2.5. OTHER ENVIRONMENTAL STUDIES PROGRAMS

2.5.1 SOILS SURVEY AND PRODUCTIVITY ASSESSMENT STUDIES

2.5.1.1 Objectives

The soils surveys are designed to fulfill the requirements of the oil shale lease, provide data necessary in the determination of ecosystem relationships and to provide information required during revegetation studies.

Samples collected for the plant-soil relationship will be analyzed for textural classification, available plant nutrients, pH, cation exchange capacity, salinity and lime percentage. These parameters and properties will provide data which are relevant to the climatic and edaphic condition in the leased area. Selected samples will be analyzed for trace metals by element scan.

The soils study and analysis should be completed by the end of November 1975. All information gathered from this program will be included in the final DDP.

2.5.1.3 Results

The soils survey and study program outlined above will fulfill all lease requirements and associated stipulations. In addition, the soils program will define the relationships between vegetative types and soil environment to determine the suitability of these soils for future revegetation purposes. The relationships obtained will determine which of the native plants can tolerate the soil environment which is available and will aid in the determination of the proper species composition for a future revegetative community.

2.5.2 ARCHAEOLOGICAL SURVEY

2.5.2.1 Objectives

An archaeological survey will be performed on the leased area to determine the location of any existing areas of historic and scientific interest as specified by the oil shale lease. This study will be completed prior to the development of any of the leased areas.

2.5.2.2 Methods

Prior to the disturbance of any lands, during the exploratory portion of the environmental programs, an archaeological survey has been completed. These initial surveys were conducted by Dr. Alan Olson, University of Denver, and Dr. Calvin H. Jennings, Colorado State University, on areas such as drill pads, shallow water monitoring holes, hydrology stations, fenceline construction for vegetation exclosures, new roads and any other disturbance areas which were surveyed.

During the summer of 1975, an intensive archaeological survey will be conducted on the site and surrounding areas. If significant artifacts are located, they will be removed for further study.

An inventory will be made to identify cultural resources that may qualify for the National Register of Historic Places. This inventory would identify the prehistoric and historic sites on the leased area and surrounding areas, and would include collections, descriptions and identification of any area which produced cultural material. These collections and records would be stored and made available to any interested parties.

A literature survey will be performed which will include an examination of collections which are pertinent to the leased area. This would include any prior archaeological studies of the area. All information will be abstracted and collated to correlate this with field information in order to provide a complete study of the cultural sites of the leased area and surrounding planned disposal areas.

The archaeological contractor will report the results of his survey to the Area Oil Shale Supervisor.

The overall results and findings of this program will be included in the Detailed Development Plan. The archaeological survey will begin in June of 1975 and will be completed sometime during the month of September 1975.

2.5.2.3 Results

Field surveys of disturbed areas have been completed except for the deep and shallow water monitoring stations and hydrology stations planned for the 84 Mesa area in the future.

No significant archaeological finds were made during these surveys. Archaeological clearance sheets are included.

FROM: Glover, Fr
Vice Pres. of Research
Thorne Ecological Inst.
Boulder, Colo. 80302

12/18

S- 59064 A

DATE REPLY DUE: 1/8/74

For Dir. Sign.

CC: Reid Stone

RFRD: LLM

DATE: 12/20/73

SUBJECT: ltr. from Fred Glover, re archeologicabi finds, that have been discovered within impending oil shale leasing areas in Colorado.

Jacobs:X5401

ACK'D BY AND DATE:

SIGNED BY AND DATE:

FILE:

1-102
(JUNE 1971)

U.S. GOVERNMENT PRINTING OFFICE: 1973 — 488-888

arch

THORNE
ECOLOGICAL
INSTITUTE

2305 CANYON BLVD. BOULDER, COLORADO 80302 (303) 443-732

Secretary of the Interior
U.S. Department of the
Office of the Secretary
Washington, D.C. 20240

December 18, 1973

Honorable Secretary:

The attached report has just come to my attention and its implications may warrant serious consideration due to the impending oil shale leasing program in Colorado.

The Ca tract and its utility corridor is the specific area of concern right now. A decision needs to be reached regarding desirable action to be taken for salvage operations of the archeological values of the Ca tract. Any time schedule for salvage operations should consider the delays that may be inherent due to our winter conditions.

We would appreciate maintaining contact and if we can be of further assistance, please call me; my home phone is: Ft. Collins, Colorado 303/484-4122.

Sincerely,

Fred Glover

Fred Glover
Vice President of Research

FG:cl

cc: Mr. Ten Eyck, Colo. Dept. Nat. Res.
Mr. Dale Andrus, State Director, BLM

1101 West Oak Street
Fort Collins, Colorado 80521
December 11, 1973

Dr. Fred Glover, Vice-President
Thorne Ecological Institute
2305 Canyon Boulevard
Boulder, Colorado 80302

Dear Fred:

Judging from accounts of the rapidity with which the Oil Shale Prototype Leasing Program is being implemented, I think it is appropriate to advise you, informally, of the results of last summer's archaeological reconnaissance in the Piceance Basin and ask that you assist in preparing a salvage program for the area.

In a non-stratified random sample of the Yellow Creek drainage and a traditional reconnaissance of the Ca and Cb Lease Tracts and the Douglas Creek shale dumps, we recorded 94 historic and prehistoric archaeological sites. As the enclosed table shows, 11 of these sites are within the boundaries of the Ca tract and several others are along the access, power and water corridors, as well as associated with spent shale dump areas. No sites were found in the Cb tract.

It is impossible to give a statement on the scientific value of each endangered site as our analysis of last summer's data is not complete as yet. However, as my report on our present knowledge of the Piceance Basin's cultural resources shows, we actually know very little about the region's history and how man has fit it into his adaptation over the past 4,000 years. Consequently, any damage to sites in the area has a high potential for seriously impairing our knowledge of the basin's prehistoric and more recent occupations. Such impairment can be avoided, however, if we can establish a coherent program of scientific study before actual development begins. The historical/cultural component of the Regional Oil Shale Study is a step in that direction, but only a first step.

The benefits to science from early organization are obvious. However, it should also be pointed out that organization of an archaeological salvage plan now will also aid the lessees and involved Federal agencies in meeting the requirements of the Antiquities Act of 1906 (Public Law 59-209; 34 Stat. 225; 16 U.S.C. 431-433) and other pertinent legislation.

There is no doubt that leases will be made well before I can complete the impact statement for the cultural resources of the basin. If

we wait until that report is finished, it is likely that sites will be damaged or destroyed and knowledge lost. I hope you can help by bringing the matter to the attention of the appropriate parties and then directing them to me or to some other qualified archaeologist for further information.

Thank you,

Cal

Calvin H. Jennings

CHJ/sj

cc: Don Bruns, BLM, Craig
H. D. Burke

DISTRIBUTION OF RECORDED ARCHAEOLOGICAL SITES BY IMPACT AREA OR TYPE*

Ca Tract	Shale Dumps	Access Corridors	Utility Corridors
5-RB-6	5-RB-1	5-RB-43	5-RB-46
5-RB-7	5-RB-17	5-RB-46	5-RB-69
5-RB-8	5-RB-78	5-RB-47	5-RB-94
5-RB-9	5-RB-79	5-RB-48	
5-RB-10	5-RB-80	5-RB-76	
5-RB-11	5-RB-81		
5-RB-12	5-RB-82		
5-RB-13	5-RB-83		
5-RB-16	5-RB-84		
5-RB-20	5-RB-85		
5-RB-23	5-RB-86		
	5-RB-87		
	5-RB-88		
	5-RB-89		
	5-RB-90		
	5-RB-91		
	5-RB-92		

*Assignment of sites to access and utility corridors is tentative. The final statement will have to await the availability of better locational data on these corridors than is presently on hand.

Piceance Basin Oil Shale

Piceance Basin

Form 6230-2
(June 1968)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

ANTIQUITIES SITE INVENTORY

[xx] Archeological [ ] Paleontological [ ] Historical

1. Site number	2. Type of site
AR-05-010-~~151~~ 245	Open chipping

3. State	County	District	4. Map reference
Colorado	Rio Blanco	Craig	Wolf Ridge 7½ min

5. Location

3½ miles west of the 84 Ranch on the east end of a ridge between Corral Gulch and Box Elder Gulch

Preliminary site report; final site report in preparation at Colorado State University, Ft. Collins, Colorado.

Section	Township	Range	Meridian
34 NE¼ of SE¼	1 South	99 West	6th PM

6. Land ownership status	7. Other site designations
Pueblic domain	5 RB-6

8. Cultural affiliation; Geologic Age and/or formation; dates of use

9. Site description, position, surrounding terrain, and importance

Flakes and finishing chips in and around several ant hills. No fire pits or other features visible on this site. Pinyon-juniper, sage, cactus, grasses on low ranging. East northeast extension of ridge 100 meters above upper perimeter of Garden Gulch member 6750 ft.

10. Area of occupation	11. Present condition
20m x 75 m	Excelent
12. Photo numbers	
none	

13. Informants and references

Robert H. Hurlbutt
Colorado State University
6-17-73

14. Recorded by	Date
Daniel J. Hutchison	February 7, 1974

(continued on reverse)

15. Sketch and/or remarks

EVALUATION

16. Does site have recreation value? ☐ Yes ☒ No If "yes," has the Recreation Inventory Form 6110–3 been completed? ☐ Yes ☐ No

17. Does site have sufficient value to justify preservation and/or development? ☐ Yes ☒ No If "yes," specify type of preservation or development.

This site has been evaluated and a determination was made that it is not of National Register significance. The only value this site has is in the material which would be salvaged before any mining operation. The salvage and removal of all the prehistoric cultural material by a qualified archeologist will greatly increase the value of this site, but the site does not warrent preservation after the salvage excavations have preserved the scientific data.

Daniel J. Hutchison

Feb 8, 1974

18. Reviewed by *(Signature of District Manager)* | Date

Form 6230-2
(June 1968)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

ANTIQUITIES SITE INVENTORY

[xx] Archeological [ ] Paleontological [ ] Historical

1. Site number	2. Type of site
AR-05-010-~~152~~ 246	open chipping

3. State	County	District	4. Map reference
Colorado	Rio Blanco	Craig	Wolf Ridge 7½ min

5. Location

4 miles west on dirt road from 84 Ranch up Corral Gulch ½ mile southwest along top of the ridge. Site on south side of road.

Preliminary Site Report ~~and~~ Final Site Report in preparation at Colorado State University, Ft. Collins, Colorado.

Section	Township	Range	Meridian
34 sw¼ ~~nw¼~~	1 south	99 west	6th PM

6. Land ownership status	7. Other site designations
Public domain	5 RB-7

8. Cultural affiliation; Geologic Age and/or formation; dates of use

Public domain

9. Site description, position, surrounding terrain, and importance

Thin scatter of flakes in small clearing on ridge. Retouched flakes in ant hills. No signs of more intensive use such as fire pits. Ridge top on divide between Corral and Box Elder Gulches about 50 meters south of road. Vegetation, pinyon and juniper, grasses. Site has excellent view of Box Elder Gulch but none of Corral Gulch. Southern Exposure. 6990 feet elevation. Water in Box Elder Gulch.

