CHAPTER 1

LEGAL, FINANCIAL, COMPLIANCE AND RELATED INFORMATION

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110 MINIMUM REQUIREMENTS FOR LEGAL, FINANCIAL, COMPLIANCE AND RELATED INFORMATION

111 Introduction

The degassification wells will be located on property owned by the Milton and Ardith Thayn Trust. The well locations are found in Table 1-1 and are shown in Figure 1-1.

TABLE 1-1

Degas Well Locations

Pine Canyon, Utah Quadrangle, Salt Lake Meridian

Hole Number	Section	Township and Range
G-1	Portion of N1/2SE1/4NW1/4 Section 24	Township 13 South, Range 12 East
G-2	Portion of N1/2SW1/4NE1/4 Section 24	Township 13 South, Range 12 East
G-3	Portion of N1/2SW1/4NW1/4 Section 19	Township 13 South, Range 13 East
G-4	Portion of N1/2NE1/4NW1/4 Section 24	Township 13 South, Range 12 East
G-5	Portion of N1/2NW1/4NE1/4 Section 24	Township 13 South, Range 12 East
G-6	Portion of S1/2SW1/4NW1/4 Section 18	Township 13 South, Range 13 East
G-7	Portion of SW1/4NE1/4SE14 Section 24	Township 13 South, Range 12 East

112 Identification of Interests

Refer to the same section of the General Chapter 1 for Canyon Fuel Company, LLC prepared for the Dugout Canyon Mine, Soldier Canyon Mine and Banning Loadout operations.

112.100 Business Entity

Refer to the same section of the General Chapter 1 for Canyon Fuel Company, LLC prepared for the Dugout Canyon Mine, Soldier Canyon Mine and Banning Loadout operations.

112.200 Applicant and Operator

Refer to the same section of the General Chapter 1 for Canyon Fuel Company, LLC prepared for the Dugout Canyon Mine, Soldier Canyon Mine and Banning Loadout operations.

112.300 Officers of the Applicant

Refer to the same section of the General Chapter 1 for Canyon Fuel Company, LLC prepared for the Dugout Canyon Mine, Soldier Canyon Mine and Banning Loadout operations.

112.400 Coal Mining and Reclamation Operation Owned or Controlled

Refer to the same section of the General Chapter 1 for Canyon Fuel Company, LLC prepared for the Dugout Canyon Mine, Soldier Canyon Mine and Banning Loadout operations.

112.500 Legal or Equitable Owner of the Surface and Mineral Properties

The legal and equitable owner of the surface and mineral properties to be affected by this operation during the duration of the permit period are list below.

Milton & Ardith Thayn Trust
7730 East US Highway 6
Sunnyside Star Route
Price, Utah 84501

United States of America
State of Utah, Department of Interior
Bureau of Land Management
Price Field Office
125 South 600 West
Price, Utah 84501

112.600 Owners of Record of Property Contiguous to Proposed Permit Area

Owners of record for surface and mineral properties contiguous to the proposed permit area are list below.

United States of America
Department of Interior
Bureau of Land Management
Price Field Office
125 South 600 West
Price, Utah 84501

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

112.700 MSHA Numbers

Refer to the same section of the approved M&RP.

112.800 Interest In Contiguous Lands

Canyon Fuel Company, LLC has no interest in contiguous lands other than those currently owned as shown on Plate 1-1 of the approved M&RP.

112.900 Certification of Submittal Information

No information has changed in the approved M&RP because of this submittal. Refer to the same section of the approved M&RP.

113 Violation Information

Refer to the same section of the General Chapter 1 for Canyon Fuel Company, LLC prepared for the Dugout Canyon Mine, Soldier Canyon Mine and Banning Loadout operations.

114 Right-of-Entry Information

Refer to the same section of the approved M&RP.

See Table 1-2 for disturbed acreage for each well site. The disturbed acres will be added to the total disturbed acreage for the Dugout Mine as each site is constructed.

TABLE 1-2

Disturbed Acres by Well Site

Well Site	Disturbed Acres
G-1	0.6
G-2	1.21
G-3	0.97
G-4	0.85
G-5	0.75
G-6	0.32
G-7	1.25

115 Status of Unsuitability Claims

Refer to the same section of the approved M&RP.

116 Permit Term

Refer to the same section of the approved M&RP.

117 Insurance, Proof of Publication, and Facilities and Structures Used in Common

The certificate of insurance(s) for each well will be obtained if required when the well is drilled. The certificate of insurance(s) will be included in Appendix 1-2 of the approved M&RP and General Chapter 1.

118 Filling Fees

Refer to the same section of the approved M&RP.

120 PERMIT APPLICATION FORMAT AND CONTENTS

This amendment submittal will comply with R645-301-120.

