study also helps Kaiser Steel to comply with federal legislation, i.e., Exectutive Order 11593 "Protection and Enhancement of the Cultural Environment" (Federal Register, Vol. 36, No. 95, May 15, 1971), "The National Historic Preservation Act of 1966 (80 Stat. 915) as ammended in 1976, The Archeological and Historical Data Preservation Act of 1974", which is an amendment of "The Reservoir Salvage Act of 1960' (74 Stat. 220), and finally, the "Archeological Resources Protection Act of 1979".

In general, these laws recognize the fragile, non-renewable nature of historic and prehistoric cultural resources. The legislation has been enacted in order to identify, report and evaluate these resources prior to any proposed impacting action.

5.1.2.1. General Goals

This study has three principle goals. The first is to identify and evaluate the cultural resource values within the mine lease area. The second goal is to ascertain

site density within certain environments in order to faciliate future development of the mine lease. As an example, if a particular environment could be demonstrated to have a low site density, then this area could be released from future culture resource inventory as mine development expands. Studies of this type have become more prevalent on federal resource lands (Reed and Nickens 1980; Holmer 1979; and Wikle 1979) and on mining plan applications in Utah (Hauck 1980). The third goal is to examine what types of impacts will likely occur to known culture resources in the future. Mine expansion plans in the next five years call for the possible development of two mine vent systems and a sedimentation pond (Plate V-2). An additional concern is the potential for impact to cultural resources resulting from land subsidence caused from long-wall coal extraction and the subsequent collapse of the mine surface. All of the various impacts will be addressed in Section 5.9.

5.1.2.2. Location

The mine lease area is approximatly 34 km southeast of Price, Utah, and about 3 km north of East Carbon City, Carbon County, Utah, (Figure V-1). The survey area includes all or parts of Sections 1, 12, 13, 24 and 25, T14S, R13E, Sections 6, 7, 8, 17, 18, 19, 20, 21, 28, 29, 30, 31, 32, 33, 34, T14S, R14E and Sections 3, 4, 5, 6, 9, 10, 15, 16, 17 of T15S, R14E. The majority of the land is the private property of Kaiser Steel Corporation with small portions of

private and B.L.M. (Price River Resource Area) Carbon County coal lease lands (Plate V-1).

5.1.3. Environmental Overview

5.1.3.1. Physical Features of the Site Area: Topography, Drainage and Elevation

The topography of the Kaiser Steel permit area is rugged and precipitous, as is typical of the maturely-dissected Book Cliffs area in general. Local relief approaches 700 meters in approximately 3.2 kilometers in rising from the town of Sunnyside (1980 meters) to the crest of West Ridge (about 2680 meters). Patmos Ridge, to the east of the permit area, reaches altitudes of 2925-3050 meters. Eighty to 90 percent of the permit area ranges in altitude from 2010 to 2620 meters and consists to steep, unstable colluvial slopes and bedrock cliffs.

Numerous short, steep canyons having dendritic patterns drain the west-facing slopes of the Book Cliffs north of the town of Sunnyside. The extreme southern part of the permit area is drained by Water Canyon and the North Fork of Horse Creek. The major part of the permit area, however, is drained by Grassy Trail Creek, which flows southward through the north to northwest-trending Whitmore Canyon. West Ridge forms the Grassy Trail Creek drainage divide on the west, and Patmos Ridge forms the drainage divide on the east. Grassy Trail Creek heads north of the permit area in the Book Cliffs, and empties into the Price River about 15 miles southwest of Sunnyside.

Whitmore Canyon has a flat alluvial floor rising abruptly in colluvial or bedrock slopes along its sides. Its tributary canyons, all of which enter from the east, have distinct V-shaped cross-profiles, and lack flat floors except near their junctures with Whitmore Canyon.

5.1.3.2 Soils

The steepness of the slopes in the permit area prevents well-developed soils from forming. Organic matter builds up under forest or brush vegetation, and along the former floodplain of the now-entrenched Grassy Trial Creek; but even in these areas the soils appear to be thin. Most of the soils in the site area are sandy and are probably entisols, inceptisols, and aridisols.

Stable ridge tops, and the pediment surfaces at the base of the Book Cliffs, probably possess the oldest soils. Most other areas are too geomorphically active for soil-forming processes to be effective for long periods of time. Mancos Shale outcrops erode quickly into soil-free badlands. Landslide deposits often are heavily vegetated so that their soils have thick "A" horizons, but the soils are probably quite young. Colluvial slopes are far too steep and active for mature soils to develop. Soils suitable for agriculture are limited except along Grassy Trail Creek at Sunnyside and along the flat bottom of Whitmore Canyon. The generally high altitude of the area, however, probably prevented prehistoric people from growing frost-sensitive crops.

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5.1.3.3 Bedrock Geology

The Book Cliffs form an impressive retreating erosional escarpment extending from Price, Utah on the west to near Grand Junction on the east. This escarpment constitutes the boundary between the Uinta Basin Section and the Canyonlands Section of the Colorado Plateau Physiographic Province (Stokes 1977). Relatively resistant Cretaceous and Tertiary sandstones and mudstones dipping at gentle angles to the north and northeast overlie the easily eroded Mancos Shale. An abrupt topographic break thus results between the relatively flat Mancos Shale lowlands and the high rugged sandstone cliffs and slopes of the Book Cliffs.

Rocks in the Sunnyside area (Figure V-2) are similar in character to the rocks along most of the length of the Book Cliffs (Fisher et al 1960). The alternating sandstones, shales, and coals of the Blackhawk Formation represent cyclic transgressions and regressions of nearshore marine and lagoonal environments at the close of the occupation of the area by the Mancos Sea (Young 1966). The overlying Cretaceous and Tertiary rocks were deposited in more terrestrial (fluvial) environments so that the major coal seams are found only in the Blackhawk Formation (Clark 1928). Extensive bituminous sandstone deposits (commonly called rock asphalt) crop out in the uppermost Wasatch and lowermost Green River formations just east of the permit area (Holmes and Page 1956).

Tertiary		Green River Formation	lowermost part exposed just east of permit area: fluvial sandstones and lacustrine shales
		Wasatch Formation	about 4000' of alternating sandstones, mud stones, and shales, and some limestone beds
		Colton Formation	
		North Horn Formation	
Cretaceous	Mesa Verde Group	Price River Formation	alternating sandstone and shale; 500'
		Castlegate Sandstone	cliff-forming sandstone; 180'
		Blackhawk Formation	includes: 680' upper shaley member upper and lower Sunnyside coal seams middle sandstone member middle shale member kenilworth coal seam lower sandstone member
		Mancos Shale	only uppermost part exposed in permit area; dark marine shales

Figure V-2. Bedrock Stratigraphy in the Sunnyside area.

(After Doelling, 1972; and Clark, 1928)

Two major sets of faults, at right angles to each other, cross the permit area (Osterwald 1962). One of the fault sets trends east-northeast, and the other, the Sunnyside fault zone, trends north-northwest (Osterwald and Dunrud 1966). The Sunnyside fault zone parallels the trend of Whitmore Canyon and probably was responsible for a zone of weakness in the bedrock along which Grassy Trail Creek downcut.

The Kaiser Steel Sunnyside mines exploit the upper and lower Sunnyside coal seams (Scheibner 1979). The upper coal seam averages 1.2 to 2.1 meters in thickness, and the lower seam averages 1.67 to 3.65 meters in thickness (see Section 3.3.1.1.). They are separated by 1 to 12 meters of shale or siltstone (Doelling 1972). Coal mining was initiated at Sunnyside in 1898, and in 1979 there were approximately 80 kilometers of underground tunnels covering an area of 39 square kilometers (Scheibner 1979).

Although subsidence cracks related to the underground mining at Sunnyside have been mapped by Osterwald (1962), there is presently no obvious evidence of these features on the ground surface. According to Osterwald's (1962) map, the subsidence cracks are located above areas where both the upper and lower coal seams have been mined out, and where there is between 90 and 244 meters of cover. Dunrud and Barnes (1972) report major tensional cracks and compressional features related to subsidence in the Geneva Mine area, 16 kilometers south of Sunnyside. The subsidence features in the Geneva area are

expressed at the surface, as much as 275 to 305 meters above the mine workings. Althought similar geologic relationships may exist in the Kaiser Steel permit area, according to the Kaiser Steel Permit Application (Sections 3.4.8 and 6.6.3.3) little subsidence is expected. Kaiser Steel is now mining at a depth of 365-762 meters.

5.1.3.4 Surficial Deposits

Sandstone bedrock cliffs and colluvial slopes dominate the landscape in the permit area. The sandstone cliffs range from several meters to more than 50 meters in height and are generally discontinous laterally. Talus deposits are not common except below cliffs that are particularly prone to fracturing and rapid disintegration.

Bouldery to sandy and clayey colluvium accumulates on the steep slopes formed on the shale layers interbedded with the cliff-forming sandstones. The colluvium generally has enough fine material for vegetation to be established, but in some areas there is little plant growth and the slopes are very unstable.

Landslide deposits are common along the west side of Whitmore Canyon. Extensive active and inactive mass movements are located in and adjacent to the NE1/4, Sec. 12, T. 14 S., R. 13 E., in the E1/2 Sec. 18, T. 14 S., R. 14 E., and in a large area adjacent to, and including Bull Flat (SE1/4, Sec. 19, 14 S., R. 14 E.).

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Three major factors are responsible for the location of mass-wasting on the short, steep west side of Whitmore Canyon as opposed to the highly dissected east side. The factors are: 1. the presence of the Sunnyside fault zone which is responsible for the orientation of Whitmore Canyon parallel to the regional strike of the rocks, and also for fractures and joints parallel to the fault zone; 2. the east to northeast dip (5^0-10^0) of the rocks; and 3. the presence of alternating layers of hard sandstones and inherently weak shales, a combination known to be susceptible to mass-wasting (Bloom, 1978). Landsliding is induced by ground waters lubricating the sandstone/shale interfaces, thus encouraging the sliding by gravity of large masses of bedrock down-dip into Whitmore Canyon. Large open cracks marking the initial phases of such landslides can be seen above Bull Flat on the east side of West Ridge, and high on the west side of Slaughter Canyon (NW1/4, NE1/4, Sec. 31, T. 14. S., R. 14 W.). Some small-scale modern slumps can be seen at the toes of the old landslide deposits in Whitmore Canyon. However, most of the major landslide activity probably occurred during the effectively moister glacial periods of the Pleistocene.

Sandy to cobbley alluvium in Whitmore Canyon reaches thicknesses of at least 4.5 to 6 meters. There is one major alluvial terrace in Whitmore Canyon resulting from downcutting by Grassy Trail Creek.

Two major Quaternary pediment levels are present within the permit area beyond the mouth of Whitmore Canyon. The upper pediment, across which Grassy Trail Creek flows, stands 85 meters above the lower one, and they are separated by an erosional scarp which runs through Sections 6,7 and 8, T15S, R14E. The contact between the sandy to bouldery pediment gravels and the underlying Mancos Shale is exposed along this scarp. Where the pediments intersect the Book Cliffs, the alluvial gravels grade upward into coarse bouldery colluvium and mudflow deposits.

5.1.3.5 Flora and Vegetation

Two major vegetation zones (Cronquist et al 1972) are represented in the permit area, the Pinyon-Juniper Zone, and the Montane Zone. Pinyon pine and Utah juniper dominate vegetation communities on the pediment surfaces, on the lower slopes of the Book Cliffs, and on south-facing slopes, even at higher altitudes (eg. 2440 meters or more). Sagebrush-grass communities are found interspersed with pinyon-juniper stands, and also dominate large areas on the ridge tops (Table V-1). In slightly moister locations, such as north-facing slopes or landslide deposits, serviceberry-sagebrush communities are common. Mountain mahogany forms pure stands in some places on the ridge tops. Riparian communities along Grassy Trail Creek and its tributaries contain cottonwood, willow, birch, sagebrush, and rabbitbrush.

The Montane Zone contains douglas fir and aspen communities. Douglas fir dominates north-facing slopes at higher altitudes, and aspen communities are found on landslide deposits, stream bottoms, and on open, well-watered slopes and draws, also at higher altitudes. Because of the sharp differences in such environmental factors as soil moisture, temperature, and sunlight on north- and south-facing slopes, the two zones, Pinyon-Juniper and Montane, are not well-separated altitudinally, rather, the various constituent communities form an intergrading mosaic pattern dependant upon micro-environmental conditions.

5.1.3.6 Fauna

According to Durrant (1952) the Book Cliffs area is transitional between the Canyonlands province of the Colorado Plateau Fanunal Area, and the Unita Basin Province of the Northern Great Plains Faunal Area. These Faunal Areas are based on physiographic divisions as they influence the distribution of small mammals.

Droppings and tracks of mule deer are common throughout the area (Table V-2), although we saw no live deer during the survey. Beaver dams and other evidence of activity by beavers is common in Whitmore Canyon and its tributaries. We encountered a live bobcat caught in a steel trap in the SE1/4, SW1/4, Sec. 29, T. 14 S., R. 14 E. The skull and skeleton of a ringtail were found near this same trap.

TABLE V-1

PLANTS IDENTIFIED IN THE PERMIT AREA DURING THE SURVEY

ACERACEAE	Maple Family
Acer sp	maple
ASCLEPIADACEAE	Milkweed Family
Asclepias speciosa	common milkweed
BERBERIDACEAE	Barberry Family
Berberis repens	Oregon grape
BETULACEAE	Birch Family
Betula occidentalis	water birch
CACTACEAE	Cactus Family
Echinocereus sp	hedge hog cactus
Opuntia sp	prickly pear cactus
CAPRIFOLIACEAE	Honeysuckle Family
Sambucus sp	elderberry
Symphoricarpos sp	snowberry
CELASTRACEAE	Bittersweet Family
Pachystima myrsinites	mountain lover
CHENOPODIACEAE	Goosefoot Family
Atriplex canescens	four-wing saltbush
COMPOSITAE	Sunflower Family
Arctium minus	burdock
Artemisia tridentata	sagebrush
Chrysothamnus nauseosus (?)	rabbitbrush
Circium sp	thistle
CRUCIFERAE	Mustard Family
Rorippa nasturtium-aquaticum	water cress
CYPRESSACEAE	Cypress Family
Juniperus osteosperma	Utah juniper
Juniperus scopulorum	Rocky Mountain juniper
Juniperus communis	common juniper
EPHEDRACEAE	Jointfir Family
Ephedra viridis	Mormon tea
EQUISETACEAE	Horsetail Family
Equisetum sp	horsetail
GENTIANACEAE	Gentian Family
Swertia ratiata	deer's ears

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TABLE V-1 CONTINUED:

GRAMINEAE	Grass Family
Agropyron smithii	western wheatgrass
Agropyron cristatum	crested wheatgrass
Bouteloua gracilis	gramma grass
Bromus tectorum	cheat grass
Elymus sp	wild rye
Oryzopsis hymenoides	Indian ricegrass
Poa sp	bluegrass
Stipa scribneri (?)	Scribner needlegrass
JUNCACEAE	Rush Family
Juncus sp	rush
LEGUMINOSEAE	Pea Family
Lupinus sp.	lupine
Melilotus sp.	sweet clover
LILIACEAE	Lily Family
Yucca harrimaniae (?)	yucca
PINACEAE	Pine Family
Pinus edulis	pinyon pine
Pinus flexilis	limber pine
Pseudotsuga menziesii	Douglas fir
POLYGONACEAE	Buckwheat Family
Eriogonum sp	wild buckwheat
Eriogonum sp	sulfur flower
ROSACEAE	Rose Family
Amelanchier alnifolia	serviceberry
Cercocarpus ledifolius	curl-leaf mtn. mahogany
Cowania mexicana	cliff rose
Rosa sp	wild rose
SALICACEAE	Willow Family
Populus tremuloides	aspen
Populus angustifolia	narrowleaf cottonwood
Salix sp	willow
SAXIFRAGACEAE	Saxifrage Family
Ribes sp	currant
SCHROPHULARIACEAE	Figwort Family
Penstemon sp	beard tongue
Verbascum thapsus	mullien
TYPHACEAE	Cattail Family
Typha latifolia	cattail
URTICACEAE	Nettle Family
Urtica gracilis	nettle

TABLE V-2

MAMMALS AND BIRDS IDENTIFIED IN THE PERMIT AREA DURING THE SURVEY

MAMMALS

NAME		EVIDENCE
Bassariscus astutus	ringtail	skull and skeleton
Mephitis mephitis	striped skunk	skull; carcass
Canis latrans	coyote	droppings; tracks
Lynx rufus	bobcat	live trapped individual
Thomomys sp	pocket gopher	snow-tunnel fillings
Castor canadensis	beaver	ponds, cut trees, skeleton
Neotoma sp	woodrat (pack rat)	middens
Erethizon dorsatum	porcupine	evidence of feeding on Douglas fir
Lepus americanus	snowshoe hare	observation
Sylvilagus sp	cottontail rabbit	observation
Odocoileus hemionus	mule deer	tracks, droppings, antlers, carcass

BIRDS

SCIENTIFIC NAME	COMMON NAME
Aquila chrysaetos	Golden Eagle
Buteo sp	Hawk
Alectoris graeca	Chukar
Dendragapus obscurus	Blue Grouse
Colaptes auratus	Common flicker
Eremophila alpestris	Horned lark
Pica pica	Black-billed magpie

TABLE V-2 BIRDS, CONTINUED:

SCIENTIFIC NAME	COMMON NAME
Alphelocoma coerulescens	Scrub jay
Nucifraga columbiana	Clark's nutcracker
Parus gambeli	Mountain chickadee
Sitta carolinensis	White-breasted nuthatch
Turdus migratorius	Robin
Myadestes townsendi	Townsend's Solitaire
Junco hyemalis	Slate-colored junco

Wintering birds were common in the permit area during the survey, and in the summer, breeding birds are probably also common in the brush, montane forest, and riparian habitats. No reptiles or amphibians were observed during the survey.

5.1.3.7. Present Climate

Figure V-3 shows climatic data for Hiawatha, Utah, 56 kilometers west of Sunnyside on the eastern slope of the Wasatch Plateau. Despite possibly some differences due to the orographic effect of the Wasatch Plateau at Hiawatha, these data should generally characterize climatic conditions in the Kaiser Steel permit area. Because of the relatively high altitudes in the permit area, the climate is somewhat cooler and moister than on the nearby Mancos Shale lowlands. There are approximately 200 frost-free days per year at Hiawatha (U.S. Dept. Comm., 1965), and similar conditions probably prevail over much of the permit area. The high precipitation peak in August (Figure V-3) represents moisture from tropical air masses originating over the Gulf of Mexico and circulating over Utah as part of the Mexican monsoon. Winter moisture comes primarily from Pacific cyclonic storms. Because of the nature of the topography in the permit area, there are sharp contrasts in microclimate between north- and south-facing slopes at the same altitude. For more detailed climatic data refer to Section 11.3 of the mine permit application.

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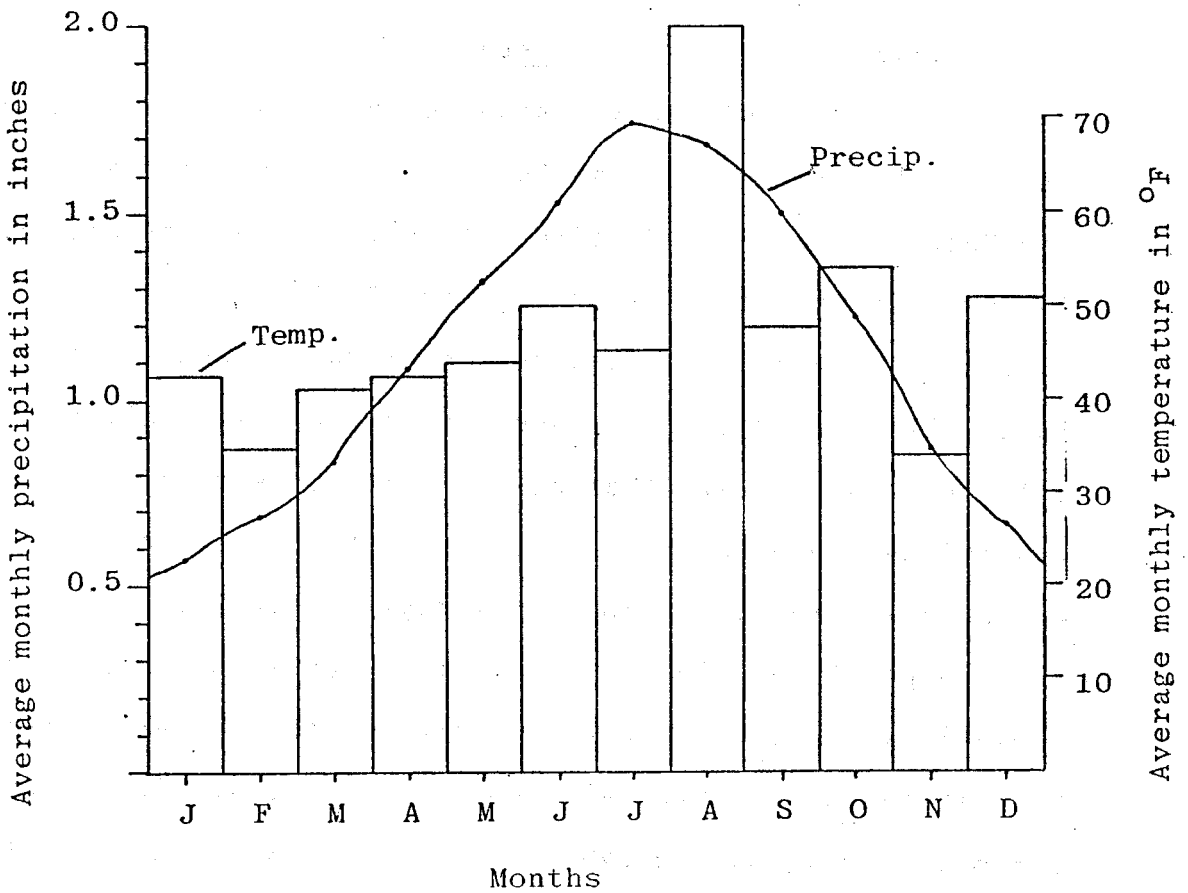

Average monthly temperatures and precipitation at Hiawatha, Utah, altitude 7230 feet. Mean annual temperature is 45.5°F; mean annual precipitation is 14.15 inches. (U.S. Dept. Comm. 1973)

Figure V-3. Climatic Summary for the Hiawatha Area.

5.1.3.8. Past Climate

Although there have been no detailed studies of Quaternary climates in the Book Cliffs, paleoclimatic studies from surrounding areas can be used to infer past conditions in the Sunnyside area. The last major period of Pleistocene glacial climate (about 22,000 to 13,000 B.P.) had profound effects on nearby areas of Utah. Due to the marked increase in effective moisture there were vast pluvial lakes in the Great Basin and extensive glaciers in the high mountain areas during this period (Morrison 1965).

There were no glaciers or pluvial lakes in the Sunnyside area during the Pleistocene. However, during each of the 19 major world-wide glacial events in the last 700,000 years (Shackleton and Opdyke 1973), the area probably underwent significant environmental changes. These probably included: decreased temperatures and/or increased precipitation, altitudinal lowering of vegetation zones, increased runoff in streams, increased soil moisture and higher gound water tables, increased snow pack, increased colluvial activity on slopes, and an increase in large-scale mass-wasting. Packrat (Neotoma sp.) middens are abundant in the permit area, and are a potential source of paleoecological data (Wells 1976) for future research.

Higher frequency Holocene (10,000 B.P. to the present) climatic changes are documented from several nearby places in Utah (e.g. Madsen and Currey 1979; Currey 1976; Currey 1980; Lindsay

1980). The general pattern in the period 13,000 to 8,000 B.P. is of gradual warming with several lesser episodes of cooling following rapid deglaciation in the mountain areas. The Altithermal, or mid-post-glacial warm period, lasted from about 8,000 B.P. to 5,000 B.P. with possibly a short period of cooler or wetter conditions around 6500 to 6000 B.P. Subsequent to 5,000 B.P. there were at least three periods of increased effective moisture (Neoglaciation) leading up to modern climatic conditions at the end of the "Little Ice Age" (about A.D. 1850). The effects of Holocene climatic fluctuations on the geology and ecology of the Sunnyside area is not known. But, it is likely that the environmental changes had a significant effect on prehistoric peoples as has been noted in surrounding areas (Benedict 1979: Madsen 1980).

5.1.3.9. Present Land Use

The area under consideration for the mine permit is owned by Kaiser Steel Corporation, individual land holders, and the B.L.M. (Plate V-I) and is used for mining, grazing, hunting, trapping, and recreation.

5.1.3.10. Historic Land Use (See Historic Overview 5.1.5.)

During the historic period, the permit area was used for the following purposes:

Trapping--Some local informants report that the mountains to the east and north of the permit area were trapped

extensively in the 1820-47 period. No documentary evidence for this claim was uncovered for the area around Sunnyside, although the Westwater Canyon area of the Book Cliffs was a primary route for trappers, such as Antoine Robidoux, going north from the Colorado Plateau into the Roan Mountains and Book Cliffs.

Homesteading--During the late 1870's before agriculture was successfully established along the Price River, early homesteaders obtained a substantial portion of their food by hunting game on a regular basis in Whitmore Canyon.

Stock Raising--Beginning in the 1880's and continuing through the 1940's Whitmore Canyon and Grassy Trail Creek were used extensively for cattle operations. George C. Whitmore, for whom the canyon is named, operated one of the largest cattle ranches in Carbon County between 1880-1890.

Agriculture--In 1897, Jefferson Tidwell and his extended family built a cabin at the mouth of Number Two Canyon to begin a small farm. Less than a year later, the Tidwells discovered coal, and sold their claims to Utah Fuel Company.

Logging Operation--One local history reports that timbers for mine shoring and homes were taken from the permit area.

Mining--The Utah Fuel Company, a subsidary of the Denver and Rio Grande Western Railroad Company mined coal from the current mine permit area. In 1942 this operation was sold

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to Kaiser Steel because the coal mined from the Sunnyside area was suitable for coking. Two attempts have been made to mine asphalt from deposits in the north end of the permit area, first in 1907 by the Bowry Asphalt Company and later in the 1920's and 30's by the Utah Rock Asphalt Company.

Residential--Associated with the Sunnyside Mine was the town of Sunnyside, located primarily in T14S, R14E, Sections 32 and 29.

5.1.3.11. Previous Investigations and Known Sites

A literature search of all regional (secondary) archeological and historical literature, as well as essential primary (site specific) literature was made. A partial survey of the Sunnyside mine area was completed by the Utah State Historical Society Preservation Office Survey and Planning staff during the summer of 1980. Three sites potentially eligible for the National Register were identified, the coke ovens (Site 42Cb243), the machine gun nest, which is now part of Site 42Cb245, and the Utah Rock Asphaltum company tramway (Site 42Cb247). No prehistoric sites were recorded prior to this study. These sites are under consideration for nomination to the Register, but no official nominations have been made. The Utah State Register of Historic Places has been incorporated into the National Register.

5.1.4. Prehistoric Overview

5.1.4.1. Paleo-Indian

The earliest inhabitants believed to have occupied the region were those of the Paleo-Indian tradition, the Llano, Folsom, and Plano cultures. The Llano or Clovis Culture (ca. 12,500-11,000 B.P.-Before Present) (Sellers 1952) is most often associated with kill sites of Late Pleistocene megafauna such as mammoth (Haury 1953; Haury, Sayles, and Wasley 1959). Little else is known about the subsistence base of the Clovis people. The kill sites are usually associated with former spring, marsh, lake side or riverine environments. There is little doubt that Clovis hunters exploited mammoth but to infer that megafauna were the principle source of subsistence may be presumptious. The environments most often associated with megafauna kill site are rich in a variety of potential resources (Niering 1966; Odum 1963) that likely were exploited along with other environments.

The Clovis point is the single distinctive artifact of the Llano Culture, and is a lancolate, fluted dart point. It has been found in association with megafauna (usually mammoth) at several locations in the Southwest and on the Great Plains (Haury, Sayles, and Wasley 1959). No such association has been found in Utah, although the point type has been recovered from surface sites in the region (Madsen, Currey, and Madsen 1976). Utah mammoth remains are also known from environments similar to classic kill sites elsewhere.

The Llano Culture was followed closely by the Folsom Culture (11,000-9,000 B.P.) (Jennings and Norbeck 1955) and is most often associated with bison (Bison antiquus) kill sites (Frison 1978). As with the earlier Llano Culture, little else is known about Folsom Culture subsistence beyond the demonstrated bison exploitation. The distinctive Folsom point, the hallmark of the culture, is smaller, and thinner than the Clovis point. It is lancolate, fluted and often eared. Point finds associated with bison remains occur on the High Plains. Isolated surface finds have been reported in Utah (Madsen, Currey, and Madsen 1976). Bison antiquus and other fauna associated with Folsom sites have also been found (Nelson and Madsen 1978; Miller 1976) but not in association with human artifacts.

The Folsom Culture was followed by the Plano Culture (9,000-7,000 B.P.) (Jennings and Norbeck 1955; Frison 1978). Plano Culture groups continued to exploit large fauna, with increased use of jump-kills. Jump-kill sites are known at several locales on the Great Plains (Frison 1978) but none are known in Utah.

The Plano groups developed a wide variety of projectile point types. Most are lancolate, non-fluted and precisely flaked. Isolated Plano style points have been found in Utah (Hauck and Weder 1980; Reed and Nickens 1980).

The Paleo-Indian traditions remain the least studied cultural phenomenon on the Utah portion of the Colorado Plateau and the

northeastern Great Basin. Some have argued that the classic Paleo-Indian traditions never existed west of the Rocky Mountains (Jennings 1957). The evidence of projectile points and megafauna (albeit not in association) suggests otherwise. It is possible that such assemblages as the Pinto Basin Complex (Campbell and Campbell 1935) may in fact be a Great Basin temporal counterpart to the Paleo-Indian. Non-diagnostic deposits in lower levels of Danger Cave (Jennings 1957) in the Great Basin and Cowboy Cave (Jennings 1978) southeast of the lease area may date to Paleo-Indian times (Madsen, Currey, and Madsen 1976). No evidence of any Paleo-Indian traditions have been located within the mine lease area.

5.1.4.2. Archaic Period

The Archaic Period is viewed by some prehistorians as being contemporaneous in part with the latter Paleo-Indians in the Great Basin (Jennings 1957; Hauck 1977; Irwins-Williams and Haynes 1970) or a follow-up to the Paleo-Indians (Madsen, Currey, and Madsen 1976; Holmer 1978; and Schroedl 1976). The term archaic was first used to define a non-ceramic assemblage at the Lamoka Site in New York (Ritchie 1932) but later developed into a general, technological stage status for the New World (Willey and Phillips 1958). In the Great Basin and on the Northern Colorado Plateau, the term has developed more specific spatial and temporal meanings. The status of current research favors a combination of technological, temporal and adaptive

definitions. The Archaic is viewed as four distinctive periods based upon population changes, statistical groupings of projectile points and regional adaptation to intensive hunting and gathering strategies keyed to specific species of flora and fauna (Schroedl 1976; Holmer 1976).

The Black Knoll Phase (8,300-6,200 B.P.) has been recognized at Cowboy Cave (Jennings et al 1980), Sudden Shelter (Jennings et al 1980), Hells Midden (Lister 1951), Deluge Shelter (Leach 1962) and Joe's Valley Alcove (Schroedl 1976). All of these sites are well stratified rockshelters or caves with good chronological control and preservation. The phase is statistically dominated by Pinto and Northern side-notched points used on spear throwers (atlatls). Populations appear to slowly increase. Cave and shelter deposits indicate that populations tend to select specific resources in each area.

The Castle Valley Phase (6,200-4,500 B.P.) indicates a possible change in environment which may have resulted in a shift in subsistence. The population declines, relative to the Black Knoll Phase and shows an increased dependence on grasses and less on hunting. A good portion of the Castle Valley Phase is dominated by the Rocker Base and Sudden and Hawken side-notch points. The latter portion of the phase may have witnessed an increase in population and dominance of unnamed lancolate and Humboldt points. Slab-lined firepits are used more extensively during this period as opposed to earlier or later times. This phase is recognized only at Sudden Shelter (Schroedl 1976).

The Green River Phase (4,500-3,300 B.P.) is recognized by Schroedl at the aforementioned Sudden Shelter, Deluge Shelter and Hells Midden in addition to Pint-Size Shelter (Lindsay and Lund 1976) and Throne Cave (Day 1964). The phase may have a western and eastern variant. The western variant is statistically dominated by the Gypsum point style with later introduction of the San Raphael side-notch point. The eastern variant is marked by the Duncan-Hannah point, which appears to be a Plains style influence. Overall, there is a possible minor increase in population and a return to more reliance on hunting and less on grass collection.

The Dirty Devil Phase (3,300-1,800 B.P.) is in Schroedl's words "the most tenuous of the four outlined..." (1976:68). Schroedl recognizes the phase at Cowboy Cave, Clyde's Cavern (Winter and Wylie 1974) and Deluge Shelter. The principle projectile point is still the Gypsum with the addition of an unnotched triangular point.