10. Area of occupation	11. Present condition
30 meters in diameter	excellent
12. Photo numbers	
yes at CSU	

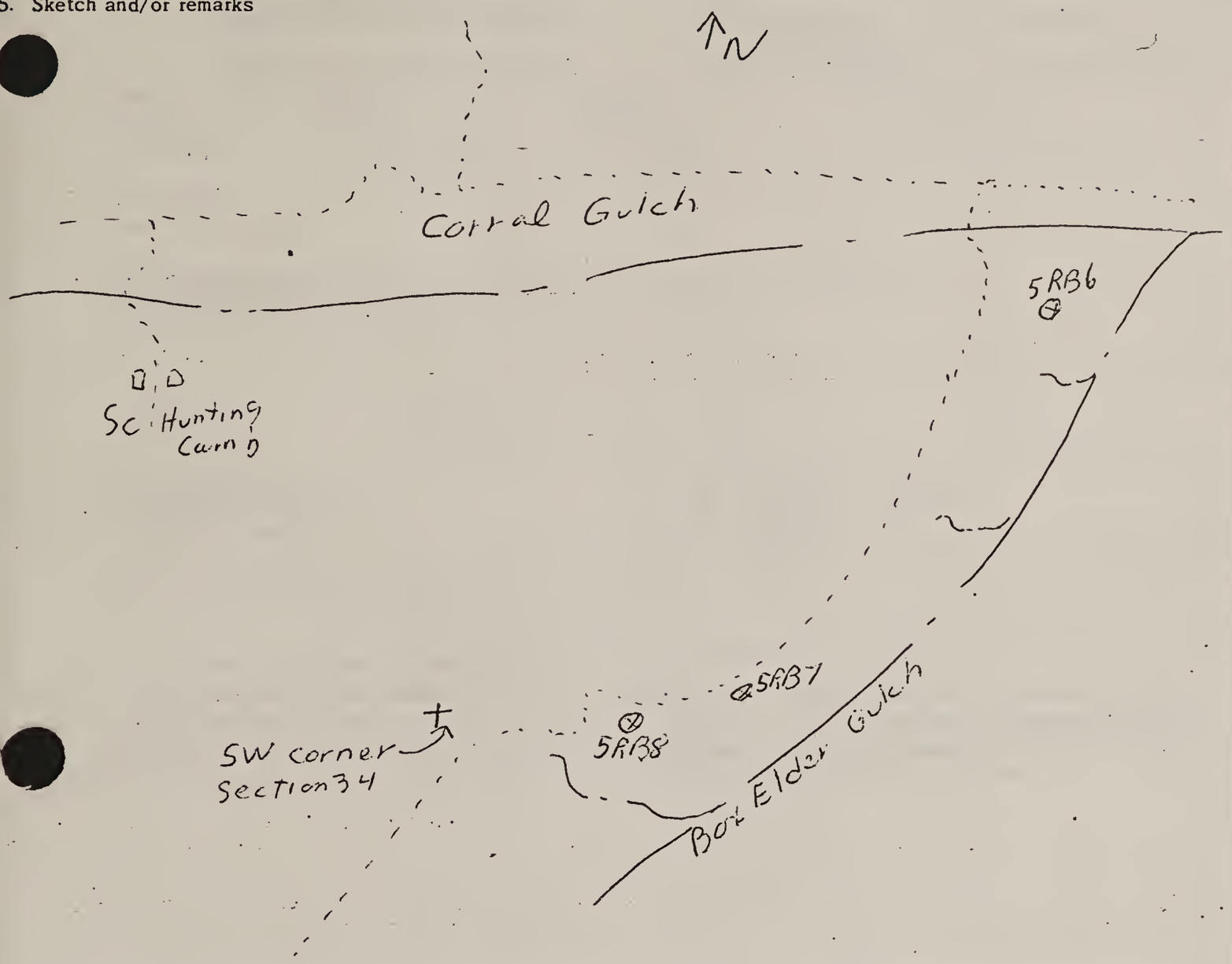
13. Informants and references

Dr. C. H. Jennings
Colorado State University
6-17-73

14. Recorded by	Date
Daniel J. Hutchison	February 7, 1974

(continued on reverse)

15. Sketch and/or remarks



EVALUATION

16. Does site have recreation value? ☐ Yes ☒ No If "yes," has the Recreation Inventory Form 6110–3 been completed? ☐ Yes ☐ No

17. Does site have sufficient value to justify preservation and/or development? ☐ Yes ☒ No If "yes," specify type of preservation or development.

This site has been evaluated and a determination was made that it is not of National Register significance. The only value this site has is in the material which would be salvaged before any mining operation. The salvage and removal of all the prehistoric cultural material by a qualified archeologist will greatly increase the value of this site, but the site does not warrent preservation after the salvage excavations have preserved the scientific data.

Daniel J. Hutchison

18. Reviewed by *(Signature of District Manager)* | Date

Form 6230-2
(June 1968)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

ANTIQUITIES SITE INVENTORY

[X] Archeological [ ] Paleontological [ ] Historical

1. Site number	2. Type of site
AR-05-010-~~150~~ 247	Open chipping

3. State	County	District	4. Map reference
Colorado	Rio Blanco	Craig	Wolf Ridge 7½ min

5. Location

West of 5 RB-7

Preliminary Site Report; Final Site Report in preparation at Colorado S ate University, Ft. Collins, Colorado.

Section	Township	Range	Meridian
34 SW¼ SW¼	1 South	99 West	6th PM

6. Land ownership status	7. Other site designations
Public domain	5 RB-8

8. Cultural affiliation; Geologic Age and/or formation; dates of use

9. Site description, position, surrounding terrain, and importance

Thin scattering of flakes in small clearing in pinyon-juniper retouching flakes in ant hills. No fire pits or other features. Site is on the highest part of the ridge between Corral and Box elder Gulchs. Exposed in all directions but vest view is of Box Elder Gulch to the south. 7000 feet elevation.

10. Area of occupation	11. Present condition
30 meters in diameter	Excellent
12. Photo numbers	
Yes CSU	

13. Informants and references

C. H. Jennings
Colorado State University
6-17-73

14. Recorded by	Date
Daniel J. Hutchison	February 7, 1974

(continued on reverse)

15. Sketch and/or remarks

EVALUATION

16. Does site have recreation value? ☐ Yes ☒ No If "yes," has the Recreation Inventory Form 6110–3 been completed? ☐ Yes ☐ No

17. Does site have sufficient value to justify preservation and/or development? ☐ Yes ☒ No If "yes," specify type of preservation or development.

This site has been evaluated and a determination was made that it is not of National Register significance. The only value this site has is in the material which would be salvaged before any mining operation. The salvage and removal of all the prehistoric cultural material by a qualified archeologist will greatly increase the value of this site, but the site does not warrent preservation after the salvage excavations have preserved the scientific data.

Daniel J. Hutchison

18. Reviewed by *(Signature of District Manager)*	Date

Form 6230-2
(June 1968)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

ANTIQUITIES SITE INVENTORY

[xx] Archeological [ ] Paleontological [ ] Historical

1. Site number	2. Type of site
AR-05-010-~~154~~ 248	open chipping

3. State	County	District	4. Map reference
Colorado	Rio Blanco	Craig	Wolf Ridge

5. Location

Preliminary Site Report; Final Site Report in preparation at Colorado State University, Ft. Collins, Colorado.

Section	Township	Range	Meridian
34 SE¼ NE¼	1 South	99 west	6th PM

6. Land ownership status	7. Other site designations
Public domain	5 RB 9

8. Cultural affiliation; Geologic Age and/or formation; dates of use

9. Site description, position, surrounding terrain, and importance

Concentration of flakes in 10 meter diameter area. Apparently eroding out of brown sandy layer over gray shale. One projectile point and one possible fire pit. Near top of ridge facing east. 6680 foot elevation. Some depth to the site - possibly 50 to 50 cm deep.

10. Area of occupation	11. Present condition
15 m x 15 m	excellent
12. Photo numbers	
2 CSU	

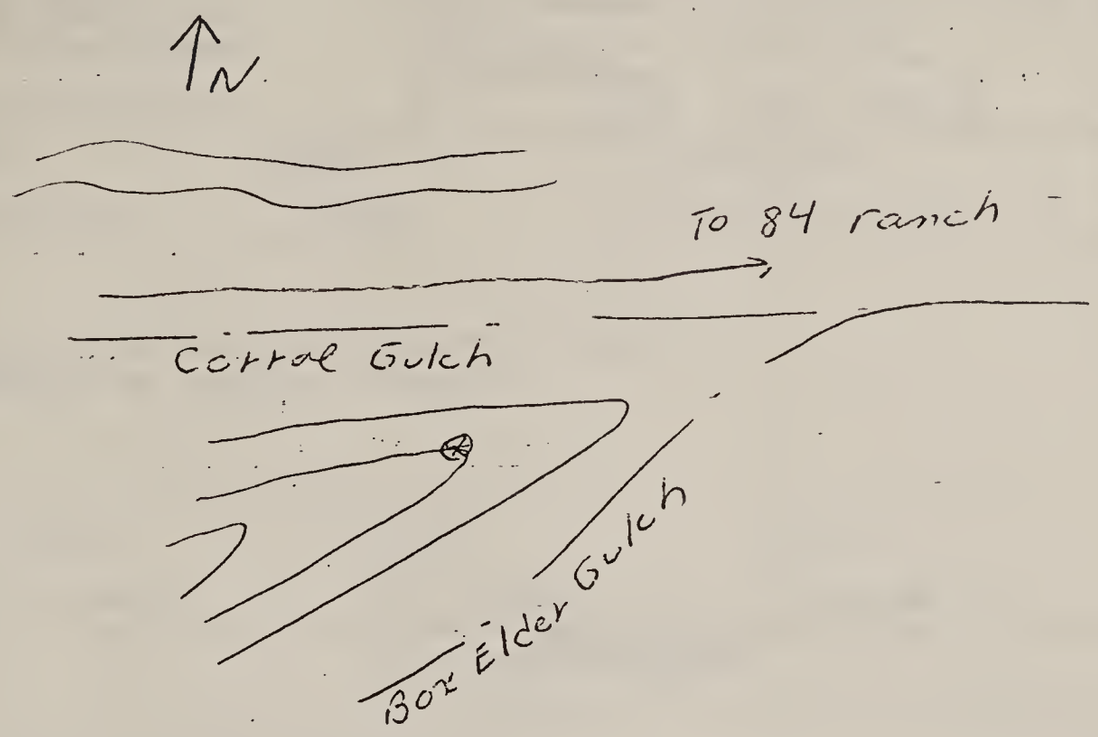
13. Informants and references

Matthew Freedman
Colorado State University
June 17, 1973

14. Recorded by	Date
Daniel J. Hutchison	February 7, 1974

(continued on reverse)

15. Sketch and/or remarks



EVALUATION

16. Does site have recreation value? ☐ Yes ☒ No If "yes," has the Recreation Inventory Form 6110–3 been completed? ☐ Yes ☐ No

17. Does site have sufficient value to justify preservation and/or development? ☐ Yes ☒ No If "yes," specify type of preservation or development.