130 REPORTING OF TECHNICAL DATA

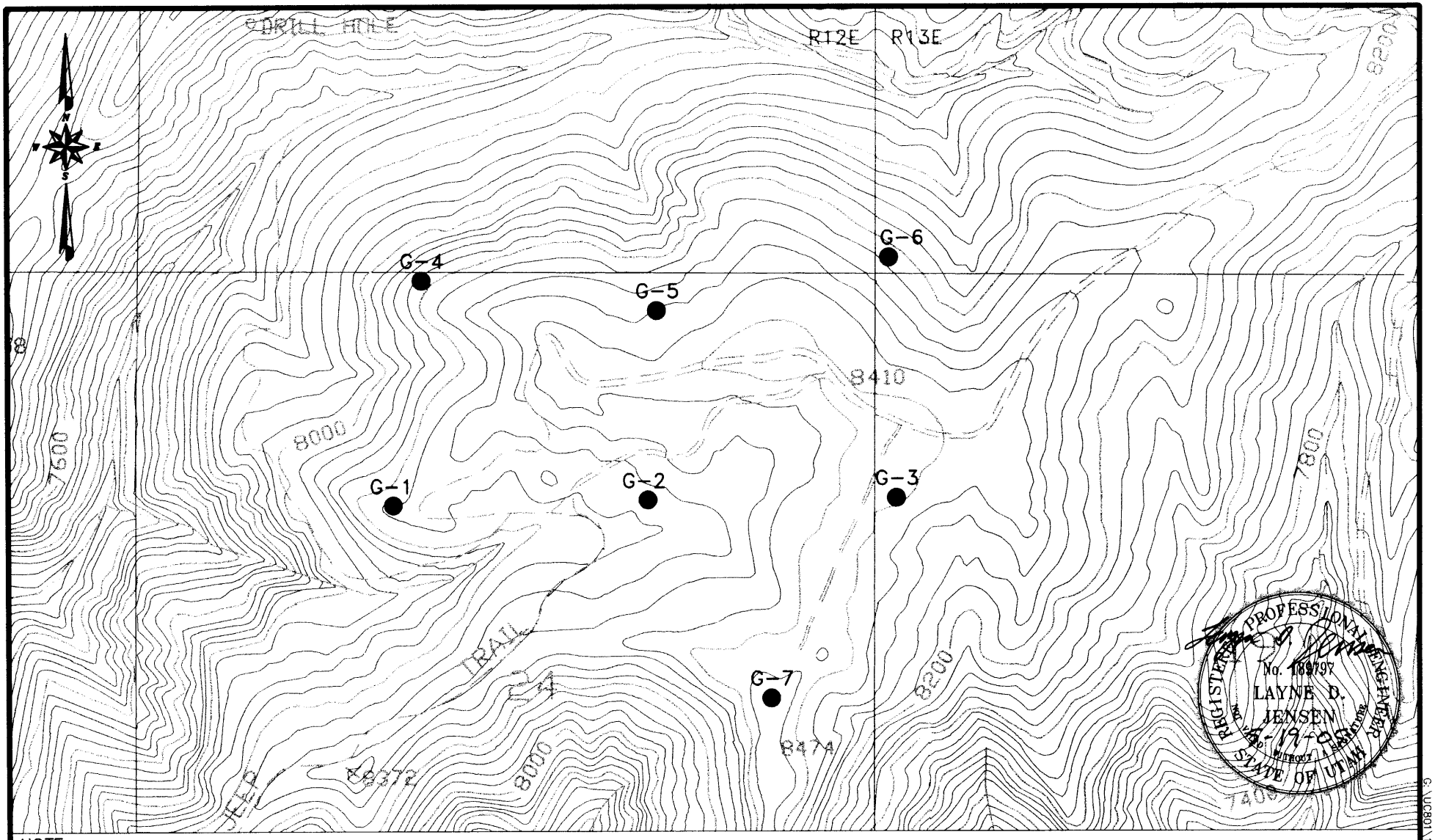
All technical data submitted in the amendment will be accompanied by the name or organization responsible for the collection and analysis of data, dates of collection and descriptions of methodology used. Technical analyses will be planned by or under the direction of a qualified professional in the subject to be analyzed.

140 MAPS AND PLANS

The maps and plans in the Mining and Reclamation Plan will correspond with the requirements in R645-301-140.

150 COMPLETENESS

CFC believes the information in this permit application to be complete and correct.



NOTE:

FOR MORE ACCURATE ROAD LOCATIONS ADJACENT TO WELL SITES REFER TO FIGURES 5-1, 5-5, 5-9. 5-17, 5-20, 5-23 AND 5-27

0' 1000'

EarthFax

FIGURE 1-1. METHANE DEGAS BORE HOLE LOCATIONS

TOWNSHIP 13 SOUTH

G:\UC801\10\DWG\FIG1-1.DWG\03-09-05

CHAPTER 2

SOILS

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210 INTRODUCTION

This chapter and associated attachments address the pertinent data required for the addition of the degassification well sites for the Dugout Canyon Mine. Only those sections of the Division regulations that apply to the well sites have been addressed. The remainder of the regulations have already been addressed in the existing M&RP. The M&RP and this document contain pertinent information relating to the identification, management, and reclamation activities associated with the soil resources.

220 ENVIRONMENTAL DESCRIPTION

The well sites range in elevation from approximately 7400 to 9000 feet. The well sites are located in the Pace Canyon area of the Book Cliffs. General vegetation includes sagebrush, serviceberry, aspen, Douglas-fir, and snowberry.

221 Prime Farmland Investigation

Due to limiting terrain, lack of water for irrigation and no evidence of past cultivation of the sites, it is concluded that no prime farmland exists within the area of the well site disturbance.

222 Soil Survey

222.100 Soils Map

The soils have been mapped as part of the Soil Survey of the Carbon Area, Utah by the Soil Conservation Service (1988), at an Order III intensity level.

A description of the soils is included in Appendix 2-2 of the approved M&RP and in Attachment 2-1, which includes a report by Dan Larsen, Soil Scientist, entitled "Soil Inventory and Assessment Six

Methane Degassification Borehole Sites". An additional report for well site G-6 was prepared in 2004 and is incorporated into Attachment 2-1. Soil information for Well G-7 is incorporated into Attachment 2-1. A photograph of the G-7 site is included in Attachment 3-1. Well site G-3 and the access road can be seen on the photograph.

222.200 Soil Identification

Well No.	Soil Map Unit	Soil Components
G-1	62/88	Midfork-Comodore complex, Rabbitex-Datino Varient
G-2	7	Brycan, Beje-Trag complex, 3-30% slopes
G-3	7	Beje-Trag complex, 3-30% slopes
G-4	62/103	Midfork-Comodore complex, Senchert-Toze complex
G-5	103	Senchert-Croydon
G-6	62	Midfork-Comodore complex
G-7	7	Beje-Trag complex, 3-30% slopes

222.300 Soil Description

Refer to Attachment 2-1 of the submittal for soil descriptions.

222.400 Soil Productivity

The depth of topsoil at each site was measured to determine the amount of growth medium available for reclamation. The following table lists each well site and the approximate amount of growth medium available.

TABLE 2-1

Topsoil Volumes

Well No.	Cubic Yards of Material
G-1	415
G-2	3,104
G-3	1,182
G-4	1,100
G-5	1,909
G-6	792
G-7	1251

Figure 5-1 through Figure 5-25 show the layout and approximate size of well pads for G-1 thru G-6. Figures 5-27 thru 5-29 show the layout and size for well G-7. Topsoil volume calculations can be found in Attachment 2-2.

Estimated topsoil salvage from the G-1 well site will average about 7". This site on a ridge top has previously been disturbed for exploration drilling. The site has pockets of fractured sandstone bedrock at the surface and stony subsoils, which are the limiting factors in the quantity of salvageable topsoil. The average topsoil depth at well site G-2 is 30". The average topsoil thickness for well site G-3 is 10". However, enough soil will be stripped to allow 12" of soil to be placed during reclamation. Thus some subsoils will be stripped with the topsoil to generate the required volume. The estimated topsoil salvage from well site G-4 area will be 28" except on the area of the exiting road(s). The average salvageable topsoil at well site G-5 is 22". Well site G-6 will be established on a pre-existing drill pad, with a portion of the new pad extending onto undisturbed area. Topsoil on the pre-existing drill pad ranges from 0 to 30 inches, on the north edge in from 20 to 28 inches and on the cut slope on the south edge from 6 to 30 inches. The slope will be restored to original contour with the application of topsoil, the entire site will receive at least 12 inches of topsoil. Twelve inches was used to calculate the volume of topsoil to be salvaged and to determine the size of the

topsoil pile for drill site G-6. Degas well G-7 will be developed on a site with soils consistent with G-3. There is a pre-existing road to well G-3 that continues on to the G-7 proposed site. There are signs of previous vehicle disturbance at the site, however the majority of the site is undisturbed. Topsoil available for salvage has been estimated to be 10 to 12 inches. Available topsoil will be salvaged and if necessary some subsoils will be stripped with the topsoil to generate the required volume to place a minimum of 12 inches during site reclamation. Available topsoil at each site will be salvaged, stockpiled and redistributed.