Little is known about population or subsistence changes. It is now believed that corn was introduced sometime around 2,100 B.P. Berry (1980). The overall effect of the advent of corn and the possibility of horticulture is still a subject of research. The Dirty Devil Phase is arbitrarily ended near 1,500 B.P. with the introduction of the bow and arrow and the shift to a different subsistence strategy keyed to horticulture.

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5.1.4.3. Formative Cultures

The Archaic sequence is followed by incipient Formative Stage cultures (1,500-650 B.P.). Formative groups are usually characterized by a sedentary village life, with widespread use of ceramics and increased reliance upon, and in some cases, complete dependence on horticulture (Lipe 1978; Willey and Phillips 1958). The three Formative groups in Utah are the Mesa Verde and Kayenta Anasazi, and the Fremont cultures (Figure V-4). The Anasazi occupied the extreme southern and southeastern portions of Utah, the Fremont Cultures nearly all of Utah north of Cedar City and Escalante and west of the Colorado River. The principle concern in the mine lease area is the Fremont. The Fremont was defined as typologically distinct from the Pueblo Cultures of the Southwest by Morss (1931). Morss' Fremont was largely confined to the Fremont River drainage of south-central Utah. Since 1931, the Fremont have been shown to inhabit nearly all of northern Utah. In addition, the Fremont Culture has been divided and redivided into sub-groups. The boundaries waxed and waned with each additional foray into the field. Sub-groups were most often defined by separate trait lists, a technique that is now viewed as futile (Ambler 1970; Madsen and Lindsay 1977). A recent attempt to divide the Fremont into three groups (the Sevier Culture, Fremont and an unnamed Plains derived) has resulted from review of subsistence data (Madsen and Lindsay 1977) and is favorably upheld by statistical analysis of settlement patterns and architecture (Lohse 1980).

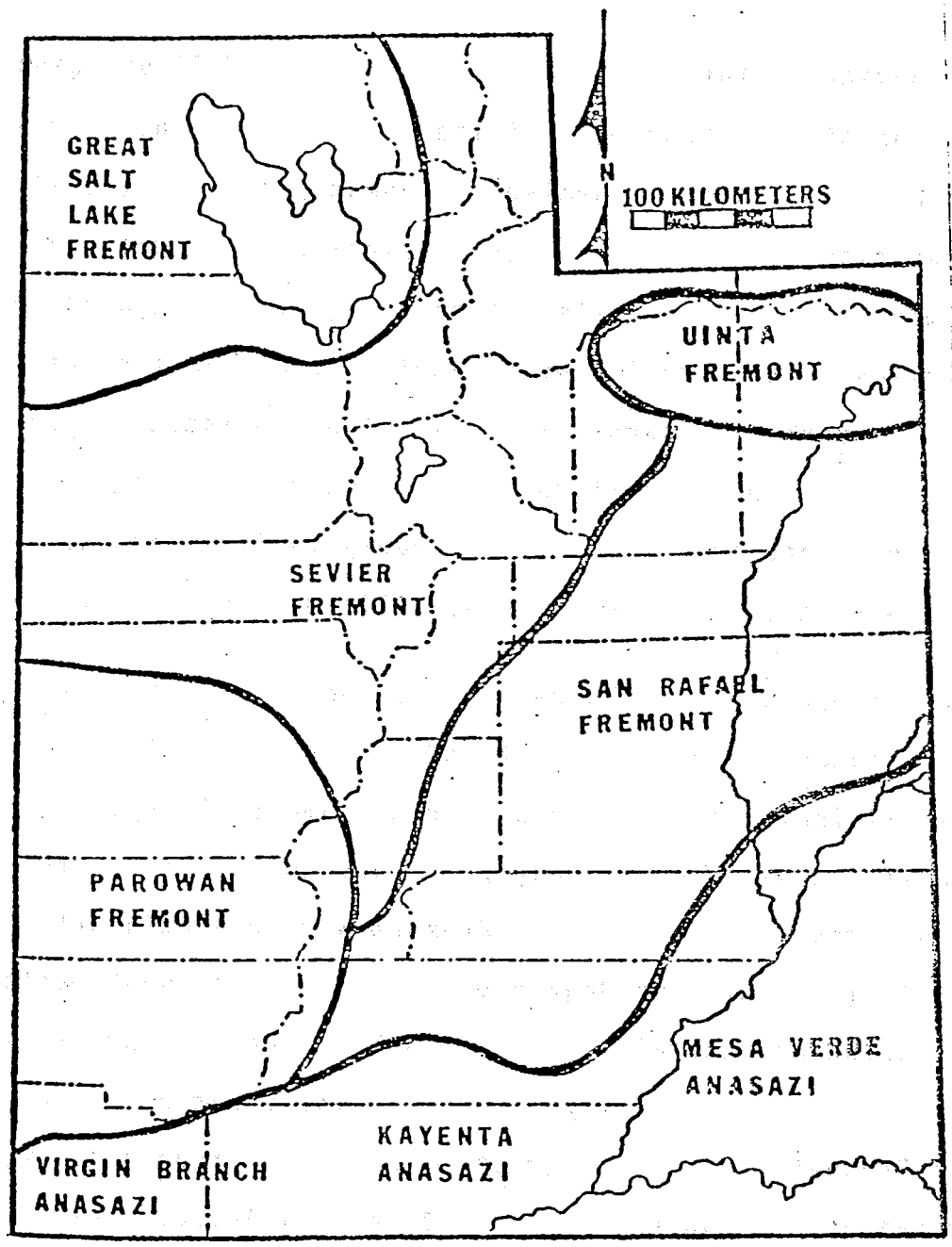

Figure V-4. Formative Culture Boundaries in Utah, 1,500-650 B.P. (after Aikens, 1970).

The Sevier Culture (1,300-650 B.P., Figure V-5) occupies the portion of the state west of the Wasatch Plateau. Large village areas contain semisubterranean pit houses, that are often clay-lined. Surface adobe storage structures are common. Several varieties of coiled gray, corrugated and black-on-white ceramics were manufactured. Settlement patterns favor riverine or marsh habitats. The subsistence base appears to be dependent on horticulture and marsh exploitation. The degree of one over the other probably varied from one village to the next (Madsen and Lindsay 1977; Nielson 1978).

The Fremont Culture (1500-700 B.P.) occupied the region east of the Wasatch Plateau and north of the Colorado River and retains the original name applied by Morss. Small villages of rock-lined semisubterranean pit house and masonary storage structures are common. The Fremont were predominantly horticulturist. The degree of dependence on supplemental gathering of natural resources, other than hunting of wild game, has not been fully examined. The ceramic assemblage of the Fremont Culture was greatly influenced from outside, as evidenced by high percentages of Kayenta Anasazi pottery types (Madsen and Lindsay 1977; Wilson and Smith 1976; Jennings 1978). The extent of the relationship between the Fremont and Kayenta people evidenced in the ceramics is not understood. If reciprocal trade items exist, originating with the Fremont in exchange for Anasazi ceramics, they have yet to be identified.

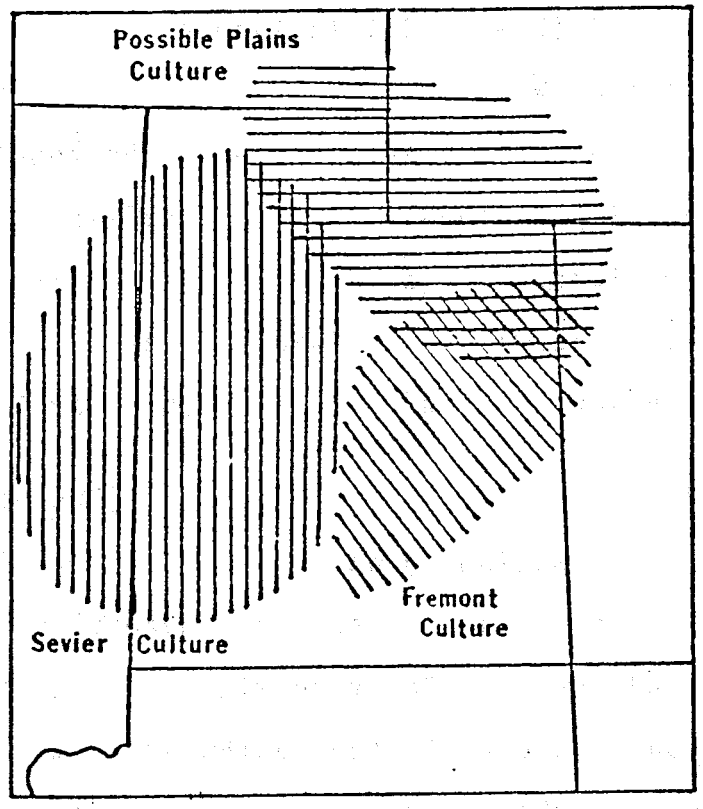

Figure V-5. Sevier, Fremont and Unnamed Plains Derived Cultures (After Madsen and Lindsay 1977).

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The unnamed Plains derived (1,300-650 B.P.) is limited to north and northeastern Utah. The group is characterized by shallow saucer-shaped pit houses. It is possible that this area had an influx of Anasazi (Pueblo II) influence as evidenced in masonary styles at Winterrock Village (Shields 1967) around 800 B.P. Much of the ceramic assemblage is the result of the paddle and anvil technique rather than coiling as in the Sevier and Fremont regions. It is assumed that subsistence centered around horticulture with additional reliance on pre-equestrian Plains style bison hunting (Madsen and Lindsay 1977).

5.1.4.4. Numic Athabascan Period (700-90 B.P.)

Beginning at around 800-750 B.P., the Formative Cultures began to decline. Generally, the eastern Great Basin and northern Colorado Plateau were abandoned, beginning about 800 B.P. in the southwest part of the state. By about 700 B.P. the abandonment was complete. At about the same time, Numic speaking peoples began to spread into Utah from southeastern Nevada (Lamb 1958; Miller, Tanner and Foley 1969). Numic speakers had reached northern Utah by 700-650 B.P. (Madsen 1975; Gruhn 1961). Through time, this language group divided into: Utes (Central and eastern Utah into Colorado), Piautes (western Utah), Goshiute-Shoshoni (north and northwestern Utah, Idaho, and Wyoming) and Southern Piaute (south and south-central Utah) (Eular 1964; Kelley 1966). Territory often overlapped with trade and intertribal warfare being common.

The Numic groups practiced an Archaic style subsistence round. Steward (1938) describes small family bands that moved from resource to resource, occasionally collecting into larger groups for special hunting or gathering activities. In some southern areas a limited horticulture was practiced (Eular 1964). Around Utah Lake marsh plants and fish allowed for large villages, while bison hunting was practiced in northeastern Utah and into Wyoming and Colorado. The basic nomadic style fostered excellent basketry, but a low quality ceramic technology. Desert side-notch points predominate.

The temporal movement of Athebascan (Navajo) groups into southern Utah is not well documented, but a few Navajo sites have been recorded in San Juan County (Hurst 1976, 1977). Beyond the limited number of sites, lttle is known in the region about Navajo material culture or subsistence. It is known that the Utes and Piautes considered the Navajo as enemies and often engaged them in warfare. During the early historic pioneering efforts, it is known that Navajo incursions resulted in considerable shrinkage of Ute and Piaute tribal lands (O'Neil and Thompson 1980).

It was the Numic and Athabascan people that early explorers and trappers encountered. The first recorded and generally friendly contacts were made by Dominguez-Escalante Expedition in 1776-1777. The expedition crossed the Wasatch Plateau north of the mine lease area. Sometime before the early Spanish fathers made their epic journey, some of the Utes in eastern

Utah had obtained horses, which likely caused considerable changes in lifestyle. With the influx of early fur trappers and trade along the old Spanish Trail, depletion of game and food sources began. The early Mormon settlements often displaced Indian bands from better resources and traditional foraging territory. During the 1850-1870's, Mormon settlement, Texas and Colorado cattle industry, and early mining efforts resulted in violent clashes such as the Black Hawk and Walker Wars. By the late 1880's the Indian population, were fairly well confined to reservations, and nomadic life style came to an end (O'Neil 1973; O'Neil and Thompson 1980; Miller 1969; McElprang et al 1949).

5.1.5. Historic Overview:

Beginning in late 1877, settlers moved into the Castle Valley area of Carbon and Emery counties from two directions. To the west, across the Wasatch Mountains, was Sanpete County (settled in 1849) and to the northwest, through Daniels Canyon and Soldier Summit pass, lay Utah County (settled in 1848). These areas were part of the original core of settlements along the Wasatch Front, from which most of the towns of southeastern Utah drew their early population.

Towns were established in Sanpete and Utah counties as part of the Mormon geopolitical strategy for controlling the Great Basin. Under the direction and stimulus of Mormon leader Brigham Young, who initiated 300 settlements in the 1847-77 period, towns were established along major transportation

routes, to take advantage of certain natural resources, and to establish Mormon political and social control throughout the Great Basin.

Stockmen were the first to cross the Wasatch Plateau in the early 1870's and use the Castle Valley for grazing. Gradually, knowledge from their explorations filtered back to Mormon leaders. A resident of Sanpete County, Jefferson Tidwell, was sent by Brigham Young in 1877 to survey the prospects for Mormon settlers in the Carbon County area (Morgan: 1940).

Tidwell reported favorably concerning an area on the Price River, just south of the present site of Wellington. Over the next five years, several attempts were made to establish a community at that site. Problems with the flooding of the irrigation system and other natural disasters produced poor crops, and the settlers hunted primarily in Whitmore Canyon for deer and other game. Several dams were constructed on the Price River in an attempt to control its waters, but it was not until 1883 that a dam was built which survived through an entire growing season and the first crops had enough water to mature (Reynolds: 1948).

Also in 1877, two groups of settlers moved over the Wasatch Plateau and settled along Huntington Creek and Cottonwood Creek in what is now Emery County (Smith: 1978). Orange Seely, after whom Orangeville is named was a leader in this group. Much of the early settlement of the Whitmore Canyon area was drawn from the groups who settled Price, Castle Dale, and Huntington.

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Whitmore Canyon is named for George C. Whitmore, owner of the Whitmore ranch, who used the canyon for summer grazing, and the water of Grassy Trail Creek for his stock raising operation. Whitmore arrived in Utah from Texas in 1878 (Eastern Utah Advocate: 1907) and soon ran one of the largest herds in Carbon County and branched out into other economic activities, like banking. The ranch house was located at the mouth of Whitmore Canyon, in the vicinity of the remaining coke ovens (Section 6, T 15 South, R 14 East) (Robinson: 1973).

The discovery of Carbon County's vast coal resources began in the late 1870's with the opening of coal mines in Pleasant Valley near the town of Scofield. As the Denver & Rio Grande Western Railroad constructed its line north from Green River toward Salt Lake in 1881-82, blasting done in preparation for laying track revealed a coal seam in Price River Canyon. (Morgan: 1940) Within a few years, other coal deposits had been discovered besides the one in Pleasant Valley--Castlegate, Sunnyside, and Hiawatha. Arrival of the railroad in Carbon County in 1881-3 provided farmers, stockmen, lumber companies, and mining companies with cheap, easy access to markets in Denver and Salt Lake. The D & R G marked the end of the predominance of subsistence/agriculture and the beginning of a long process of integration into the national economy.

In 1897, Jefferson Tidwell, his family, and relatives moved into Whitmore Canyon, building a two room log cabin at the mouth of Number Two Canyon (Reynolds: 1948). The Tidwells

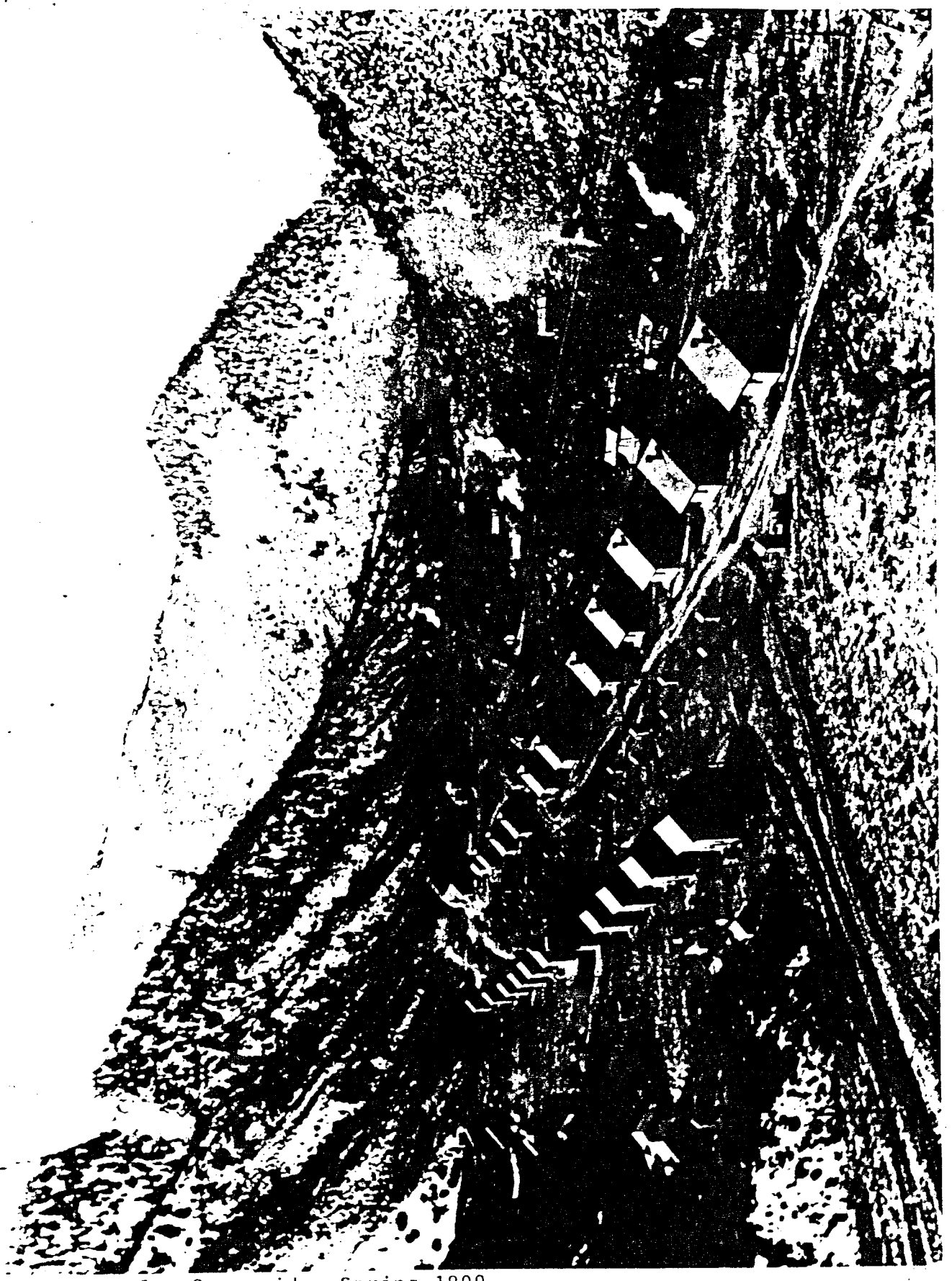

Figure V-6. Sunnyside, Spring 1899.

planned to build a small family ranch, but within a year afterwards they discovered an outcropping of coal near the present-day opening of the #2 mine. Land records in the Carbon County Archives show the Tidwells as owners of most of Sections 32 and 33 in T14S, R14E and as having filed coal mining claims in that area in 1898 (Joseph Seeley, son of Orange Seeley also filed coal claims in the vicinity of Number Two Canyon). The Tidwells and Seeley sold their land and claims to a Royal C. Peabody in 1900, who immediately sold them to the Utah Fuel Company. A George Foster Peabody of New York was treasurer of the Rio Grande Western Construction Company, parent firm for the Utah Fuel Company. (Salt Lake City Directory: 1900)

In the Spring of 1899, the Utah Fuel Company built twenty houses in a flat area just above the mouth of Number Two Canyon, approximately where the main Kaiser buildings now stand (Figure V-6). During the summer the Denver & Rio Grande Western Railroad built a line from Mounds up to the mine at Sunnyside. On November 19, 1899 the first coal was shipped from the Sunnyside Mine. (Gibson: 1948)

Sunnyside Historic District (42Cb245)

Contained within Section 32, T 14 South, R 14 East, is a portion of Whitmore Canyon containing, at least, 25 components from the original town of Sunnyside, Utah.

Eight years after the opening of the coal mine, Sunnyside had become the largest coal mine in Carbon County, producing (1907)

2700 tons, and its nearest competititor 1300.(Eastern Utah Advocate: 1907) Because of the suitable coking properties of Sunnyside coal, the mine was the second largest coke producing operation in the United States, with only Pittsburgh producing more. In the peak coke years, 800 "beehive" coke ovens dotted the plain below the mouth of Whitmore Canyon. (Gibson: 1948)

Utah Fuel Company officials came into conflict with George C. Whitmore over the waters of Grassy Trail Creek. Whitmore had appropriated most of the water and asked the exorbitant price of $90,000 for his rights. As the mining operation expanded, the need for water for Sunnyside grew acute. The Company dug a well near the creek and this supplied some of the community's needs, until 1906 when a pipeline was laid from Range Creek, over Patmos Ridge, and down into the growing community. There was a spiggot for every four houses (Robinson: 1973) (Richins: 1940).

As with most mining towns in Utah, Sunnyside proved a boon to local farmers, who made regular trips to sell their livestock and produce to miners. Utah Fuel owned the town and would allow only one company-owned store, the Wasatch Store Company, to operate. Figure V-7 shows the construction of a wood-frame bunkhouse and store in 1899). Miners were forced by the threat of losing their jobs to purchase goods there (Richins: 1940). Most of the manufactured goods bought by the miners thus came from this facility, although later another privately owned store called "The Golden Rule Store" (J.C.Penney) opened below town.

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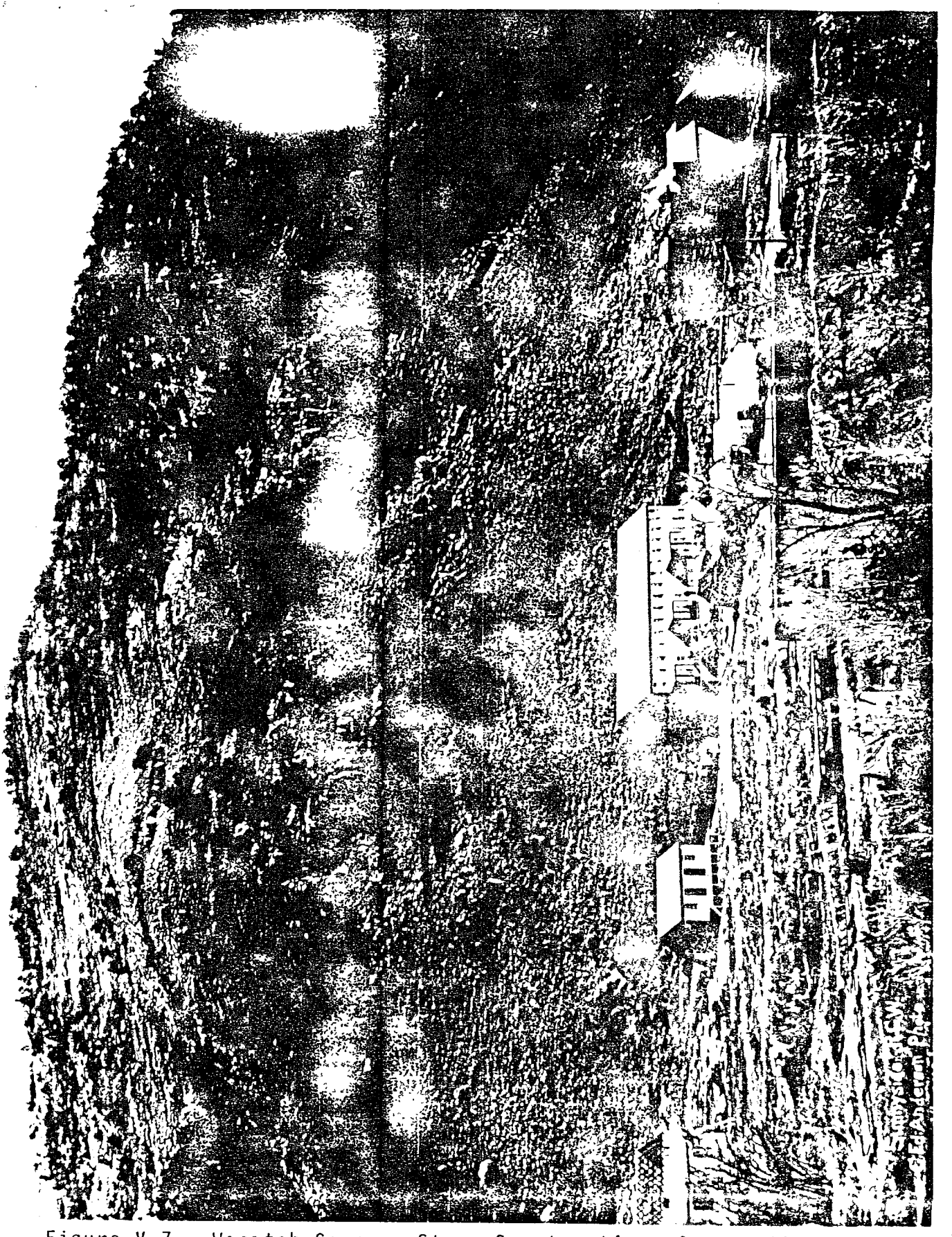

Figure V-7. Wasatch Company Store Construction, Summer 1899.

Sunnyside soon grew into a community of 400 homes, with a hospital, liquor store, amusement hall, a large cut-stone school, two churches, an "opera house," and a variety of trades and services (Figure V-8). Immigrants from all over Europe came to work in the mines, particularly from countries on the Mediteranean littoral, such as Greeks and Italians. There were other nationalities and races as well, American blacks, Austrians, and Japanese. The population would often expand faster than the available housing supply. Many newcomers would live in tents, and their was always a "rag town" near Sunnyside. A number of boarding houses were also built to house single men, but generally the immigrant groups were segregated into their own buildings (Richins: 1940).

Sunnyside has a social history, yet to be written, as the various ethnic groups learned to understand and adapt to differing cultures and the new immigrants learned to become Americans. It was, for the ancestors of many Utahns, the first difficult introduction to life in America.

Labor relations in Sunnyside were often troubled, but Utah Fuel's determined resistance to unionization sparked a major strike in 1922. On April 1, 1922, wages in the coal mines were reduced 30% and miners followed their unionized co-workers in Wyoming out on the national strike called by John L. Lewis and the UMWA. Strikers were forced from their company-owned homes, and allowed to enter town only under guard to visit the post office. Company officials built guard posts on the hillsides

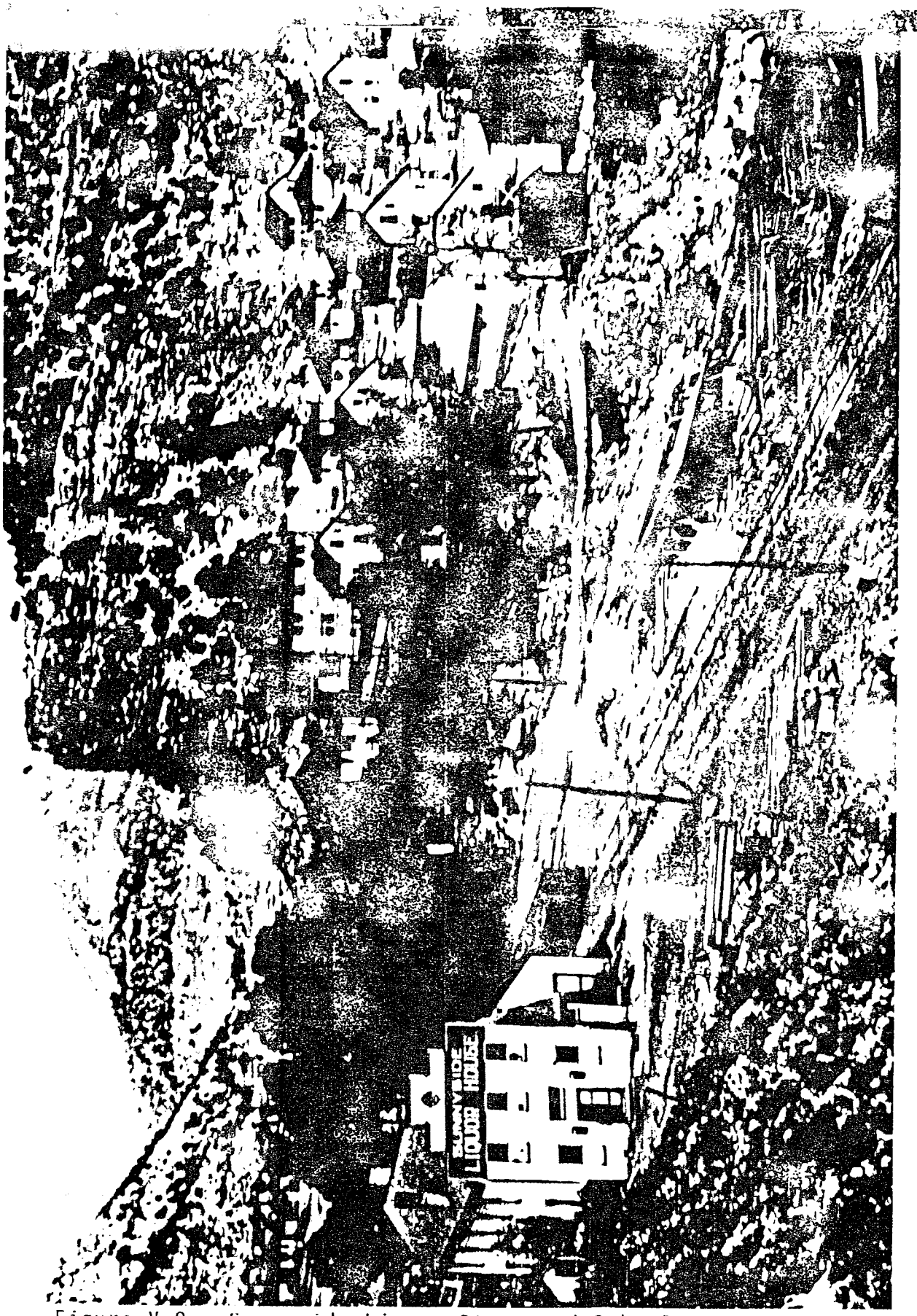

Figure V-8. Sunnyside Liquor Store and School.

above the mine portal and tipple to guard against sabatoge. Miners eventually won the strike and a local of the United Mine Workers of America was formed (Powell: 1976).

In 1942, the Kaiser Steel company bought the Sunnyside mine to provide coking coal for its Fontana California mill and closed the coke ovens. Kaiser built homes at the present site for Sunnyside, which in the historic period was called Sunnydale, and put new mine buildings on the original townsite (Robinson: 1973). Numerous stone foundations exist in the canyon bottom where the original town was. This covers most of the canyon in section 32 and a portion of the southern end of section 29. In the upper left-hand corner of Figure V-8, miner's homes can be seen in section 29. One local informant reported, that a stone mason in Sunnyside had perfected the technique of building rock foundations without mortar. Except in the Gobler's Nob area, no mortar was seen in the rock foundations, although there was occasional patching with mud.

Component #1-Gobler's Nob (east of contemporary Kaiser Engineering building)--Gobler's Nob was a residential area built in 1915 where mine officials lived on the hillside above the town. Concrete stairs led from the original townsite to the eight homes. These homes had cut stone foundations with a cement block structure on top. Cement block houses were considered "modern" at that time, and their construction a great step forward for the community (Richins: 1940). Eight stone foundations mark the location of the homes in that area (see

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Appendix 1 site forms and photos). The construction of these homes in 1915 was a part of general plan by Utah Fuel officials to improve the town, by modernizing the homes, building a new amusement hall, and planting trees and lawns.

Component #2--Rock retaining wall, east of Gobler's Nob.

Component #3--Road Cut leading to Gobler's Nob from east.

Component #4--Site of Roosevelt School, a cut-stone, two-story school house that educated Sunnyside children as well as those from surrounding communities. Later named the Washington School.

Component #5--Home site, rock foundation.

Component #6--Concrete, stone, and steel beam bridge for original county road.

Component #7--Home sites, three separate foundations.

Component #8--Home site, rock foundation and road behind.

Component #9--Home site, rock foundation.

Component #10--Home site, rock foundation.

Component #11--Home site, rock foundation.

Component #12--Machine gun nest, steel and rock construction. This emplacement was built during the 1922 miner's strike across from the Sunnyside tipple, boilers, and mine portals.

South of the machine gun nest are a dozen rock foundations, and the foundation of two boarding houses, including the Japanese Boarding House. When Kaiser bought the property in 1942, they moved the stream 100 feet north, destroying many of these homes. The changed topography is noticeable between Figure 9 and on site form 42Cb245 (photo #) (see Appendix 1). The only structures still in use in this section of the Sunnyside Historic District, are a Seventh Day Adventist Church and a home (circa 1901) currently owned by the Massatt family. Adjacent to the Massatt home is the foundation of the Japanese boarding house.