This site has been evaluated and a determination was made that it is not of National Register significance. The only value this site has is in the material which would be salvaged before any mining operation. The salvage and removal of all the prehistoric cultural material by a qualified archeologist will greatly increase the value of this site, but the site does not warrent preservation after the salvage excavations have preserved the scientific data

Daniel J. Hutchison

Reviewed by *(Signature of District Manager)*	Date

Form 6230-2
(June 1968)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

ANTIQUITIES SITE INVENTORY

[xxx] Archeological [ ] Paleontological [ ] Historical

1. Site number	2. Type of site
AR-05-010-~~155~~ 249	Open chipping

3. State	County	District	4. Map reference
Colorado	Rio Blanco	Craig	Wolf Ridge 7½ min

5. Location

Preliminary Site Report; Final Site Report in preparation at Colorado State University, Ft. Collins, Colorado.

Section	Township	Range	Meridian
10 NE¼ SW¼	2 south	99 west	6th pm

6. Land ownership status	7. Other site designations
Public domain	5 RB 10

8. Cultural affiliation; Geologic Age and/or formation; dates of use

9. Site description, position, surrounding terrain, and importance

Open ridge top on crest of first ridge north of Stake Springs Draw. Site in the pinyon-juniper tree line adjoining a large sage opening. 7180 feet elevation

10. Area of occupation	11. Present condition
75 meter diameter	excellent
12. Photo numbers	
yes CSU	

13. Informants and references

Robert E. Hurlbutt
Colorado State University

14. Recorded by	Date
Daniel J. Hutchison	February 7, 1974

(continued on reverse)

15. Sketch and/or remarks

EVALUATION

16. Does site have recreation value? ☐ Yes ☒ No If "yes," has the Recreation Inventory Form 6110–3 been completed? ☐ Yes ☐ No

17. Does site have sufficient value to justify preservation and/or development? ☐ Yes ☒ No If "yes," specify type of preservation or development.

This site has been evaluated and a determination was made that it is not of National Register significance. The only value this site has is in the material which would be salvaged before any mining operation. The salvage and removal of all the prehistoric cultural material by a qualified archeologist will greatly increase the value of this site, but the site does not warrent preservation after the salvage excavations have preserved the scientific data.

Daniel J. Hutchison

18. Reviewed by *(Signature of District Manager)*	Date

Form 6230-2
(June 1968)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

ANTIQUITIES SITE INVENTORY

[xx] Archeological [ ] Paleontological [ ] Historical

1. Site number	2. Type of site
AR-05-010-~~156~~ 350	open chipping

3. State	County	District	4. Map reference
Colorado	Rio Blanco	Craig	Wolf Ridge 7½ min

5. Location

Preliminary site report; Final site report in preparation at Colorado State University, Ft. Collins, Colorado.

Section	Township	Range	Meridian
10 SW¼ NE¼	2 south	99 W	6th PM

6. Land ownership status	7. Other site designations
Public domain	5 RB-11

8. Cultural affiliation; Geologic Age and/or formation; dates of use

9. Site description, position, surrounding terrain, and importance

Scattered flakes and one point on ridge top. Old road cuts through the site. Elevation 7140 feet. Sage, small pinyon and juniper. Charcoal, dead larger pinyon.

10. Area of occupation	11. Present condition
30 meters in diameter	good
12. Photo numbers	
yes CSU	

13. Informants and references

Cathy Holder
Colorado State University
6-18-74

14. Recorded by	Date
Daniel J. Hutchison	February 7, 1974

(continued on reverse)

15. Sketch and/or remarks

EVALUATION

16. Does site have recreation value? ☐ Yes ☒ No If "yes," has the Recreation Inventory Form 6110–3 been completed? ☐ Yes ☐ No

17. Does site have sufficient value to justify preservation and/or development? ☐ Yes ☒ No If "yes," specify type of preservation or development.

This site has been evaluated and a determination was made that it is not of National Register significance. The only value this site has is in the material which would be salvaged before any mining operation. The salvage and removal of all the prehistoric cultural material by a qualified archeologist will greatly increase the value of this site, but the site does not warrent preservation after the salvage excavations have preserviced the scientific data.

Daniel J. Pluntkerson

18. Reviewed by *(Signature of District Manager)* | Date

Form 6230-2
(June 1968)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

ANTIQUITIES SITE INVENTORY

[xx] Archeological [ ] Paleontological [ ] Historical

1. Site number	2. Type of site
AR-05-010-~~157~~ 281	open chipping

3. State	County	District	4. Map reference
Colorado	Rio Blanco	Craig	Wolf Ridge 7½ min

5. Location

Preliminary Site Report, Final Site Report in preparation at Colorado State University, Ft. Collins, Colorado.

Section	Township	Range	Meridian
10 SE¼ NE¼	2 south	99 west	6th PM

6. Land ownership status	7. Other site designations
public domain	5 RB-12

8. Cultural affiliation; Geologic Age and/or formation; dates of use

9. Site description, position, surrounding terrain, and importance

On south slope on a small north south ridge - perpindicular to Box Elder. Knife and many flakes recovered. Elevation 7060. Pinyon, juniper, sagebrush.

10. Area of occupation	11. Present condition
10 meters	good
12. Photo numbers	
yes CSU	

13. Informants and references

Rebecca A. Gilbert
Colorado State University

14. Recorded by	Date
Daniel J. Hutchison	February 7, 1974

(continued on reverse)

15. Sketch and/or remarks

EVALUATION

16. Does site have recreation value? ☐ Yes ☒ No If "yes," has the Recreation Inventory Form 6110–3 been completed? ☐ Yes ☐ No

17. Does site have sufficient value to justify preservation and/or development? ☐ Yes ☒ No If "yes," specify type of preservation or development.

This site has been evaluated and a determination was made that it is not of National Register significance. The only value this site has is in the material which would be salvaged before any mining operation. The salvage and removal of all the prehistoric cultural material by a qualified archeologist will greatly increase the value of this site, but the site does not warrent preservation after the salvage excavations have preserved the scientific data.

Daniel J Hutchison

Reviewed by *(Signature of District Manager)*	Date

Form 6230-2
(June 1968)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

ANTIQUITIES SITE INVENTORY

[XX] Archeological [ ] Paleontological [ ] Historical

1. Site number	2. Type of site
AR-05-010-~~158~~ 252	open camp

3. State	County	District	4. Map reference
Colorado	Rio Blanco	Craig	Wolf Ridge 7½ min

5. Location

Preliminary site report, final site report in preparation at Colorado State University, Ft. Collins, Colorado.

Section	Township	Range	Meridian
10 SW¼ NE¼	2 south	99 west	6 th pm

6. Land ownership status	7. Other site designations
Public domain	5 RB-13

8. Cultural affiliation; Geologic Age and/or formation; dates of use

9. Site description, position, surrounding terrain, and importance

Site on open top of first ridge north of stake Springs Draw. Site is 15 in the pinyon-juniper tree line adjoining a large sage opening. Several fire pits with flakes on top of fire area. Best preserved site in the CA tract. This site should be studied intensively. Test drilling was planned for an area 50 feet from the site in the summer of 1973. Elevation 7120 feet.

10. Area of occupation	11. Present condition
75 meters	excellent
12. Photo numbers	
yes 1973 CSU	

13. Informants and references

Colorado State University
June 18, 1973

14. Recorded by	Date
Daniel J. Hutchison	February 7, 1974

(continued on reverse)

15. Sketch and/or remarks

EVALUATION

16. Does site have recreation value? ☐ Yes ☒ No If "yes," has the Recreation Inventory Form 6110–3 been completed? ☐ Yes ☐ No

17. Does site have sufficient value to justify preservation and/or development? ☐ Yes ☒ No If "yes," specify type of preservation or development.

This site has been evaluated and a determination was made that it is not of National Register significance. The only value this site has is in the material which would be salvaged before any mining operation. The salvage and removal of all the prehistoric cultural material by a qualified archeologist will greatly increase the value of this site, but the site does not warrent preservation after the salvage excavations have preserved the scientific data.

Daniel J. Wintemute

Reviewed by *(Signature of District Manager)*	Date

Form 6230-2
(June 1968)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

ANTIQUITIES SITE INVENTORY

[xx] Archeological [ ] Paleontological [ ] Historical

1. Site number	2. Type of site
AR-05-010-~~159~~ 253	open camp

3. State	County	District	4. Map reference
Colorado	Rio Blanco	Craig	Wolf Ridge 7½ min

5. Location

Preliminary Site Report; Final Site Report in preparation at Colorado State University, Ft. Collins, Colorado.

Section	Township	Range	Meridian
10 NE¼ NE¼	2 south	99 west	6th PM

6. Land ownership status	7. Other site designations
Public Domain	5 RB-14

8. Cultural affiliation; Geologic Age and/or formation; dates of use

9. Site description, position, surrounding terrain, and importance

Ridge top with heavy concentration of flakes scattered around the area. Many dead trees, evidence of fire. Pinyon-juniper, sage, grasses. 7120 foot elevation.

10. Area of occupation	11. Present condition
60 meters in diameter	
12. Photo numbers	
yes CSU 1973	

13. Informants and references

Colorado State University
June 18, 1973

14. Recorded by	Date
Daniel J. Hutchison	February 7, 1973

(continued on reverse)

15. Sketch and/or remarks

EVALUATION

16. Does site have recreation value? ☐ Yes ☒ No If "yes," has the Recreation Inventory Form 6110–3 been completed? ☐ Yes ☐ No

17. Does site have sufficient value to justify preservation and/or development? ☐ Yes ☒ No If "yes," specify type of preservation or development.

This site has been evaluated and a determination was made that it is not of National Register significance. The only value this site has is in the material which would be salvaged before any mining operation. The salvage and removal of all the prehistoric cultural material by a qualifieid archeologist will greatly increase the value of this site, but the site does not warrent preservation after the salvage excavations have preserved the scientific data.

Daniel J Hutchison

18. Reviewed by *(Signature of District Manager)*	Date

Form 6230-2
(June 1968)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

ANTIQUITIES SITE INVENTORY

[xx] Archeological [ ] Paleontological [ ] Historical

1. Site number	2. Type of site
AR-05-010-~~160~~ 259	chipping

3. State	County	District	4. Map reference
Colorado	Rio Blanco	Craig	Sagebrush Hills 7½ min

5. Location

Preliminary Site Report, Final Site Report in preparation at Colorado State University, Ft. Collins, Colorado.

Section	Township	Range	Meridian
33, NE¼ NE¼	1 south	99 west	

6. Land ownership status	7. Other site designations
public domain	5 RB 20

8. Cultural affiliation; Geologic Age and/or formation; dates of use

9. Site description, position, surrounding terrain, and importance

A thin scatter of flakes and 1 projectile point on a narrow ridge top with exposure to the south and west. Elevation 7,080 feet.

10. Area of occupation	11. Present condition
½ mile diameter	good
12. Photo numbers	
yes CSU	

13. Informants and references

Colorado State University
June 17, 1973

14. Recorded by	Date
Daniel J. Hutchison	February 7, 1974

(continued on reverse)

15. Sketch and/or remarks

EVALUATION

16. Does site have recreation value? ☐ Yes ☒ No If "yes," has the Recreation Inventory Form 6110–3 been completed? ☐ Yes ☐ No

17. Does site have sufficient value to justify preservation and/or development? ☐ Yes ☒ No If "yes," specify type of preservation or development.