223 Soil Characterization

The topsoil evaluation described in this chapter was performed by Daniel M. Larsen, Professional Soil Scientist and Dean Stacy, NRCS Range Management Specialist in accordance with the standards of the National Cooperative Soil Survey.

224 Substitute Topsoil

Dugout Canyon does not plan to use substitute topsoil as growth media except as described in Section 222.400.

230 OPERATION PLAN

231 General Requirements

231.100 Removing and Storing Topsoil Methods

The topsoil will be removed, stockpiled and protected with a berm and/or silt fence. A qualified person will be on site during soil salvage to monitor and supervise the operation for the purpose of maximizing salvage volumes. Prior to topsoil salvage shrubs/vegetation will be removed and placed/wind rowed along the inside perimeter of the disturbed area.

After the topsoil is removed, the mud pit will be excavated and the soils from the mud pit excavation will be stored immediately adjacent to the mud pit. Mud pit excavation of subsoil will be approximately 110 CY at each well site. A portable container for drilling fluids will be used if necessary, should there not be sufficient subsoil depth to excavate a mud pit.

Topsoil beneath the topsoil stockpiles will not be removed. Ribbon or a marking fabric will be placed on top of the topsoil prior to placement of the topsoil from the well pad area.

The approximate volume of subsoil to be salvaged and used to create berms around the perimeter of the well site including the topsoil stockpile perimeter is: G-1 - 161 CY; G-2 - 254 CY, G-3 - 208 CY, G-4-165 CY, G-5 - 191CY, G-6 - 156 CY and G-7 - 107 CY.

231.200 Suitability of Topsoil Substitutes/Supplements

See Section 224.

231.300 Testing of Topsoil Handling and Reclamation Procedures Regarding Revegetation

Dugout will exercise care to guard against erosion during and after application of topsoil and will employ the necessary measures to ensure the stability on graded slopes. Erosion control measures will include silt fences, berms, seeding, straw bales, soil roughening, and mulching of the soils.

Topsoil will be redistributed and the original soil surface beneath the topsoil stockpile will be roughened as presented in Section 242.100 and seeded with the seed mix described in Chapter 3, Section 352.

Methods used to evaluate success of revegetation and stabilization are discussed in Chapter 3, Section 356.

231.400 Construction, Modification, Use, and Maintenance of Topsoil Storage Pile

Topsoil removed from the drill pad sites will be stockpiled on the site. The estimated volumes of topsoil stockpile for each site are shown in Table 2-1. The stockpiles will be sized as shown in Table 2-2.

The slopes of the stockpile will be 1H:1V or approximately 45^0 during the construction phase. Soils in these areas generally have an angle of repose greater than 50 degrees, making a stockpile with 1:1 slopes feasible. The steeper slope also help minimize the area to be disturbed. When space is available topsoil will be stockpiled with slopes of 2H:1V.

TABLE 2-2

Topsoil Stockpile Dimensions*

Well No.	Length (ft)	Width (ft)	Height (ft)
G-1	55	35	16
G-2	156	50	20
G-3	70	60	17
G-4	110	35	17
G-5	90	65	21
G-6	105	30	13
G-7	80	70	6 to12

* These are approximate dimensions of the topsoil stockpile and construction dimensions may vary.

See Section 234.200 for detailed information on the topsoil stockpile(s).

232 Topsoil and Subsoil Removal

232.100 Topsoil Removal and Segregation

All topsoil will be removed as a single layer with no segregation. Topsoil will be removed using a dozer and/or loader. Refer to Section 231.100 for additional details.

232.200 Poor Topsoil

No poor soils exist at the well sites see Attachment 2-1.

232.300 Thin Topsoil

Not applicable see Attachment 2-1.

232.400 Minor Disturbances Not Requiring Topsoil Removal

Topsoil will not be removed along the fence line at the wells sites.

232.500 Subsoil Segregation

The B and C soil horizons will not be removed. Any small quantity of subsoil removed with the topsoil will not be segregated.

232.600 Timing

Topsoil removal will take place after all vegetation that could interfere with salvaging the topsoil has been grubbed.

232.700 Topsoil and Subsoil Removal Under Adverse Conditions

The topsoil will be removed first and stockpiled and the remaining soil horizons will be left in place, except where natural conditions render removal operations hazardous or detrimental to soils outside the disturbed area then topsoil will not be removed.

Conventional Machines - In locations where steep grades, adverse terrains, severe rockiness, limited depth of soils, or other adverse conditions exist that render soil removal activities using conventional machines hazardous, soils will not be salvaged and stockpiled. Such conditions are not likely to occur in these areas.

Substitute Topsoil - Importing of substitute topsoil is not anticipated (Section 224).

233 Topsoil Substitutes and Supplements

233.100 Overburden Materials Supplementing and/or Replacing Topsoil

No overburden material will be used.

233.200 Suitability of Topsoil Substitutes and Supplements

No substitute topsoil is planned.

233.300 Physical and Chemical Analysis

See Section 243.

233.400 Testing of Substitute Topsoil

No substitute topsoil is planned.

234 Topsoil Storage

234.100 Topsoil Stockpiling

Topsoil will be stockpiled for later use in reclamation operations. During the construction of the Pace Canyon Fan it may become necessary to store topsoil at Degas Well Site G-3. The topsoil will be stored and treated as outlined in Section 234 of this amendment. Refer to Sections 231 through 234 of the M&RP for additional information pertaining to the topsoil at the Pace Canyon Fan site.

234.200 Topsoil Stockpile

Stable Stockpile Site - Stockpiled material will be placed on a stable site.

Protection from Contaminants and Compaction - To protect the topsoil from contaminants and unnecessary compaction that could interfere with vegetation, the stockpile will be isolated from the main surface area by a berm and/or silt fence. A sign designating "topsoil" will be installed on the stockpile.

The topsoil stockpile will be constructed in such a manner as to allow access for repair of the pile surfaces and diversion structures.

Wind and Water Erosion Protection - The topsoil stockpile will be protected from water erosion by berms, which trap sediment runoff from the stockpile. The berms have been designed to completely contain the 10-year 24-hour storm event (see Attachment 7-1). The stockpile will be

surface pitted, gouged and/or roughened and revegetated using the grass seeds listed in Table 3-2 to prevent wind erosion.