Sunnyside Coke Ovens 42Cb243

Located in Section 6, Township 15 South, 14 East are approximately 26 coke ovens remaining from the original 800. Coal from the mine was brought down by rail, onto the top of the coke ovens, and the oven was given a "charge" through a hole in the top. After 72 hours the coked coal was removed from an opening on the side and loaded onto another rail car . These coke ovens are the only physical remains from the era when Sunnyside coke was used widely throughout the western United States for smelting.

Range Creek/Sunnyside Water System (42Cb244)

Located in Section 33, Township 14 S, Range 14 E are the remains of the water system built in 1906 by Utah Fuel Company to supply the growing mining community with culinary water.

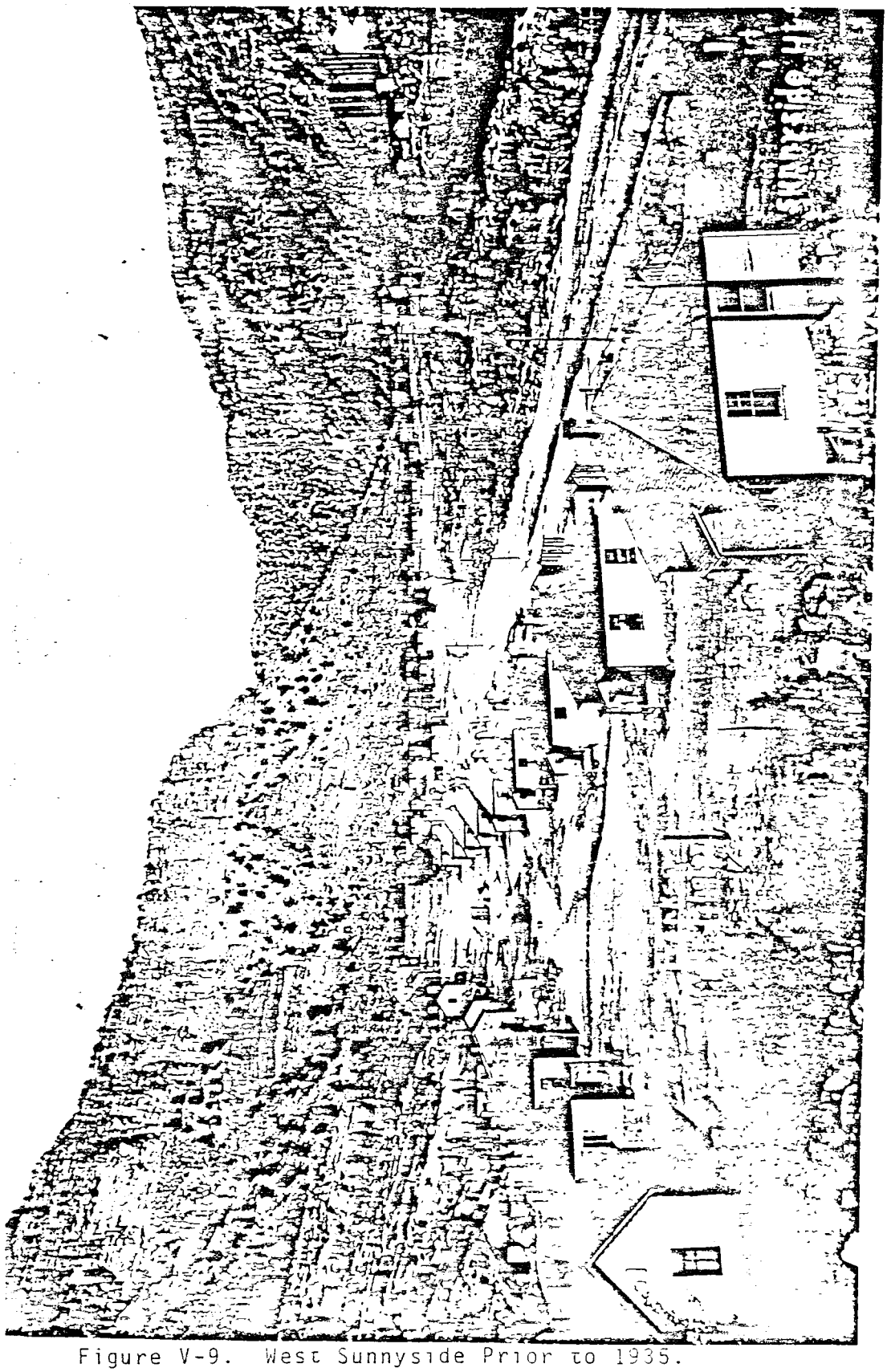

Figure V-9. West Sunnyside Prior to 1935.

The pipeline crossed a trestle and was pumped into a storage reservoir. Traces of the pipeline can be seen at various points in number two canyon.

Asphaltum Mining Tramway (42Cb247)

In Section 17, Township 14 S, Range 14 E is an aerial tramway used to tranport rock asphalt from a mine in Section 9, Township 14 S Range 14 E. A mining claim (Carbon County Archives) was filed on portions of Section 9 and Section 4 in January 1917 by the Utah Asphalt Company and the Utah Savings & Trust Company of Salt Lake City. For the first years of the mine's operation, the asphalt was load on wagons and freighted over a precarious road down Water Canyon (Robinson: 1973). In the 1920's, rock asphalt was principally used for road paving. It was crushed, trucked to the site, and compacted with a steam roller. The naturally volatile oils gradually evaporated, and the aspahlt formed a hard surface. This paving process, however, was gradually replaced by the use of gravel and crude oil, which by the late thirties was considerably cheaper than rock asphalt in price. In 1931, the Utah Rock Asphalt Company built this tramway to provide a more efficient means for carrying their product down to the bottom of Whitmore Canyon. (easement, Carbon County Archives). Land records show a series of mortgages to the Federal Reconstruction Finance Coporation during the 1930's, but company did not survive the era of cheap crude oil and by 1952 had abandoned their mining operation.

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Bowry Asphalt Company (42Cb234)?

A mining claim for a S. A. Wood and the Bowry Asphalt Company was filed in Section 6 of Township 14 S, 14 E in 1907. There was a great deal of interest in this period in finding commercial uses for a variety of hydrocarbons in the Uinta Basin and Roan Mountain areas of Utah. Early experiments in the production of gilsonite, elaterite, oil shale, and rock asphalt concentrated on extracting the hydrocarbons contained in these various ores for use as fuel. Asphalt was not as yet used for paving in Utah, so it is unlikely that the Bowry Asphalt Company intended to mine asphalt for that purpose. Cheap crude oil ended the profitability of most of these experiments.

5.1.6. Previous Archaeological Research

No archaeological work has been done on the mine lease prior to this project. In the region, Montgomery (1894) reported archaeological sites in Nine Mile Canyon north of the lease. Nine Mile Canyon has since been the subject of numerous surveys that have paid special attention to its wide variety of rock art (Beckwith 1931, 1931b; Morss 1931; Reagan 1931, 1931b Gillin 1938; Schaafsma 1971; Seigrist 1972; Hurst and Louthan 1979). The Claflin-Emerson Expedition of the late 1920's and mid-early 1930's was the first intensive archaeological investigation in the region. The expedition tested and excavated numerous rockshelters and open structures, but was not reported in detail until 1969 (Gunnerson 1969). At about

the same time, Morss (1931) completed his work and named the Fremont Culture, which eventually came to include the mine lease area. The 1950's, 1960's and 1970's witnessed most of the excavations of Archaic rockshelters and caves (see 5.1.4.2). Caldwell Village (Ambler 1966), Winterocks Village (Shields 1967), and Boundary Village (Ambler 1967) were excavated in the Unita Basin during the late 1960's. All of these sites are now classified as part of the unnamed Plains derived culture (Madsen and Lindsay 1977). Fremont sites in Emery County along Interstate-70 have also been excavated and reported (Madsen 1976; Schroedl and Hogan 1976; Wilson and Smith 1976).

Sampling surveys have been conducted for mineral and range management studies in the region. The most extensive is that of Hauck (1977). This report concludes that the Range Creek Planning Unit, which includes the mine lease area has a high proportion of rockshelters and rock art sites with low percentages of limited activity sites (1977:333). Hawkins and Seward (1980) reported five historic sites related to mining activity in Fiasco, Starpoint and Straight canyons northeast of the mine lease. The University of Utah is currently evaluating the results of an intensive sample survey 5 km. east of the lease area at Columbia for Kaiser Steel (Rick Holmer: personal communication 1981). Numerous small-scale surveys have been and are being reported as part of management requirements for mineral exploration. These reports will be summerized on a

county by county basis by the Division of State History, but are of little research value due in part to their restricted nature. Regional synthesis of historic events are contained in several reports (Hauck 1977; Hawkins and Seward 1980; Christensen 1980). The Preservation Research Section of the Division of State History conducted a partial review and survey of historic values of the lease area, but never compiled a report (see 5.1.5).

5.2. Methodology

5.2.1. Research Design

The field research and evaluation were guided by a general goal-oriented research design. The model is an elaboration of Binford's (1980) ethnoarcheological research among the Nunamiut Eskimo and San Bushman. The model has been expanded and subjected to some statistical varification in the Plateau and in the Great Basin a part of the research design for the MX Missile survey. The reader is encouraged to examine the extended model for all of the theoretical background and specific applications (Fowler *et al* 1980).

Basically, resource acquisition is preceived as a continuum which ranges from taking the consumer to the resource or moving the resource to a consumer. At the simpliest end, residential groups move from one resource patch to another. The more complex groups develop complicated systems of storage and transportation (Fowler *et al* 1980:15). Figure V-10 shows graphically this continuum, while Figure V-11 characterizes

COMPLEXITY OF LOGISTICAL ORGANIZATION

least complex			*most complex*
Organized to move residential groups to resources			Organized to move resources to residential groups
Forager	Collector	Harvester	Agriculturalist

THEORETICAL DISTRIBUTIONS OF LOGISTICAL ORGANIZATION BY GROUP

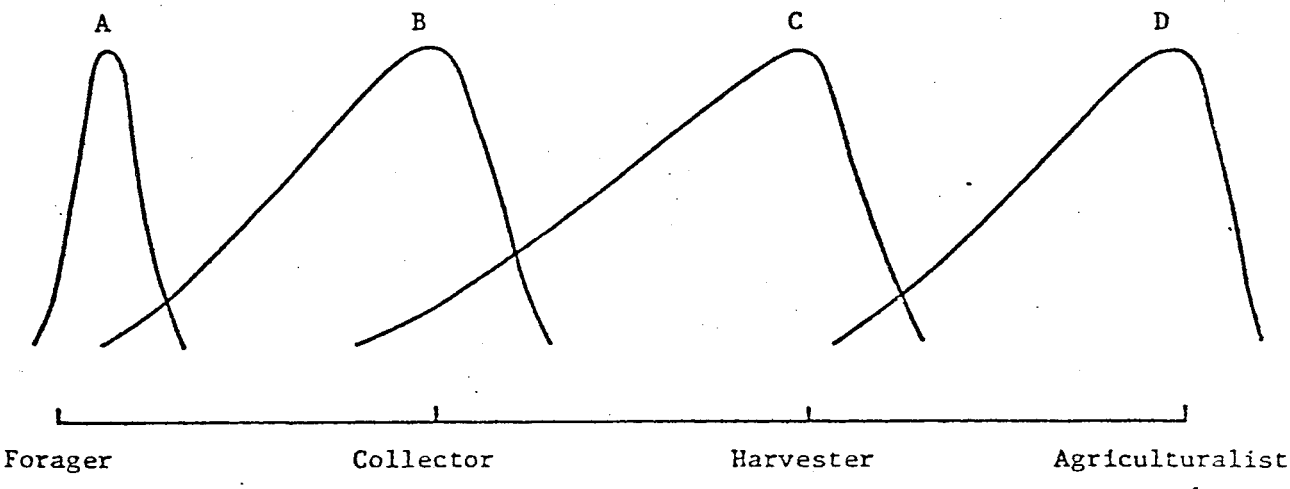

Figure V-10 The Continumn of Logistical Organization (After Fowler et al 1980).

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subsistence-settlement systems of the continuum. Foragers are viewed as the least complex while agriculturalists are the most complex. In expanding the model, Fowler et al are careful to point out that it may be impossible to place any given culture at any give time into one specific catagory (1920:20).

Figure V-12 illustrates the various continuum strategies one might expect in the mine lease area. Archaic foragers/collectors would frequently move and their camps would allow access to a variety of resource patches (1980:25). The locations for special task camps or residential camps would show great diversity in settlement patterns and food preparation tools for plant processing and hunting.

The harvester/agriculturalist Fremont, on the other hand, should demonstrate a different land-use pattern. A certain amount of sedentism is expected, therefore, sites should be located near a major critical resource patch (a field or marsh) with close proximity to water. Habitation and/or storage structures should be near. The variety of resources exploited would be much more narrow, and hence, fewer resource zones would be utilized. Even if a variety of zones were used, the greater dependence on the critical resource will greatly diminish the site density in the other zones (1980:27).

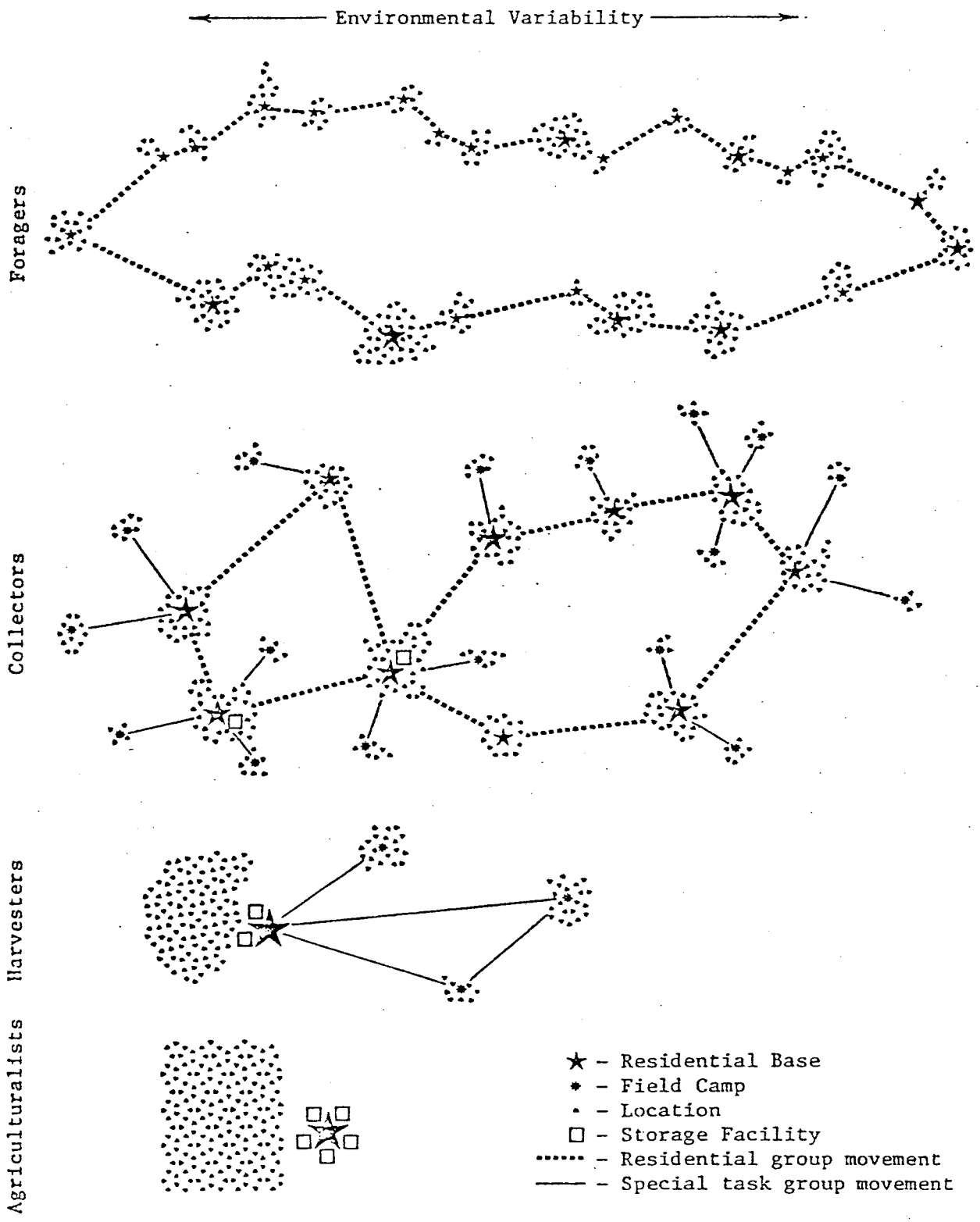

Figure V-11 Characterization of Subsistence-Settlement Systems (After Fowler et al 1980).

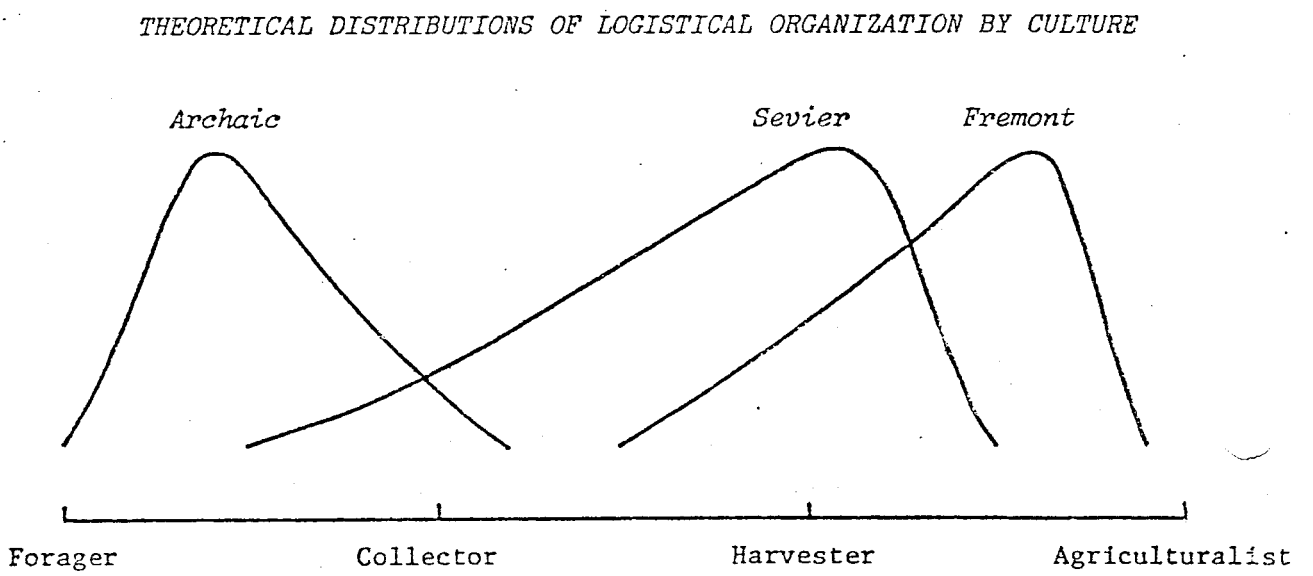

Figure V-12 Levels of Logistical Organization for Archaic Sevier and Fremont Cultures (After Fowler et al 1980).

5.2.1.2. Goals and Predictions

Given the data at hand from the regional overview and the research model, we should expect the following:

1. the presence of Archaic period sites; and
2. these sites will be distributed through several resource patches; and
3. these sites sould contain evidence of plant and hunting tool assembledges; and
4. these sites will be of a temporary nature, lacking architecture; and
5. areas requiring higher energy expenditure for exploitation will exhibit fewer sites

For the Formative Fremont we expect:

1. that residential bases will be located near a critical resource patch; and
2. these bases will have evidence of sedentary life; i.e. habitation structures and/or storage; and
3. they will be located near permanent water; and
4. Fremont residences will occur on a narrower range of environmental situations; and
5. that special collector forays will result in temporary camps in several locations that will not show signs of architecture or prolonged use.

The Historic Period poses a different set of problems. Binford's model can be extended only to groups with a relatively low level of technological sophistication. The

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complexity of the western market economy and technology will not lend itself to simple ethnographic models. A thorough review of western economy and model construction is beyond the needs of this research. However, a few predictions can be made based on the Historic Overview. We expect to find sites related to three specific activities:

1. mining, 2. grazing, and 3. hunting.

Mining sites will be:

1. restricted to easy access locations; and
2. directly affected spatially by relatively static geological factors; and
3. will not of necessity be close to secondary resources of water, food or building materials as these may be provided through the complex technological and economic network; and
4. artifact assembleges will show this diverse network by a variety of non-local manufactured goods.

Grazing and hunting sites will show the following:

1. small, single unit farmsteads or homesteads will have permanent architecture; and
2. these sites will be supported from the outside by the complex economy and will show a diversity of cultural remains of non-localized manufactures; and
3. these camps will be located near easy access areas with permanent water; and
4. temporary camps will show no architecture or evidence

of prolonged use; and

5. temporary sites will be limited to higher elevations at greater energy expense; and
6. material remains will be few, a wide variety, non-localized manufacture, and of an easily transportable nature.

These predictions are by no means exhaustive, nor on the highest level of abstraction. Historic models should be developed to examine ethnic subgroups as expressed in the material remains. Models should also be devised to re-examine the material cultural flow between nearby settlements. Our specific task here is to generate enough data to be able to predict the occurrence and location of significant cultural resources with research potential.

5.2.1.3. Field Implementation

A 10% random, stratified sample design was implemented to examine the goals and check the predication of the research design. At first, we planned to divide the mine lease area into vegetation zones, based on the assumption that various vegetation zones, (resource patches) could be identified and would reflect vegetation related settlement patterns similar to those found during the MX survey. However, vegetation maps were not available at the time of fieldwork. Our next option was to subdivide (in the lease area) into topographic categories. It was assumed that at a 10% random level, a universe divided into topographic units would

evidentially sample all of the vegetation units as well. This assumption was varified by field observation.

The mine lease was divided into five topographic units, utilizing a composite 7.5 minute, U.S.G.S. series map provided by Kaiser Steel. The five units are: 1. the valley pediment beyond the mouth of Whitmore Canyon; 2. primary canyon drainages with permanent water; 3. secondary (tributary) canyons without permanent water; 4. talus and cliff slopes that exceed 20% grade; and 5. high altitude terraces, benches or flats with grades of 0-20%. These units were then divided into 40 acre quadrats. The rugged relief often made it difficult to precisely separate all of the units. The result is occasional primary canyons with minor sections of steep talus slope. Forty acre quadrats were selected over long transects because of the extreme topographic relief. Long transects are simply less feasible in this region, are too difficult to maintain and given time and monetary restraints, not efficient. The quadrats are all oriented along the U.S.G.S. cadastral survey lines and were numbered on the field map using the northwest corner, proceeding from left to right. Once the area was divided, the quadrats numbered and the relative percentage of acreages computed, a table of random numbers was used to select thirty-seven quadrats to be examined. Table V-3 is a written summary of quadrat locations and Plate V-2 is a visual depiction of the location. In addition, bias windshield surveys were conducted between

QUADRAT	QUARTER	QUARTER	SECTION NUMBERS	TOWNSHIP	RANGE	MAP REFERENCE
1.	SW	NE	6	14S	14E	Mt. Bartles, Utah
2.	SE	NE	6	14S	14E	Mt. Bartles, Utah
3.	SE	SE	1	14S	13E	Sunnyside, Utah
4.	SW	NW	12	14S	13E	Sunnyside, Utah & Mt. Bartles, Utah
5.	SE	NW	7	14S	14E	Sunnyside, Utah & Mt. Bartles, Utah
6.	SW	SE	12	14S	13E	Sunnyside, Utah
7.	SW	SE	8	14S	14E	Patmos Head, Utah
8.	NE	NE	13	14S	13E	Sunnyside, Utah
9.	NW	NE	18	14S	14E	Sunnyside, Utah
10.	NE	NE	17	14S	14E	Sunnyside, Utah
11.	NE	SE	17	14S	14E	Patmos Head, Utah
12.	SE	NW	19	14S	14E	Sunnyside, Utah
13.	SE	NW	20	14S	14E	Sunnyside and Patmos Head, Utah
14.	NW	SW	20	14S	14E	Sunnyside, Utah
15.	NW	SW	21	14S	14E	Patmos Head, Utah
16.	SW	SW	20	14S	14E	Sunnyside, Utah
17.	SE	SW	20	14S	14E	Sunnyside and Patmos Head, Utah
18.	NE	NW	29	14S	14E	Sunnyside and Patmos Head, Utah
19.	SW	NE	29	14S	14E	Patmos Head, Utah
20.	NW	SW	28	14S	14E	Patmos Head, Utah
21	SW	SE	29	14S	14E	Patmos Head, Utah
22.	NW	NE	31	14S	14E	Sunnyside, Utah
23.	NE	NW	33	14S	14E	Patmos Head, Utah
24.	SW	NE	31	14S	14E	Sunnyside, Utah
25.	NE	SE	32	14S	14E	Patmos Head, Utah
26.	NE	SE	33	14S	14E	Patmos Head, Utah
27.	NW	NW	5	15S	14E	Sunnyside, Utah
28.	NW	NW	3	15S	14E	Patmos Head, Utah
29.	SW	NW	5	15S	14E	Sunnyside, Utah
30.	SE	SW	6	15S	14E	Sunnyside, Utah
31.	SE	SW	3	15S	14E	Patmos Head, Utah
32.	NW	NW	8	15S	14E	Sunnyside, Utah
33.	SW	SW	10	15S	14E	Patmos Head, Utah
34.	NW	SE	9	15S	14E	Patmos Head, Utah
35.	SE	SE	9	15S	14E	Patmos Head, Utah
36.	NE	NE	16	15S	14E	Patmos Head, Utah
37.	SE	NE	16	15S	14E	Patmos Head, Utah

TABLE V-3

Quadrant Locations as They Are Plotted on
Plate V-2
(numbered from top to bottom [north-south] and from left to right [west to eas

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quadrats and all sites found were recorded. Three areas of proposed mine expansion surface facilities were intensively (100%) examined. A sediment pond of about 15 acres was examined, and two access roads (40 meter corridors) and two, 150 m by 150 m areas of proposed construction locations were examined (Plate V-2). In total, about 1,460 acres were examined.

The quadrats were surveyed by locating the nearest corner by U.S.G.S. markers or a combination of compass back readings and topographical location. The surveyors were placed 15-20 meters apart. They walked straight-line transects on north-south, or east-west bearings, guided by the field director using a Brunton compass. When sites were encountered, the crew marked the forward progress of the transect, then began to examine the sites for extent, type and chronological indicators. The sites were documented on the Utah State Antiquities Site Forms, appropriate sketch maps made, photographs taken and recorded and a random grab sample of artifacts was made if the artifacts were unique or required close lab examination. The sites locations were plotted of the U.S.G.S. 7.5 minute series maps and the survey transects were continued. Cultural remains are considered a site when a minimum of three artifacts of any type were found in a definable area. Also considered a site are rock art, initials or names with dates prior to 1930, rock quarries, architectural evidence such as cists, hunting blinds, checkdams, granaries, and all other items listed on the Utah

Antiquities Site Form. Historic remains were considered historic if they could be shown to predate 1940.

The straight transects varied only when steep talus or cliff areas made contour transecting more efficient. The number of sweeps per quadrat varied from six to ten, depending on slope and vegetation. Access was usually by vehicle with short hikes on foot. Long hikes were required on occasions, such as finding the quadrats on the east flank of the lease.

All of the quadrats were selected before going into the field. The sample was altered and biased toward the canyon bottoms near the end of the survey when snow covered the surface of some of the higher quadrats and remained on some of the north-facing talus slope/cliff quadrats. However, several quadrats from the high altitude benches and talus/cliff slopes were examined before the snow arrived. In the long run, this worked to our advantage. It allowed us a better look at what turned out to be the area of highest site probability. We are still confident that our charted sensitivity areas and recommendations are valid (Plate V-3).

All of the collected artifacts were transported back to Salt Lake City. Toni Ray organized, cleaned and cataloged the materials. Bruce Hawkins, staff historic archaelogist, examined the historic materials and Asa Nielson, field director, examined the prehistoric materials. Current references and collections were used to aid the identification of the artifacts.

5.3 Historic Resources Survey Results

5.3.1. Historic Inventory

42Cb233 is a small historic herding camp or hunting site. It is in a saddle at the head of a tributary to B Canyon (Plate V-2). There is a small aspen log corral 100 meters east of the main site in a draw. The site is about 20 meters by 20 meters, with a possible fire heath on the west side of the site. A couple of solder sealed cans and a piece of non-diagonstic iron stone ceramics were observed. The site has a ground view down to Castle Valley through B Canyon and also a view of the open sage flats to the north and east.

42Cb234 is in the Right Fork of Whitmore Canyon (Plate V-2). It is a single stone foundation and log super-structure. The foundation is of fine cut sandstone and mortar. It is rectangular, 4 by 6 meters with 1.5 meter of standing walls. Apsen and pine cribbing with a large pine center post remain inside. The soil outside to the east and north is ash stained. A single piece of pearl-ware ceramics and several types of colored glass suggest a pre-1940's occupation. The site is in the mouth of a tributary to the Right Fork of Whitmore Canyon. Both Whitmore and the small tributary have permanant water. This may be the location of the Bowry Mine Claim (see 5.1.5.) but there is no evidence of mining activity in the area.

42Cb235 is a small, stone lined depression 40 meters south and across the creek from 42Cb234. The depression is about 2 meters in diameter and 1 meter deep. The stone is rough shaped basalt and sandstone from the immediate area. There is a small entry-way on the northside. No artifacts were observed. The depression may be a spring or well house associated with the cabin at 42Cb234.

42Cb236 is a turn of the century community located north of the Grassy Trail Reservoir (Plate V-2). It consists of at least nine buildings, of which six are possibly habitation, one small log shed and two outhouses. There is a corral of about 20 meters in diameter. The center site is 100 by 100 meters. One stone structure is being washed away by the creek. The site sits on the edge of an aspen/sage flat on the flood plain of the creek. Ceramics, glass, and metal are clustered around the stone structure near the creek. This site may have been the support base camp for the Bowry Asphalt Company, whose mine claim was somewhere in Section 6, T14S, R14E (see 5.1.5.)

Site 42Cb237 is probably a small (10 by 10 meter) hunting or historic herding camp. It is on a ridge (Plate V-2) between Whitmore Canyon and Patmos Ridge. Its isolation suggest that the occupant likely followed cattle or deer down from Patmos Ridge. It consists of a handfull of iron stone and porcelian ceramics. It is on the edge of a heavy mountain mahogany/aspen stand looking north into are open sage flat. Large boulders at the site would provide some shelter from the wind. Initials

cut into the aspens have now overgrown and are very hard to read. There is no evidence of structures.

42Cb239 is about 400 meters southwest of the rodeo grounds (Plate V-2). The existing highway cuts into the east side of the site. It occupies the level sage flood plain and is about 130 meters east/west by 200 meters north-south. The whole site has been leveled and planted with crested wheat. A midden deposit of ash, glass, metal, and ceramics is at least 75 centimeters deep at a cut-bank on the creek. There are several structure foundations on the westside of the site. All but one has been recently leveled by a bull dozer. The remaining 4 by 4 meter structure is of rough shaped sandstone blocks and historic sand mortar. The artifacts suggest a late 1800's to early 1900's occupation. This site was likely a north most extension of Old Sunnyside Town (42Cb245).

42Cb243 is the old Kaiser Steel Sunnyside Coking Ovens (see 5.1.5.). They are located about 400 meters east of Sunnyside on the edge of the coal tailing dump (Plate V-2). At the present time, twenty-five of the ovens remain. Several have been destroyed in the north end to accommodate the expansion of the tailing pile. The ovens are beehive shaped, with level roofs for "charging" function (see 5.1.5. for details). The door openings, which all face east, are large enough to walk into a cavern about 2.3 meters high and 3 meters in diameter. Old coke still remains on the floors. The ovens are being vandalized for brick and are in various states of stability.

42Cb244 is the remaining section of the old Sunnyside water system (5.1.5.). It consists of pipes and an aqueduct trellis above Number 2 Canyon (Plate V-2) and a large, concrete reservoir. The reservoir is about 10 meters in diameter and four meters deep. The concrete and brick building at the reservoir has been vandalized for building material. The system was build to bring water from Range Creek to Old Sunnyside. It had been cut into the side of a talus slope in heavy oak and sage vegetation.

42Cb245 is the old city and mine portion of Sunnyside, Utah. The city is located just inside the mouth of Whitmore Canyon (Plate V-2). The vast majority of the city has been cleared away for mine expansion. Dozens of old foundations of a wide variety of construction still exist (5.1.5.). The old mine portal is no longer used. A portion of the city referred to "Rag Town" has been totally leveled for the present coal tipple and stock pile. House foundations are limited to the southwest and northeast corners of the 1.3 km long town (see 5.1.5. and Appendix 1 for details). The site occupied the canyon bottom with small portions extending up the canyon walls. Grassy Trail Creek has been re-channeled in recent time for flood control and this action removed a large portion of the town.