This site has been evaluated and a determination was made that it is not of National Register significance. The only value this site has is in the material which would be salvaged before any mining operation. The salvage and removal of all the prehistoric cultural material by a qualified archeologist will greatly increase the value of this site, but the site does not warrent preservation after the salvage excavations have preserved the scientific data.

Daniel J. Hutchison

18. Reviewed by *(Signature of District Manager)*	Date

Form 6230-2
(June 1968)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

ANTIQUITIES SITE INVENTORY

[xx] Archeological [ ] Paleontological [ ] Historical

1. Site number	2. Type of site
AR-05-010-161 262	chipping

3. State	County	District	4. Map reference
Colorado	Rio Blanco	Craig	Sagebrush Hill 7½ min

5. Location

Preliminary Site Report; Final Site Report in preparation at Colorado State University, Ft. Collins, Colorado.

Section	Township	Range	Meridian
33 NE¼ SW¼	1 South	99 west	6th PM

6. Land ownership status	7. Other site designations
Public Domain	5 RB-23

8. Cultural affiliation; Geologic Age and/or formation; dates of use

9. Site description, position, surrounding terrain, and importance

Cultural material found on knoll of a saddle along a ridge crest. Gulches run north and south of the site. Open sagebursh flat with grasses and shrubs. Small runoff areas from hill to the saddle. Indegenous parchute shale. Exposure on east and west. Elevation 6960.

10. Area of occupation	11. Present condition
75 x 30 meters	good
12. Photo numbers	
yes CSU 1973	

13. Informants and references

Colorado State University
June 18, 1973

14. Recorded by	Date
Daniel J. Hutchison	February 7, 1974

(continued on reverse)

15. Sketch and/or remarks

EVALUATION

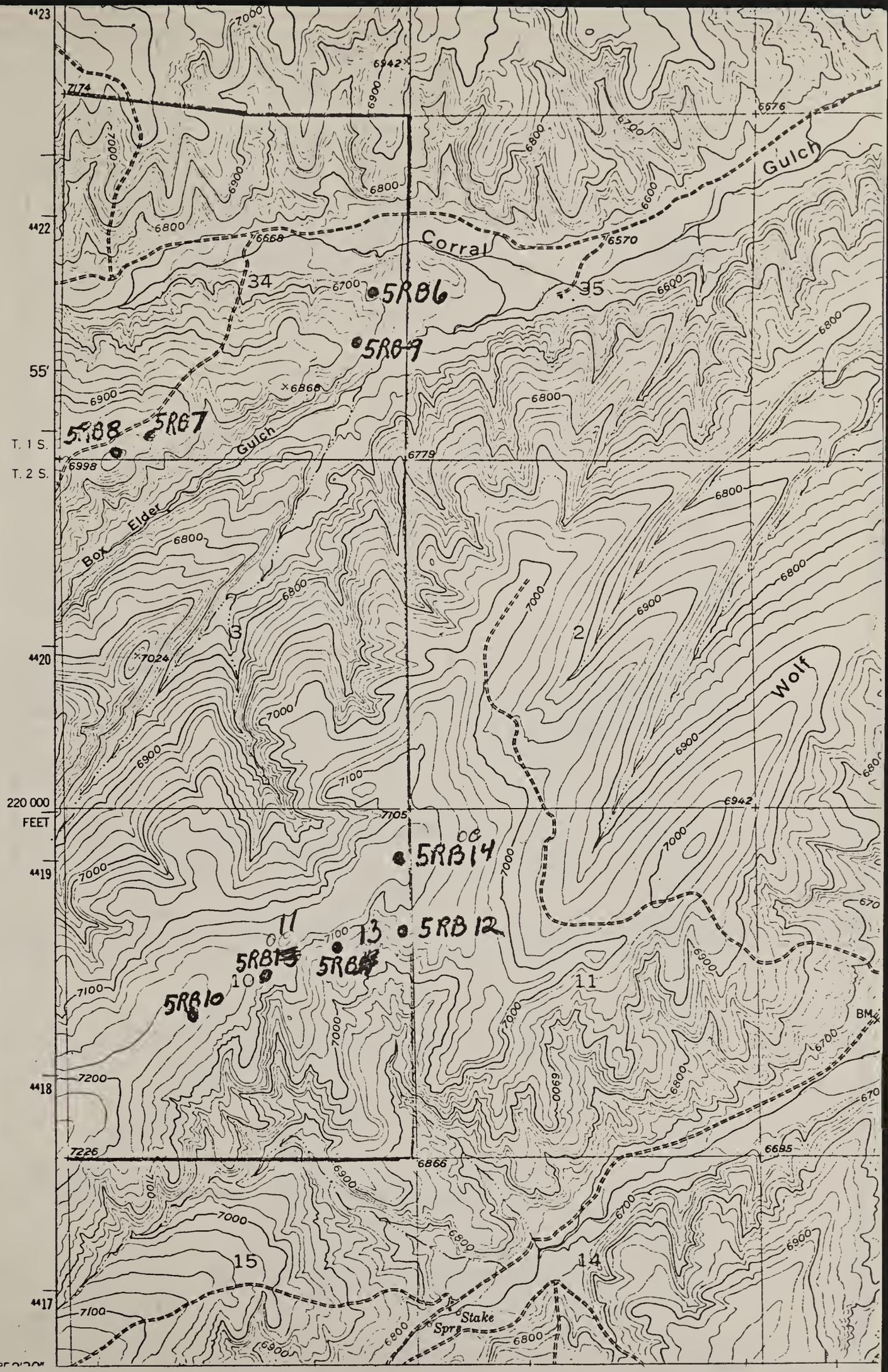
16. Does site have recreation value? ☐ Yes ☒ No If "yes," has the Recreation Inventory Form 6110–3 been completed? ☐ Yes ☐ No

17. Does site have sufficient value to justify preservation and/or development? ☐ Yes ☒ No If "yes," specify type of preservation or development.

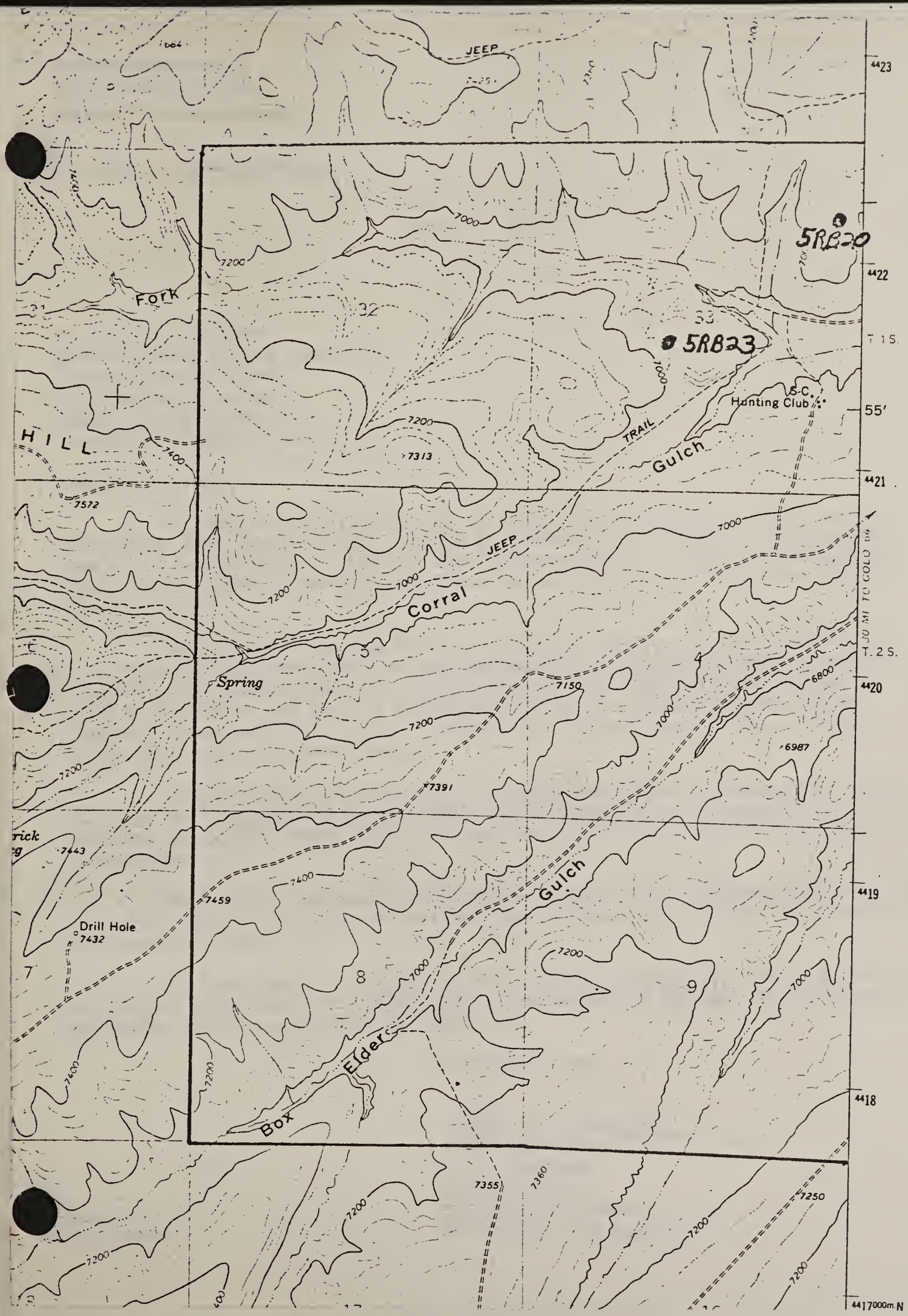
This site has been evaluated and a determination was made that it is not of National Register significance. The only value this site has is in the material which would be salvaged before any mining operation. The salvage and removal of all the prehistoric cultural material by a qualified archeologist will greatly increase the value of this site, but the site does not warrent preservation after the salvage excavations have preserved the scientific data.

Daniel J. Hutchison

Reviewed by *(Signature of District Manager)*	Date


Corral
Gulch
Box Elder
Gulch
Wolf
5RB6
5RB9
5RB8
5RB7
5RB14
5RB12
5RB13
5RB10
Stake Spr
T. 1 S.
T. 2 S.
220 000 FEET
BM
34
35
3
2
11
13
10
15
14

15,995


JEEP
5RB20
5RB23
Fork
HILL
S.C.
Hunting Club
TRAIL
Gulch
JEEP
Corral
Spring
Gulch
Drill Hole
7432
Box
Elder
7313
7572
7391
7459
7443
7150
6987
6800
7355
7360
7250
7000m N
4423
4422
4421
4420
4419
4418
T. 1 S.
T. 2 S.
55'

Gulf Mineral Resources Co.
A Division of Gulf Oil Corporation

Standard Oil Company (Indiana)

Rio Blanco Oil Shale Project

June 27, 1974

Mr. Peter A. Rutledge
Area Oil Shale Mining Supervisor
Conservation Division
U.S. Geological Survey
Denver Federal Center
Lakewood, Colorado 80215

Dear Mr. Rutledge:

Included in the stipulations for approval of a portion of the Tract C-a Exploratory Plan (specifically, Section 5 - Geological Exploration Plan and Section 6.2 - Subsurface Hydrology) is the requirement for biological and archaeological investigations of areas to be disturbed by the lessees' activities on the tract.