Topsoil Redistribution - Stockpile soil will not be moved until redistribution during contemporaneous or final reclamation operations unless approved by the Division.

234.300 Topsoil Stockpile Relocation

Stockpiled soil in jeopardy of being detrimentally affected in terms of its quantity and quality by drilling operations may be temporarily redistributed or relocated on approval by the Division and modification of this M&RP.

240 RECLAMATION PLAN

241 General Information

Reclamation of the degassification sites (topsoil redistribution, amendments, and stabilization) is discussed in Sections 242, 243, and 244 respectively.

242 Soil Redistribution

242.100 Soil Redistribution Practices

The topsoil will be placed after recontouring of the site has occurred. Topsoil will be handled when they are loose or in a friable condition. The moisture content will be visually monitored and water will be added as needed to enhance the soil's condition for handling. The approximate amount of topsoil available for each site is shown in Table 2-1. The reclamation time line can be found on Figure 5-15 for sites G-2 and G-3 and on Figure 5-26 for sites G-4, G-5, G-6 and G-7.

The topsoil will be distributed in two phases at well site G-1, G-2 and G-3, the first phase will be the contemporaneous reclamation of a portion of the pad area used during well construction (see Figures 5-4, 5-8 and 5-12). During contemporaneous reclamation topsoil from the stockpile will be distributed on each site in the depths shown in Table 2-3.

Final reclamation will occur at all well sites after venting of the methane gas is complete, venting equipment has been removed and the well has been plugged. The topsoil stockpile storage area and access road (G-2 and G-5) will be reclaimed during this final phase. The access roads to G-1, G-3, G-4, G-6 and G-7 are pre-existing and will not be reclaimed. Refer to Section 341 for additional information.

Soil Thickness - The topsoil will be distributed during contemporaneous and final reclamation in the thickness shown in Table 2-3.

TABLE 2-3

Approximate Topsoil Distribution Thickness

Well Site No.	Topsoil Thickness (Inches)
G-1	7
G-2	30
G-3	12
G-4	28
G-5	22
G-6	12
G-7	12

Compaction - Prior to the application of topsoil, compacted subsoils will be roughened or loosened for a depth of 18 to 24 inches. To prevent compaction of topsoil, soil moving equipment will refrain from unnecessary operation over spread topsoil. The topsoil will be in a loosened condition prior to seeding.

Following the drying of the mud pit materials, the dirt excavated to create the mud pit will be mixed with the drill cutting and returned to the pit to prevent a boundary of hard material from forming in the mud pit area that would hamper root penetration and then compacted to minimize settling.

Erosion - Care will be exercised to ensure the stability of topsoil on graded slopes to guard against erosion during and after topsoil application. Post reclamation (contemporaneous and final) erosion control measures will be surface roughing, mulching and seeding.

242.200 Regrading

The areas will be graded to their approximate original topographic configuration.

242.300 Topsoil Redistribution on Impoundments and Roads

The mud pits will be dismantled and filled following completion of drilling. See Section 242.100, Compaction for additional information. Mud pits will be covered with the same amount of topsoil as the rest of the site. The roads existing prior to starting the drilling program will not be reclaimed. Access roads built to allow entrance to the drilling pads will be reclaimed and will receive topsoil in the same depth as their corresponding pad areas when methane venting is complete.

243 Soil Nutrients and Amendments

The soils will be analyzed directly following salvage to determine if amendments are needed. Testing of the topsoil will be done according to Table 6 of the Division's Topsoil and Overburden Guidelines. The topsoil will be tested at a minimum for the following parameters: pH, electrical conductivity, total carbon, SAR, water holding capacity, plant available nitrogen, and phosphorus. Results of these analyses will be incorporated into Attachment 2-2.

244 Soil Stabilization

244.100 Protection and Stabilization of Surface Area

All reclaimed areas will be stabilized to control erosion by application of mulch, tackifier, and roughening of the surface. The areas will be graded to the approximately original topographic configuration. Seeding will be accomplished with the application of seeds and mulch with a long fiber tackifier or broadcast. Methods of protection and stabilization are further discussed in Chapter 3, Section 341.

244.200 Mulch Application

Mulch/tackifier will be applied to stabilize the soil on all areas that have been regraded and covered with growth media. For further discussion of revegetation practices to be utilized, see Chapter 3, Section 341.

244.300 Rills and Gullies

Postmining Land Use and Revegetation - Rills and gullies that are approximately nine (9) inches in depth and disrupt the postmining land use or reestablishment of vegetative cover will be regraded and seeded.

Water Quality - There are no streams immediately adjacent to the well sites.

250 PERFORMANCE STANDARDS

251 Topsoil, Subsoil, and Topsoil Supplements Management

All topsoil, subsoil, and topsoil supplements will be managed as outlined in Sections 230 and 240.

252 Stockpiled Topsoil and Subsoil

All stockpiled topsoil and subsoil will be managed according to plans outlined in Sections 230 and 240.

ATTACHMENT 2-1

SOIL INVENTORY AND ASSESSMENT

add to the back of existing information

United States Department of Agriculture

NRCS
Natural Resources Conservation Service
350 N. 400 E.
Price, UT 84501
(435) 637-0041
FAX (435) 637-3146

NRCS Utah

November 8, 2004

Ms Vicky Miller
Canyon Fuel Company, LLC
Dugout Canyon Mine
P.O. Box 1029
Wellington, UT 84542

Re: Production estimates and soils information for Proposed Degas Well G-7, as well as proposed surface facilities within Pace Canyon (T 13S., R 13E., Sec 30 N1/2 of the NW1/4).

Ms. Miller,

Following our meetings regarding the two above mentioned locations, I have collection Ecological Site Description (ESD) data for the different locations as well as the NRCS Non Technical Soil Descriptions for the areas of concern. As we have discussed, as weather conditions have made the area impassible, onsite visits were not possible this year. However, I vividly recall the areas as I conducted productions estimates for degas wells G-1 – G-6 the previous year. I have included the following information for your review:

- **Proposed Degas well G-7**
  - *ESD*: "Mountain Shallow Loam (Mountain Big Sagebrush)" Based off of field visits throughout the 2004 growing season and precipitation amounts received, I have concluded that the area would have experienced average production. Please review page 4 of the "Mountain Big Sagebrush" ESD for production estimates for the site.
  - Non Technical Soil Descriptions "Beji-Trag Complex"

- **Proposed Surface Facilities in Pace Canyon**
  - *Western facing slopes ESD*: "High Mountain Loam (Aspen)" Based off normal year with a "medium canopy cover class", refer to page 3 of the "Aspen" ESD for production estimates for the site.
  - *Eastern facing slopes ESD*: "Upland Very Steep Stony Loam (Pinyon/Utah Juniper)" Based off an average year for production, refer to page 4 of "Pinyon/Utah Juniper" ESD for production estimates.