42Cb247 is the Utah Asphaltum Company Tramway. It follows Water Canyon for about 4 km up to the asphaltite sand mines (42Cb248). There are about 30 tower structures remaining in the tramway, which is easily viewed from the road to Patmos

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Ridge in Water Canyon (Plate V-2). Cable and buckets still hang from the towers. The towers of concrete base, wood and iron frames and are all in disrepair. The tramway ends in Whitmore Canyon at a large structure used for turn around and transfer to wagons (5.1.5.). Some vandalism has occurred for building materials.

42Cb248 is the location of the Utah Asphaltum Tram Mines. They are not in the mine lease area (Plate V-2) but the Tramway (42Cb247) was constructed as part of the mines. Access to the old mine was along a steep wagon trail up Water Canyon. The mine area has a few structures still in various state of repair (see Appendix 1). The area is divided into two mine areas, each about 100 meters by 100 meters. No artifacts were collected as snow covered most of the mine at the time of our survey. At the present time Atlantic-Richfield Oil Company holds the mineral lease and may develop the mine area for shale-oil recovery.

5.3.1.1. Historic Artifacts

A representative collection was made of historic artifacts from site 42Cb239. The sample included ceramic, glass, clothing-related items, toys, games, and miscelany.

Ceramics

Porcelain

Fragment representing 4 vessels of Japanese porcelain were collected (Figure V-13). These represent 1 saucer, or small

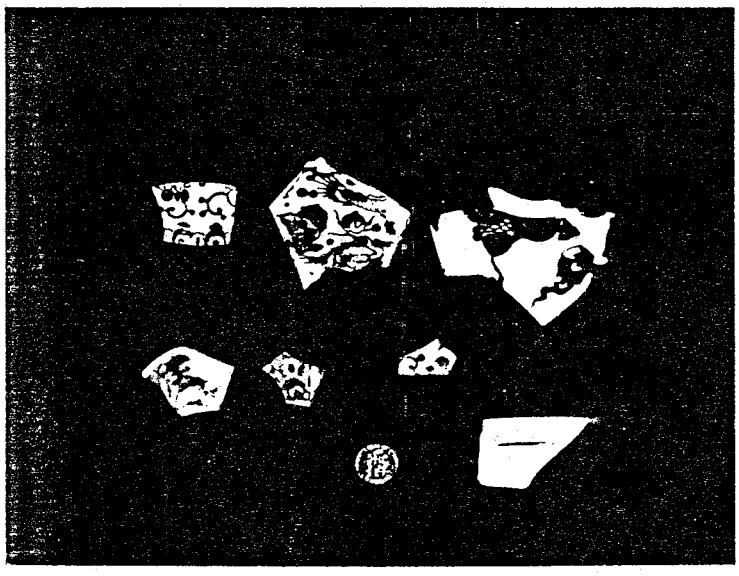


Figure V-13 Ceramics from 42Cb239.

Top row left to right: Japanese porcelain (1) small plate or saucer (2) unidentified vessel (3) unidentified vessel.

Bottom row left to right: (1) painted porcelain plate (2) Japanese porcelain, unidentified vessel (3) Japanese porcelain unidentified vessel (4) porcelain cup with purple band.

Dime is for scale.

plate and 3 unidentified vessels. The vessels are decorated with designs of underglaze blue on white. Designs include dragons, fish, and floral elements.

Fragments representing 3 other porcelain vessels are represented in addition to Japanese porcelain (Figure V-13). Vessel types include 1 plate and one cup or bowl. The plate is decorated with green leaves and stalks and pink flowers painted overglaze. The cup or bowl is decorated with an underglaze purple band running around the outside rim and gilded bands beneath.

Stoneware

All stoneware from the site is Ironstone/White Granite. Five plates, 1 saucer, and 4 unidentified vessels represent the collected sherds (Figure V-14). Two of these vessels are decorated with transfer printed designs. Three are decorated with flown colors. Two are decorated with decals around the rim. One of the vessels decorated with flown colors also exhibits a molded edge with overglaze gilding. Trademarks include:

(1) "...GE"
"IRIS" (script)

(2) "T.S.T."
"Penova"
CHINA"

(3) "THE ..."(script)

(4) ... H. GRINDLEY"

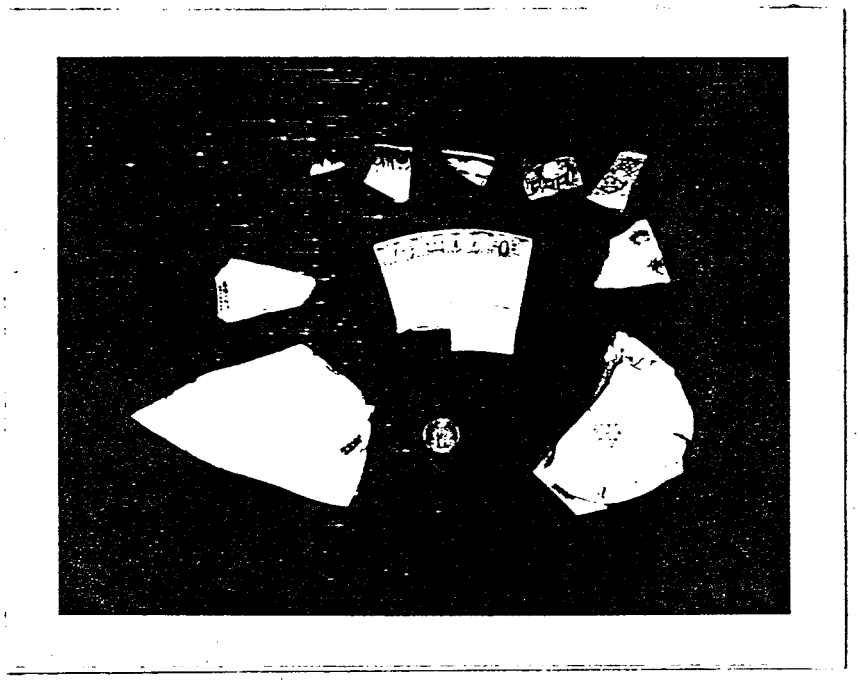


Figure V-14 Ceramics from 42Cb239.

Top row, left to right:	Ironstone/White Granite, (1) Flown blue decoration (2) decorated with flown blue, molded edge, and gilding (3) flown blue decoration (4) & (5) transfer printed.
Center row, left to right:	Ironstone/White Granite, (1) trademark: "The..." (2) & (3) decal decoration.
Bottom row, left to right:	Ironstone/White Granite (1) trademark: "Iris" (2) dime for scale (3) manufactured by Taylor, Smith and Taylor.

Only "T.S.T. Penova CHINA" and ... H. GRINDLEY" were identified. "T.S.T. Penova CHINA was manufactured by the firm of Taylor, Smith and Taylor of East Liverpool, Ohio probably after 1904 as the mark fails to appear in The Pottery & Porcelian of the United States & Marks of American Potters by Barber. " H. GRINDLEY" was manufactured by W.H. Grindley & Co. of Tunstall, England. The mark was used on wares manufactured from 1914 to 1925 (Godden 1964).

Glass

Bottles

One complete and fragments of 2 bottles were collected. These represent a beer bottle, and the finishes of a preserve bottle and an unidentified bottle (Figure V-15) (Berge 1980). The beer bottle is brown, measures 9 1/4 inches by 2 3/8 inches and is manfactured by the firm of William Frazen and Son which operated out of Milwaukee, Wisconsin from 1900 to 1921 (Tolouse 1971).

The preserve finish is clear with manganese which indicates that the bottle was probably manufactured before 1917 (Berge 1980).

The third bottle exhibits a finish which has been manufactured by an automatic bottle machine. The glass is clear with manganese. Date of manufacture was probably between 1903 and 1917 (Berge 1980).

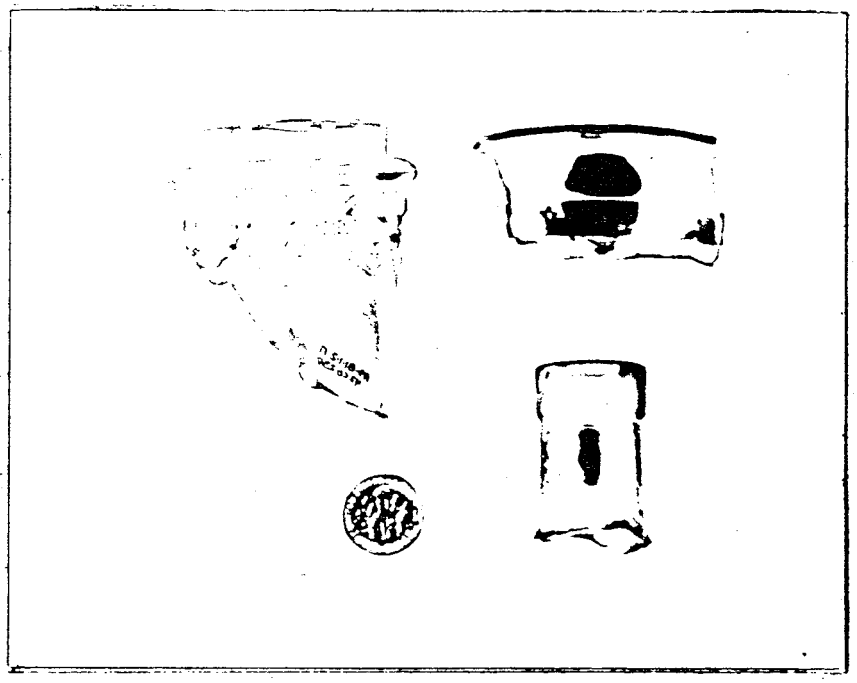


Figure V-15 Glass from 42Cb239.
Top row, left to right: (1) pressed glass vessel (2) preserve bottle finish.
Bottom row, left to right: (1) dime for scale (2) unidentified bottle finish.

Other Glass

One finish of a pressed glass vessel was collected from the site. The vessel was manufactured with a 3 piece mold. Finish is similar to champagne with an opening of 1 1/8 inches. The neck is decorated with 9 fluted panels topped with a diamond band. The glass is clear with manganese which indicates the vessel was probably manufactured before 1917 (Figure V-15) (Berge 1980).

Clothing Related

Buttons

Two buttons were recovered from the site (Figure V-16). One button is made of shell, is 4 hole and measures 1 1/8 inches in diameter. The other is made of glass, has 2 holes and measures 1/2 inch in diameter.

Toys, Games, and Miscelany

Doll Parts

Fragments from 2 bisque dolls were recovered from the site (Figure V-16).

Beads

One monochrome tube bead was collected. The bead is bright navy blue and measures 6mm in diameter by 4mm long (Kidd & Kidd: 1970).

42Cb236

A representative sample collection made from site 42Cb236 includes ceramics and glass.

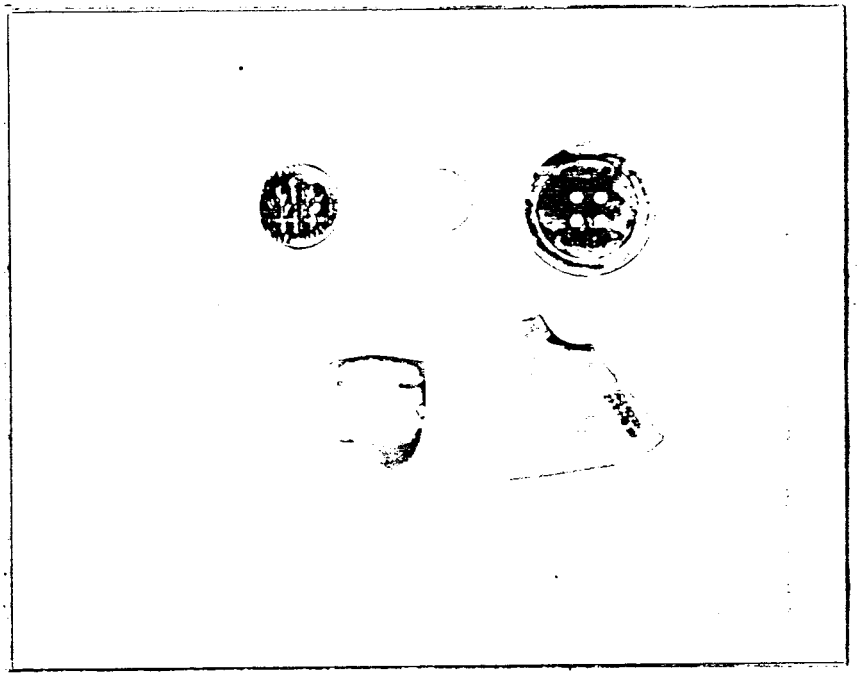


Figure V-16 Buttons & Doll Parts from 42Cb239.

Top row, left to right: (1) dime for scale (2) 2 hole glass button (3) 4 hole shell button.

Bottom row, Doll parts.

Ceramics

Earthenware

A fragment from 1 salt glazed gray earthenware crock was collected (Figure V-17).

Stoneware

Fragments from 4 Ironstone/White Granite vessles were collected from the site (Figure V-17). The vessels include 2 plates and 2 saucers. Molded edges and gilding comprise the decoration for the plates. Decoration from the saucers is unknown, however both saucers contain the trade mark "Homer Laughlin, Sunrise Dinnerware". These wares were manufactured by the Homer Laughlin China Co. of East Liverpool, Ohio, and probably date after 1904 as they are not illustrated in Barber (1904).

Glass

Bottles

One finish, neck and shoulder from an amber Medical/Chemical bottle was collected from the site (Figure V-18). It was manufactured in an automatic bottle machine which dated its use after 1909 (Berge 1980).

5.3.2. Mining Impacts to Historic Sites (see 5.7.)

5.4. Prehistoric Resource. Survey Results

5.4.1. Prehistoric Inventory

Site 42Cb232 is light scatter of lithics and a single quartzite, rectangular mano. The site is on a knoll, about 120

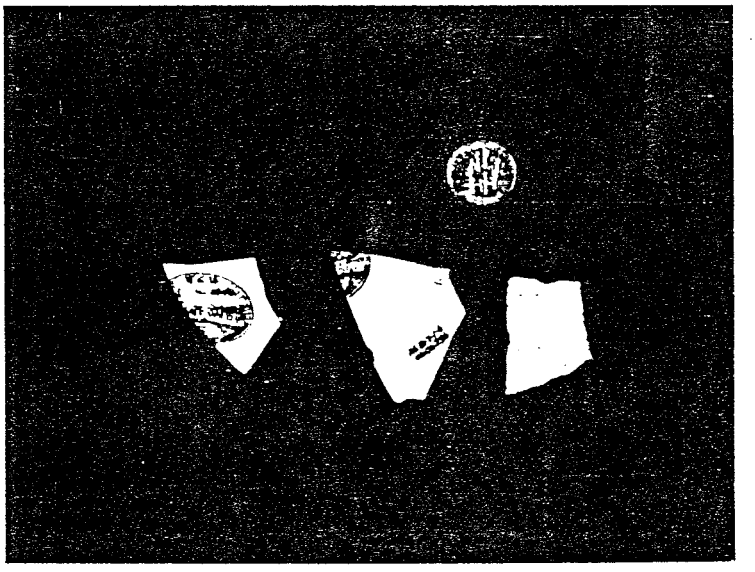


Figure V-17 Ceramics from 42Cb236
Left to right: Ironstone/White Granite (1) & (2) "Homer Laughlin Sunrise Dinnerware" (3) salt glazed gray earthenware.

Dime is for scale.

meters northeast of 42Cb234 (Plate V-2), on West Ridge. The area is on open sage plain with aspen grooves south and north of the site. There were no diagnostic artifacts. The site area is about 40 by 40 meters in a rocky sand. No structures, fire hearths or other evidence of depth were noted.

42Cb238 is a small petroglyh panel. It is about 150 meters south of the canyon rodeo grounds on a rock outcrop. The cliff faces west and is abutted by the floodplain of Grassy Trail Creek. It consists of one set of horizontal, pecked lines, one set of undulating lines and a single arching pecked line (see Appendex 1). The panel has been vandalized and used for historic target Mactico. Historic rubbish from 42Cb239 is found at the base of the outcrop. The whole glyph is about 75 centimeters and is not diagnostic. No prehistoric artifacts were observed.

42Cb240 is a rockshelter with a good amount of undisturbed cultural deposits. It is on the west side of Whitmore Canyon, directly across (west of) the rodeo grounds. Vandalism has exposed at least 1 meter of cultural deposit and a small, rock lined cist that is about 40 centimeters in diameter. The front of the shelter extends about 15 meters north-south. It is about 4 meters above the Grassy Trail floodplain. Several Emery Gray sherds, lithics and bone were observed on the surface. Ash motting is continuous throughout the full.

Associated with the shelter are 4 panels of pictographs and

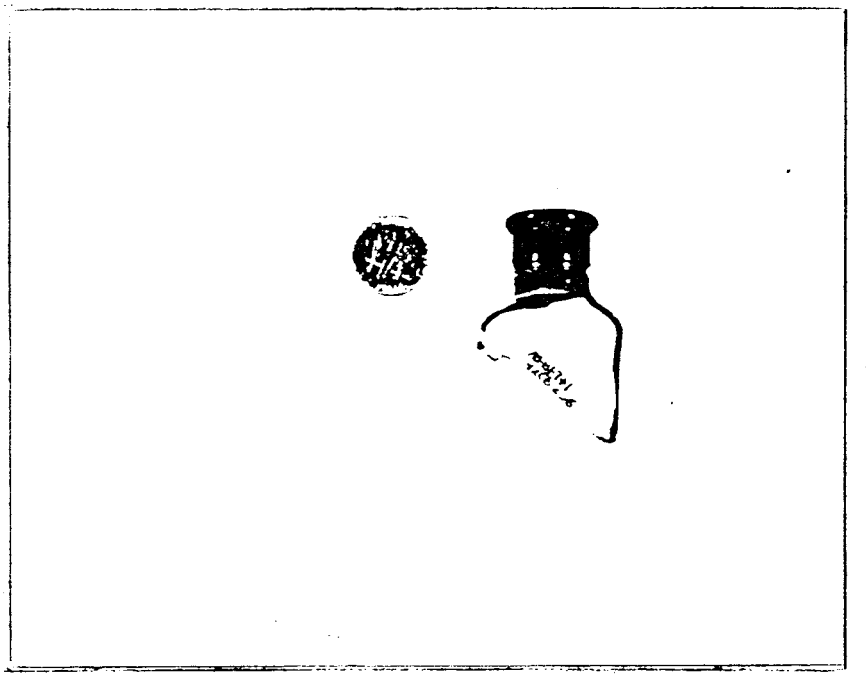


Figure V-18 Medical/Chemical bottle from 42Cb236.

petroglyphs. These include red and yellow painted anthropomorphs, and pecked zoomorphs. Two large figurine type glyphs are on the north end of the site. One shows evidence of coloring in the pecked surface. Samples of yellow ochre nodules were found at the site.

This shelter contains a known Fremont occupation. Its observed depth may also be in part due to possible Archaic occupation. It is stratified, and it has excellent research potential.

42Cb241 is an open structure site of Fremont origins. it consists of a scatter of ceramics (Sevier Gray), lithics and two separate structures. The site occupies a north/south oriented terrace above Whitmore Canyon (Plate V-2). The terrace is the second up from the flat below. 42Cb242 is 15 meters west and below the site.

There are two structures on opposite sides of the site. The first structure is on the south end. It is roughly square, about 1.5 by 1.5 meters, with a shaped sandstone rock outline. The structure on the north end is roughly circular, 2 meters in diameter and outlined by rough, unshaped upright slabs. Sevier Gray ceramics were found in an area discolored by ash 3 meters south of the round structure. There is no evidence of any vandalism. It is assumed that the structures and the ash stained area may have some depth. The soil at the site is a light gray sand on top of eroded talus.

42Cb242 is a small scatter of lithics just below (west) of

42Cb241. It is on the first level terrace above the valley floor. The area has been used as an historic rock quarry. An access road extends to the south of the site area. A few pieces of gray chert flakes were noted. A small side-notched point and a biface blade were collected. A rectangular quartzite mano was also noted. No structures, hearths or midden were observed. It is possible that the site has been nearly obliterated by the historic quarry.

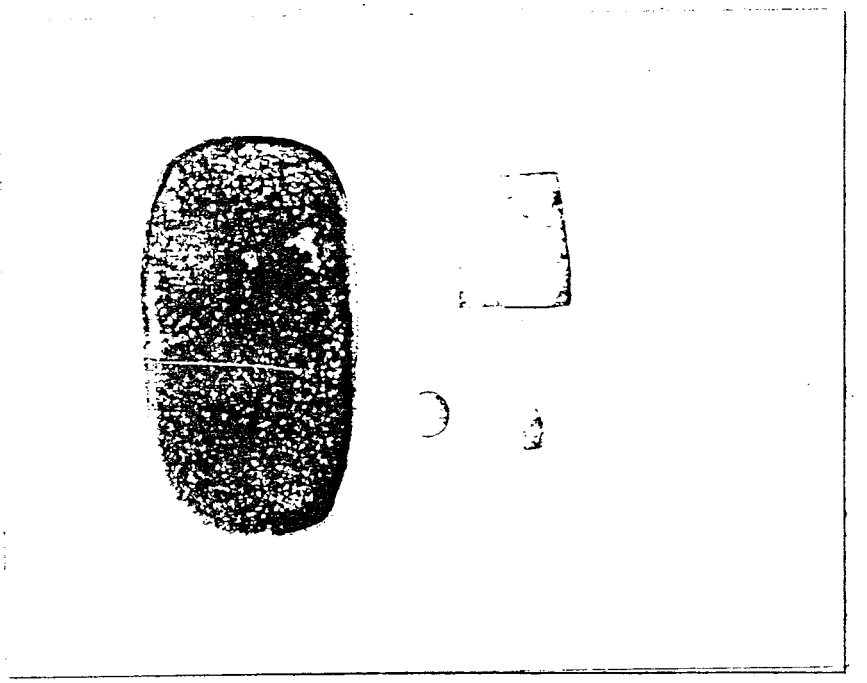
The historic component is a 10 meter long face of quarry rock. The evidence for historic use are fragments of rock that contain bore holes for expanding wood wedges. No historic artifacts were observed. Modern names have been spray painted on the quarry face. The date and use of the quarry could not be documented. It is assumed that the stone was used for building foundations in the town of Sunnyside

5.4.1.1. Prehistoric Artifacts

A total of twenty-one prehistoric artifacts were collected during the survey. This includes seven pieces of ceramic, two arrow points, one biface knife fragment, a rectanular mano, eight pieces of bone, one fragment of fresh water shell and one piece of yellow ochre (limonite).

42Cb240. All of the bone, shell, ochre, and four pieces of ceramic were colleted from the rockshelter.

Ceramics. Three body sherds and one handle fragment are all classified as Emery Gray following Madsen (1977). The body



Left: rectangular mano; upper right: biface (knife?) fragment; lower right: Elko side-notch point.

Dime is for scale.

Figure V-19. Artifacts from 42Cb241.

sherds are light gray and have been scraped and polished. Temper in the fine texture paste includes small amounts of crushed basalt and some quartz sand. A couple of flecks of mica are present on one sherd's surface. The average thickness is 3.5 millimeters. The fourth piece is identical in paste, temper and surface treatment. It is a lug handle that appears to have broken away from the rim of a jar shaped vessel. The lug diameter is 17.5 millimeters.

Tentative identification of five fragments of deer bone (Odocoileus hemionus) includes one fragment of long bone, one fragment of the scapula, two phalange fragments and a molar. Also tentatively identified is the distal end of a rabbit humerus, a fragment of fresh water mullusk shell, and two fragments of dense, unidentified burned bone.

The fragment of limonite (Fe_2O_3) weighs 2 grams. Its color is identical to the yellow-red color of the pictograph panel on the north end of the rockshelter.

42Cb241. This collection includes a mano, a projectile and one biface fragment (Figure V-19). The mano is rectangular with rounded corners. One surface is covered with a heavy deposit of calcite. The other shows evidence of pecking. Impact scars are prevalent on one end. The grinding surfaces are rounded, lending the whole mano a convex cross-section. The material is a purple-brown colored, dense quartzite. It

measures 15 centimeters wide and 4.5 centimeters thick. It weighs 943 grams.

The small projectile point (Figure V-19) is tentatively identified as an Elko side-notched point after Hester and Heizer (1973) and Holmer (1978). It is slightly convex in cross-section, of gray chert with a weight of .7 grams. The length is 2 centimeters; the width is 1.1 centimeters with a thickness of 4 millimeters.

The biface fragment is probably the remains of a knife (Figure V-19). It is slightly convex in cross-section and appears to be thinned primarily by percussion reduction with pressure flecking along the edges. Maximum width is 4.2 centimeters with a thickness of 3 millimeters. It is made from a light gray chert material.

42Cb242. Collections from this site include three ceramic pieces and an unidentified triangular projectile.

The ceramics are all identified as Sevier Gray after Madsen (1977). Two are from the same bowl with an estimated diameter of 11 centimeters. The sherds have been scraped and polished. Temper includes heavy course basalt and some sand in a fine paste. Average thickness is 4 millimeters.

The third sherd is a neck piece from an olla. The estimated neck diameter is 6 centimeters. The exterior surface has been

scraped but not polished. Tempering includes heavy amounts of course basalt and sand in a fine paste.

The projectile is an unidentified, triangular point. It is made from a dark gray chert. Maximum width at the base is 1.6 centimeters. The cross-section is convex with a maximum thickness of 3 millimeters.

Summary. The ceramics from the two sites indicate a Fremont Culture origin with the Sevier Gray being a likely product of trade. Both types were manufactured between 1,150-700 B.P. (Madsen 1977). The Elko side-notched point has a wide temporal span of nearly 7,500 years (Holmer 1978). However, its lack of association with other diagnostics prevents a better estimate of cultural affiliation. The deer bone from 42Cb240 is a strong indicator of at least a temporary hunting camp function for the site.

5.4.2. Effect of Mining on Archeological Sites (see 5.7.)

5.5. Paleontological Resource Survey Results

5.5.1. Paleontological Inventory

42Cb231p is a fossiliferous limestone outscrop west of Slaughter Canyon (Plate V-2). The outcrop can be reached by walking down the west finger of the south end of West Ridge. Numerous well preserved gastropods and 2 or 3 bivalve mollusk were recorded. The literal continuity of the deposit is not

known. The formation is likely upper Price River or perhaps lower North Horn.

5.5.2. Effects of Mining on Paleontological Sites (see 5.7.)

5.6. Survey Results (Table V-4)

5.6.1. Relationship of the Results to the Research Design

Two of the principle goals or predictions of the research design were to identify the presence of Archaic and Fremont culture sites in relationship to the natural resources available in the lease area. No Archaic affiliated sites were positively identified, nor were isolated Archaic style artifacts found. One site, 42Cb240 could possibly contain an Archaic component. Without testing the site to assure this, any statements about Archaic settlement or exploitation of the area would be conjectural.

Two sites have known Fremont Culture affiliations, 42Cb240 and 42Cb241. Both of these sites have evidence of prolonged use, i.e., deep deposits, storage structures or possible habitation structures such as the one at 42Cb241.

42Cb240 likely represents a short term, perhaps seasonal site, used primarily for hunting and gathering. The large amount of animal bone, the hunting scene on the petroglyph, and the exposed slab-lined cist are evidence of such activity. The site could be reached from permanent habitation in the valley. During the spring and summer, a variety of seeds and seasonal berries could be available; while in the winter, deer or

SITE NUMBER	SITE TYPE-PREHISTORIC				SITE TYPE-HISTORIC					
	Open Structure	Rock Shelter	Lithic Scatter	Rock Art	Paleontological	Hunting/Herding Camp	Community	Homestead	Mining	Water Control
42Cb231				X						
42Cb232			X							
42Cb233						X				
42Cb234								X	X(?	
42Cb235										
42Cb236							X			
42Cb237						X				
42Cb238			X							
42Cb239							X			
42Cb240		X								
42Cb241	X									
42Cb242			X							
42Cb243									X	
42Cb244										X
42Cb245							X			
42Cb247									X	
42Cb248	Not in Mine lease area									

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TABLE V-4

Summary of Sites by Types and Relative Chronology

mountain sheep would be concentrated in the canyon bottom. 42Cb240 and 42Cb238 are probably evidence of short term hunting forays beyond the primary resource base for the Fremont.

42Cb241 is a habitation and storage site. This site is predicted by sections 1-3 of the Fremont model. Fremont and Sevier culture habitations in similar environments have been recorded on both sides of the Wasatch Plateau (Nielson 1977, 1978; Madsen 1980). The stream and flat provide a critical resource patch for crop production. Grassy Trail Creek provides the essential permanent water supply. A larger village is reported to exist at the town of modern Sunnyside (Don Berge, personal communication 1981). Mr. Berge, Curator of the College of Eastern Utah Prehistoric Museum in Price, has reported another large village at the mouth of Price Canyon. The environment is identical at that location.

Section 5 of the Archaic model could also be applied to the Fremont. Those areas which would require higher energy expenditure for obtaining a given resource likely will have fewer, smaller sites. Site 42Cb233 is the only one that may fulfill this prediction. The area of West Ridge is difficult to gain access to. Heavy amounts of snow cover the ridge during normal winters, reducing even more the resource base on the ridge. The mano found at 42Cb233 is evidence of some collecting activity, but what the resource was is not known. Other high elevations lacked sites all together. It appears that areas such as West Ridge lacked the type of resources that

would be constantly sought after. The few resources that did exist probably were ignored due to the disproportionate expenditure of energy required for acquisition.

The model for the historic sites appears to hold true for all but one section. In general, historic sites are keyed to relatively static geological factors. In this case, the east dipping strata of the Black Hawk Formation exposed the major coal seams near ground level at the present mine facilities. This same situation is true of the coal seams in Price Canyon, Columbia, Wattis, Hiawatha, and Standardville. Mining technology at the turn of the century would not allow for detection of deep coal. As a result, mines were placed on exposed seams.

The larger sites (42Cb236 and 42Cb245) demonstrate the dependence on outside support in that no artifacts noted or examined are known to be of local manufacture. That water was important is demonstrated in the water system which brought this resource over Patmos Ridge _via_ aquaduct.

The single exception to the model is 42Cb248. This site is a considerable distance from easy access and appears to be in contradiction to Section 3 of the historic model. To solve the access problem, 42Cb247 was constructed to transport asphalt into the canyon. This indicates that limiting factors can be overcome by economic interest.

Historic hunting and herding sites were adequately predicted by

the model. 42Cb234 is a possible homestead with permanent habitation. The artifacts are all imported to the site. A lack of good crop land would necessitate transportation of food to the site. The homestead is near two sources of permanent water and efforts were made to develop a spring or well (42Cb235). The two temporary camps are both on the high ridges, lack any evidence of permanence, and all of the artifacts are easily transported to the site from elsewhere.

The generalization drawn from the models are not on a high statistical level. It was originally planned to subject the data to statistical verification, but the nature of the results is not amenable to such manipulation. Finding a single example of certain type of site in a given universe, such as 42Cb243 in the valley pediment will not lend itself to predictive statistics (Richard Holmer, personal communication 1981).

5.7. Site Density, Mining Impacts to Cultural Resources and Sensitivity Zones

5.7.1. Site Density

One of the purposes of this research is to ascertain potential site density for use in future mine development. Since we are dealing with all cultural resources as a group, historic and prehistoric are considered as a single category.

The most surprising result is the relatively low site density in the mine lease area as a whole. The mine lease contains

about 22.3 square miles, in which sixteen sites were inventoried. 42Cb248 is not considered as it is out of the lease area. This averages out to only .72 sites per square mile, much lower than many other areas. For comparison, site density figures for other areas are listed below:

Area	Reference	Sites Predicted (Per Sq. Mi)
BLM Indian Creek Planning Unit	Thompson 1979	19
BLM Castle Valley Planning Unit	Thompson 1979	13
BLM Dolores Planning Unit	Thompson 1979	5
BLM Beef Basin Planning Unit	Thompson 1979	32
Cedar Mesa Area, SE Utah	Fike and Lindsay 1976	6-30
White Mesa Area, SE Utah	Fike and Lindsay 1976	9
White River Area, NE Utah	Berry and Berry 1976	1.3
Natural Buttes Area, NE Utah	Hauck et al 1979	1.5
Red Wash Area, NE Utah	Larralde and Nickens 1979	1.3
Moon Lake Project Area, NE Utah	Chandler and Nickens, 1979	2.58
Cisco Resource Area, Eastern UT	Reed and Nickens, 1980	2.4

(After Reed and Nickens 1980)

However, when viewed in a different way, the density changes significantly. The lease area was originally divided into five sample universes based on topography. Table V-5 is a summary of the sites inventoried on the five universes. The results of this analysis are listed below:

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LOCATION	MAIN CANYON	SECONDARY CANYON	TALUS/CLIFF	PEDIMENT	HIGH FLATS
42Cb231					X
42Cb232					X
42Cb233					X
42Cb234	X				
42Cb235	X				
42Cb236	X				
42Cb237					X
42Cb238	X				
42Cb239	X				
42Cb240	X				
42Cb241			X		
42Cb242			X		
42Cb243				X	
42Cb244		X			
42Cb245	X				
42Cb247	X	X	X		
42Cb248			X		

TABLE V-5

Site Locations Summerized on the Five Sampling Universes

Universe	Total Sq. Mi.	No. of Sites	Sites per sq. mile
Primary Canyons	2.3	7	3.05
Secondary Canyons	5	1	.20
Valley Pediment	.75	1	1.3
Upper Flats/Benches	3.4	4	.85
Talus/Cliff Slopes	11	2	.18

432Cb247 (the tramway) was not included in the above tabulation. It ends on the floor of a primary canyon, crosses talus/cliff slopes, proceeds up a secondary canyon and ends on a small flat. This particular site is one of a kind in Utah, and hence, of no predictive value.