This is to inform you that detailed investigations of drill hole sites 6, 7, 8 and 11 have been completed with regard to archaeological and biological resources. The investigators have determined that no archaeological resources would be destroyed, and that no significant or unique flora or fauna would be affected, by work on these sites. Attached is a letter from Dr. Alan P. Olson and David B. Winsor to that effect.

Archaeological and biological examinations of the remaining drill hole sites, as well as proposed access routes, will be completed as expeditiously as possible, and a final report will be submitted to you upon completion of these examinations.

Drill hole site construction and drilling will be limited to sites 6, 7, 8 and 11 until archaeological and biological clearances have been obtained on the remaining sites.

Also attached is a letter to the Tract C-a lessees from the BLM approving Exploration Operations Bond 8063-25-88, in the amount of $20,000, to cover the initiation of exploration work on Tract C-a.

Sincerely yours,

Charles Spielman

C. O. Spielman
Vice President
Oil Shale Resources
Gulf Mineral Resources Co.

COS:rc
Enclosures

COLORADO SEMINARY
UNIVERSITY OF DENVER
UNIVERSITY PARK • DENVER, COLORADO 80210

DEPARTMENT OF ANTHROPOLOGY

June 24, 1974

Mr. Charles Spielman
Vice President, Oil Shale Resources
Gulf Mineral Resources Company

Dear Mr. Spielman:

We have investigated coreholes 6,7,8,and 11, and meteorological stations 1,2,3, and 4. These locations were investigated on a three hundred foot radius for the coreholes, and one hundred foot for the meteorological stations. Nothing was found which will impede the utilization of these sites for the projected drilling and station location. Our recommendation is that no resources would be damaged by these projects.

Sincerely,

Alan P. Olson

Alan P. Olson, Ph.D.
Associate Professor

David B. Winsor

David B. Winsor
Limnetics, Inc.

ENVIRONMENTAL SURVEY ON

GULF-STANDARD TRACT C-a

Date of Survey: June 23 74

Site: C-96 & road, Parameters (Area) Surveyed: 5'10 Ft

The subject site has been surveyed for environmental baseline conditions an the findings are as follows:

1. Terrestrial: similar to Air station #3
crested wheat grass & ruegrass

2. Wildlife: indication of rabbits & gnd-squirrels

3. Aquatic: stream not flowing

Method Used:

1. Terrestrial: surface observations

2. Wildlife:

3. Aquatic:

Recommendations:
proceed with drilling operations

David Winsor

Dave Winsor
Environmental Ecologist

Dr. Alan Olson
Archeologist
Observer

ARCHEOLOGICAL SURVEY ON

GULF-STANDARD TRACT C-a

Date of Survey: 7/3-8/74

Site: C7 and 9., Parameters (Area) Surveyed: 300 ft. R.

The subject site has been surveyed and the findings are as follows:

Negative as far as any archaeological material

Method Used:

Surface Survey

Recommendations:

Any construction be allowed.

Alan Nelson

Dave Winsor
Terrestrial Ecologist
Observer

Dr. Alan Olson
Archeologist
Surveyor

ENVIRONMENTAL SURVEY ON

GULF-STANDARD TRACT C-a

Date of Survey: June 23

Site: C-7, Parameters (Area) Surveyed:

The subject site has been surveyed for environmental baseline conditions and the findings are as follows:

1. Terrestrial: sagebrush dominant vegetation with needlegrass & wheatgrass

2. Wildlife: rabbits, ground squirrels & signs of deer

3. Aquatic: next to stream which was trickling. do not damn up this stream.

Method Used:

1. Terrestrial: Surface observations

2. Wildlife:

3. Aquatic:

Recommendations: proceed with drilling

Dave Winsor

Dave Winsor
Environmental Ecologist

Dr. Alan Olson
Archeologist
Observer

ENVIRONMENTAL SURVEY ON

GULF-STANDARD TRACT C-a

Date of Survey: June 22, 1974

Site: C-8, C-9, Parameters (Area) Surveyed: 300 ft D

The subject site has been surveyed for environmental baseline conditions and the findings are as follows:

1. Terrestrial: Sagebrush, some P-J

2. Wildlife: rabbit, ground squirrels, rodents

3. Aquatic: —

Method Used:

1. Terrestrial:

2. Wildlife:

3. Aquatic:

Recommendations: Proceed with drilling operations

David Winsor

Dave Winsor
Environmental Ecologist

Dr. Alan Olson
Archeologist
Observer

ENVIRONMENTAL SURVEY ON

GULF-STANDARD TRACT C-a

Date of Survey: June 22

Site: Air Quality Stations 1,2,3,4, Parameters (Area) Surveyed: 300 Ft diameter

The subject site has been surveyed for environmental baseline conditions and the findings are as follows:

1. Terrestrial: #1 Sagebrush, scarlet gila, P-J comm
#2 sagebrush
#3 wheatgrass, rice grass, sagebrush
#4 sagebrush rice grass

2. Wildlife: #1 - rabbit, deer, wildhorses (in the area) songbirds
#2 - songbirds, rabbits
#3 - rabbits, groundsquirrels, chipmunk, gambel's grd. squirrel
#4 - cows, squirrels, rabbits

3. Aquatic: #3 next to running stream however placement of met. tower should be no problem

Method Used:

1. Terrestrial: SURFACE Observations

2. Wildlife:

3. Aquatic:

Recommendations:
proceed with drilling

Dave Winsor

Dave Winsor
Environmental Ecologist

Dr. Alan Olson
Archeologist
Observer

July 22, 1974

Memorandum

To: Marvin W. Pearson, District Manager, BLM, Craig, CO 81625
Stanley G. Colby, Area Manager, BLM, Meeker, CO 81641

From: Area Oil Shale Supervisor

Subject: Archeological/biological clearances

Attached are the clearances received to date for C-a and C-b. The C-a clearance includes the air quality/meteorology sites and the trailer site in sec. 4.

With regard to drill hole C-10 on C-a which is in the wild horse area, Charles Spielman conferred with Bill Lawhorn (BLM wildlife) who advised there was no need to move the hole. Unless I hear differently from you I will not require the lessees to move the hole.

Additional clearances on C-b are expected shortly to facilitate approval of the rest of their plan.

Peter A. Rutledge

Attachments

File copy

PARutledge/ns

LIMNETICS, INC.
environmental consultants

July 16, 1974
D-19

Mr. Peter A. Rutledge
Area Oil Shale Mining Supervisor
Conservation Division
U. S. Geological Survey
Lakewood, CO 80215

Subject: Archaeological and biological clearances of drill hole sites and access roads on Tract C-a.

Dear Mr. Rutledge:

This letter supplements C. Spielman's letter dated June 27, 1974.

Included in the stipulations for approval for a portion of Tract C-a Exploratory Plan, Section 5, Geological Exploration Plan and Section 6.2 - Surface Hydrology, is the requirement for biological and archaeological investigations of areas to be disturbed by the leessees activities on the Tract.

This is to inform you that detailed investigations were made of core hole sites C-2, 3, C-4, 5, C-10, C-11, C-12, C-13, C-7 (new site), C-9 (new site) and the access roads leading to core holes C-11, C-12, and C-13. Additionally, the proposed trailor office area in Section 4, between core holes C-8 and C-9, was also cleared. Each core hole site was cleared within a 300 foot radius of the designated site and each access road was studied within a 30 foot corridor to these respective core holes. Upon completion, the investigators, Dr. Olson, archaeologist and Dave Winsor, ecologist, indicated the general description found at each site and completed the attached forms to provide a more detailed explanation of their findings and their recommendations.

All the proposed sites were cleared from an archaeological and biological standpoint, however, core hole site C-10 and its access road were found to be

9025 East Kenyon Avenue, Denver, CO 80237 • Phone 303/770-8252

within the home range of a wild horse herd which were visibly observed utilizing this area. Furthermore, sign posts were sighted in this area marking the territory of this herd. It has been recommended to Gulf-Standard, as a result of this finding, that core hole C-10 be moved directly to the east, adjacent to the Tract boundary and in the general vicinity of the existing access road. This is presently being investigated and when the relocation of this core hole becomes a reality, you will be notified.

The remaining core holes and shallow drill wells located on Tract C-a will be investigated by this same team on July 19 through the 21st. Their findings will be reported to you during the section ending July 27.

Sincerely,

LIMNETICS, INC.

Donald R. Millert

Donald R. Millert,
Project Manager

DRM/bjs

cc: C. Spielman
Dr. Schwendinger
Dr. Harmsworth
Dr. Olson

July 10, 1974
D-8

Mr. Charles Spielman
Vice President - Oil Shale Resources
Gulf Mineral Resources Company
1780 S. Ballaire
Denver, Colorado 80222

Dear Mr. Spielman:

In accordance with the lease agreement, all prospective core hole sites and access roads to the proposed sites must be cleared from a biological and archaeological standpoint. This clearing is to insure that no unique biological communities or archaeological ruins are present in the proposed perturbated area.

During the site visit from July 3 through July 7, eight core hole sites, two access roads and one trailor office area were viewed. Numerically they included core hole sites C 2-3, C4-5, C-10, C-11, C-12, C-13, C-7 (new site), C-9 (new site) and the access road leading to core holes C-11, C-12, and C-13. Additionally, the proposed trailor office area in Section 4 was also cleared. Each core hole site was studied within a 400 foot radius of the designated site and each access road was studied within a 30 foot corridor to its respective core hole. At each site a form was filled out indicating its general description and is attached with this letter to provide a more detailed explanation of its components and our recommendations.

All of the proposed sites were cleared from an archaeological and biological standpoint, however, core hole site C-10 and its access road, needs to be discussed further prior to its biological clearance. This site is located

within the home range of a wild horse herd which were visually observed utilizing this area. Furthermore, sign posts were sighted in this area marking the territory of this herd. Should the access road be cleared as well as the core hole site, this would undoubtedly result in the herd moving to a new area, thus adversely effecting future baseline data accumulation. With this one exception, all of the other sites were cleared biologically for core hole drilling and access road construction.

Sincerely,

David Winsor,
Environmental Ecologist

Dr. Alan Olson,
Archaeologist

DW/bjs

ARCHEOLOGICAL SURVEY ON

GULF-STANDARD TRACT C-a

Date of Survey: July 3-8, 1974

Site: Coreholes 23-45, Parameters (Area) Surveyed: 300 Ft. D.

The subject site has been surveyed and the findings are as follows:

~~Negative.~~

Method Used:

Surface Survey

Recommendations:

~~Any necessary operations be allowed.~~

Dave Winsor
Terrestrial Ecologist
Observer

Dr. Alan Olson
Archeologist
Surveyor

ARCHEOLOGICAL SURVEY ON

GULF-STANDARD TRACT C-a

Date of Survey: July 3-8, 1974

Site: C 11, 12, 13, plus access roads Parameters (Area) Surveyed: 300Ft D.

The subject site has been surveyed and the findings are as follows:

Site surveyed, with negative results, roadway, also.

Method Used:

Surface survey

Recommendations:

These sites, and the roadway are clear, no problems as far as archeaological material.