- Although much of the area has been previously disturbed I have also included the Non Technical Soil Descriptions for "Croydon Loam, 8-30 Percent Slopes", "Podo-Rock Outcrop Complex", "Rock Outcrop-Rubbleland-Travessilla Complex".

If you have any questions or comments please feel free to contact me at any time.

Sincerely,

M. Dean Stacy
Range Management Specialist

CC: Tim Julander, Acting District Conservationist
Gary Roeder, Area Resource Conservationist
file

NRCS Natural Resources Conservation Service

NRCS Utah

United States Department of Agriculture

Natural Resources Conservation Service

Price Office
350 North 400 East
Price, Utah
84501

Phone:
435 637-0041

FAX
435 637-3146

December 3, 2004

Ms Vicky Miller
Dugout Canyon Mine
P.O. Box 1029
Wellington, Utah 84542

DEC 10 2004

RE: Soils (prime farmland) for Proposed Degas Well G-7, and surface facilities within Pace Canyon (T 13S., R13E., Sec 30 N1/2 of the NW1/4).

Dear Ms. Miller

After a site visit the Natural Resources Conservation Service has determined that there are no prime farmlands in the site area because the soils contain more than 10 percent surface rock fragments or the site has already been converted to non agricultural purposes or the percent slope x K (erodibility factor) exceeds 2.

If you need any further assistance please let us know.

Leland Sasser

Leland Sasser NRCS Soil Scientist

Cc: Michael J. Domeier State Soil Scientist

FIELD OFFICE TECHNICAL GUIDE: SECTION IIE
LOCATION: MLRA 047A
AREA:
STATE: UTAH

FORESTLAND SITE DESCRIPTION

FOREST SITE NAME: HIGH MOUNTAIN LOAM (ASPEN)

FOREST SITE NUMBER: 047AY508UT

ORIGINAL DATE: 08/23/1993

AUTHOR'S INITIALS: DLT TW

Pace Canyon
Surface Facilities

A. FOREST CHARACTERISTICS

1. FOREST COMMUNITY TYPE

Overstory: QUAKING ASPEN (POPULUS TREMULOIDES)

Understory: MOUNTAIN BROME, SLENDER WHEATGRASS

Site Index: 40 to 50

2. ENVIRONMENT

THIS SITE OCCURS ON GENTLY SLOPING TO STEEP MOUNTAIN SLOPES OF 5 TO 10 PERCENT, BUT MOSTLY 5 TO 40 PERCENT. ELEVATION RANGES FROM 6200 TO 9500 FEET. IT IS FOUND ON ALL EXPOSURES BUT IS PRIMARILY ON THE NORTH AND EAST AT 6200 TO 7500 FEET. THE AVERAGE ANNUAL PRECIPITATION IS 25 TO 35 INCHES, THE MEAN ANNUAL AIR TEMPERATURE IS 36 TO 46 DEGREES F, AND THE MEAN SOIL TEMPERATURE IS 38 to 48 DEGREES F. THE FROST-FREE PERIOD IS 30 TO 80 DAYS. SITE INDEX OF ASPEN IS BASED ON AN 80-YEAR GROWTH CYCLE.

REFERENCES:
MUEGGLER, WATLER F., 1988 ASPEN COMMUNITY TYPES OF THE INTER-MOUNTAIN REGION, GENERAL TECHNICAL REPORT, INT-250, PAGE 20, POTR/TALL/FORB
NEVADA SOIL CONSERVATION SERVICE FOREST SUITABILITY GROUP DESCRIPTION 028BY067NV

3. SOILS

SOILS ARE DEEP AND WELL DRAINED. SURFACE LAYERS ARE DARK 14 TO 26 INCHES THICK. THE SURFACE LAYERS ARE MAINLY LOAM, SILT LOAM, OR CLAY LOAMS AND IN PLACES ARE STONY, GRAVELLY, COBBLY, OR VERY COBBLY. THE SUBSOIL AND SUBSTRATUM ARE MAINLY LOAM, CLAY LOAM, SILTY CLAY LOAM, OR CLAY, AND ARE STONY, COBBLY, OR GRAVELLY. THEY ARE GENERALLY SLIGHTLY ACID TO VERY STRONGLY ACID. THEY FORMED ON GENTLY SLOPING TO VERY STEEP MOUNTAIN SLOPES IN MATERIAL WEATHERED FROM SANDSTONE, SHALE, LIMESTONE, QUARTZITE, AND IGNEOUS ROCKS. THE SURFACE HAS

INCH LAYER OF LEAVES, TWIGS, AND DUFF. THE AMOUNT OF ROCK IS VARIABLE IN THE PROFILE. INTAKE RATE IS MODERATE TO RAPID AND WATER MOVEMENT THROUGH THE SOIL IS MODERATE TO SLOW. ROOTS PENETRATE THE SOIL READILY. WATER HOLDING CAPACITY IS HIGH AT 10 TO 14 INCHES FOR A 6-FOOT PROFILE. WATER SUPPLYING CAPACITY IS 16 TO 30 INCHES.

LIST OF SOIL TAXONOMIC UNITS OR SOILS MAPPING UNITS FOR ALL SOILS INCLUDED IN THIS SITE:

ERCAN FAMILY GR-L 25-60%
BAIRD HOLLOW L 6-60%
MULT L CL CB-L 5-40%
CROYDON L 30-60%
LUCKY STAR SIL 15-60%
SCAVE L 15-60%
YELJACK L, NORTH 10-30%
SKUTUM L 8-50%
HAILMAN L, CB-L 6-60%
ROUNDY L, CB-L 5-60%
FLYGARE L 30-60%
RICHENS L 3-15%
RED SPUR L 10-30%

4. NATURE OF THE FOREST COMMUNITY

a.

QUAKING ASPEN IS THE DOMINANT OVERSTORY PLANT. OVERSTORY TREE CANOPY COVER WILL VARY FROM 25 TO 70 PERCENT, BUT IS MOST COMMON FROM 40 TO 55 PERCENT. SHADE TOLERANT PLANTS SUCH AS BLUE WILDRYE, BEARDED WHEATGRASS, MOUNTAIN BROME, NODDING BLUEGRASS, SWEETANICE, MEADOWRUE, AND EDIBLE VALERIAN ARE THE DOMINANT UNDERSTORY SPECIES.

b. Productivity Rating of Major Understory Species:

Productivity Rating Index: This rating provides an index to the relative importance of species in the understory community as affected by overstory canopy cover.