The difficulty in separating the universe into precise units has been noted in Section 5. The arbitrary division and its attendant problems was reinforced with 42Cb241 and 42Cb242. These sites occur in one of the valley pediment units, but in reality, are located in the talus/cliff slope environment. For that reason, these sites were tabulated under the talus/cliff classification. The valley pediment then contains only 42Cb243, the coking ovens.

If the two canyon universes are combined, it will be noted that 53% of the sites are located in them, for an average of 1.54 sites per square mile. The remaining universe contains 47% of the sites, but only .46 sites per square mile, or less than 1/3 the number of sites in the canyon universe.

5.7.2. Mining Impact to Cultural Resources

5.7.2.1. Types of Impacts to Cultural Resources.

There are four potential types of impact that could affect the cultural resources in the mine lease area. The first type includes naturally occurring events of erosion, flooding, fire, landslides, earthquakes, etc. As an example, natural erosion is removing part of 42Cb236. Natural weathering is impacting the rock art at sites 42Cb238 and 42Cb240. Little or nothing can be done to prevent these occurrences, hence, no mitigation plan can be implemented.

The second type is vandalism. This occurs in the form of illegal excavations (relic hunting), destroying standing walls, defacing rock art or architecture with paint, target practice, etc., or illegally removing surface artifacts. Vandalism cannot be totally prevented but can be curbed. We would suggest that Kaiser Steel be constantly on the alert for, and remove people from, the sites that are of National Register quality. Vandalism to cultural resources can be prosecuted under existing state laws and under existing law that protects private property.

A third type of impact occurs to any part or all of a site during construction, gaining access to specific areas (roads and trails) or any other human related ground disturbance. Kaiser Steel should either avoid the National Register quality sites or undergo specific mitigation procedures (see 5.7.3.) prior to the impact of the site. At the present time, planned

ground disturbance within the mine lease area will not impact any known cultural resources.

The fourth type of impact is the most difficult to assess-subsidence. When subsidence does occur, it can cause irreversible damage to site surfaces, subsurface deposits and cliff faces containing architecture or rock art. At the present time, there is no adequate evidence of subsidence on the mine lease area nor is any expected (see 5.1.3.4.). If in the future, impact to cultural resources can be directly attributed to subsidence, then an appropriate mitigation plan should be completed (see 5.7.3.).

5.7.3. Sensitivity Zones

The application of predictive models to develop sensitivity maps for cultural resource management has been successful. The long term purpose of such maps is to release some areas from further requirement under federal cultural resource laws while concentrating concern on high probability areas (Reed and Nickens 1980; Holmer 1980). The result of such an attempt for this project is Plate V-3.

Three zones are outlined on Plate V-3. The zones are designated as "high", "medium", and "low." The high density areas are limited to the primary canyon bottom and the first or second contour (12 to 18 meters) above the canyon floor, plus the valley pediment. High sensitivity areas have deep soils (relative to the mine lease area as a whole), open sage parks,

and are at least 30-40 meters wide. Site density is about 1.12 sites per square mile. If the two sites (42Cb241, 42Cb242) on the talus area above the valley pediment are included under the contour specification, site density increases to 1.37 per square mile. Medium sensitivity areas are limited to the high altitude (2280 meters a.s.l.) flats and benches. Medium sensitivity areas would average about .85 sites per square mile. The remaining area is classified as low density and includes the talus/cliff slopes and the narrow (30 meters or less) secondary canyons. Average site density would be less than .10 sites per square mile. This classification is not without problems. One of the best prehistoric sites (42Cb241) is in the talus/cliff areas, which are considered a low density zone. We examined other potential areas similar to the location of that site (a bench, above the valley near water) and found no other sites. It should also be noted that all of the sites in the medium density area are listed as non-significant (see 5.8). Based on the existing data, we would recommend the following for future management purposes:

1. That all sites listed as eligible for nomination to the National Register of Historic Places be protected from future mining impacts.

2. Should eligible sites be threatened by future mining impacts, that a program of adequate mitiation be undertaken prior to impact as negotiated with the State Historic Preservation Officer.

3. Areas of low and medium site density be released from future cultural resource requirements. In addition, a large portion of the pediment area has been impacted for modern tailing expansion. Areas already impacted should be exempt from further cultural resource requirements.

4. Areas within the high sensitivity zone be examined on an intensive (100%) site specific level prior to any future development.

5.8. National Register Consideration

5.8.1. National Register Evaluations.

Most federal and state agencies require archeologists to determine site significance and eligibility of sites for nomination to the National Register of Historic Places. This is done in compliance with the U. S. Federal Code of Regulations (30 CFR 60). The criteria stated in 36 CFR read:

> National Register criteria for evaluation. The quality of significance in American history, architecture, archeology, and culture is present in districts, sites, buildings, structures, and objects of State and local importance that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and
>
> (a) That are associated with events that have made a significant contribution to the broad patterns of our

history; or

(b) That are associated with the lives of persons significant in our past; or

(c) That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or

(d) That have yielded, or may be likely to yield, information important in prehistory or history.

The criteria listed under the law are subject to a great deal of subjectivity. Reed and Nickens have eloquently outlined some of the inherent problems in the law and will be quoted at length:

"It is evident that the criteria above allow for a considerable degree of subjectivity in the determination of site significance. In one sense, it can be viewed as beneficial to declare virtually all sites whose integrity has not been destroyed by construction, vandalism, agriculture, or natural agents as significant, as there exists the potential that they contain information important in prehistory or history. Seldom can an archaeologist be confident that a site is insignificant

prior to its excavation.

To consider all sites as inviolate, however, is wholly impractical in areas where multiple-use of lands is necessary. Some kinds of trade-off must be established, for to provide the protection that eligibility to the National Register of Historic Places offers would likely destroy the Register as a tool for protecting truly remarkable cultural resources. There exist too many archaeological sites and too many demands on federal land in the western United States for such an approach to work. Hypothetical "scales" for weighing the relative importance of each site must therefore be constructed.

Different types of significance can be determined. Type may include scientific (research) significance, historical significance, ethnic significance, monetary significance, or significance as a public educational facility. Most prehistoric and historic sites in the Cisco project area can best be viewed in terms of scientific significance. Criteria for scientific significance may include how unique a particular site is, or how well it typifies a large number of similar sites. Depth of cultural deposits, horizontal extent, and the condition (preservation) of deposits may be criteria. Criteria may also pertain to the potential of a particular site to answer regional or cultural research questions (Nickens and Reed 1980).

The sites in the mine lease area typify a wide range of cultural resources in the region. Some are deserving of protection for future study; others simply are not. Table V-6 summerizes the sites and their eligibility for nomination to the National Register.

5.9. Conclusions

This survey has examined an area that has never been surveyed. It is unique in that to date, no other survey of its type or intensity has been accomplished and reported on the west side of the Book Cliffs. The survey demonstrated that during prehistoric times, the talus and cliffs between the valley and the crest of the Book Cliffs were little used. Site density is lower than most areas. It is apparent that the costs in energy for exploiting the rugged west side simply outweigh the potential benefits. If other surveys should repeat this pattern, perhaps a large region could be exempted from future cultural resource reguirements. Canyon bottoms with live water appear to have provided excellent hunting and gathering for permanent settlements elsewhere. The canyons probably functioned as a natural corridor to higher areas as well.

There remain far more questions than answers about the prehistory of the area. The total lack of Archaic sites is puzzling. Little is known of Archaic patterns in the area. It is possible that a future test or excavation of sites, like

SITE NUMBER	PREHISTORIC	HISTORIC	ELIGIBLE	NOT ELIGIBLE	JUSTIFICATION
42Cb231p	X			X	Not a unique paleontological site*
42Cb232	X			X	No diagnostics, depth or features
42Cb233		X		X	No diagnostics, depth or features
42Cb234		X	X		Good structure, with diagnostics and no disturbance
42Cb235		X	X		Associated with 42Cb234 intact with depth
42Cb236		X	X		Mine community, good structures/depth
42Cb237		X		X	No depth, no features
42Cb238	X			X	No diagnostics, eroded, vandalized
42Cb239		X	X		Depth, one good structure and, diagnostics
42Cb240	X		X		Diagnostics, depth, excellant rock art
42Cb241	X		X		Structures, depth and diagnostics
42Cb242	X			X	Destroyed, no depth
42Cb243		X	X		Good architecture, mine history potential
42Cb244		X		X	Historically documented, not architecturally unique
42Cb245		X	X		Structures, mine history, with depth
42Cb247		X	X		Unique-one of a kind in Utah-Mine History
42Cb248	Not in mine lease area	X	X		Mine history, some structures

*The determination of non-eligibility of 42Cb231p was made after consulting with the Utah Stae Paleontologist Mr. James H. Madsen Jr

TABLE V-6

List of Eligible/Non-eligible Sites for Nomination to the National Register of Historic Places

42Cb240, could yield valuable data on the Archaic. It is also interesting that in the immediate Price to Green River area, not a single Fremont open village has ever been excavated. Site 42Cb241 is in a unique position, close to water, near land for cultivation and in a montane gathering zone. The interface of these environments by the Fremont could result in very significant research contributions.

The principle weakness of the survey was the lack of a general research design-predictive model for historic sites. Historic sites are as important as prehistoric sites under the law, yet no research designs for historic sites have been proposed for the region. Reports abound in recitations of historic names, places and events. However, next to nothing is known about historic material culture on the Plateau. It is hoped that future survey and research will result in more than a mere description of events.

BIBLIOGRAPHY

Ambler, J. R.
1966 Caldwell Village. University of Utah Anthropological Papers 84:118 pages, including appendices. Salt Lake City.

Ambler, J. R.
1970 "Just What is Fremont?" Paper presented at the Fremont Culture Symposium, 35th Annual Meeting of the Society for American Archeology, April 30-May 2, 1970. Mexico City.

Barber, E. A
1904 The Pottery and Porcelain of the United States and Marks of American Potters. Reprinted in 1976 by Feingold & Lewis/J&J, New York.

Beckwith, F.
1931 Some Interesting Pictographs in Nine Mile Canyon, Utah. El Palacio 30(14):216-222. Santa Fe.

1931a Serpent Petroglyph in Nine Mile Canyon. El Palacio 33(15-16):147-149. Santa Fe.

Benedict, J. B.
1979 Getting Away From It All: A Study of Man, Mountains, and the Two-Drought Altithermal. Southwestern Lore, Vol. 45, No. 3, pp. 1-12.

Berge, D. L.
1980 Simpson Springs Station: Historical Archaeology in Western Utah. Cultural Resource Series Monograph No. 6. Bureau of Land Management, Utah State Office, Salt Lake City.

Berry, M. S.
1980 Time, Space, and Transition in Anasazi Prehistory. Unpublished Ph.D. Dissertation. Ms. on file, Dept. of Anthropology, University of Utah. Salt Lake City.

Binford, L. W.
1980 Willow Snake and Dogs Tails: Hunter-gather Settlement Systems and Archeological Site Formation. American Antiquitiy, Vol. 45, No. 1.

Bloom, A. L.
1978 Geomorphology: A Systematic Analysis of Late Cenozoic Landforms. Prentice-Hall, Inc., Englewood Cliffs, New Jersey.

Campbell, E. W. C. and Campbell, W. H.
1935 The Pinto Basin Site. Southwest Museum Papers, No. 9. Los Angeles.

Christensen, D. et al
1980 Documentation and Recommendation For Determination of Eligibility to the National Register of Three Archeological Sites in Crandall Canyon, Carbon County, Utah. Utah Archaeological Research corporation. Spanish Fork.

Clark, F. R.
1928 Economic Geology of the Castlegate, Wellington, and Sunnyside Guadrangles, Carbon County, Utah. United States Geological Survey, Bulletin 793.

Cronquist, A.; Holmgren, A.H., Holmgren, N.H.; and Reveal, J.L.
1972 Intermountain Flora. New York Botanical Garden, Hafner Publishing Company, Inc., New York.

Currey, D. R.
1976 Late Quaternary Geomorphic History of Pint-Size Shelter. In Pint-Size Shelter, by L. W. Lindsay and C. K. Lund. Antiquities Section Selected Papers, No. 10, pp 59-65. Salt Lake City.

1980 Coastal Geomorphlogy of Great Salt Lake and Vicinity. In Great Salt Lake: A Scientific, Historical and Economic Overview, edited by J. W. Gwynn. Utah Geological and Mineralogical Survey Bulletin 116, pp. 69-82.

Day, K. C.
1964 Thorne Cave, Northeastern Utah: Archeology. American Antiquity, Vol. 30.

Denver & Rio Grande Western Railroad. "Station Map, Sunnyside, Utah." Utah State Historical Society Map 1556.

Doelling, H. H.
1972 Central Utah Coal Fields: Sevier-Sanpete, Wasatch, Book Cliffs, and Emery. Utah Geological and Mineralogical Survey Monograph Series No. 3, pp. 375-388.

Dunrud, C. R. and Barnes, B. K.
1972 Engineering Geologic Map of the Geneva Mine Area, Carbon and Emery Counties, Utah. United States Geological survey Miscellaneous Geologic Investigations Map I-704.

Durrant, S. D.
1952 Mammals of Utah. Taxonomy and Distribution. University of Kansas, Lawrence.

Eastern Utah Advocate (Price), December 13, 1908.

Euler, R. C.
1966 Southern Paiute Ethnohistory. University of Utah Anthropological Papers, No. 78, Glen Canyon Series, No. 28. Salt Lake City.

Fisher, D. J., Erdmann, C. E., and Reeside, J. B., Jr.
1960 Cretaceous and Tertiary Formations of the Book Cliffs, Carbon, Emery, and Grand Counties, Utah, and Garfield and Mesa Counties, Colorado. United States Geological Survey Professional Paper 332.

Fowler, D. D., et al
1980 M-X Cultural Resources Studies Regional Cultural Resources Survey Area C. University of Utah and Utah Division of State History. Salt Lake City.

Frison, G. C.
1978 Prehistoric Hunters of the High Plains. Academic Press. New York.

Gibson, Arthur E. "Sunnyside." Centennial Echoes From Carbon County. Price: Daughters of the Utah Pioneers, 1948.

Gillin, J. P.
1938 Archaeological Investigations in Nine-Mile Canyon, Utah, During the Year 1936. Bulletin of the University of Utah, Vol. 28, No. 11. Salt Lake City.

Godden, G. A.
1964 Encyclopedia of British Pottery and Porcelain Marks. Bonanza Books, New York.

Gunnerson, J. H.
1969 The Fremont Culture, A Study in Culture Dynamics in the Northern Anasazi Frontier. Papers of the Peabody Museum of Archaeology and Ethnology, Vol. 59, No. 2. Limbridge.

Gruhn, R.
1961 The Archaeology of Wilson Butte Cave, South Central Idaho. Idaho State College Museum Occasional Papers, No. 6, Pocatello.

Hauck, F. R.
1977 Cultural Resources Evaluation in Central Utah 1977. Cultural Resource Series, No. 3. Salt Lake City.

Hauck, R. F., and Weder, D. G.
1980 Archeological Surface Evaluations in the Skyline Project in Carbon and Emery Counties, Utah. Archeological-Environmental Research Corporation, Paper No. 23. Salt Lake City.

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Haury, E. M.
1953 Artifacts with Mammoth Remains, Naco, Arizona, I: Discovery of the Naco Mammoth and the Associated Projectile Points. American Antiquity, Vol. 19, No. 1. Salt Lake City.

Haury, E. M., Sayles, E. B. and Wasley, W. W.
1959 The Lehner Mammoth Site. American Antiquity, Vol. 25, No. 1. Salt Lake City.

Hawkins, B. and Seward, G. L.
1980 An Archeological Survey of Portions of Frasco Canyon, Starpoint Canyon and Straight Canyon, Near Price, Utah. Ms. on file, Antiquities Section, Division of State History. Salt Lake City.

Holmer, R. N.,
1978 A Mathematical Typology for Archaic Projectile Points of the Eastern Great Basin. Unpublished Ph.D. Dissertation, Dept. of Anthropology, University of Utah. Salt Lake City.

1979 Split Mountain Cultural Study Tract. Archeological Center, Department of Anthropology, University of Utah. Salt Lake City.

Holmes, C. N. and Page, B. M.
1956 Geology of the Bituminous Sandstone Deposits Near Sunnyside, Carbon County, Utah. Intermountain Association of Petroleum Geologists, Seventh Annual Field Conference Guidebook, pp. 171-177.

Hurst, W.,
1976 The Westwater Park Archaeological Survey. Ms on file, Antiquities Section, Division of State History. Salt Lake City.

1977 Preliminary Report on the Westwater Navajo Project, Phase I: Archaeological Reconnaissance. Ms on file, Antiquities Section, Division of State Histiry. Salt Lake City.

Hurst, W., Louthan, B. D.
1979 Survey of Rock Art in the Central Portion of Nine Mile Canyon Eastern Utah. Publications in Archaeology, New Series, No. 4. Department of Anthropology and Archaeology, Brigham Young University. Provo.

Irwin-Williams, C., and Haynes, C. V.
1970 Climatic Change and Early Population Dynamics in the Southwestern United States. Quaternary Research, Vol. 1, No. 1, New York.

Jennings, J. D.
1957 Danger Cave. University of Utah Anthropological Papers, No. 27. Department of Anthropology, University of Utah. Salt Lake City.

Jennings, J. D. and Norbeck, E. L.
1955 Great Basin Prehistory: A Review. American Antiquitiy, Vol. 21, No. 1. Salt Lake City.

Jennings, J. D. et al
1980 Cowboy Cave. University of Utah Anthropological Papers, No. 104. Department of Anthropology, University of Utah. Salt Lake City.

Kelley, I. T.
1964 Southern Paiute Ethnography. University of Utah Anthropological Papers, No. 69. Department of Anthropology, University of Utah. Salt Lake City.

Kidd, K. and M. A.
1970 A Classification System for Glass Beads for the Use of Field Archaeologist. Canadian Historic Sites: Occasional Papers in Archaeology and History No. 1. Dept. of Indian Affairs and Northern Development, Ottawa.

Lamb, S. M.
1958 Linguistic Prehistory in the Great Basin. International Journal of American Linguistics, Vol. 24, No. 2. Baltimore.

Land Title Records. Carbon County Archives. Price, Utah.

Leach, L. L.
1966 Archeological Investigations at Deluge Shelter (42Un1). Ms on file, Department of Anthropology, University of Utah. Salt Lake City.

1967 The Archeology of Boundary Village. University of Utah Anthropological Papers, No. 83. Department of Anthropology, University of Utah, Salt Lake City.

Lindsay, L. W.
1980 Pollen Analysis of Cowboy Cave Cultural Deposits. In Cowboy Cave, by J. D. Jennings. University of Utah Anthropological Papers, No. 104, Appendix X, pp. 213-224. Salt Lake City.

Lindsay, L. W. and Lund, C. K.
1976 Pint-Size Shelter. Antiquities Section Selected Papers, Vol. III, No. 10. Antiquities Section, Division of State History. Salt Lake City.

Lipe, W. D.
1978 The Southwest. In Ancient Native American, by Jesse D. Jennings (ed). W. H. Freeman, San Francisco.

Lister, R. H.
1951 Excavation at Hell's Midden, Dinosaur National Monument. University of Colorado Studies. Series in Anthropology, No. 3. Boulder.

Lohse, E. S.
1980 Fremont Settlement Pattern and Architectural Variation. Antiquities Section Selected Papers, Vol. VII, No. 16. Antiquities Section, Division of State History. Salt Lake City.

Madsen, D. B.
1975 Dating Paiute-Shoshoni Expansion in the Great Basin. American Antiquity, Vol. 40, No. 1, pp. 82-86. Washington, D.C.

1976 Three Fremont Sites in Emery County, Utah. Antiquities Section Selected Papers, Vol. 1, No. 1. Utah State Historical Society, Salt Lake City.

1980 The Human Prehistory of the Great Salt Lake Region. In Great Salt Lake: A Scientific, Historical, and Economic Overview edited by J. W. Gwynn. Utah Geological and Mineralogical Survey Bulletin 116, pp. 19-31.

Madsen, D. B. and D. R. Currey
1979 Late Quaternary Glacial and Vegetation Changes, Little Cottonwood Canyon Area, Wasatch Mountains, Utah. Quaternary Research, Vol. 12, pp. 254-270.

Madsen, D. B., D. R. Currey, and J. H. Madsen
1976 Man, Mammoth, and Lake Fluctuations in Utah. Antiquities Section Selected Papers, Vol. 2, No. 5. Salt Lake City.

Madsen, D. B., and L. W. Lindsay
1977 Backhoe Village. Antiquities Section Selected Papers, Vol. 4, No. 12. Utah State Historical Society, Salt Lake City.

Madsen, Rex
1977 Prehistoric Ceramics of the Fremont. Museum of Northern Arizona Ceramic Series, No. 6. Flagstaff.

McElprang, S. et al
1949 Castle Valley. Daughters of the Utah Pioneers, Emery County Chapter. Salt Lake City.

Miller, D. E.
1968 Utah History Atlas, Second Edition, Smith Printing Service. Salt Lake City.

Miller, W. E.
1976 Late Pleistocene Vertebrates of the Silver Creek Local Fauna from North-central Utah. Journal of Paleontology. Lawrence.

Miller, W. R., Tanner, T. L. and Foley, L. P.
1969 A Lexicostatistic Study of Shoshoni Dialects. Anthropological Linguistics, Vol. 13, No. 4. Bloomington.

Mining Claim Records. Carbon County Archives. Price, Utah.

Montgomery, H.
1894 Prehistoric Man in Utah. The Archaeologist, Vol. 2, No. 8, pp. 227-34; No. 10, pp. 298-306; No. 11, pp. 335-42. Waterloo.

Morgan, Dale. Carbon County Archives. Salt Lake: Utah Historical Records Survey, 1941.

Morgan, Dale. Emery County Archives. Salt Lake: Utah Historical Records Survey, 1941.

Morrison, R.B.
1965 Quaternary Geology of the Great Basin. In The Quaternary of the United States, edited by H. E. Wright Jr. and D. G. Frey, pp. 265-285. Princeton University Press. Princeton.

Morss, N.
1931 The Ancient Culture of the Fremont River in Utah. Peabody Museum of American Archaeology and Ethnology, Harvard University, Papers, Vol. 12, No. 3. Cambridge.

Neiring, W.
1966 The Life of the Marsh, The North American Wetlands. McGraw-Hill. New York.

Nelson, M. E. and Madsen, J. H.
1978 Late Pleistocene Musk Oxen from Utah. Transactions of the Kansas Academy of Science, Vol. 81, No. 4.

Nielson, A. S.
1977 A Cultural Resource Inventory for Energy Reserve Group in Eastern Sevier County, Utah. MS. on file, Department of Anthropology and Archaeology, Brigham Young University. Provo.

1978 Proposed Subsistence Models for the Sevier Culture: Sevier River Drainage, West Central Utah. MA thesis, Department of Anthropology, Brigham Young University. Provo.

Odum, E. P.
1963 Ecology, Modern Biology Series: Holt, Rinehart, and Winston. New York.

O'Neil, F. A.
1973 A History of the Ute Indians of Utah Until 1890. Ph.D. Dissertation, University of Utah.

O'Neil, F. A. and Thompson, G. C.
1980 White Mesa Ute History Project. American West Center, University of Utah. Salt Lake City.

Osterwald, F. W.
1962 Preliminary Lithologic and Structural Map of Sunnyside No. 1 Mine Area, Carbon County, Utah. United States Geological Survey Coal Investigations Map C-50.

Osterwald, F. W. and Dunrud, C. R.
1966 Instrumentation Study of Coal Mine Bumps, Sunnyside Distinct, Utah. Utah Geological and Mineralogical Survey Bulletin 80, pp. 97-110.

1978 Prehistory of Utah and the Eastern Great Basin. University of Utah Anthropological Papers, No. 98. Salt Lake City.

Photograph Collection. Utah State Historical Society. Salt Lake City, Utah.

Reagan, A. B.
1931a Some Archaeological Notes on Nine Mile Canyon, Utah. El Palacio, Vol. 31, No. 4, pp. 45-71. Santa Fe.

1931b Ruins and Pictographs in Nine Mile Canyon, Utah. Illinois State Academy of Science Transactions, Vol. 24, No. 2, pp. 369-70. Springfield.

Reed, A. D., Nickens, P. R.
1980 Sample Inventories of Oil & Gas Fields in Eastern Utah 1978-1979. Culture Resource Series No. 5. Bureau of Land Managment. Utah.

Reynolds, Thursey J. "A Story and Pictures of the First People of Sunnyside Coal Camp." Centennial Echos From Carbon County. Price: Daughters of the Utah Pioneers, 1948.

Richins, Lucille Personal History. Utah State Historical Society Manuscript A 211.

Ritchie, W.
1932 The Lamoka Lake Site: The Type Station of the Archaic Algonkin Period in New York. Researches and Transactions, Vol. 7, No. 4. New York State Archaeological Assocation. Rochester.

Robinson, Richard G. Castle Country. Price: Richard G. Robinson, 1973.

Schaafsma, P.
1971 The Rock Art of Utah: from the Donald Scott Collection. Peabody Museum of American Archaeology and Ethnology, Harvard University, Papers, Vol. 65. Cambridge.

Scheibner, B. J.
1979 Geology of the Single-Entry Project at Sunnyside Coal Mines 1 and 2, Sunnyside, Utah. United States Bureau of Mines Report of Investigations No. 8402.

Schroedl, A. R.
1976 The Archaic of the Northern Colorado Plateau. Ph.D. dissertation, Department of Anthropology, University of Utah. Salt Lake City.

Schroedl, A. R. and P. F. Hogan
1976 Innocents Ridge and the San Rafael Fremont. Antiquities Section Selected Papers, Vol. 1, No. 2. Utah State Historical Society, Salt Lake City.

Sellers, E. H.
1952 Early Man in America. University of Texas Press. Austin.

Shackleton, N. J. and Opdyke, N. D.
1973 Oxygen Isotope and Paleomagnetic Stratigraphy of Equational Pacific Core V28-238: Oxygen Isotope Temperatures and Ice Volumes on a 10^5 Year and 10^6 Year Scale. Quaternary Research, Vol. 3, pp. 39-55.

Shields, W. F.
1967 1966 Excavations: Uinta Basin. University of Utah Anthropological Papers, No. 89, Miscellaneous Collected Papers, No. 15, pp. 1-30. Salt Lake City.

Siegrist, R. (ed.)
1972 Prehistoric Petroglyphs and Pictographs in Utah. Utah State Historical Society and Utah Museum of Fine Arts, Salt Lake City.

Smith, John H. S. "Census Perspectives: The Sanpete Origins of Emery County Settlement." Emery County: Reflections on Its Past and Future. Salt Lake: Utah State Historical Society, 1979.

Steward, J. H.
1938 Basin-Plateau Aboriginal Sociopolitical Groups. Smithsonian Institution Bureau of American Ethnology, Bulletin No. 120. Washington.

Stokes, W. L.
1977 Subdivisions of the Major Physiographic Provinces in Utah. Utah Geology, Vol. 4, No. 1, pp. 1-17.

1980 Sudden Shelter. University of Utah Anthropological Papers, No. 103. Department of Anthropology, University of Utah. Salt Lake City.

Tolouse, J. H.
1971 Bottle Makers and Their Marks. Thomas Nelson Inc., New York.

United States Department of Commerce, Weather Bureau
1965 Climatic Summary of the United States, Utah, Supplement for 1951 through 1960, Washington, D.C.

United States Department of Commerce, National Oceanic and Atmospheric Administration, Enrironmental Data Service.
1973 Monthly Normals of Temperature, Precipitation, and Heating and Cooling Degree Days, 1941-70. Climatography of the United States No. 81, Utah.

Wells, P. V.
1976 Macrofossil Analysis of Woodrat (Neotoma) Middens as a Key to the Quaternary Vegetation Histsory of Arid America. Quaternary Research, Vol. 6, pp. 223-248.

Wikle, L.
1979 The Hot Deseret Survey: A Stratified Random Sample of the Cultural Resources of the Beaver Dam and Hurricane Planning Units of the Cedar City District of the Bureau of Land Management in Washington County, Utah. Western Anasazi Reports, Vol. 2, No. 4, Cedar City.

Willey, G. and Phillips P.
1958 Method and Theory in American Archeology. University of Chicago Press. Chicago.

Wilson, C. J., and Smith H.L.
1976 Interstate Highway I-70 Salvage Archeology, 1974. Antiquities Section Selected Papers, Vol. 2, No. 7. Utah State Historical Society, Salt Lake City.

Winter, J. C., and H. G. Wylie
1974 Paleoecology and Diet at Clyde's Cavern. American Antiquity, Vol. 39, No. 2, pp. 303-315. Washington, D.C.

Young, R. G.
1966 Stratigraphy of Coal-Bearing Rocks of the Book cliffs, Utah-Colorado. Utah Geological and Mineralogical Survey, Bulletin 80, pp. 7-21.

APPENDIX 1

Utah Antiquities Project
developed by cooperative agreement by:
Bureau of Land Management
Division of State History
University of Utah Archeological Center

1. Site No. [I/1-10] 42Cb231p
PALEONTOLOGY-001

2. County Carbon
3. Temp. No. K-1

4. Class: __ Prehistoric __ Historic XX Paleontologic
5. Cultural Site Type (interpreted function): ____
6. Paleontological Site Type: XX Invertebrate; __ Vertebrate; __ Flora
7. Elevation [I/11-15] 7920 ft. X.3048 = 2414 m.
elevation source: U.S.G.S. topographic
8. UTM Grid: [I/16-30] zone 12 ; 550550 m E; 4380850 m N
9. [II/1-16] NE of NW of SE of Section 30 T. 14S , R. 14E
10. Map Reference: Sunnyside, Utah Series: 7.5 Date: 1972
11. Aerial Photo Data: ____

12. Site Location: On ridge crest, just north of prominent saddle, in Book Cliffs.

13. Land Owner [II/17-18]: Private: Kaiser Steel Corp.
BLM District/Forest [II/19]: ____
14. Site Name/Previous Designations: None

15. Description of Site: Poorly-exposed outcrop of highly fossiliferous limestone. Several species of gastropods & at least one bivalve mollusk species, represented as well-preserved fossils. Limestone unit is of unknown thickness; lateral continuity of the limestone bed, or of the outcrop(s) is also unknown. The limestone is probably in upper Price River Formation, or lower North Horn Formation.

16. Artifacts: Artifacts should be described/drawn on a continuation sheet and their locations plotted on the site map.

CLASS	QUANTITY
Debitage [II/30]	____
Bifaces [III/1-9]	____
Scrapers [III/1-9]	____
Utilized Flakes	____

CLASS	TYPE	QUANTITY
Ceramics [III/10-21]	____	____
Proj Pnt [III/1-9]	____	____
Gnd Stn [II/22-29]	____	____
Glass [II/22-29]	____	____
Metal [II/22-29]	____	____
Nails [II/22-29]	____	____
Cans [II/22-29]	____	____
Wood [II/22-29]	____	____
Other [II/22-29]	____	____

Description: None

17. Non-Structural Features: (describe and locate on site map) [III/22-27]

_hearth/firepit(HE)	_rubble mound(RM)	_earthen mound(EM)	_trail/road(TR)
_midden(MD)	_stone circle(SC)	_burial(BU)	_RR grade(RG)
_depression(DE)	_rock alignment(RA)	_pictograph(PI)	_tram way/road(TW)
_water control(WC)	_mine tailings(MT)	_petroglyph(PE)	_other(OT)

Description: None

18. Structural Features: (describe and locate on site map) [III/28-IV/6]

CLASS	MATERIAL	QUANTITY
Single rm	____	____
Multiple rm	____	____
Granary	____	____
Cist	____	____
Pithouse	____	____
Kiva	____	____
Well	____	____

CLASS	MATERIAL	QUANTITY
Tower	____	____
Cairn	____	____
Corral	____	____
Dugout	____	____
Kiln	____	____
Monument	____	____
Mine	____	____

Description: None

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19. Cultural Affiliation [IV/7-14]: _____
How Determined? _____
20. Site Dimensions : 10 m X 10 m;? Area [IV/17-21]; 100 sq m
21. Were surface ~~XXXXXXXXXX~~ fossils collected? XX Yes; __No; [IV/22] If yes, attach a continuation sheet describing sampling method used. (not emati
22. Estimated depth of fill [IV/23] : _____
Subsurface test? __Yes; __No (Include location of test on site map)
Description: _____
23. Site Condition [IV/25] : XX Excellent; __Good; __Fair; __Poor
Agent of Impact: _____
24. Nat. Register Potential [V/1]: __Significant(C); XX Non-Significant(D)
Justification: _____

25. Research Potential: Unknown
26. Recommended Mitigation: _____
27. Direction/Distance to Permanent Water [V/5-10] : _____/_____m
Type/Name of Water Source [V/11] : _____
Distance to nearest other Water Source [V/2-4]: _____
Type of other water source: _____
Distance to Cultivatable Soil [V/12-14] : _____
28. Topographic Location (check one under each heading) [V/15-18]

SITE NO.