Dave Winsor
Terrestrial Ecologist
Observer

Dr. Alan Olson
Archeologist
Surveyor

ENVIRONMENTAL SURVEY ON

GULF-STANDARD TRACT C-a

Date of Survey: 7-4-74

Site: C-11 - 12-13 + access road, Parameters (Area) Surveyed: 300 Ft radius of corehole 30 Ft strip for road

The subject site has been surveyed for environmental baseline conditions and the findings are as follows:

1. Terrestrial: presence of P-J (Pinon-Juniper) community as dominant plant with other secondary species such as Opuntia, buckbush, Indian paintbrush, scarlet gilia occasional blue spruce

2. Wildlife: evidence of wild horses utilizing this area as well as occasional mule deer. numerous small rodents were observed as well as birds such as morning dove, meadowlark, kingbird, r-t hawk

3. Aquatic: situated on top of ridge - little water present however runoff channels were evident providing water removal during heavy rains or snows. brome grass in area

Method Used:

1. Terrestrial: Visual observations. This area is perhaps on the ~~extem~~ extreme edge of the home range of a group of wild horses. Although sign did not indicate heavy utilization of this area by the herd, the herd was nevertheless observed frequently about 5 miles east, ~~west~~ from Air Station 1.

2. Wildlife: This area is heavily utilized by both domestic and wild animals as indicated by the numerous game trails and fecal ~~[illegible]~~ droppings.

3. Aquatic:

Recommendations:

The Pinon-Juniper community that the access road will cut through are ~~an~~ old individuals (75-100 years). When the road is cut extreme caution should be taken to remove as few individual trees as possible. Furthermore with core hole drilling and access road drilling the herd of wild horses that utilize this area will leave due to ~~the~~ human presence and their associated activities.

David B. Winsor

Dave Winsor
Environmental Ecologist

Dr. Alan Olson
Archeologist
Observer

ENVIRONMENTAL SURVEY ON

GULF-STANDARD TRACT C-a

Date of Survey: July 5, 1974.

Site: C 2-3, Parameters (Area) Surveyed: _____

The subject site has been surveyed for environmental baseline conditions and the findings are as follows:

1. Terrestrial: This area has already been disturbed by core holing. The vegetation consisted of scattered sagebrush and bucebrush interspersed by grasses and flowers

2. Wildlife: The wildlife observed in this area included, weasels, groundsquirrels, chipmunks. Those noted by their signs were mule deer, rabbits, and an occasional coyote.

3. Aquatic: A creek runs adjacent to this site and it ~~was~~ had water running at the time of this survey. Numerous small mammal traces were observed along the creek bed indicating utilization of this water supply.

Method Used:

1. Terrestrial: _____

2. Wildlife: _____

3. Aquatic: _____

Recommendations:

This area appears to have little drawbacks and drilling and clearing could commence immediately.

David Winsor

Dave Winsor
Environmental Ecologist

Dr. Alan Olson
Archeologist
Observer

ENVIRONMENTAL SURVEY ON

GULF-STANDARD TRACT C-a

Date of Survey: July 6, 1974

Site: C-~~2~~3 4-5, Parameters (Area) Surveyed: 400 Ft radius

The subject site has been surveyed for environmental baseline conditions and the findings are as follows:

1. Terrestrial: This area was located in a depression between two ridges and was exclusively a sagebrush community with interspersed grasses.

2. Wildlife: Little wildlife was observed in this area perhaps the result of its openness. Rabbits and mule deer droppings were noticed however they appeared old

3. Aquatic: Just south of this site is a intermittent stream For runoff control however it is intermittent in nature

Method Used:

1. Terrestrial:

2. Wildlife:

3. Aquatic:

Recommendations: This areas appears ready for core hole drilling operations from a biological standpoint.

David Winsor

Dave Winsor
Environmental Ecologist

Dr. Alan Olson
Archeologist
Observer

ENVIRONMENTAL SURVEY ON

GULF-STANDARD TRACT C-a

Date of Survey: July 6 1974

Site: C-10 - ✓ access road, Parameters (Area) Surveyed: Access road 30 ft section to core hole. Core hole 4.0 ft radius

The subject site has been surveyed for environmental baseline conditions and the findings are as follows:

1. Terrestrial: The vegetative community consisted of Pinon-Juniper (very old trees) with sagebrush meadows. Numerous species of grass (cheat, wheat) and wild flowers were noted (sunset plus cacti

2. Wildlife: This area is apparently part of the entire home range of a herd of wild horses. Sightings were made of this herd and their marks were evident throughout this area.

3. Aquatic: No ~~permanent~~ permanent streams were noted in this area however intermittent streams were evident for runoff control during heavy rains

Method Used:

1. Terrestrial: Mule deer droppings were noted as well as rabbits feces. Furthermore, a golden eagle was sighted soaring in this vicinity. Other songbirds were seen such

2. Wildlife: as the mountain bluebird, magpies, and morning doves.

3. Aquatic:

Recommendations: Since the purpose of this initial two year is to accumulate baseline data on Tract C-a it is imperative that the natural condition of the area be disturbed as little as possible therefore it would be advisable not to disturb this area if plans can be altered. ~~Should~~ If this area must be drilled then base line data accumulation on the wild horse status in this area will be difficult to ascertain.

David Winsor

Dave Winsor
Environmental Ecologist

Dr. Alan Olson
Archeologist
Observer

LIMNETICS, INC.
environmental consultants

August 1, 1974
D-33

Mr. Peter Rutledge
U. S. Geological Survey
Conservation Division
7200 W. Alameda
Lakewood, Colorado 80226

Dear Mr. Rutledge:

This letter is to inform you of the biological and archaeological clearing of core holes C-1, C-14, C-15 and access roads leading to core holes C-1, C-14, C-15 and C-10. These sites were surveyed by Dr. Alan Olson, Ms. Barbara Thiaville, and David Winsor between July 19 - 23, 1974.

The basic procedure for core hole clearing involved intensively walking a 400-foot radius of the designated site looking for the presence of unique or endangered flora or faunal communities. Also, emphasis is placed on describing the area generally from a vegetative and zoological aspect. Any signs such as game paths, scats or other identifiable material is recorded.

Archaeologically, the core holes and access roads were scoured for remances of pottery or tools indicating the area might have been inhabitated some time in the past. Presently, no artifacts have been found at any of the core hole sites examined.

Should you have any question about our procedure or our findings, please contact me at your convenience.

Sincerely,

David Winsor

David Winsor,
Terrestrial Ecologist

DW/bjs
cc: Dr. R. Harmsworth

9025 East Kenyon Avenue, Denver, CO 80237 • Phone 303/770-8252

ARCHEOLOGICAL SURVEY ON

GULF-STACKHOUSE TRACT C-8

Date of Survey: JULY 20, 1974

Site: CH 1, Parameters (Area) Surveyed: 300'R

The subject site has been surveyed and the findings are as follows:

ARCHAEOLOGICALLY NEGATIVE.

Method Used:

SURFACE SURVEY.

Recommendations:

PROCEED WITH PLANNED DRILLING.

Dave Winsor
Terrestrial Ecologist
Observer

Alan P. Olson

Dr. Alan Olson
Archeologist
Surveyor

ARCHEOLOGICAL SURVEY ON

GULF-STANDARD IMPACT C-a

Date of Survey: JULY 20, 1974

Site: NEW CH 10, Parameters (Area) Surveyed: 300' ~~B~~ R
ROAD 35'

The subject site has been surveyed and the findings are as follows:

NO ARCHAEOLOGICAL MATERIAL ON SITE OR ALONG ACCESS ROAD.

Method Used:

SURFACE SURVEY

Recommendations:

SITE BE CLEARED FOR CONSTRUCTION!

Dave Winsor
Terrestrial Ecologist
Observer

Alan P. Olson

Dr. Alan Olson
Archeologist
Surveyor

ENVIRONMENTAL SURVEY ON

GULF-STANDARD TRACT C-a

Date of Survey: 7-23-74

Site: C-1, Parameters (Area) Surveyed: soil + vegetation 400 values

The subject site has been surveyed for environmental baseline conditions and the findings are as follows:

1. Terrestrial: Vegetation Sagebrush with occasional Juniper

2. Wildlife: cattle, deer, rabbit

3. Aquatic: no water present in area

Method Used:

1. Terrestrial:

2. Wildlife:

3. Aquatic:

Recommendations: proceed with drilling operations

David Winsor

Dave Winsor
Environmental Ecologist

Dr. Alan Olson
Archeologist
Observer

ENVIRONMENTAL SURVEY ON

GULF-STANDARD TRACT C-a

Date of Survey: 7-22-74

Site: C10 new access road, Parameters (Area) Surveyed: 30 ft corridor

The subject site has been surveyed for environmental baseline conditions and the findings are as follows:

1. Terrestrial: same as described on C-10 some Juniper appear to be rather ancient (300 yrs old)

2. Wildlife: " " " "

3. Aquatic: no ~~flow~~ water present

Method Used:

1. Terrestrial:

2. Wildlife:

3. Aquatic:

Recommendations: proceed with clearing for road.

David Winsor

Dave Winsor
Environmental Ecologist

Dr. Alan Olson
Archeologist
Observer

ARCHEOLOGICAL SURVEY ON

GULF-STANDARD [illegible]

Date of Survey: JULY 20, 1974

Site: CH 14 & 15, Parameters (Area) Surveyed: 300' R; ROAD 35'

The subject site has been surveyed and the findings are as follows:

ARCHAEOLOGICALLY NEGATIVE ON BOTH COREHOLE SITES AND ACCESS ROADS.

Method Used:

SURFACE SURVEY.

Recommendations:

ARCHAEOLOGICALLY, THE ROADS & SITES ARE CLEARED FOR CONSTRUCTION. HOWEVER, A HERD OF NINE WILD HORSES LED BY THE SAME STALLION PREVIOUSLY SIGHTED NEAR CH 10 WERE OBSERVED. LIMNETICS HAS BEEN NOTIFIED ABOUT THE HORSES.

Alan P. Olson

Dave Winsor
Terrestrial Ecologist
Observer

Dr. Alan Olson
Archeologist
Surveyor

ENVIRONMENTAL SURVEY ON

GULF-STANDARD TRACT C-a

Date of Survey: 7-22-74

Site: C-14 & access roads, Parameters (Area) Surveyed: 30 Foot corridor to center 400 radius of core

The subject site has been surveyed for environmental baseline conditions and the findings are as follows:

1. Terrestrial: Vegetation - Sagebrush community with additional species ie. scarlet gilia, indian paintbrush, and numerous grasses. band of P-J near core hole

2. Wildlife: groundsquirrels signs of horses and other livestock, lizards (Sceloporus + Phrynosoma)

3. Aquatic: No water in area

Method Used:

1. Terrestrial:

2. Wildlife:

3. Aquatic:

Recommendations: proceed with drilling operations. Care should be taken to go in between the band of P-J near the core hole as marked by Gene Ziemba.

David Wensor

Dave Winsor
Environmental Ecologist

Dr. Alan Olson
Archeologist
Observer

ENVIRONMENTAL SURVEY ON

GULF-STANDARD TRACT C-a

Date of Survey: 7-22-74

Site: C-15 + access road, Parameters (Area) Surveyed: 400 radius of rat hole 30 ft corridor to cor. hole marker

The subject site has been surveyed for environmental baseline conditions and the findings are as follows:

1. Terrestrial: topography - hilly with intervening valleys. Vegetation ranged from PJ commonly on hilltops to sagebrush on hillsides.