PRODUCTIVITY INDEX

1	Always present:	MORE THAN 50% OF TOTAL UNDERSTORY PRODUCTION
2	Always present:	25 TO 50% OF TOTAL UNDERSTORY PRODUCTION
3	Generally present:	10 TO 24% OF TOTAL UNDERSTORY PRODUCTION
4	Frequently present:	5 TO 9 % OF TOTAL UNDERSTORY PRODUCTION
5	Occasionally present:	1 TO 5% OF TOTAL UNDERSTORY PRODUCTION
6	Rarely present:	LESS THAN 1% OF TOTAL UNDERSTORY PRODUCTION

FOREST SITE NAME: HIGH MOUNTAIN LOAM (ASPEN)
FOREST SITE NUMBER: 047AY508UT

Plant Symbol	Plant Name	OVERSTORY CANOPY CLASS 0-10%	11-20%	21-35%	36-60%
BRCA5	MOUNTAIN BROME	3	3	2	1
ELGL	BLUE WILDRYE	3	3	2	1
ELTR7	SLENDER WHEATRASS	3	3	3	2
PORE	NODDING BLUEGRASS	3	2	2	2
CAGE2	GEYER SEDGE	3	3	2	2
STNE3	COLUMBIA NEEDLEGRASS	4	3	3	3
POPR	KENTUCKY BLUEGRASS	3	3	3	3
LALA3	THICKLEAF PEAVINE	3	3	2	2
VAED	TOBACCO ROOT	4	3	2	1
OSOC	SWEETANICE	4	3	2	1
AGUR	NETTLELEAF GIANT HYSSOP	4	4	3	2
THFE	FENDLER MEADOWRUE	4	3	2	1
SYOR2	MOUNTAIN SNOWBERRY	4	3	2	2
MARE11	CREEPING OREGON GRAPE	4	4	3	2
PRVI	CHOKECHERRY	6	5	5	4

c. Total Average Understory Production by Overstory Canopy Class:

	CANOPY COVER CLASS Open 0-10%	Sparse 11-20%	Medium 21-35%	Dense 36-60%
	lbs/acre (air - dry weight			
Favorable Years	1700	1300	800	600
Normal Years	1200	900	600	400
Unfavorable Years	900	600	400	200

d. Major Sucessional Stages of Forest Development:

HERBACEOUS:

VEGETATION IS DOMINATED BY GRASSES AND FORBS UNDER FULL SUNLIGHT. THIS STAGE IS EXPERIENCED AFTER A MAJOR DISTURBANCE SUCH AS CROWN FIRE OR TREE HARVEST. SKELETON FOREST (DEAD TREES) REMAINING AFTER FIRE OR RESIDUAL TREES LEFT FOLLOWING HARVEST HAVE LITTLE OR NO AFFECT ON THE COMPOSITION AND PRODUCTION OF THE HERBACEOUS VEGETATION.

SHRUB-HERBACEOUS:

HERBACEOUS VEGETATION AND WOOD SHRUBS DOMINATE THE SITE. VARIOUS AMOUNTS OF TREE SEEDLINGS (LESS THAN 20 INCHES IN HEIGHT) MAY BE PRESENT UP TO THE POINT WHERE THEY ARE OBVIOUSLY A MAJOR COMPONENT OF THE VEGETAL STRUCTURE. QUAKING ASPEN IS VERY INTOLERANT OF SHADE. NATURAL PRUNING IS EXCELENT AND LONG, CLEAN STEMS ARE USUALLY PRODUCED WHEN SIDE SHADE IS PRESENT.

SAPLING:

IN THE ABSENCE OF DISTURBANCE, THE TREE SEEDLINGS DEVELOP INTO SAPLINGS (20 INCHES TO 4.5 FEET IN HEIGHT) WITH A RANGE IN CANOPY COVER OF ABOUT 5 TO 10 PERCENT. VEGETATION CONSISTS OF GRASSES, FORBS, AND SHRUBS IN ASSOCIATION WITH TREE SAPLINGS.

IMMATURE FOREST:

THE VISUAL ASPECT AND VEGETAL STRUCTURE ARE DOMINATED BY QUAKING ASPEN GREATER THAN 4.5 FEET IN HEIGHT. SEEDLINGS AND SAPLINGS ARE PRESENT IN THE UNDERSTORY. UNDERSTORY VEGETATION IS MODERATELY INFLUENCED BY A TREE OVERSTORY CANOPY OF ABOUT 10 TO 20 PERCENT.

MATURE FOREST:

THE VISUAL ASPECT AND VEGETAL STRUCTURE ARE DOMINATED BY QUAKING ASPEN THAT HAVE REACHED OR ARE NEAR MAXIMAL HEIGHTS FOR THE SITE. TREES HAVE DEVELOPED TALL, STRAIGHT, CLEAR STEMS WITH SHORT, HIGH ROUNDED CROWNS. TREE CANOPY COVER RANGES FROM 20 TO 40 PERCENT. UNDERSTORY VEGETATION IS STRONGLY INFLUENCED BY TREE COMPETITION, OVERSTORY SHADING, DUFF ACCUMULATION, ETC. FEW SEEDLINGS AND/OR SAPLINGS OF QUAKING ASPEN OCCUR IN THE UNDERSTORY.

Climax Forest:

IN THE ABSENCE OF WILDFIRE OR OTHER NATURALLY OCCURRING DISTURBANCES, THE TREE CANOPY ON THIS SITE CAN BECOME VERY DENSE. THIS STAGE IS DOMINATED BY QUAKING ASPEN THAT HAVE REACHED MAXIMAL HEIGHTS FOR THE SITE. TREES HAVE STRAIGHT, CLEAR STEMS WITH SHORT, HIGH ROUNDED CROWNS. UNDERSTORY VEGETATION IS SPARSE TO ABSENT DUE TO TREE COMPETITION, OVERSTORY SHADING, DUFF ACCUMULATION, ETC. TREE CANOPY COVER IS AT A MAXIMUM FOR THE SITE AND IS COMMONLY GREATER THAN 50 PERCENT.

5. PRODUCTIVE CAPACITY

Productivity Class: 1.0

CMAI: 16 to 21 cu ft/ac./yr

1.1 to 1.5 cu m/ha./yr

Fuelwood Production:

8 TO 10 CORDS PER ACRE PER YEAR. FIREWOOD IS COMMONLY MEASURED BY CORDS OR A STACKED UNIT EQUIVALENT TO 128 CUBIC FEET. ASSUMING AN AVERGE OF 90 CUBIC FEET OF SOLID VOLUME WOOD PER CORD, THERE ARE ABOUT 196,400 BRITISH THERMAL UNITS (BTU'S) PER CUBIC FOOT OR ABOUT 17 MILLION BTU'S OF HEAT VALUE IN A CORD OF QUAKING ASPEN.