PRIMARY LANDFORM	POSITION ON LANDFORM	DEPOSITIONAL ENVIRONMENT		SECONDARY POSITION
_mountain spine(A)	_top/crest/peak(A)	_fan(A)	_marsh(L)	_top/crest/ridge(A)
_hill/butte(B)	_edge(B)	_talus(B)	_landslide/slump(M)	_edge(B)
_tableland/mesa(C)	_slope(C)	_dune(C)	_delta(N)	_slope(C)
_ridge(D)	_toe/foot/bottom(D)	_stream terrace(D)	_island(O)	_toe/foot(D)
_valley(E)	_saddle/pass(E)	_playa(E)	_cliff(P)	_cutbank(E)
_plain(F)	_bench/ledge(F)	shore feature	_outcrop(Q)	_detached monolith(F)
_canyon(G)	_rimrock(G)	_extinct lake(F)	_stream bed(R)	_interior(G)
	_interior(H)	_extant lake(G)		_step(H)
		_alluvial plain(H)		_riser(I)
		_coluvium(I)		_port.geo.feature(J)
		_moraine(J)		_spring mound/bog(K)
		_flood plain(K)		_cave(L)
				_alcove/shelter(M)
				_patterned ground(N)

Description: _____

29. Degree/Aspect of slope [V/19-23] : _____
30. Vegetation COMMUNITY and association [V/24-25]:

_ALPINE GRASSLAND(AA)	_YELLOW PINE-OAK(DZ)	_COLD DESERT SHRUB(FZ)	_SALT DESERT SHRUB(GZ)	_WARM DESERT SHR
	_ponderosa pine(DA)	_sagebrush(FA)	_greasewood(GA)	_desert saltbru
_SPRUCE FIR(BZ)	_oakbrush(DB)	_small sagebrush(FB)	_grswood-shadscl(GB)	_creosote bush(Z
_krumholz(BA)	_mountain brush(DC)	_little rabbitbrsh(FC)	_seepweed(GC)	_creosote/bursage
_white fir-spruce(BB)	_maple(DD)	_shadscale(FD)	_pickleWd/samphire(GD)	_joshua tree(HD)
_ASPEN DOUGLAS FIR(CZ)	_streamside(DE)	_horsebrush(FE)	_saltgrass(GE)	_MARSH COMMUNITY(LA
_limber pine(CA)		_winter-fat(FF)	_alkali sacaton(GF)	
_douglas fir(CB)		_hop-sage/blkbrsh(FG)	_rabbitbrush(GG)	_ALKALI FLATS/MUD
_lodgepole pine(CC)	_PLAINS/PRAIRIE(EZ)	_bud sagebrush(FH)		FLATS/DRY LAKE/
_bristlecone pine(CD)	_grasslands(EA)	_mat saltbrush(FI)		WASTELAND(KZ)
_aspen(CE)	_pinyon-juniper(EB)	_gray molly(FJ)		
_streamside(CD)	_streamside(EC)	_streamside(FK)		_CULTIVATED LAND( )
_meadow grassland(CG)				

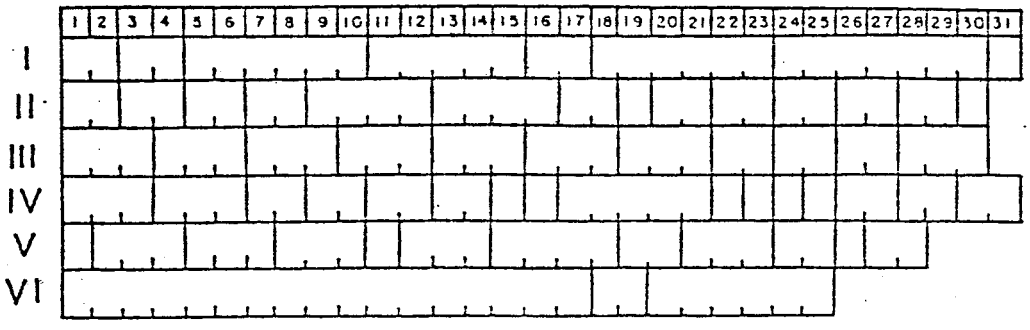
(Check COMMUNITY only if association cannot be determined)

Description: _____

31. Next nearest plant association/distance: _____
32. Photograph Numbers [V/26] : No Photo
33. Recorded by: Jack Oviatt
Survey Org. [V/27-28]: Antiquities Date: 1/20/81
Assisting Crew Members: J. Kirkman, A. Nielson

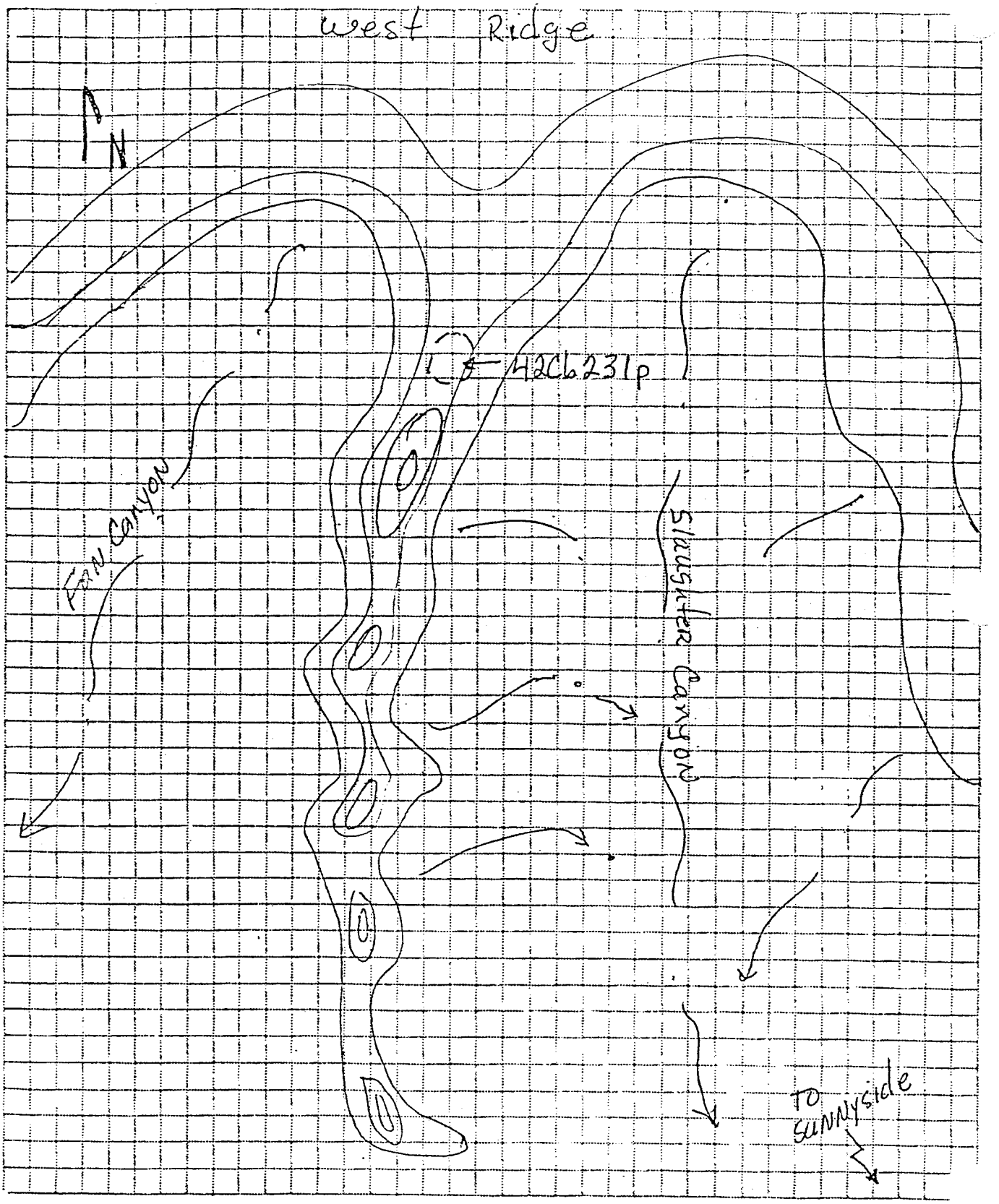
SITE NO. _____

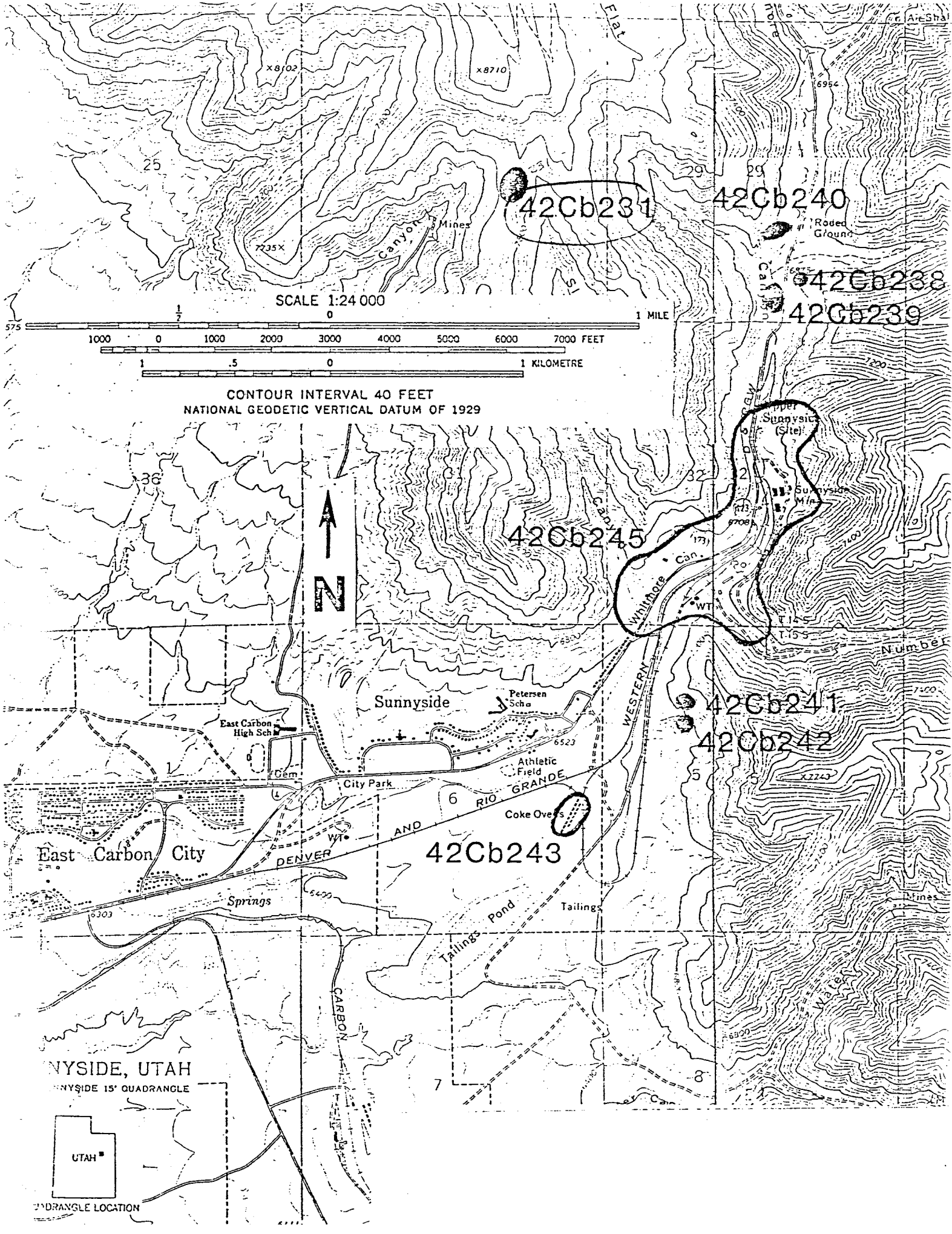
35. Encoding Form: (all entries are right justified)



Form must be accompanied by a site map; photocopy of U.S.G.S. topo map with T., R., scale, and quad name; photographs of the site; and artifact sketches (if applicable).

SITE NO. 42Cb23:p





42Cb231
42Cb240
42Cb238
42Cb239
42Cb245
42Cb241
42Cb242
42Cb243
SCALE 1:24 000
1 MILE
7000 FEET
1 KILOMETRE
CONTOUR INTERVAL 40 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929
N
Sunnyside
Petersen Sch
East Carbon High Sch
City Park
Athletic Field
Coke Ovens
East Carbon City
DENVER AND RIO GRANDE
WESTERN
Springs
Tailings
Tailings Pond
CARBON
Whitmore Can
Roded Ground
Mines
Sunnyside Mine
Upper Sunnyside (Site)
NYSIDE, UTAH
NYSIDE 15' QUADRANGLE
UTAH
DRANGLE LOCATION

UTAH ANTIQUITIES SITE FORM
developed by cooperative agreement by:
Bureau of Land Management
Division of State History
University of Utah Archeological Center

1. Site No. [I/1-10] 42Cb232

2. County Carbon
3. Temp. No. K-2

4. Class: XX Prehistoric ___ Historic ___ Paleontologic
5. Cultural Site Type (interpreted function): Open camp
6. Paleontological Site Type: ___ Invertebrate; ___ Vertebrate; ___ Flora
7. Elevation [I/11-15] 8620-8640 ft. X.3048 = 2627-2633 m.
elevation source: contour
8. UTM Grid: [I/16-30] zone 12 ; 551110 m E; 4385250 m N
9. [II/1-16] NE of SW of SE of Section 12 T. 14S , R. 13E
10. Map Reference: Sunnyside, Utah Series: 7.5 Date: 1972
11. Aerial Photo Data:

12. Site Location: Located on west ridge, west of Whitmore Canyon. Take jeep trail opposite Bear Canyon up west ridge, pass Bull Flat, up to top, proceed north about 2.5 miles. Site just north of saddle and an historic camp.

13. Land Owner [II/17-18]: Private: Kaiser Steel Corp.
BLM District/Forest [II/19]:
14. Site Name/Previous Designations: None
15. Description of Site: A light lithic scatter with a couple of gray lithic flakes and a round, uniface sandstone mano. Occupies a small knoll top & rocky slope southeast of the knoll. Overlooks a natural pass or saddle overlooking Bear Canyon.

16. Artifacts: Artifacts should be described/drawn on a continuation sheet and their locations plotted on the site map.

CLASS	QUANTITY
Debitage [II/30]	2
Bifaces [III/1-9]	
Scrapers [III/1-9]	
Utilized Flakes	

CLASS	TYPE	QUANTITY
Ceramics [III/10-21]		
Proj Pnt [III/1-9]		
Gnd Stn [II/22-29]	Mano- Round	1.
Glass [II/22-29]		
Metal [II/22-29]		
Nails [II/22-29]		
Cans [II/22-29]		
Wood [II/22-29]		
Other [II/22-29]		

Description: Gray/white chert flakes. Mano is of pink, fine grained sandstone.

17. Non-Structural Features: (describe and locate on site map) [III/22-27]

_hearth/firepit(HE) _rubble mound(RM) _earthen mound(EM) _trail/road(TR)
_midden(MD) _stone circle(SC) _burial(BU) _RR grade(RG)
_depression(DE) _rock alignment(RA) _pictograph(PI) _tram way/road(TW)
_water control(WC) _mine tailings(MT) _petroglyph(PE) _other(OT)

Description: None observed.

18. Structural Features: (describe and locate on site map) [III/28-IV/6]

CLASS	MATERIAL	QUANTITY
Single rm		
Multiple rm		
Granary		
Cist		
Pithouse		
Kiva		
Well		

CLASS	MATERIAL	QUANTITY
Tower		
Cairn		
Corral		
Dugout		
Kiln		
Monument		
Mine		

Description: None observed.

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19. Cultural Affiliation [IV/7-14]: Unknown
How Determined?
20. Site Dimensions : 40 m X 40 m; Area [IV/17-21]: ____ sq
21. Were surface artifacts collected? __Yes; XX No; [IV/22] If yes, attach a continuation sheet describing sampling method used.
22. Estimated depth of fill [IV/23] : Unknown
Subsurface test? __Yes; XX No (Include location of test on site map)
Description:
23. Site Condition [IV/25] : __Excellent; __Good; __Fair; XX Poor
Agent of Impact: Erosion
24. Nat.Register Potential [V/1]: __Significant(C); X Non-Significant(D)
Justification: No diagnostics, very sparce, bad erosion.

25. Research Potential: None
26. Recommended Mitigation: None
27. Direction/Distance to Permanent Water [V/5-10] : East / 600 m
Type/Name of Water Source [V/11] : Grassy trail creek.
Distance to nearest other Water Source [V/2-4]: Unknown
Type of other water source:
Distance to Cultivatable Soil [V/12-14] : 600 m
28. Topographic Location (check one under each heading) [V/15-18]

PRIMARY LANDFORM	POSITION ON LANDFORM	DEPOSITIONAL ENVIRONMENT		SECONDARY POSITION
_mountain spine(A)	XX top/crest/peak(A)	_fan(A)	_marsh(L)	XX top/crest/ridge(A)
_hill/butte(B)	_edge(B)	_talus(B)	_landslide/slump(M)	XX edge(B)
_tableland/mesa(C)	_slope(C)	_dune(C)	_delta(N)	_slope(C)
X ridge(D)	_toe/foot/bottom(D)	_stream terrace(D)	_island(O)	_toe/foot(D)
_valley(E)	_saddle/pass(E)	_playa(E)	_cliff(P)	_cutbank(E)
_plain(F)	_bench/ledge(F)	shore feature	_outcrop(Q)	_detached monolith(F)
_canyon(G)	_rimrock(G)	_extinct lake(F)	_stream bed(R)	_interior(G)
	_interior(H)	_extant lake(G)		_step(H)
		_alluvial plain(H)		_riser(I)
		_coluvium(I)		_port.geo.feature(J)
		_moraine(J)		_spring mound/bog(K)
		_flood plain(K)		_cave(L)
				_alcove/shelter(
				_patterned ground(

Description: On a small knoll that is part of West Ridge.

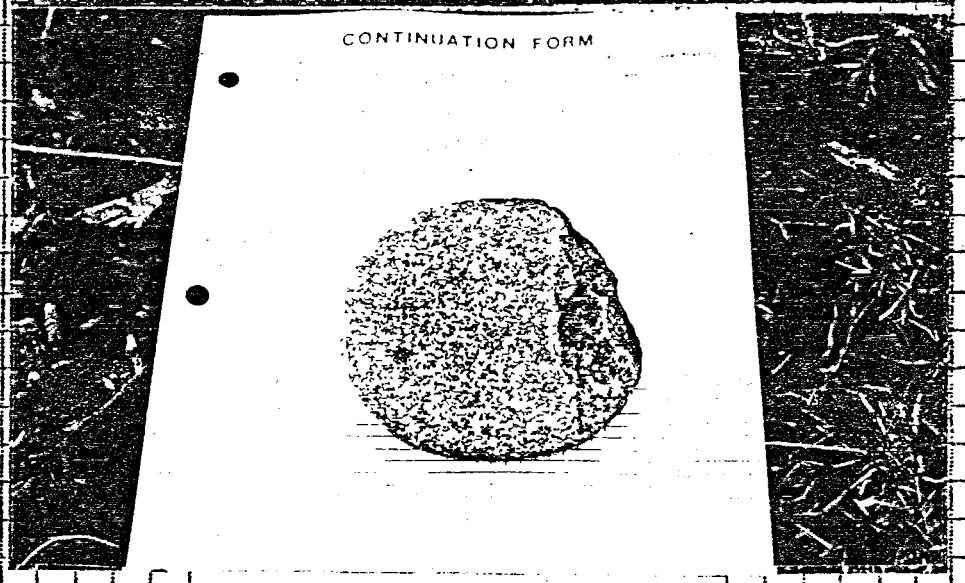
29. Degree/Aspect of slope [V/19-23] : 15% southeast
30. Vegetation COMMUNITY and association [V/24-25]:

_ALPINE GRASSLAND(AA)	_YELLOW PINE-OAK(DZ)	_COLD DESERT SHRUB(FZ)	_SALT DESERT SHRUB(GZ)	_WARM DESERT SHRUB(F
	_ponderosa pine(DA)	_sagebrush(FA)	_greasewood(GA)	_desert saltbrush(H
_SPRUCE FIR(BZ)	_oakbrush(DB)	_small sagebrush(FB)	_grsw ood-shadscl(GB)	_creosote bush(E
_krumholz(BA)	_mountain brush(DC)	_little rabbitbrsh(FC)	_seepweed(GC)	_creosote/bursag
_white fir-spruce(BB)	_maple(DD)	_shadscale(FD)	_picklewd/samphire(GD)	_joshua tree(HD)
_ASPEN DOUGLAS FIR(CZ)	_streamside(DE)	_horsebrush(FE)	_saltgrass(GE)	_MARSH COMMUNITY(
_limber pine(CA)		_winter-fat(FF)	_alkali sacaton(GF)	
X douglas fir(CB)		_hop-sage/blkbrsh(FG)	_rabbitbrush(GG)	_ALKALI FLATS/MU
_lodgepole pine(CC)	_PLAINS/PRAIRIE(EZ)	_bud sagebrush(FH)		FLATS/DRY LAKE/
_bristlecone pine(CD)	_grasslands(EA)	_mat saltbrush(FI)		WASTELAND(KZ)
_aspen(CE)	_pinyon-juniper(EB)	_gray molly(FJ)		
_streamside(CD)	_streamside(EC)	_streamside(FK)		_CULTIVATED LAND Z)
_meadow grassland(CG)				

(Check COMMUNITY only if association cannot be determined)

Description: Area rich with Douglass fir, some mahogany, sage, service berry, lupene, grasses

31. Next nearest plant association/distance: CZ 200m southeast
32. Photograph Numbers [V/26] : AN-81-1.2(BW) AN-81-2.2(C/s)
33. Recorded by: Asa Nielson
Survey Org. [V/27-28]: AS-CS Date: 1/21/81
Assisting Crew Members: Jack Oviatt, Jim Kirkman



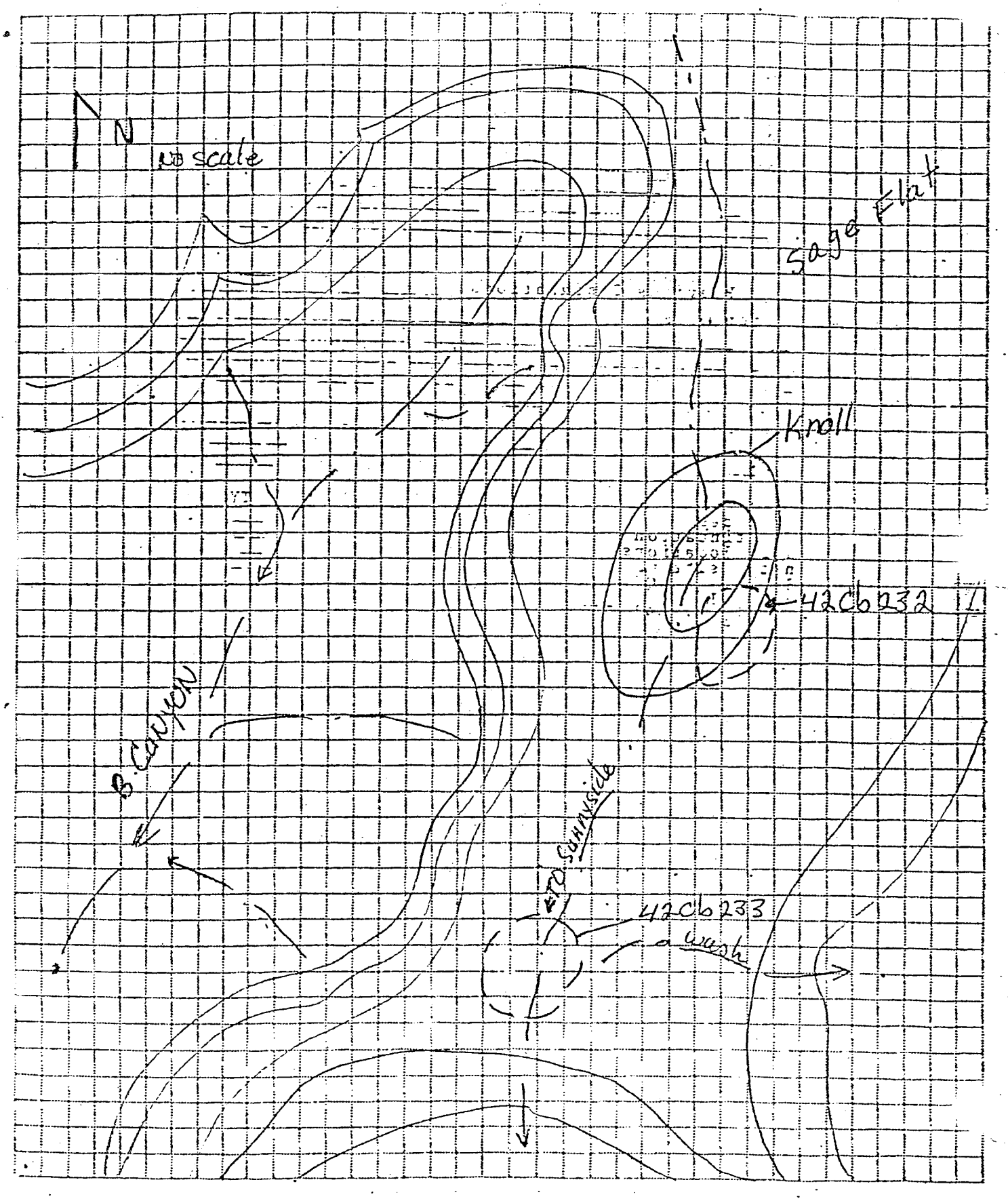
Site 42Cb232
Top: General Site View
Looking North.
Bottom: Oval Mano Found
at Site

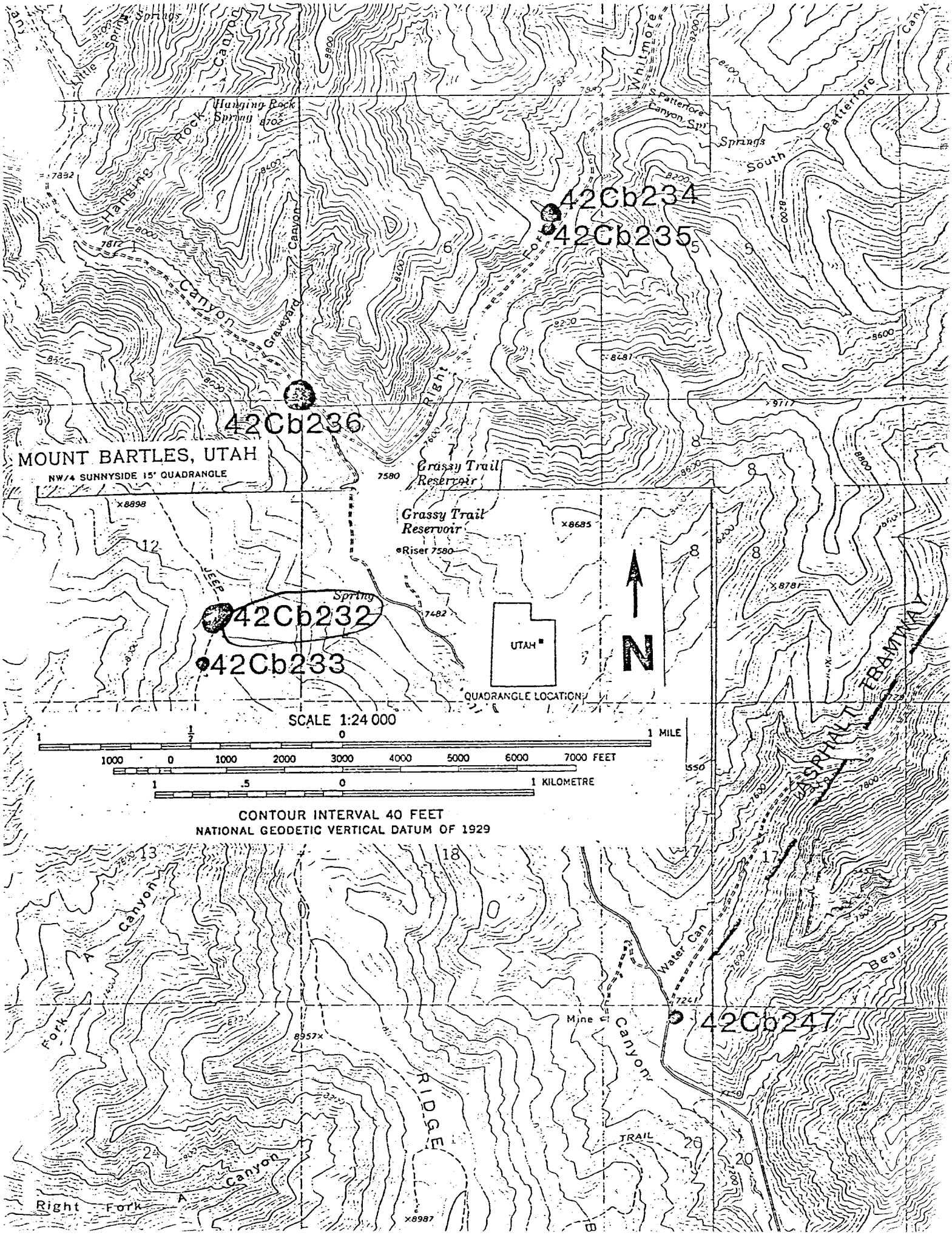
35. Encoding Form: (all entries are right justified)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
I																															
II																															
III																															
IV																															
V																															
VI																															

Form must be accompanied by a site map; photocopy of U.S.G.S. topo map with T., R., scale, and quad name; photographs of the site; and artifact sketches (if applicable).

SITE NO. 42Cb 232





MOUNT BARTLES, UTAH
NW/4 SUNNYSIDE 15' QUADRANGLE
42Cb234
42Cb235
42Cb236
42Cb232
42Cb233
42Cb247
Hanging Rock Spring
Hanging Rock Canyon
Little Spring Springs
Whitmore
S Patterfore Canyon Spr
South Patterfore Canyon
Springs
Graveyard Canyon
Right Fork
Grassy Trail Reservoir
Riser 7580
JEEP
Spring
UTAH
QUADRANGLE LOCATION
N
SCALE 1:24 000
1 MILE
7000 FEET
1 KILOMETRE
CONTOUR INTERVAL 40 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929
ASPHALT TRAMWAY
Water Can
Bear
Mine
Canyon
RIDGE
TRAIL
Fork A Canyon
Right Fork A Canyon

UTAH ANTIQUITIES SITE FORM
developed by cooperative agreement by:
Bureau of Land Management
Division of State History
University of Utah Archeological Center

1. Site No. [I/1-10] 42Cb233

2. County Carbon
3. Temp. No. K-3
4. Class: __Prehistoric XX Historic __Paleontologic
5. Cultural Site Type (interpreted function): Camp
6. Paleontological Site Type: ___Invertebrate; ___Vertebrate; ___Flora
7. Elevation [I/11-15] 8690 ft. X.3048= 2648 m.
elevation source: contour line
8. UTM Grid: [I/16-30] zone 12 ; 550950 m E; 4385150 m N
9. [II/1-16] SE of SW of SE of Section 12 T. 14S , R. 13E
10. Map Reference: Sunnyside, Utah Series: 7.5 Date: 1972
11. Aerial Photo Data:
12. Site Location: On ridge named West Ridge, west of Whitmore Canyon. Take jeep trail opposite Bear Canyon from Whitmore, go up ridge past Bull Flat to top, ca 2.5 miles north to natural saddle & site area.

13. Land Owner [II/17-18]: Private: Kaiser Steel Corp.
BLM District/Forest [II/19]:
14. Site Name/Previous Designations: None
15. Description of Site: A small, historic camp site still in use. Small aspen, corral below (east) site. Consists of recent historic trash plus older cans. Occupies the ridge edge overlooking Bear Canyon to the west. Some ash from camp fires present. No fire ring.

16. Artifacts: Artifacts should be described/drawn on a continuation sheet and their locations plotted on the site map.

CLASS	QUANTITY
Debitage [II/30]	
Bifaces [III/1-9]	
Scrapers [III/1-9]	
Utilized Flakes	

CLASS	TYPE	QUANTITY
Ceramics [III/10-21]	Iron stone	1
Proj Pnt [III/1-9]		
Gnd Stn [II/22-29]		
Glass [II/22-29]		
Metal [II/22-29]		
Nails [II/22-29]		
Cans [II/22-29]	Bear Canyon Cream Cans	10-15
Wood [II/22-29]		
Other [II/22-29]		

Description: Modern aluminum pop tops, but also 2 solder sealed cans.

17. Non-Structural Features: (describe and locate on site map) [III/22-27]

XX hearth/firepit(HE) _rubble mound(RM) _earthen mound(EM) _trail/road(TR)
_midden(MD) _stone circle(SC) _burial(BU) _RR grade(RG)
_depression(DE) _rock alignment(RA) _pictograph(PI) _tram way/road(TW)
_water control(WC) _mine tailings(MT) _petroglyph(PE) _other(OT)

Description: Small ash stain on west side, perhaps a hearth.