2. Wildlife: indication of horses, deer, porcupine, chipmunks, ground squirrels, golden eagle and lizards (see C-14)

3. Aquatic: creek beds present however no water was running

Method Used:

1. Terrestrial:

2. Wildlife:

3. Aquatic:

Recommendations: proceed with drilling operations

David Winsor

Dave Winsor
Environmental Ecologist

Dr. Alan Olson
Archeologist
Observer

ARCHEOLOGICAL SURVEY ON

GULF-STANDARD TRACT C-a

Date of Survey: SEPT. 5, 1974

Site: S5 + PROPOSED ACCESS, Parameters (Area) Surveyed: 300'R

The subject site has been surveyed and the findings are as follows:

AREA LOCATED IN SHALLOW DRAINAGE DRAINING A BASIN, 300-400' BELOW RIDGE TOPS. NEGATNE ARCHAEOLOGICALLY.

Method Used:

SURFACE SURVEY

Recommendations:

INSTALLATION OF EQUIPMENT

Dave Winsor
Terrestrial Ecologist
Observer

Alan P. Olson

Dr. Alan Olson
Archeologist
Surveyor

ARCHEOLOGICAL SURVEY ON

GULF STANDARD TRACT C-a

Date of Survey: SEPT 5, 1974

Site: M1, Parameters (Area) Surveyed: 300' R

The subject site has been surveyed and the findings are as follows:

AREA LOCATED ON NORTH FACING SLOPE OF RIDGE APPROXIMATELY 300' BELOW THE CREST NO ARCHAEOLOGICAL

Method Used:

SURFACE SURVEY

Recommendation:

CONSTRUCTION BE ALLOWED.

Dave Winsor

Dr. Alan Olson
Archeologist

ARCHAEOLOGICAL SURVEY OF

GULF [illegible]

Date of Survey: SEPT 5, 1974

Site: M3, Parameters (Area) Surveyed: 300' R

The subject site has been surveyed and the findings are as follows:

SITE LOCATED AT THE INTERSECTION OF A STEEP NORTH FACING RIDGE FACE AND THE VALLEY BOTTOM. NO FINDINGS ARCHAEOLOGICALLY.

Method Used:

SURFACE SURVEY.

Recommendation:

INSTALLATION OF EQUIPMENT APPROVED

Dave Winsor
Terrestrial Ecologist
Observer

Alan P. Olson

Dr. Alan Olson
Archeologist
Surveyor

Date: SEPT 4, 1974

Site: M2, S10 300'R

Title: NEGATIVE FOR ANY ARCHAEOLOGICAL MATERIAL

Method:

SURFACE SURVEY

Purpose:

INSTALLATION OF TEST EQUIPMENT AUTHORIZED

Alan P. Olson

Name: Alan Olson
Terr: A. Archaeologist
Div: Surveyor

ARC[illegible] SURVEY ON

GRI[illegible] PROJECT [illegible]

Date of Survey: SEPT 4, 1974
New location NW ¼ Sec 21, R[illegible] W, Township [illegible]

Site: METEOROLOGICAL STA 4 , Parameters (Area) Surveyed: 300' R.

The subject site has been surveyed and the findings are as follows:

NEW SITE LOCATED AT W END OF WHAT APPEARS TO BE AN ABANDONED AIR STRIP 60 X .5 MILES. AREA IS MODERATELY DISTURBED & NO ARCHEOLOGICAL MATERIAL WAS FOUND WITHIN THE AREA DESCRIBED. IF ACCESS TO SITE [illegible] FOLLOWS THE LOGICAL ROUTE, IT WILL MOST [illegible] DISTURBED GROUND.

Method Used:

CASUAL SURVEY

Recommendation:

INSTALLATION OF EQUIPMENT

Dave Winzer
Terrestrial Ecologist
Observer

Alan P Olson

Dr. Alan Olson
Archeologist
Surveyor

[illegible]

[illegible]

Date of survey: SEPT. 4, 1974

Site: [illegible], Parameters (Area) Surveyed: 300' R

The subject site has been surveyed and the findings are as follows:

TEST PIT IN ARROYO NEGATIVE.

BENCHES ON EITHER SIDE OF ARROYO ALSO NEGATIVE

Method Used:

SURFACE SURVEY

Recommendations:

CONSTRUCTION [illegible] ALLOWED.

Dave Winter
Terrestrial Archeologist
Observer

Alan P. Olson

Dr. Alan Olson
Archeologist
Surveyor

[illegible]

[illegible]

Date of Survey: [illegible] PT 6, 1974

Site: S4, Parameters (Area) Surveyed: EXOR

The subject site has been surveyed and the findings are as follows:

NO ARCHAEOLOGICAL REMAINS WERE FOUND IN THE SHALLOW DRAINAGE OR THE SURROUNDING SLOPES

Method Used:

SURFACE SURVEY

Recommendations:

WELL MAY BE LOG

Alan P. Olson

Date Winn [illegible]
Terrestrial Archeologist
Observer

Dr. Alan Olson
Archeologist
Surveyor

Date of [illegible] SEPT. 6, 1974

Site: S3, Parameters (Area) Surveyed: 200'R

The subject [illegible] been surveyed and the findings are as follows:

SITE LOCATED IN A DELTA ARROYO

NO ARTIFACTUAL MATERIAL WAS FOUND

Method [illegible]:

SURFACE SURVEY

Recommendations:

CONSTRUCTION MAY PROCEED

Alan P. Olson

[illegible]

Terrestrial [illegible]:

Observer:

Dr. Alan Olson
Archeologist
Surveyor

SEPT 6, 1974

S2 300'R

NO ARCHAEOLOGICAL MATERIAL FOUND

SURFACE SURVEY

INSTALLATION OF EQUIPMENT MAY PROCEED.

WARNING
NOTICE

Date of Survey: 9/5/74

Site: Historic Horse Trap Parameter (Area) Surveyed: ca 200 yds E-W, 100 yds N-S

The subject site has been surveyed and the findings are as follows:

Site located immediately south of the present access road on Dead Horse Ridge, in the NE¼ of NE¼ of Sec. 29, R99W, T1S, approximately 1 mile west of the location of Station M4. The site is a winged horse trap with cable reinforcement and a catch and holding corral that is also cable reinforced using natural trees and additional wooden elements. The site is not terribly old and has not been used for some time, but it is in a good state of preservation and should not be damaged. The area has also been extensively used as a deer camp area with attendant trash. Any expansion of the present road to the south would present a danger to the site.

Method Used:

Surface Survey.

Recommendations:

That this area be flagged out and avoided prior to the time of road expansion. The site is easily recognizable and should present no problem.

Dave Winsor
Terrestrial Ecologist
Observer

Alan R. Olson

Dr. Alan Olson
Archeologist
Surveyor

Date of [illegible] SEPT 6, 1974

Site: S2 [illegible] 300'R

The [illegible] the findings are as follows:

NO ARCHAEOLOGICAL MATERIAL FOUND

Method [illegible]

SURFACE SURVEY

Recommendations:

INSTALLATION OF EQUIPMENT MAY PROCEED.

Dave Winco:
Terre[illegible]ologist
Observer

Alan P. Olson

Dr. Alan Olson
Archeologist
Surveyor

ARCHEOLOGICAL SURVEY ON

GULF-STANDARD TRACT C-a

Date of Survey: SEPT 6, 1974

Site: S3, Parameters (Area) Surveyed: 300'R

The subject site has been surveyed and the findings are as follows:

SITE LOCATED IN A DEEP ARROYO.
NO ARTIFACTUAL MATERIAL WAS FOUND.

Method Used:

SURFACE SURVEY.

Recommendations:

CONSTRUCTION MAY PROCEED.

Dave Winsor
Terrestrial Ecologist
Observer

Alan P. Olson

Dr. Alan Olson
Archeologist
Surveyor

ARCHEOLOGICAL SURVEY ON

GULF-STANDARD TRACT C-a

Date of Survey: SEPT 6, 1974

Site: S4, Parameters (Area) Surveyed: 300'R

The subject site has been surveyed and the findings are as follows:

NO ARCHAEOLOGICAL REMAINS WERE FOUND IN THE SHALLOW DRAINAGE OR THE SURROUNDING SLOPES.

Method Used:

SURFACE SURVEY

Recommendations:

WELL MAY BE DUG.

Dave Winsor
Terrestrial Ecologist
Observer

Alan P. Olson

Dr. Alan Olson
Archeologist
Surveyor

ARCHEOLOGICAL SURVEY ON

GULF-STANDARD TRACT C-a

Date of Survey: SEPT. 4, 1974

Site: S9, Parameters (Area) Surveyed: 300' R

The subject site has been surveyed and the findings are as follows:

TEST SITE IN ARROYO NEGATIVE.
BENCHES ON EITHER SIDE OF ARROYO ALSO
NEGATIVE.

Method Used:

SURFACE SURVEY

Recommendations:

CONSTRUCTION BE ALLOWED.

Dave Winsor
Terrestrial Ecologist
Observer

Alan P. Olson

Dr. Alan Olson
Archeologist
Surveyor

ARCHEOLOGICAL SURVEY ON

GULF-STANDARD TRACT C-a

Date of Survey: SEPT 4 1974

New loc. in NW 1/4 sect 21; RANGE 98 West, TOWNSHIP 1 SOUTH

Site: METEOROLOGICAL STA. 4, Parameters (Area) Surveyed: 300' R

The subject site has been surveyed and the findings are as follows:

NEW SITE LOCATED AT W END OF WHAT APPEARS TO BE AN ABANDONED AIR STRIP 60' X .5 MILES. AREA IS ALREADY DISTURBED & NO ARCHAEOLOGICAL MATERIAL WAS FOUND WITHIN THE AREA DESCRIBED. IF ACCESS & SITE LOCATION FOLLOWS THE LOGICAL ROUTE, IT WILL ALL BE OVER DISTURBED GROUND.

Method Used:

SURFACE SURVEY

Recommendations:

INSTALLATION OF EQUIPMENT

Dave Winsor
Terrestrial Ecologist
Observer

Alan P. Olson

Dr. Alan Olson
Archeologist
Surveyor

Date of Survey: SEPT 4, 1974

Site: M2, S10, Parameter (Area) Surveyed: 300'R

The subject site has been surveyed and the findings are as follows:

NEGATIVE FOR ANY ARCHAEOLOGICAL MATERIAL

Method Used:

SURFACE SURVEY

Recommendations:

INSTALLATION OF TEST EQUIPMENT APPROVED

Dave Winsor
Terrestrial Ecologist
Observer

Alan P. Olson

Dr. Alan Olson
Archeologist
Surveyor

ARCHEOLOGICAL SURVEY ON

GULF-STANDARD TRACT C-a

Date of Survey: SEPT 5, 1974

Site: M1, Parameters (Area) Surveyed: 300' R

The subject site has been surveyed and the findings are as follows:

AREA LOCATED ON NORTH FACING SLOPE OF RIDGE APPROXIMATELY ~~B~~ 300' BELOW THE CREST NO ARCHAEOLOGICAL

Method Used:

SURFACE SURVEY

Recommendations:

CONSTRUCTION BE ALLOWED.