SAW TIMBER: 200 TO 300 BOARD-FEET PER ACRE PER YEAR.

6. WATERSHED

THE SOILS ARE IN HYDROLOGIC GROUPS B AND C. THE RUNOFF CURVE NUMBERS ARE 61 TO 86 DEPENDING ON THE OVERALL WATERSHED CONDITION.

7. WILDLIFE

WILDLIFE SPECIES SEEKING FOOD AND COVER IN THIS FOREST SITE INCLUDE MOOSE, ELK, MULE DEER, BEAR, PORCUPINE, SHOWSHOE HARE, OWL, AND WOODPECKER.

8. THREATENED AND ENDANGERED SPECIES

THIS SECTION WILL BE COMPLETED AS INFORMATION IS AVAILABLE.

9. LIMITATIONS AND CONSIDERATIONS

A. POTENTIAL FOR SHEET AND RILL EROSION IS MODERATE TO SEVERE DEPENDING ON SLOPE.

B. MODERATE TO SEVERE EQUIPMENT LIMITATIONS ON WET SOILS DURING CRITICAL TIMES OF THE YEAR.

C. PROPER SPACING IS THE KEY TO A WELL MANAGED, MULTIPLE USE AND MULTI-PRODUCT ASPEN FOREST.

10. ESSENTIAL REQUIREMENTS

A. ADEQUATELY PROTECT FROM HIGH INTENSITY WILDFIRE.

B. PROTECT SOILS FROM ACCELERATED EROSION.

C. APPLY PROPER GRAZING MANAGEMENT PRACTICES (SEE MANAGEMENT GUIDES).

11. SILVICULTURAL PRACTICES

A. HARVEST CUT SELECTIVELY OR IN SMALL PATCHES (SIZE DEPENDENT UPON SITE CONDITIONS) TO ENHANCE FORAGE PRODUCTION.

1. THINNING AND IMPROVMENT CUTTING--REMOVAL OF POORLY FORMED, DISEASED, AND LOW VIGOR TREES FOR FUELWOOD.

2. HARVEST CUTTING--SELECTIVELY HARVEST SURPLUS TREES TO ACHIEVE DESIRED SPACING. HARVEST STANDS IN SMALL BLOCKS OF 1/5 TO 1/2 ACRE WITH SLASH LEFT IN PLACE TO SHELTER EMERGING ASPEN SUCKERS FROM BROWSING.

3. SPACING GUIDE: A SPACING OF ABOUT 15 X 15 FEET IS CONSIDERED DESIRABLE FOR MULTIPLE USE MANAGEMENT DURING PERIOD OF STAND MATURITY.

B. SELECTIVE TREE REMOVAL ON SUITABLE SITES TO ENHANCE FORAGE PRODUCTION AND MANAGE SITE REPRODUCTION.

12. FORAGE PRODUCTS

a. Livestock Grazing

THIS SITE IS SUITED TO CATTLE AND SHEEP GRAZING DURING THE SUMMER AND FALL. LIVESTOCK WILL OFTEN CONCENTRATE ON THIS SITE TAKING ADVANTAGE OF THE SHADE AND SHELTER OFFERED BY THE TREE OVERSTORY. GRAZING MANAGEMENT SHOULD ALLOW ASPEN SAPLINGS TO ATTAIN A MINIMUM HEIGHT OF 55 TO 60 INCHES BEFORE USE TO PREVENT DESTRUCTIVE BROWSING BY LIVESTOCK. HARVESTING TREES UNDER A SOUND MANAGEMENT PROGRAM FOR FUELWOOD OR OTHER PRODUCTS CAN OPEN UP THE TREE CANOPY TO ALLOW INCREASED PRODUCTION OF UNDERSTORY SPECIES DESIRABLE FOR GRAZING WHILE REJUNEVATING THE ASPEN FOREST.

b. Initial Stocking Rates

STOCKING RATES VERY WITH SUCH FACTORS AS KIND AND CLASS OF GRAZING ANIMAL, SEASON OF USE AND FLUCTUATIONS IN CLIMATE. ACTUAL USE RECORDS FOR INDIVIDUAL SITES, TOGETHER WITH A DETERMINATION OF THE DEGREE TO WHICH THE SITES HAVE BEEN GRAZED AND AN EVALUATION OF TREND IN SITE CONDITION, OFFER THE MOST RELIABLE BASIS FOR DEVELOPING INITIAL STOCKING RATES.

SELECTION OF AN INITIAL STOCKING RATES FOR GIVEN GRAZING UNITS IS A PLANNING DECISION. THIS DECISION SHOULD BE MADE ONLY AFTER CAREFUL CONSIDERATION OF THE TOTAL RESOURCES AVAILABLE, EVALUATION OF ALTERNATIVES FOR USE AND TREATMENT, AND ESTABLISHMENT OF OBJECTIVES BY THE DECISIONMAKER.

c. Forage Value Rating

Plant Symbol	Common Name	Relative Forage Value to: Cattle	Horses	Sheep	Deer
BRCA5	MOUNTAIN BROME	P	P	D	D
ELGL	BLUE WILDRYE	P	P	D	D
ELTR7	SLENDER WHEATGRASS	P	P	D	D
PORE	NODDING BLUEGRASS	P	P	P	D
CAGE2	GEYER SEDGE	P	P	U	D
STNE3	COLUMBIA NEEDLEGRASS	P	P	D	D
POPR	KENTUCKY BLUEGRASS	P	P	P	P
LALA3	THICKLEAF PEAVINE	P	D	P	P
VAED	TOBACCO ROOT	D	U	P	P
OSOC	SWEETANICE	D	D	P	P
GABO2	NORTHERN BEDSTRAW	U	U	D	D
RUOC2	WESTERN CONEFLOWER	U	U	P	D
SESE2	BUTTERWEED	U	U	P	D
AGUR	NETTLELEAF GIANT HYSSOP	D	D	P	U
THFE	FENDLER MEADOWRUE	U	U	D	D

FIELD OFFICE TECHNICAL GUIDE: SECTION II E
LOCATION: MLRA 034
AREA:
STATE: UTAH

RANGE SITE DESCRIPTION

RANGE SITE NAME: UPLAND VERY STEEP STONY LOAM (PINYON UTAH JUNIPER)