18. Structural Features: (describe and locate on site map) [III/28-IV/6]

CLASS	MATERIAL	QUANTITY	CLASS	MATERIAL	QUANTITY
Single rm			Tower		
Multiple rm			Cairn		
Granary			Corral		
Cist			Dugout		
Pithouse			Kiln		
Kiva			Monument		
Well			Mine		

Description: None observed.

19. Cultural Affiliation [IV/7-14]: Euro. American(?)
How Determined? Modern cans
20. Site Dimensions : 10 m X 10 m; Area [IV/17-21]: ____ sq m
21. Were surface artifacts collected? __Yes; XX No; [IV/22] If yes, attach a continuation sheet describing sampling method used.
22. Estimated depth of fill [IV/23] : Unknown
Subsurface test? __Yes; XX No (Include location of test on site map)
Description:
23. Site Condition [IV/25] : __Excellent; __Good; XX Fair; __Poor
Agent of Impact: Erosion
24. Nat. Register Potential [V/1]: __Significant(C); XX Non-Significant(D)
Justification: No good preservation or depth observed; likely a sheep or deer canyon.

25. Research Potential: None
26. Recommended Mitigation: None
27. Direction/Distance to Permanent Water [V/5-10] : East / 600 m
Type/Name of Water Source [V/11] : Grassy trail creek
Distance to nearest other Water Source [V/2-4]: Unknown
Type of other water source:
Distance to Cultivatable Soil [V/12-14] : 600 m
28. Topographic Location (check one under each heading) [V/15-18]

SITE NO.

PRIMARY LANDFORM	POSITION ON LANDFORM	DEPOSITIONAL ENVIRONMENT		SECONDARY POSITION
_mountain spine(A)	_top/crest/peak(A)	_fan(A)	_marsh(L)	_top/crest/ridge(A)
_hill/butte(B)	_edge(B)	_talus(B)	_landslide/slump(M)	_edge(B)
_tableland/mesa(C)	_slope(C)	_dune(C)	_delta(N)	_slope(C)
X ridge(D)	_toe/foot/bottom(D)	_stream terrace(D)	_island(O)	_toe/foot(D)
_valley(E)	X saddle/pass(E)	_playa(E)	_cliff(P)	_cutbank(E)
_plain(F)	_bench/ledge(F)	shore feature	_outcrop(Q)	_detached monolith(F)
_canyon(G)	_rimrock(G)	_extinct lake(F)	_stream bed(R)	X interior(G)
	_interior(H)	_extant lake(G)		_step(H)
		_alluvial plain(H)		_riser(I)
		_coluvium(I)		_port.geo.feature(J)
		_moraine(J)		_spring mound/bog(K)
		_flood plain(K)		_cave(L)
				_alcove/shelter(M)
				_patterned ground(

Description: In a natural saddle pass between Whitmore and Bear Canyon.

29. Degree/Aspect of slope [V/19-23] : D-1 west
30. Vegetation COMMUNITY and association [V/24-25]:

_ALPINE GRASSLAND(AA)	_YELLOW PINE-OAK(DZ)	_COLD DESERT SHRUB(FZ)	_SALT DESERT SHRUB(GZ)	_WARM DESERT SHRU EZ
	_ponderosa pine(DA)	_sagebrush(FA)	_greasewood(GA)	_desert saltbrush(HA)
_SPRUCE FIR(BZ)	_oakbrush(DB)	_small sagebrush(FB)	_grswood-shadscl(GB)	_creosote bush(HB)
_krumholz(BA)	_mountain brush(DC)	_little rabbitbrsh(FC)	_seepweed(GC)	_creosote/bursage (HC)
_white fir-spruce(BB)	_maple(DD)	_shadscale(FD)	_pickleud/samphire(GD)	_joshua tree(HD)
_ASPEN DOUGLAS FIR(CZ)	_streamside(DE)	_horsebrush(FE)	_saltgrass(GE)	_MARSH COMMUNITY( )
_limber pine(CA)		_winter-fat(FF)	_alkali sacaton(GF)	
X douglas fir(CB)		_hop-sage/blkbrsh(FG)	_rabbitbrush(GG)	_ALKALI FLATS/MUD FLATS/DRY LAKE/ WASTELAND(KZ)
_lodgepole pine(CC)	_PLAINS/PRAIRIE(EZ)	_bud sagebrush(FH)		
_bristlecone pine(CD)	_grasslands(EA)	_mat saltbrush(FI)		
_aspen(CE)	_pinyon-juniper(EB)	_gray molly(FJ)		
_streamside(CD)	_streamside(EC)	_streamside(FK)		_CULTIVATED LAND(JZ)
_meadow grassland(CG)				

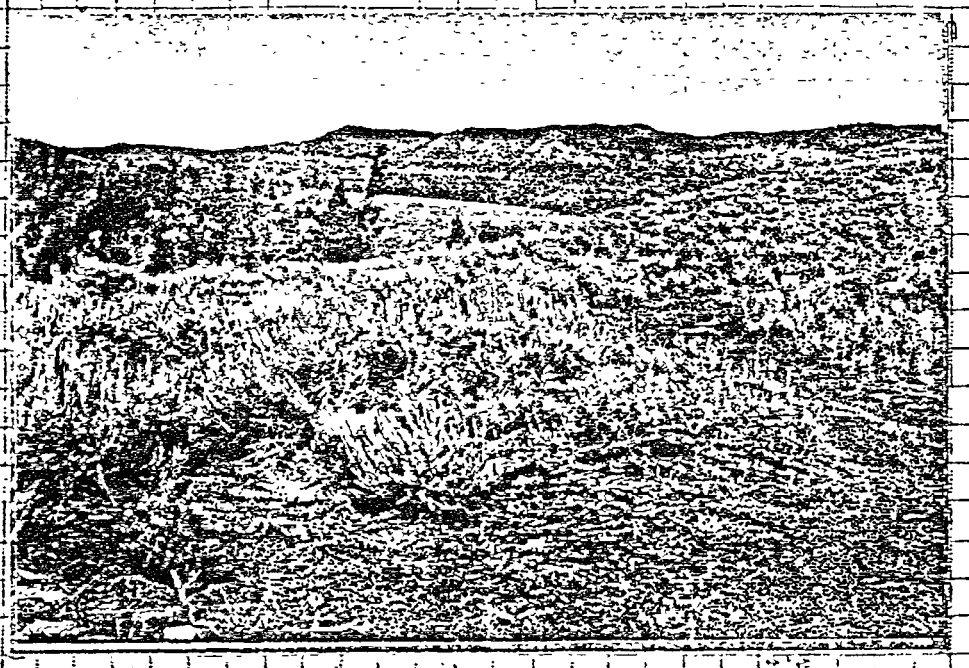
(Check COMMUNITY only if association cannot be determined)

Description: Douglass fir, sage, mahogany, grasses present.

31. Next nearest plant association/distance: 200 meters E. (CE)
32. Photograph Numbers [V/26] : AN-81-1,3 AN-81-2,3
33. Recorded by: Asa Nielson
Survey Org. [V/27-28]: ASKS Date: 1/21/81
Assisting Crew Members: Jack Oviatt, Jim Kirkman

Kaiser Steel Contract No.

SITE NO. 42Cb 233



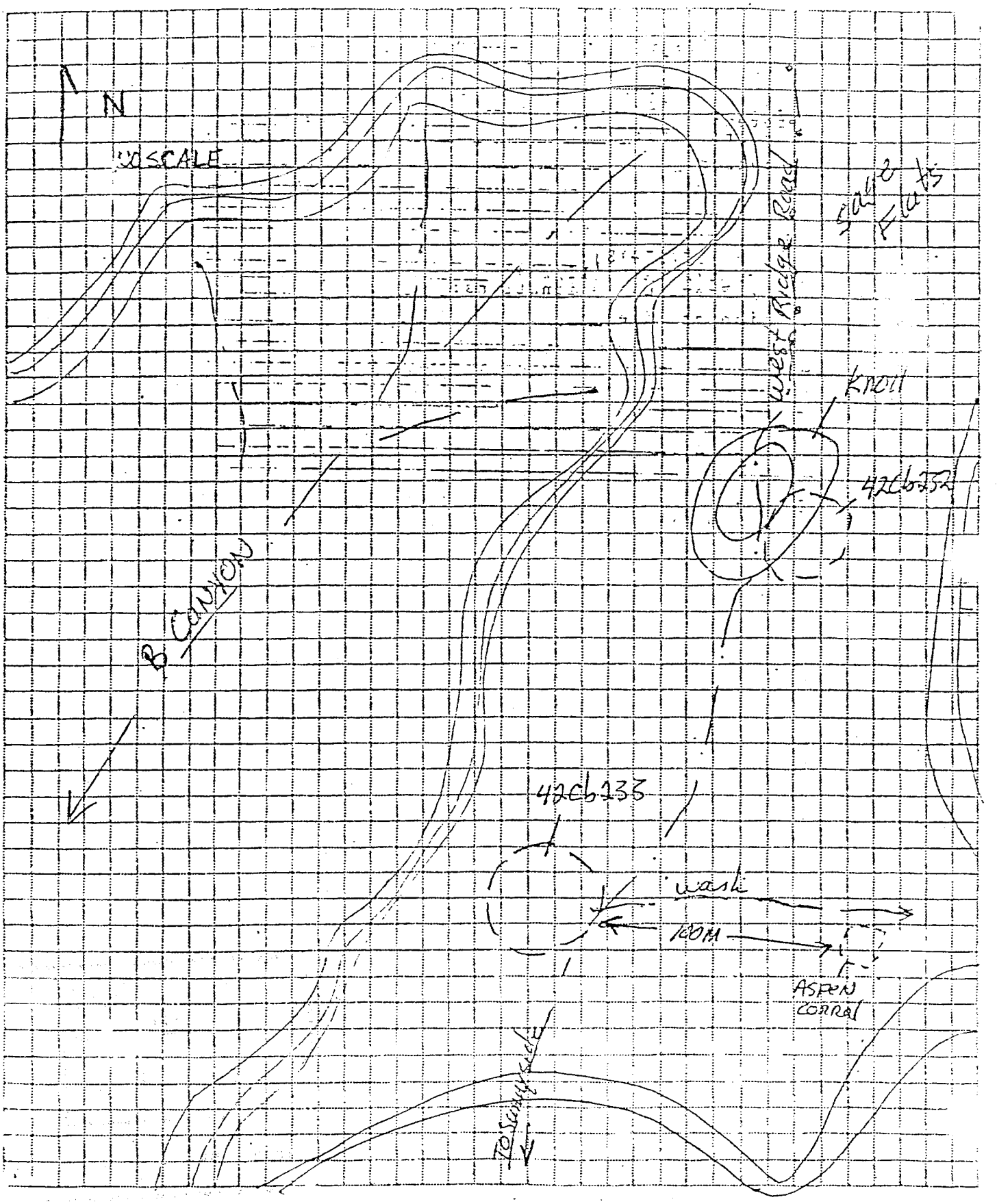
Site 42Cb233
General Site View Looking
North.

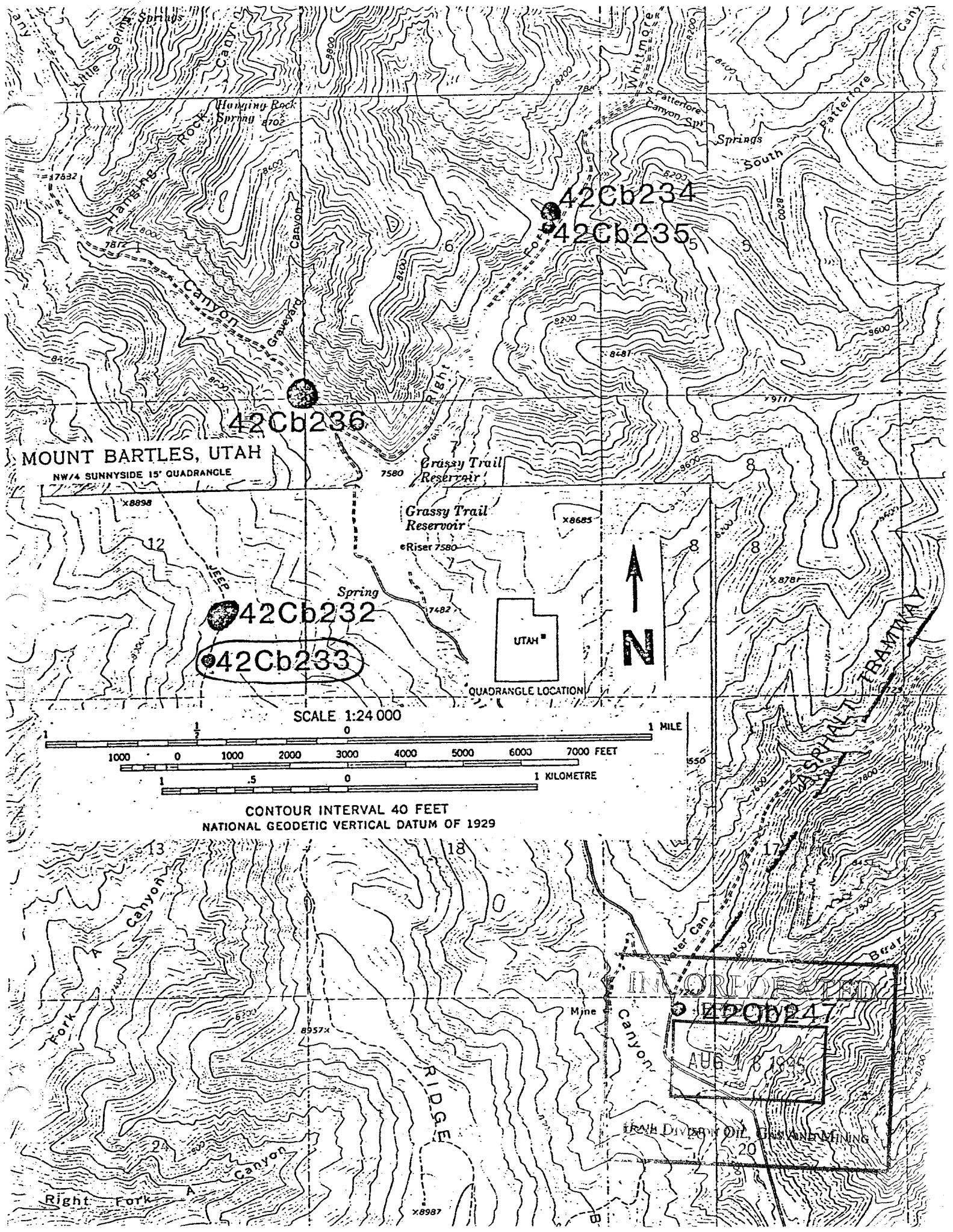
35. Encoding Form: (all entries are right justified)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
I																															
II																															
III																															
IV																															
V																															
VI																															

Form must be accompanied by a site map; photocopy of U.S.G.S. topo map with T., R., scale, and quad name; photographs of the site; and artifact sketches (if applicable).

SITE NO. _____


N
SCALE
West Ridge Road
Knoll
42Cb232
B Canyon
42Cb233
wash
100M
ASPEN CORRAL
TO SUNNYSIDE



MOUNT BARTLES, UTAH
NW/4 SUNNYSIDE 15' QUADRANGLE
42Cb234
42Cb235
42Cb236
42Cb232
42Cb233
42Cb247
Hanging Rock Spring
Hanging Rock Canyon
Little Spring Canyon
Graveyard Canyon
Whitmore
S. Patterfore Canyon Spr
South Patterfore Canyon
Springs
Right Fork
Grassy Trail Reservoir
Riser 7580
Spring
JEEP
UTAH
QUADRANGLE LOCATION
N
SCALE 1:24 000
1 MILE
7000 FEET
1 KILOMETRE
CONTOUR INTERVAL 40 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929
WASPHALT TRAMWAY
Water Can
Bear
Mine
Canyon
RIDGE
Fork A Canyon
Right Fork A Canyon
INCORPORATED
AUG 1 6 1995
TRAIL DIVISION OIL, GAS AND MINING

UTAH ANTIQUITIES SITE FORM
developed by cooperative agreement by:
Bureau of Land Management
Division of State History
University of Utah Archeological Center

1. Site No. [I/1-10] 42Cb234

2. County Carbon
3. Temp. No. K-5
4. Class: __Prehistoric XXHistoric __Paleontologic
5. Cultural Site Type (interpreted function): Cabin
6. Paleontological Site Type: ___Invertebrate; ___Vertebrate; ___Flora
7. Elevation [I/11-15] 8000 ft. X.3048 = 2436 m.
elevation source: contour
8. UTM Grid: [I/16-30] zone ___; ___ m E; ___ m N
9. [II/1-16] NW of SE of NE of Section 6 T. 14S, R. 14E
10. Map Reference: Mount Bartles, Utah Series: 7.5 Date: 1972
11. Aerial Photo Data:

12. Site Location: About 1 mile north of Grassey Trail Reservoir on Right Fork of Whitmore Canyon.

13. Land Owner [II/17-18]: Private: Kaiser Steel Corp.
BLM District/Forest [II/19]:
14. Site Name/Previous Designations: None
15. Description of Site: A stone & log cabin on a terrace above the creek. Consists of one large, rectangular stone walled structure and a trash deposit north & east of the structure.

16. Artifacts: Artifacts should be described/drawn on a continuation sheet and their locations plotted on the site map.

CLASS	QUANTITY
Debitage [II/30]	
Bifaces [III/1-9]	
Scrapers [III/1-9]	
Utilized Flakes	

CLASS	TYPE	QUANTITY
Ceramics [III/10-21]	Pearl ware	1
Proj Pnt [III/1-9]		
Gnd Stn [II/22-29]		
Glass [II/22-29]	yellow,brown,purple	6
Metal [II/22-29]		
Nails [II/22-29]		
Cans [II/22-29]		
Wood [II/22-29]		
Other [II/22-29]		

Description: One small piece of pearl ware ceramics and several types of colored glass, all likely pre-1940's at least.

17. Non-Structural Features: (describe and locate on site map) [III/22-27]

_hearth/firepit(HE)	_rubble mound(RM)	_earthen mound(EM)	_trail/road(TR)
X midden(MD)	_stone circle(SC)	_burial(BU)	_RR grade(RG)
_depression(DE)	_rock alignment(RA)	_pictograph(PI)	_tram way/road(TW)
_water control(WC)	_mine tailings(MT)	_petroglyph(PE)	_other(OT)

Description: Scatters through soil to northeast of structure.

18. Structural Features: (describe and locate on site map) [III/28-IV/6]

CLASS	MATERIAL	QUANTITY	CLASS	MATERIAL	QUANTITY
Single rm	stone/wood	1	Tower		
Multiple rm			Cairn		
Granary			Corral		
Cist			Dugout		
Pithouse			Kiln		
Kiva			Monument		
Well			Mine		

Description: A 4 x 6 meter, stone lined cabin. Stonewalls at least two courses thick, shaped stone, gray sandy mortar. Cribbing for roof of aspen with large pine center support.

19. Cultural Affiliation [IV/7-14]: Historic
How Determined? Glass, ceramics, architecture
20. Site Dimensions : 15 m X 20 m; Area [IV/17-21]; _____ sq m
21. Were surface artifacts collected? __Yes; xx No; [IV/22] If yes, attach a continuation sheet describing sampling method used.
22. Estimated depth of fill [IV/23] : Unknown
Subsurface test? __Yes; xx No (Include location of test on site map)
Description:
23. Site Condition [IV/25] : __Excellent; __Good; xx Fair; __Poor
Agent of Impact: Natural cave-in
24. Nat. Register Potential [V/1] xx Significant(C); __Non-Significant(D)
Justification: Good midden & much of structure intact. No evidence of vandalism or potting.

25. Research Potential: Yes, Early 1900's homestead or ranch cabin
26. Recommended Mitigation: preserve
27. Direction/Distance to Permanent Water [V/5-10] : South / 10 m
Type/Name of Water Source [V/11] : Un-named Trib. to R. Fork of Grassey Trail Creek
Distance to nearest other Water Source [V/2-4]; 40 m
Type of other water source: Creek, right fork of Whitmore Creek
Distance to Cultivatable Soil [V/12-14] : On site
28. Topographic Location (check one under each heading) [V/15-18]

PRIMARY LANDFORM	POSITION ON LANDFORM	DEPOSITIONAL ENVIRONMENT		SECONDARY POSITION
_mountain spine(A)	_top/crest/peak(A)	_fan(A)	_marsh(L)	X top/crest/ridge(A)
_hill/butte(B)	_edge(B)	_talus(B)	_landslide/slump(M)	_edge(B)
_tableland/mesa(C)	_slope(C)	_dune(C)	_delta(N)	_slope(C)
_ridge(D)	X toe/foot/bottom(D)	_stream terrace(D)	_island(O)	_toe/foot(D)
_valley(E)	_saddle/pass(E)	_playa(E)	_cliff(P)	_cutbank(E)
_plain(F)	_bench/ledge(F)	shore feature	_outcrop(Q)	_detached monolith(F)
X canyon(G)	_rimrock(G)	_extinct lake(F)	_stream bed(R)	_interior(G)
	_interior(H)	_extant lake(G)		_step(H)
		X alluvial plain(H)		_riser(I)
		_coluvium(I)		_port.geo.feature(J)
		_moraine(J)		_spring mound/bog(K)
		_flood plain(K)		_cave(L)
				_alcove/shelter(M)
				_patterned ground(N)

Description: On a flood plain of a narrow canyon, at mouth of Canyon looking onto right fork of Whitmore Creek. Large ridges on west and north sides.

29. Degree/Aspect of slope [V/19-23] : 1-4 East
30. Vegetation COMMUNITY and association [V/24-25]:

_ALPINE GRASSLAND(AA)	_YELLOW PINE-OAK(DZ)	_COLD DESERT SHRUB(FZ)	_SALT DESERT SHRUB(GZ)	_WARM DESERT SHRUB(HZ)
	_ponderosa pine(DA)	_sagebrush(FA)	_greasewood(GA)	_desert saltbrush(EA)
_SPRUCE FIR(BZ)	_oakbrush(DB)	_small sagebrush(FB)	_grswood-shadscl(GB)	_creosote bush(HB)
_krumholz(BA)	_mountain brush(DC)	_little rabbitbrsh(FC)	_seepweed(GC)	_creosote/bursage(HC)
_white fir-spruce(BB)	_maple(DD)	_shadscale(FD)	_picklewd/samphire(GD)	_joshua tree(HD)
X ASPEN DOUGLAS FIR(CZ)	_streamside(DE)	_horsebrush(FE)	_saltgrass(GE)	_MARSH COMMUNITY(LA)
_limber pine(CA)		_winter-fat(FF)	_alkali sacaton(GF)	
_douglas fir(CB)		_hop-sage/blkbrsh(FG)	_rabbitbrush(GG)	_ALKALI FLATS/MUD FLATS/DRY LAKE/ WASTELAND(KZ)
_lodgepole pine(CC)	_PLAINS/PRAIRIE(EZ)	_bud sagebrush(FH)		
_bristlecone pine(CD)	_grasslands(EA)	_mat saltbrush(FI)		
_aspen(CE)	_pinyon-juniper(EB)	_gray molly(FJ)		
_streamside(CD)	_streamside(EC)	_streamside(FK)		_CULTIVATED LAND( )
_meadow grassland(CG)				

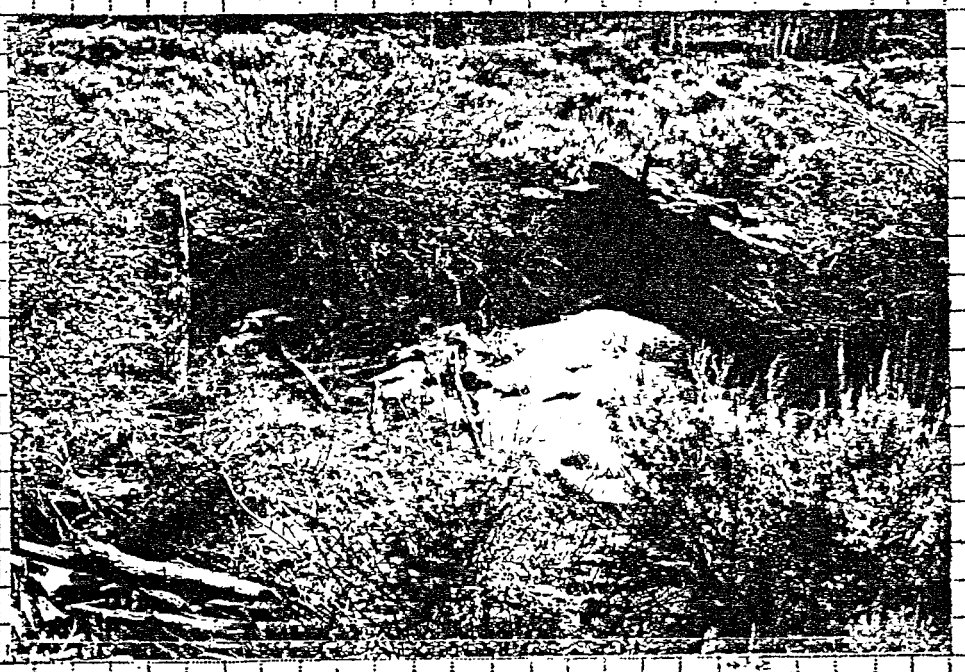
(Check COMMUNITY only if association cannot be determined)

Description: Near Aspen groves & creek area, in open sage flat. Also Birch, service berry, grasses, thistle.

31. Next nearest plant association/distance: 200 m BZ
32. Photograph Numbers [V/26] : AN-81-1-7 AN-81-2-7
33. Recorded by: Asa Nielson
Survey Org. [V/27-28]: CSAS Date: 1/22/81
Assisting Crew Members: Jack Oviatt, Jim Kirkman

SITE NO. _____

SITE NO. _____



Site 42Cb234
Stone Structure at the
Site Looking East.

35. Encoding Form: (all entries are right justified)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
I																															
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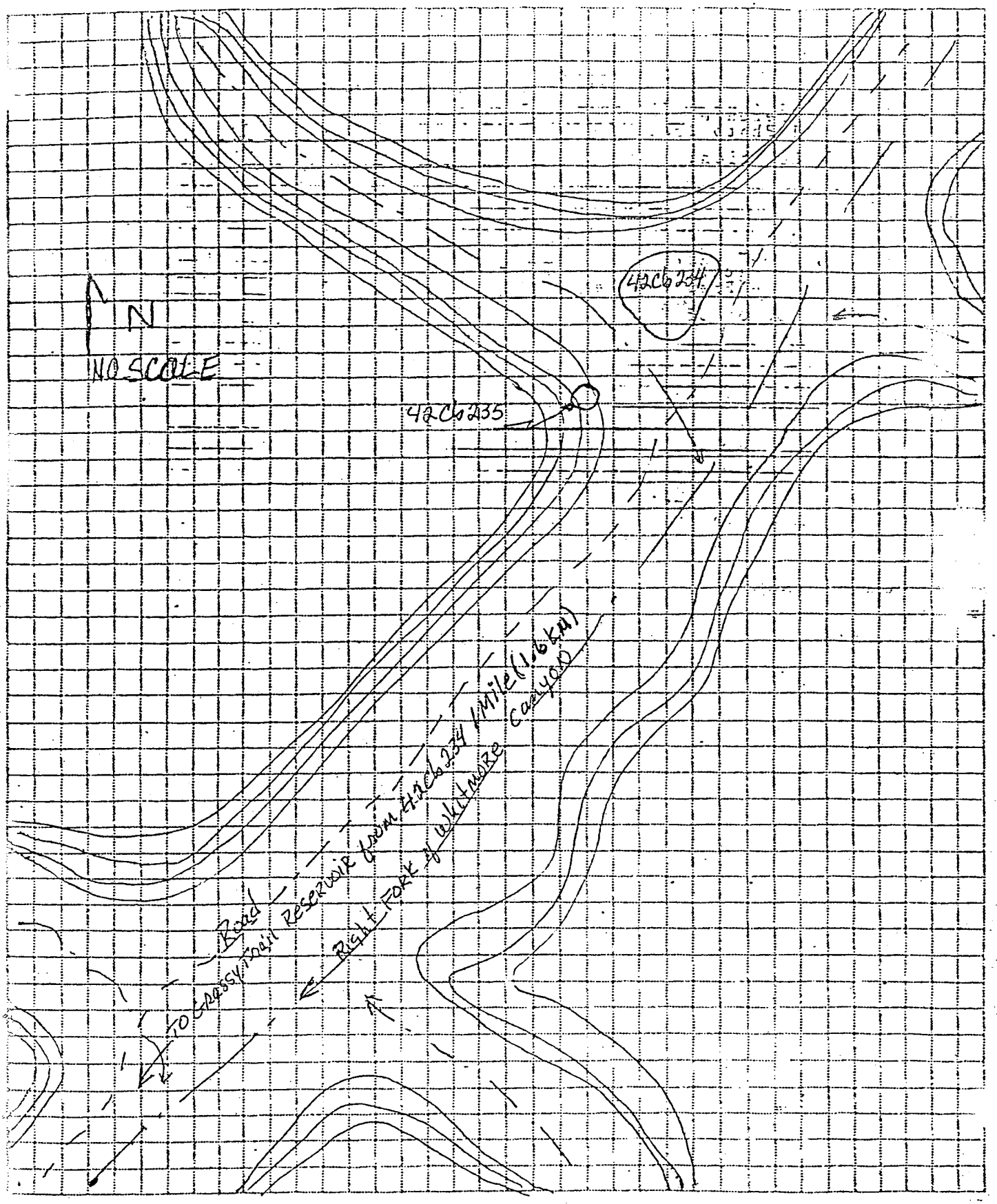
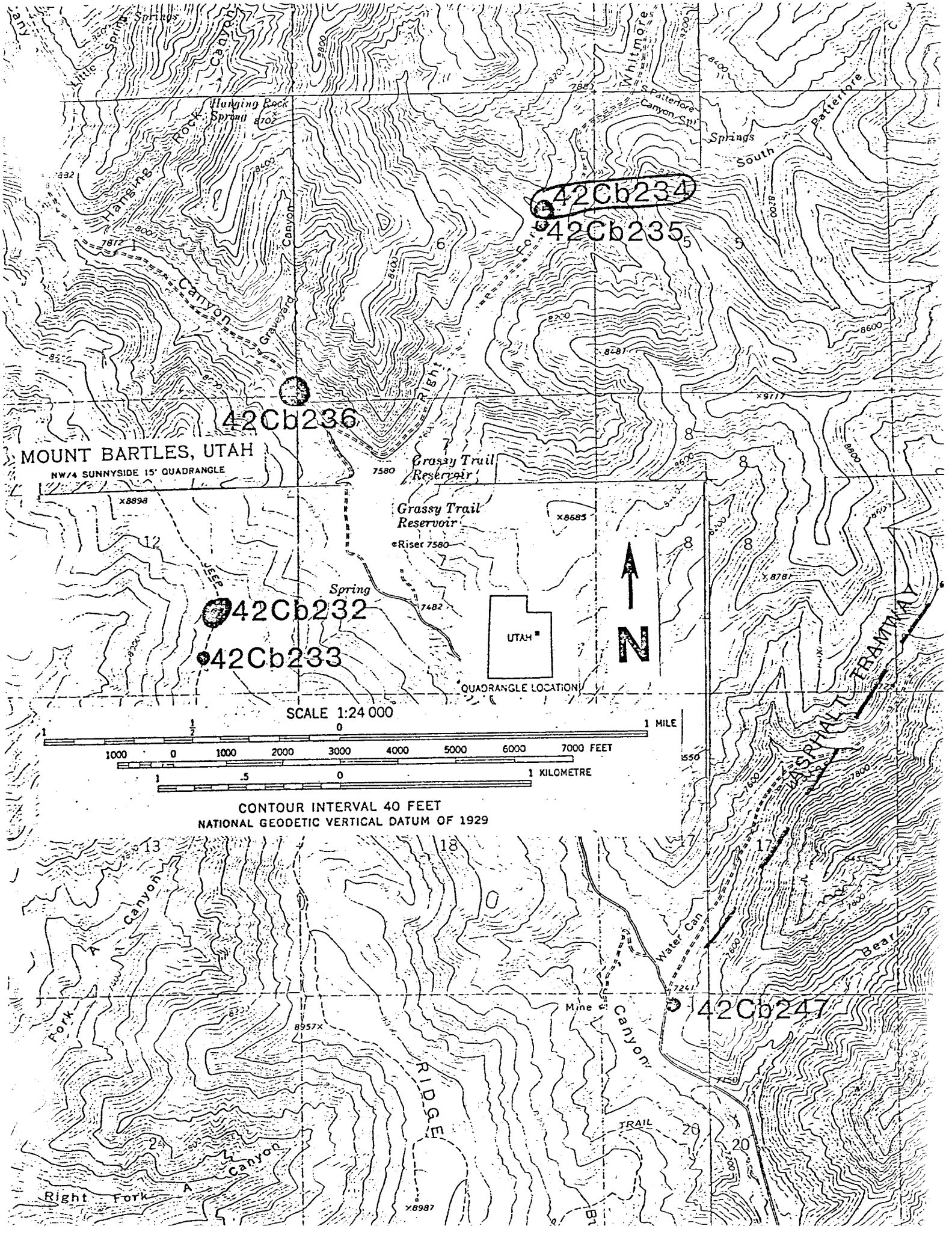
V																															
VI																															

INCORPORATED
EFFECTIVE
AUG 16 1995
UTAH DIVISION OIL, GAS AND MINING

Form must be accompanied by a site map; photocopy of U.S.G.S. topo map with T., R., scale, and quad name; photographs of the site; and artifact sketches (if applicable).