Dave Winsor
Terrestrial Ecologist
Observer

Alan P. Olson

Dr. Alan Olson
Archeologist
Surveyor

ARCHEOLOGICAL SURVEY ON

GULF-STANDARD TRACT C-a

Date of Survey: SEPT. 5, 1974

Site: M3, Parameters (Area) Surveyed: 300' R

The subject site has been surveyed and the findings are as follows:

SITE LOCATED AT THE INTERSECTION OF A STEEP NORTH FACING RIDGE-FACE AND THE VALLEY BOTTOM. NO FINDINGS ARCHAEOLOGICALLY.

Method Used:

SURFACE SURVEY.

Recommendations:

INSTALLATION OF EQUIPMENT APPROVED.

Dave Winsor
Terrestrial Ecologist
Observer

Alan P. Olson

Dr. Alan Olson
Archeologist
Surveyor

ARCHEOLOGICAL SURVEY ON

GULF-STANDARD TRACT C-a

Date of Survey: SEPT. 5, 1974

Site: S5 + PROPOSED ACCESS, Parameters (Area) Surveyed: 300'R

The subject site has been surveyed and the findings are as follows:

AREA LOCATED IN SHALLOW DRAINAGE DRAINING A BASIN, 300-400' BELOW RIDGE TOPS. NEGATNE ARCHAEOLOGICALLY.

Method Used:

SURFACE SURVEY

Recommendations:

INSTALLATION OF EQUIPMENT.

Dave Winsor
Terrestrial Ecologist
Observer

Alan P. Olson

Dr. Alan Olson
Archeologist
Surveyor

LIMNETICS, INC.
environmental consultants

RECEIVED
FEB 10 1975
OFFICE OF
AREA OIL SHALE SUPERVISOR
U.S. G.S.

February 4, 1975

D-311
74-948
File 14.3

Mr. Dale R. Andrus
State Director
Bureau of Land Management
Room 700
Colorado State Bank Building
1600 S. Broadway
Denver, CO 80202

Dear Mr. Andrus:

Enclosed is a copy of the archaeological survey made by Cal Jennings on December 3. This survey was made to report on the three exclosure pens in the process of construction on Tract Ca. It is my understanding these copies have already been submitted to your office on December 17, but unfortunately our contractor, ECI has just forwarded this information to our office.

The results of this survey indicated that no notable or significant archaeological items were uncovered.

If you have any questions on Mr. Jennings report, please get in touch with me.

Sincerely,

Donald R. Millert

Donald R. Millert,
Project Manager
DRM/bj

cc: Mr. Ed Sandel
Dr. Olson
Dr. Schwendinger
Dr. Harmsworth

9025 East Kenyon Avenue, Denver, CO 80237 • Phone 303/770-8252

REPORT ON THE CULTURAL RESOURCES OF THREE EXCLOSURE PENS NEAR THE Ca OIL SHALE LEASE TRACT

Laboratory of Public Archaeology
Colorado State University
Project No. 74-10
Rio Blanco County

The following is a report on an archaeological survey conducted by the Laboratory of Public Archaeology for Ecology Consultants, Inc., in the Piceance Basin of northwestern Colorado. Authorization to do the field work comes under Federal Antiquities Permit 74-CO-55, issued to Colorado State University by the Bureau of Land Management, U.S. Department of the Interior. The reconnaissance, which examined two sites proposed for pen consturction and a third at which the pen had already been built, was designed to assess the nature and extent of the cultural resources likely to be affected by construction of the pens. The resource would manifest itself in the form of artifacts and/or architectural features left behind by aboriginal or early Euro-american occupants of the area.

Man-Days Input

The field work was undertaken and completed on December 3, 1974, at the cost of one man-day labor. Another two man-days were involved in the preparation for the porject and report writing.

Description of the Exclosure Pens

Exclosure Pen No. 1: This pen is located in T2S, R99W, SWSE of Sec. 5 and NWNE of Sec. 8. (UTM coordinates: 4419220m N, 711600m E.) The pen is on a northeast facing slope overlooking Boxelder Gulch. The locality produced no evidence of cultural resources.

Exclosure Pen No. 2: Pen 2 is located in T2S, R99W, SWNE of Sec. 7. (UTM coordinates: 4418480m N, 710150m S.) Proposed Pen No. 2, situated on the

northern slope of an unnamed ridge to the south of Corral Gulch, was not demarcated at the time of the survey. Consequently, the survey was conducted along fence lines flagged at the time of the archaeological reconnaissance. No archaeological sites or materials were discovered in the projected construction area.

Exclosure Pen No. 3 T1S R99W Sec. 29 NENE. UTM Coordinates: 4424000M N., 711800M E.. Proposed Exclosure Pen No. 3, located on the northeastern slope of Dead Horse Ridge adjacent to Big Duck Creek, was also void of flagging. The projected area of construction and fence lines were laid out, after which the survey was conducted. Archaeological materials and sites were absent within the confines and fence lines of the proposed exclosure pen.

Conclusion

An absence of archaeological sites, materials, or significant cultural resources within the proposed and constructed areas of the exclosure pens, numbered #1, #2 and #3, precludes any recommendation of a mitigating nature. On archaeological grounds, the clearance for the initiation of construction activity is hereby granted.

Submitted by:

Robert W. Leonard

December 9, 1974

2.5.3 REVEGETATION

2.5.3.1 Objectives

In accordance with good rehabilitation practices, to meet the lease stipulations, and as an obligation to mitigate environmental impacts due to mining and processing operations, all portions of lands which have been disturbed by these operations will be revegetated. This includes the temporary revegetation of processed oil shale, overburden and topsoil stockpiles; and the establishment of a stable ecosystem on the spent shale-overburden-topsoil rehabilitation sites and the sites with minor surface disturbances (e.g., corehole pads and access roads).

The revegetation research program must address and provide answers to engineering problems directly related to the disposal of spent shale which will allow Rio Blanco to take the necessary steps to develop a viable rehabilitation program.

2.5.3.2 Methods

In the development of a revegetation program of this magnitude, historical information must be obtained through a literature review and search. Prior to the initiation of the Tract Ca studies, abstracts and periodicals obtained must be accumulated, stored, abstracted and summarized to identify experimental designs which have been successfully used in revegetation studies. Areas where additional field and laboratory experimental studies must be performed will be defined. Through literature review, feasibility of certain revegetation programs and qualified investigators can be identified. Prior established field sites will be visited, inspected, and evaluated. The studies in this revegetation program will be directly related to the mining and processing methods used in the Tract Ca operation, and the effects of local geology, climatology and revegetation.

During the late spring and summer of 1975, various types of revegetation studies will be initiated on Tract Ca. Some of the revegetation studies presently under consideration are:

1) The reseeding of disturbed areas, such as corehole pads, with mixtures of native and exotic grasses, and other corehole pads with mixtures of grasses, native forbs and shrubs. This seeding will be accomplished after the area has been reshaped.

The purpose of these and other studies is to determine procedures and methods which may be used in the future for revegetation of areas with minor surface disturbances.

These studies may identify various seeds which will germinate and grow under natural conditions, without additional water and utilizing native topsoil as a growing medium. Other studies will determine the water requirements of these plants through water amendment plots established on the corehole pads. Some of the pads will be mulched after seeding to assess the benefits of mulch covers on seed germination and establishment, and erosion control in this area.

2) The many sites within the area of the leased tract which have been subjected to various types of disturbances in the past years will be studied. These disturbed sites (e.g., air strips, drill pads, old roads, pipleine corridors) may offer an immediate view of the natural sequence of revegetation, through comparison of species composition on sites disturbed at different times. Estimates of the time necessary for different stages of succession on various soil types can be made from these comparisons. This information will be useful in evaluating revegetation programs for this region.

3) Spent shale from different retorting methods will be used for the study of temporary revegetation of spent shale piles to determine the effects of underlying spent shale on the germination and growth of native and exotic plants in overburden. A portion of this study will be carried out in the laboratory.

2.5.3.3 Results

The results from literature surveys, site inspections, and experimental plots should answer the following questions:

1) What are the effects of wind and water erosion on spent shale overburden and topsoil?

2) What is the quantity and quality of water required for revegetation and how long will it need be applied for successful establishment of plants?

3) How much overburden and topsoil is available? What are their physical and chemical characteristics? What are the optimal mixtures for successful plant establishment?

4) What is the amount and depth of leaching of spent shale and the effect of leachates on ground water? What are the tendencies of spent shale salts to move to the surface and their effects on the vegetation?

5) What are the effects of soil disruption on soil flora and fauna? What procedures need be implemented to re-establish the soil system prior to, or concurrent with, revegetation activities?

6) What is the plant species composition of the proposed revegetation community? What plant species should be used for the temporary stabilization of the stockpiles?

7) What is the best configuration (degrees of slope, aspect, terracing, water collection areas, etc.) for the spent shale disposal site to assure successful revegetation?

8) What are the effects of mulches, fertilizers and water amendment on seed germination and seedling establishment?

9) Are there alternative methods for establishing native perennials which are more rapid than growing from seeds? Which native perennials are conducive to revegetation propagation?

Other questions will arise as this revegetation program progresses. The flexibility built into the program allows for emphasis to be shifted to new and important questions which need immediate attention. Results from the revegetation research program will be incorporated into the overall engineering and rehabilitation plans and will be outlined as a preliminary revegetation program in the Detailed Development Plan.

2.5.4 TOXICOLOGY

2.5.4.1 Objectives

An animal testing program will be performed to evaluate the environmental health effects of an oil shale industry and to obtain data which would form the basis for a sound industrial hygiene program. The proposed plan of evaluation is designed to meet Rio Blanco Oil Shale Project's most immediate needs of defining toxicity problems, primarily as they relate to man.

Materials related to both the Tosco II and the Paraho process will be evaluated. Raw oil shale, raw organic matter (kerogen plus extractables), spent shale (TOSCO II and Paraho), total shale oil (TOSCO II and Paraho), and water extract of spent shale will be included in the tests.

2.5.4.2 Methods

(a)	Toxicology Screen:	- acute oral and inhalation (rats). - acute dermal and eye (rabbits).
(b)	Subacute toxicity	- two week dermal test in rabbits. - four week inhalation -- 2 species. (rats and monkeys); one concentration.
(c)	Sensitization	- Human patch tests for allergic contact dermatitis photosensitization.
(d)	Chronic toxicity	- lifetime skin painting in mice -- groups of 50 animals including positive and negative controls. - two year inhalation (3 test levels, rats and monkeys, dust exposure, evaluations to include clinical chemistry, respiratory physiology, pathology, chemical analyses of tissues and chamber dust sampling.)
(e)	90-day feeding water extract of spent shale	- 3 levels -- rats and dogs.

2.5.4.3 Results

The toxicity testing program will begin within a few months. Some test results will be available within a few months after start-up. The more significant tests (e.g., carcinogencity by skin painting and inhalation toxicity) require 80 weeks and 2 years respectively.

2.5.5 TRACE METALS

Trace metal analysis will be performed on a step-wise basis. Soils will be analyzed for metals. If any are found in sufficient quantities, then plants will be analyzed. If sufficient amounts are found in plants, then a first level herbivore will be analyzed and so forth.