SITE NO. 42Cb 234





MOUNT BARTLES, UTAH
NW/4 SUNNYSIDE 15' QUADRANGLE
42Cb234
42Cb235
42Cb236
42Cb232
42Cb233
42Cb247
Hanging Rock Spring
Hanging Rock Canyon
Little Spring Springs
Whitmore
S. Patterfore Canyon Spr
South Patterfore
Springs
Graveyard Canyon
Right Fork
Grassy Trail Reservoir
Riser 7580
Spring
JEEP
UTAH
QUADRANGLE LOCATION
N
SCALE 1:24 000
1 MILE
7000 FEET
1 KILOMETRE
CONTOUR INTERVAL 40 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929
ASPHALT TRAMWAY
Water Can
Bear
Mine
Canyon
RIDGE
TRAIL
Fork A Canyon
Right Fork A Canyon

UTAH ANTIQUITIES SITE FORM
developed by cooperative agreement by:
Bureau of Land Management
Division of State History
University of Utah Archeological Center

1. Site No. [I/1-10] 42Cb235

2. County Carbon
3. Temp. No. K-4

4. Class: ___Prehistoric XXHistoric ___Paleontologic
5. Cultural Site Type (interpreted function): Spring house or well
6. Paleontological Site Type: ___Invertebrate; ___Vertebrate; ___Flora
7. Elevation [I/11-15] 8000 ft. X.3048= ___ m.
elevation source: contour
8. UTM Grid: [I/16-30] zone___; ___m E; ___m N
9. [II/1-16] SW of SE of NE of Section 6 T. 14S, R. 14E
10. Map Reference: Mount Bartles, Utah Series: 7.5 Date: 1972
11. Aerial Photo Data:

12. Site Location: North of Sunnyside, up Whitmore Canyon, proceed past Grassy Trail Reservoir up right fork of Whitmore Canyon about 1 mile. Canyons on either side of site above. South Pattermore Canyon 1/2 mile further north of site.

13. Land Owner [II/17-18]: Private: Kaiser Steel Corp.
BLM District/Forest [II/19]:
14. Site Name/Previous Designations: None
15. Description of Site: A small, walled spring of about 2 meters diameter. Washed out on north and toward small creek. Creek erosion likely responsible for disuse of spring. Walled by large sandstone boulders. Depression about 1 meter deep.

16. Artifacts: Artifacts should be described/drawn on a continuation sheet and their locations plotted on the site map.

CLASS		QUANTITY
Debitage	[II/30]	
Bifaces	[III/1-9]	
Scrapers	[III/1-9]	
Utilized Flakes		

CLASS		TYPE	QUANTITY
Ceramics	[III/10-21]		
Proj Pnt	[III/1-9]		
Gnd Stn	[II/22-29]		
Glass	[II/22-29]		
Metal	[II/22-29]		
Nails	[II/22-29]		
Cans	[II/22-29]		
Wood	[II/22-29]		
Other	[II/22-29]		

Description: None

17. Non-Structural Features: (describe and locate on site map) [III/22-27]

_hearth/firepit(HE)	_rubble mound(RM)	_earthen mound(EM)	_trail/road(TR)
_midden(MD)	_stone circle(SC)	_burial(BU)	_RR grade(RG)
_depression(DE)	_rock alignment(RA)	_pictograph(PI)	_tram way/road(TW)
X water control(WC)	_mine tailings(MT)	_petroglyph(PE)	_other(OT)

Description: Well or possible spring location

18. Structural Features: (describe and locate on site map) [III/28-IV/6]

CLASS	MATERIAL	QUANTITY	CLASS	MATERIAL	QUANTITY
Single rm			Tower		
Multiple rm			Cairn		
Granary			Corral		
Cist			Dugout		
Pithouse			Kiln		
Kiva			Monument		
Well	Sandstone	1	Mine		

Description: 2 meter diameter well or spring.

SITE NO. _____

19. Cultural Affiliation [IV/7-14]: Historic (?)
How Determined? likely related to nearby cabin
20. Site Dimensions : 2 m X 2 m; Area [IV/17-21]: _____ sq m
21. Were surface artifacts collected? __Yes; XX No; [IV/22] If yes, attach a continuation sheet describing sampling method used.
22. Estimated depth of fill [IV/23] : Unknown
Subsurface test? __Yes; XX No (Include location of test on site map)
Description: _____
23. Site Condition [IV/25] : __Excellent; __Good; XX Fair; __Poor
Agent of Impact: Erosion
24. Nat. Register Potential [V/1]: __Significant (C); XX Non-Significant (D)
Justification: No artifacts, erosion

25. Research Potential: None
26. Recommended Mitigation: None
27. Direction/Distance to Permanent Water [V/5-10] : North / 3 m
Type/Name of Water Source [V/11] : Right Fork, Grassy Trail Creek
Distance to nearest other Water Source [V/2-4]: 30 m east
Type of other water source: creek
Distance to Cultivatable Soil [V/12-14] : 5 m
28. Topographic Location (check one under each heading) [V/15-18]

PRIMARY LANDFORM	POSITION ON LANDFORM	DEPOSITIONAL ENVIRONMENT		SECONDARY POSITION
_mountain spine(A)	_top/crest/peak(A)	_fan(A)	_marsh(L)	_top/crest/ridge(A)
_hill/butte(B)	_edge(B)	_talus(B)	_landslide/slump(M)	_edge(B)
_tableland/mesa(C)	_slope(C)	_dune(C)	_delta(N)	_slope(C)
_ridge(D)	X toe/foot/bottom(D)	_stream terrace(D)	_island(O)	X toe/foot(D)
_valley(E)	_saddle/pass(E)	_playa(E)	_cliff(P)	_cutbank(E)
_plain(F)	_bench/ledge(F)	shore feature	_outcrop(Q)	_detached monolith(F)
_canyon(G)	_rimrock(G)	_extinct lake(F)	_stream bed(R)	_interior(G)
	_interior(H)	_extant lake(G)		_step(H)
		_alluvial plain(H)		_riser(I)
		X colluvium(I)		_port.geo.feature(J)
		_moraine(J)		_spring mound/bog(K)
		_flood plain(K)		_cave(L)
				_alcove/shelter(M)
				_patterned ground

Description: On edge of a ridge/slope and edge of a creek bottom. Slope to west is heavy bouldered—good conductor of spring water.

29. Degree/Aspect of slope [V/19-23] : 6 northeast
30. Vegetation COMMUNITY and association [V/24-25]:

_ALPINE GRASSLAND(AA)	_YELLOW PINE-OAK(DZ)	_COLD DESERT SHRUB(FZ)	_SALT DESERT SHRUB(GZ)	_WARM DESERT SHRUB(HZ)
	_ponderosa pine(DA)	_sagebrush(FA)	_greasewood(GA)	_desert saltbrush(HA)
_SPRUCE FIR(BZ)	_oakbrush(DB)	_small sagebrush(FB)	_grswood-shadscl(GB)	_creosote bush(HB)
_krumholz(BA)	_mountain brush(DC)	_little rabbitbrsh(FC)	_seepweed(GC)	_creosote/bursage(HC)
_white fir-spruce(BB)	_maple(DD)	_shadscale(FD)	_pickleweed/samphire(GD)	_joshua tree(HD)
X ASPEN DOUGLAS FIR(CZ)	_streamside(DE)	_horsebrush(FE)	_saltgrass(GE)	_MARSH COMMUNITY(IZ)
_limber pine(CA)		_winter-fat(FF)	_alkali sacaton(GF)	
_douglas fir(CB)		_hop-sage/blkbrsh(FG)	_rabbitbrush(GG)	_ALKALI FLATS/MUD FLATS/DRY LAKE/ WASTELAND(KZ)
_lodgepole pine(CC)	_PLAINS/PRAIRIE(EZ)	_bud sagebrush(FH)		
_bristlecone pine(CD)	_grasslands(EA)	_mat saltbrush(FI)		
_aspen(CE)	_pinyon-juniper(EB)	_gray molly(FJ)		_CULTIVATED LAND(JZ)
_streamside(CD)	_streamside(EC)	_streamside(FK)		
_meadow grassland(CG)				

(Check COMMUNITY only if association cannot be determined)

Description: In aspen grove, some birch, sage, grasses.

31. Next nearest plant association/distance: 300 m BZ
32. Photograph Numbers [V/26] : AN-81-1-6 AN-81-2-6
33. Recorded by: Asa Nielson
Survey Org. [V/27-28]: CSAS Date: 1/22/81
Assisting Crew Members: Jack Oviatt, Jim Kirkman

SITE NO. _____

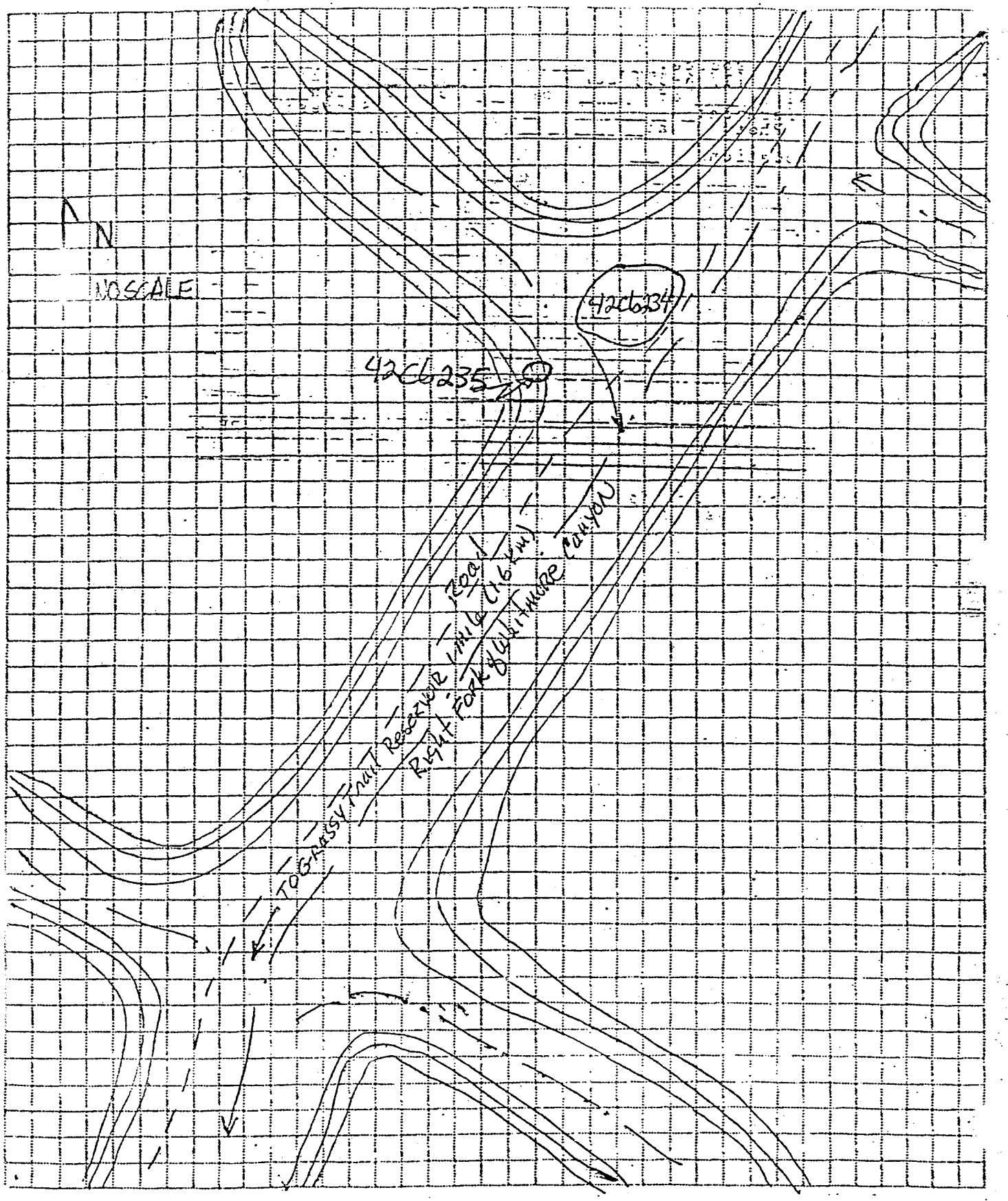
Site 42Cb235
Rock Lined Depression
Looking South.

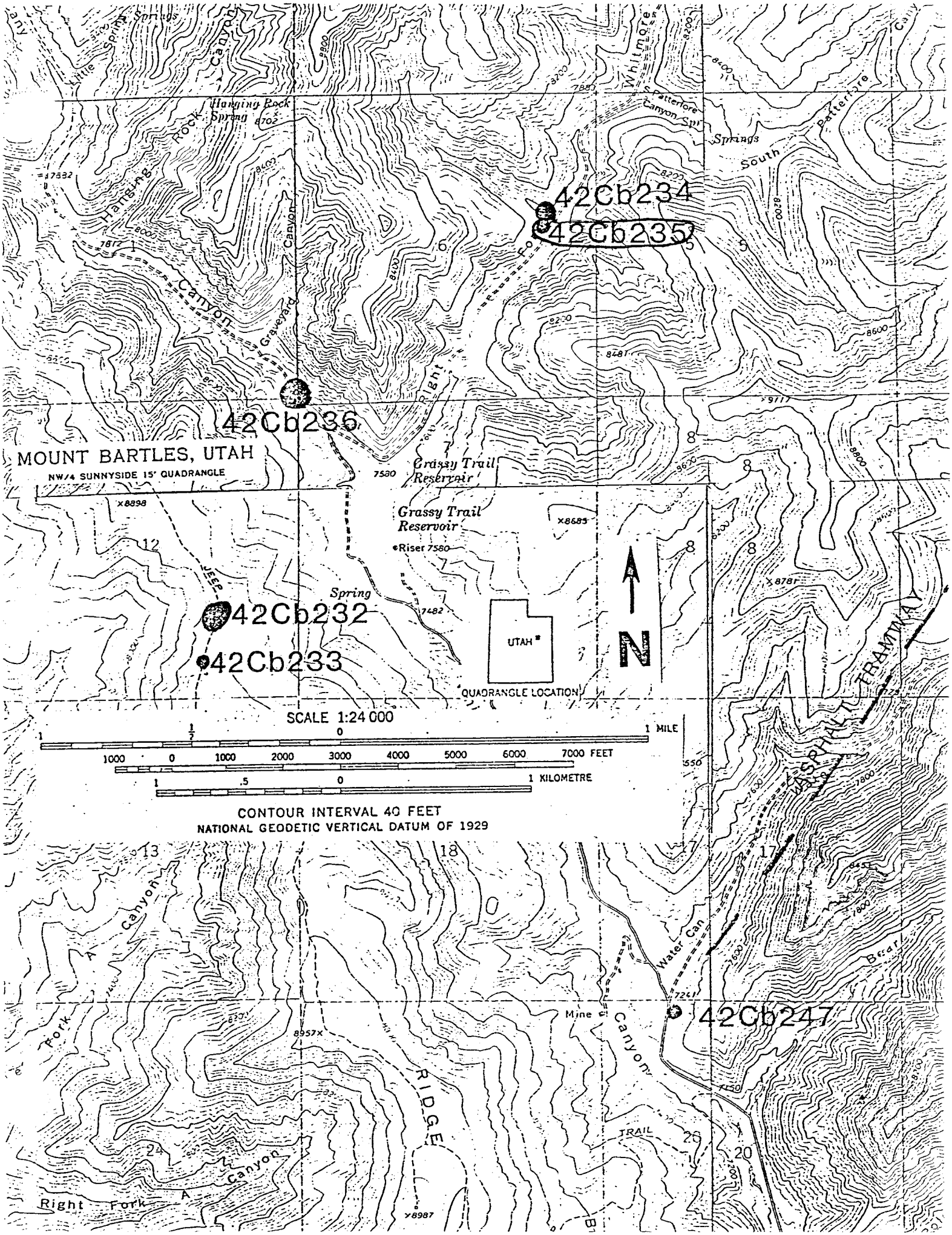
35. Encoding Form: (all entries are right justified)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
I																															
II																															
III																															
IV																															
V																															
VI																															

Form must be accompanied by a site map; photocopy of U.S.G.S. topo map with T., R., scale, and quad name; photographs of the site; and artifact sketches (if applicable).

SITE NO. 42Cb235





MOUNT BARTLES, UTAH
NW/4 SUNNYSIDE 15' QUADRANGLE
42Cb234
42Cb235
42Cb236
42Cb232
42Cb233
42Cb247
Hanging Rock Spring
Hanging Rock Canyon
Little Spring Springs
Whitmore
S Patterfore Canyon Spr
South Patterfore Canyon
Springs
Graveyard Canyon
Right Fork
Grassy Trail Reservoir
Riser 7580
Spring
JEEP
UTAH
QUADRANGLE LOCATION
N
SCALE 1:24 000
1 MILE
7000 FEET
1 KILOMETRE
CONTOUR INTERVAL 40 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929
WASPHALT TRAMWAY
Water Can
Mine
Canyon
RIDGE
TRAIL
Right Fork A Canyon
Fork A Canyon

UTAH ANTIQUITIES SITE FORM
developed by cooperative agreement by:
Bureau of Land Management
Division of State History
University of Utah Archeological Center

1. Site No. [I/1-10] 42Cb 236

2. County Carbon
3. Temp. No. K-6
4. Class: Prehistoric X Historic Paleontologic
5. Cultural Site Type (interpreted function): Miner community
6. Paleontological Site Type: Invertebrate; Vertebrate; Flora
7. Elevation [I/11-15] 7600 ft. X.3048 = 2317 m.
elevation source: Contour
8. UTM Grid: [I/16-30] zone 12; 551360 m E; 4386655 m N
9. [II/1-16] SE of SE of SE of Section 1, T. 14 S, R. 13 E
10. Map Reference: Mount Bartles, Utah Series: 7.5 Date: 1972
11. Aerial Photo Data:
12. Site Location: One-half mile north of Grassy Trail Reservoir up left hand fork of Whitmore Canyon.

13. Land Owner [II/17-18]: BLM
BLM District/Forest [II/19]: Price River Resource area - Moab
14. Site Name/Previous Designations:
15. Description of Site: A series of at least nine buildings on the west side of the creek. Occupied a creek terrace below west ridge, in an open sage flat. Building on creek cut of large stone blocks set into a dugout. Roofs of logs and tin. A corral to the south.

16. Artifacts: Artifacts should be described/drawn on a continuation sheet and their locations plotted on the site map.

CLASS	QUANTITY
Debitage [II/30]	
Bifaces [III/1-9]	
Scrapers [III/1-9]	
Utilized Flakes	

CLASS	TYPE	QUANTITY
Ceramics [III/10-21]	several	20+
Proj Pnt [III/1-9]		
Gnd Stn [II/22-29]		
Glass [II/22-29]		
Metal [II/22-29]	stove pieces	10+
Nails [II/22-29]	dozens	
Cans [II/22-29]		
Wood [II/22-29]		
Other [II/22-29]		

Description: Looks like turn of the century to mid-30 type pearl wares, nails, etc.

17. Non-Structural Features: (describe and locate on site map) [III/22-27]

_hearth/firepit(HE) _rubble mound(RM) _earthen mound(EM) _trail/road(TR)
_midden(MD) _stone circle(SC) _burial(BU) _RR grade(RG)
_depression(DE) _rock alignment(RA) _pictograph(PI) _tram way/road(TW)
_water control(WC) _mine tailings(MT) _petroglyph(PE) _other(OT)

Description:

18. Structural Features: (describe and locate on site map) [III/28-IV/6]

CLASS	MATERIAL	QUANTITY
Single rm		
Multiple rm	houses	6
Granary		
Cist		
Pithouse		
Kiva		
Well		

CLASS	MATERIAL	QUANTITY
Tower		
Cairn		
Corral	X	1
Dugout		
Kiln		
Monument		
Mine		

Description: Stone block houses about 3 X 5 meter retangles. Corral is about 20 meters in diameter. Five houses are about 2.5 X 4 meter log cabins with cribed logs, nails, and tin roof. Outhouse of logs. Fences of logs and wire.

19. Cultural Affiliation [IV/7-14]: Historic
How Determined? Ceramics, metal, etc.
20. Site Dimensions : 100 m X 100 m; Area [IV/17-21]: _____ sq m
21. Were surface artifacts collected? X Yes; __ No; [IV/22] If yes, attach a continuation sheet describing sampling method used. Grab
22. Estimated depth of fill [IV/23] : Some but unknown.
Subsurface test? __ Yes; X No (Include location of test on site map)
Description:
23. Site Condition [IV/25] : __ Excellent; __ Good; X Fair; __ Poor
Agent of Impact: Erosion, natural decay
24. Nat. Register Potential [V/1]: X Significant (C); __ Non-Significant (D)
Justification: Small mining or ranch community type studies.

25. Research Potential: Yes
26. Recommended Mitigation: Preserve
27. Direction/Distance to Permanent Water [V/5-10] : E / 10 m
Type/Name of Water Source [V/11] : Left fork, Grassy Trail Creek.
Distance to nearest other Water Source [V/2-4]: 60 meters south.
Type of other water source: Spring.
Distance to Cultivatable Soil [V/12-14] : On site.
28. Topographic Location (check one under each heading) [V/15-18]

PRIMARY LANDFORM	POSITION ON LANDFORM	DEPOSITIONAL ENVIRONMENT		SECONDARY POSITION
_mountain spine(A)	_top/crest/peak(A)	_fan(A)	_marsh(L)	X_top/crest/ridge(A)
_hill/butte(B)	_edge(B)	_talus(B)	_landslide/slump(M)	_edge(B)
_tableland/mesa(C)	_slope(C)	_dune(C)	_delta(N)	_slope(C)
_ridge(D)	_toe/foot/bottom(D)	X_stream terrace(D)	_island(O)	_toe/foot(D)
_valley(E)	_saddle/pass(E)	_playa(E)	_cliff(P)	_cutbank(E)
_plain(F)	X_bench/ledge(F)	shore feature	_outcrop(Q)	_detached monolith(F)
X_canyon(G)	_rimrock(G)	_extinct lake(F)	_stream bed(R)	_interior(G)
	_interior(H)	_extant lake(G)		_step(H)
		_alluvial plain(H)		_riser(I)
		_coluvium(I)		_port.geo.feature(J)
		_moraine(J)		_spring mound/bog(K)
		_flood plain(K)		_cave(L)
				_alcove/shelter(M)
				_patterned ground(

Description: On first terrace above creek, bounded on west by west ridge and on south by an arroyo. Rocky mountain type soil.

29. Degree/Aspect of slope [V/19-23] : 2-5 east.
30. Vegetation COMMUNITY and association [V/24-25]:

_ALPINE GRASSLAND(AA)	_YELLOW PINE-OAK(DZ)	_COLD DESERT SHRUB(FZ)	_SALT DESERT SHRUB(GZ)	_WARM DESERT SHRU
	_ponderosa pine(DA)	_sagebrush(FA)	_greasewood(GA)	_desert saltbrush(
_SPRUCE FIR(BZ)	_oakbrush(DB)	_small sagebrush(FB)	_grswood-shadscl(GB)	_creosote bush(EB)
_krumholz(BA)	_mountain brush(DC)	_little rabbitbrsh(FC)	_seepweed(GC)	_creosote/bursage
_white fir-spruce(BB)	_maple(DD)	_shadscale(FD)	_picklewd/samphire(GD)	_joshua tree(HD)
_ASPEN DOUGLAS FIR(CZ)	_streamside(DE)	_horsebrush(FE)	_saltgrass(GE)	_MARSH COMMUNITY(LA)
_limber pine(CA)		_winter-fat(FF)	_alkali sacaton(GF)	
_douglas fir(CB)		_hop-sage/blkbrsh(FG)	_rabbitbrush(GG)	_ALKALI FLATS/MUD FLATS/DRY LAKE/ WASTELAND(KZ)
_lodgepole pine(CC)	_PLAINS/PRAIRIE(EZ)	_bud sagebrush(FH)		
_bristlecone pine(CD)	_grasslands(EA)	_mat saltbrush(FI)		
X_aspen(CE)	_pinyon-juniper(EB)	_gray molly(FJ)		
_streamside(CD)	_streamside(EC)	_streamside(FK)		_CULTIVATED LAND(
_meadow grassland(CG)				

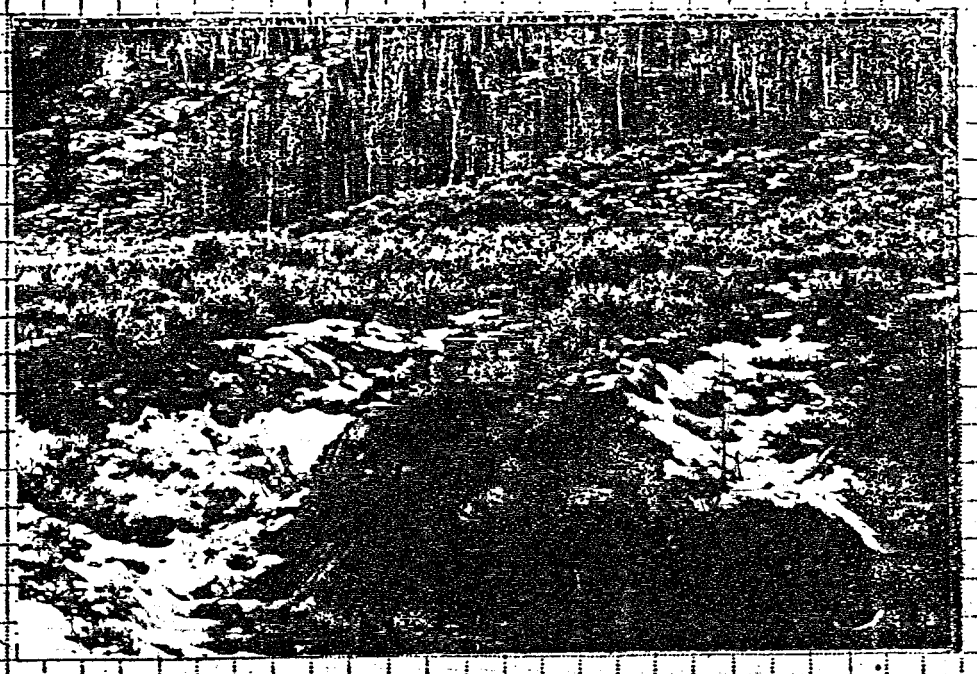
(Check COMMUNITY only if association cannot be determined)

Description: Aspen, sages, grasses, stream willow, thistle, birch.

31. Next nearest plant association/distance: CB 150 M west
32. Photograph Numbers [V/26] : AN-81-1.7-14; AN-81-2.7-14
33. Recorded by: Asa S. Nielson
Survey Org. [V/27-28]: Cultural Services, AS Date: Jan 22, 1981
Assisting Crew Members: Jim Kirkman, Jack Oviatt

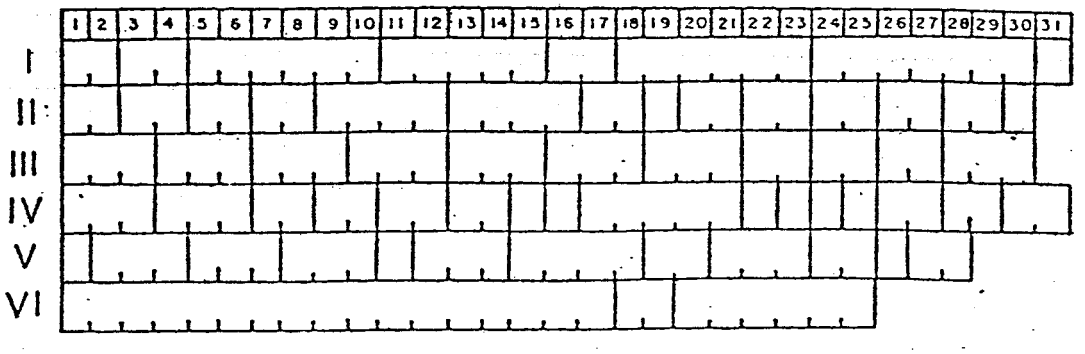
34. Sponsoring Agency: Kaiser Steel _____ Contract No.

SITE NO. _____

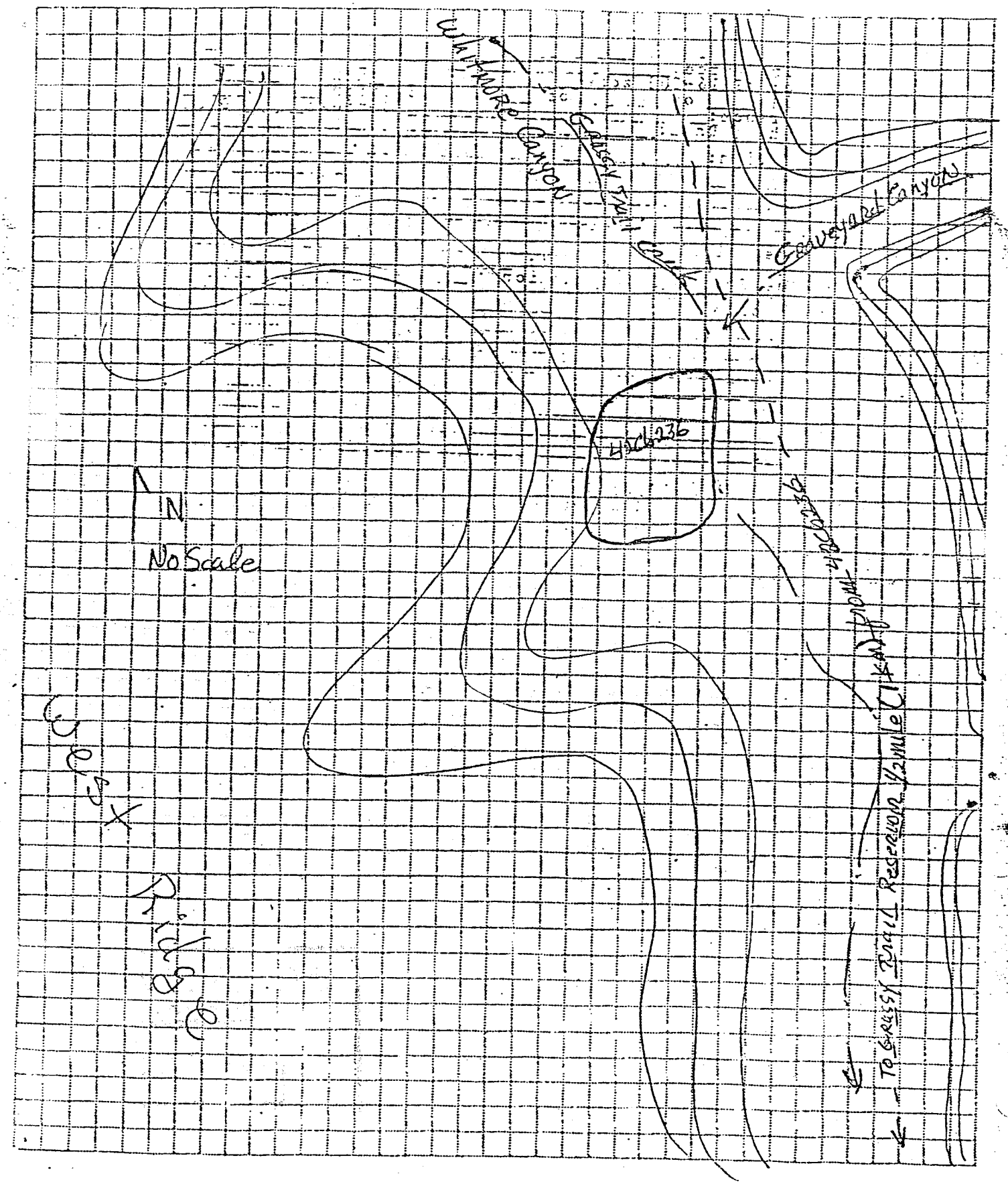


Site 42Cb236
Site Area Looking West
with Stone Foundation in
the Cut Bank.

35. Encoding Form: (all entries are right justified)



Form must be accompanied by a site map; photocopy of U.S.G.S. topo map with T., R., scale, and quad name; photographs of the site; and artifact sketches (if applicable).


Whitmore Canyon
Grassy Trail Creek
Graveyard Canyon
42Cb236
N
No Scale
West Ridge
To Grassy Trail Reservoir 1/2 mile (1 km) from 42Cb236

Coral at 42Cb236.

Rip-gut style fence at 42Cb236.

ATED

UTAH DIVISION OIL, GAS AND MINING

Coral at 42Cb236.

Rip-gut style fence at 42Cb236.

TED

UTAH DIVISION OIL, GAS AND MINING