RANGE SITE NUMBER: 034XY344UT

ORIGINAL DATE: 05/15/1981

REVISION DATE: 01/13/1994

AUTHOR'S INITIALS: JLB GWL

I. SOIL NARRATIVE:

THIS SITE OCCURS ON BACKSLOPES IN MOUNTAIN CANYONS. THE SOIL IS 20 TO 40 INCHES DEEP AND WELL DRAINED. IT FORMED IN COLLUVIUM AND RESIDUUM DERIVED MAINLY FROM SANDSTONE AND SHALE. THE SURFACE HORIZON IS A MOLLIC EPIPEDON 7 TO 8 INCHES THICK. THE ROOT ZONE IS 15 TO 18 INCHES THICK. THE AVAILABLE WATER CAPACITY IS 0.06 TO 0.12 INCHES PER INCH. FIFTY TO 70 PERCENT OF THE SOIL SURFACE IS COVERED BY ROCK FRAGMENTS. AVERAGE ANNUAL SOIL LOSS IN POTENTIAL IS APPROXIMATELY 3 TONS PER ACRE. AVERAGE ANNUAL PRECIPITATION IS 14 TO 16 INCHES. APPROXIMATELY 60 PERCENT OCCURS AS RAIN FROM MARCH THROUGH OCTOBER. MUCH OF THIS SUMMER PRECIPITATION OCCURS AS CONVECTION THUNDERSTORMS. ON THE AVERAGE, NOVEMBER THROUGH FEBRUARY ARE THE DRIEST MONTHS AND JULY THROUGH OCTOBER ARE THE WETTEST MONTHS. THE SOIL TEMPERATURES ARE IN THE MESIC AND FRIGID REGIMES. THE AVERAGE FREEZE-FREE PERIOD IS 90 TO 110 DAYS. IN AVERAGE YEARS, PLANTS BEGIN GROWTH AROUND MARCH AND APRIL AND END GROWTH IN OCTOBER. PLANTS USUALLY REMAIN GREEN UNTIL FROST IN OCTOBER EXCEPT IN DRIER THAN AVERAGE YEARS. THERE IS USUALLY AN ACTIVE GREENUP PERIOD IN THE FALL. THE MOST RAPID GROWTH OCCURS DURING APRIL, MAY, AND JUNE.

II. LIST OF SOIL TAXONOMIC UNITS OR SOILS MAPPING UNITS FOR ALL SOILS INCLUDED IN THIS SITE:

WHETROCK STX-L DRY 50-90% ERODED CABBA FAMILY 40-70%
STRYCH STVL-L 50-70%

III. LANDSCAPE FACTORS

A. PHYSIOGRAPHY:

1. ELEVATION/ASPECT:

LOW 4400 ft / ALL HIGH 7600 ft / ALL

2. PERCENT SLOPE:

LOW 50 HIGH 90

RANGE SITE NAME: UPLAND VERY STEEP STONY LOAM (PINYON-UTAH JUNIPER)
RANGE SITE NUMBER: 034XY344UT

IV. CLIMATE FACTORS

A. FREEZE-FREE PERIOD (FFP): 90 TO 110 (DAYS)

B. FROST-FREE PERIOD: 0 TO 0 (DAYS)

C. MEAN ANNUAL PRECIPITATION (MAP): 14 TO 16 (INCHES)

D. MEAN ANNUAL AIR TEMPERATURE (MAAT): 42 TO 44 (F)

E. MEAN ANNUAL SOIL TEMPERATURE (MAST): 45 TO 47 (F)

F. MOISTURE AND TEMPERATURE DISTRIBUTION:

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
- PPT -												
HIGH	0.00	0	0	0	0	0	0	0	0	0	0	0
MEAN	0.47	0.89	1.36	1.10	1.29	1.32	1.28	0.93	1.90	1.12	1.16	0.72
LOW	0.00	0	0	0	0	0	0	0	0	0	0	0
- TEMP -												
HIGH	30	36	48	60	67	78	83	83	72	60	44	32
MEAN	17	24	36	46	53	63	69	68	58	48	33	21
LOW	4	12	24	33	39	48	54	53	45	35	22	9

V. VEGETATION FACTORS - CLIMAX PLANT COMMUNITY

A. RANGE SITE DESCRIPTION NARRATIVE:

THE DOMINANT ASPECT OF THIS SITE IS PINYON AND JUNIPER. THE UNDERSTORY COMPOSITION BY AIR-DRY WEIGHT IS 40 PERCENT PERENNIAL GRASSES, 10 PERCENT FORBS, AND 50 PERCENT SHRUBS.

B. PERCENT COVER:

1. GROUND COVER AND STRUCTURE:

	% CANOPY COVER (VERTICAL VIEW)	AVERAGE HEIGHT (FT)	% BASAL AREA COVER
GRASSES AND GRASSLIKES	20	2.00	10
FORBS	5	1.00	2
CRYPTOGAMS	0	0	0
SHRUBS	30	5.00	15
TREES	25	12.00	10

RANGE SITE NAME: UPLAND VERY STEEP STONY LOAM (PINYON-UTAH JUNIPER)
RANGE SITE NUMBER: 034XY344UT

C. Plant community composition and production:

1. Herbaceous

a. Grasses and grasslikes

National Symbol	Common Name	Grp	% Composition by weight	Group % Allowable
ORHY	INDIAN RICEGRASS	0	10 to 15	0 to 0
STCO4	NEEDLEANDTHREAD	0	5 to 10	0 to 0
PSSP6	BLUEBUNCH WHEATGRASS	0	5 to 10	0 to 0
LESAS	SALINA WILDRYE	0	3 to 5	0 to 0
BOGR2	BLUE GRAMA	1	1 to 3	3 to 5
CAGE2	GEYER SEDGE	1	1 to 3	3 to 5
POFE	MUTTONGRASS	1	1 to 3	3 to 5
PPGG	OTHER PERENNIAL GRASSES	1	3 to 5	3 to 5
AAGG	OTHER ANNUAL GRASSES	1	3 to 5	3 to 5

b. Forbs

National Symbol	Common Name	Grp	% Composition by weight	Group % Allowable
EROV	CUSHION WILD BUCKWHEAT	2	3 to 5	10 to 15
SIOF	HEDGE MUSTARD	2	3 to 5	10 to 15
MAGR2	GUMWEED TANSYASTER	2	3 to 5	10 to 15
CRFL5	PLATEAU YELLOW CATSEYE	2	3 to 5	10 to 15
PEPA6	THICKLEAF BEARDTONGUE	2	3 to 5	10 to 15
PHHO	CARPET PHLOX	2	3 to 5	10 to 15
PPFF	OTHER PERENNIAL FORBS	2	10 to 15	10 to 15
AAFF	OTHER ANNUAL FORBS	2	10 to 15	10 to 15

2. Shrubs

National Symbol	Common Name	Grp	% Composition by weight	Group % Allowable
CEMO2	BIRCHLEAF MOUNTAINMAHOGANY	0	15 to 20	0 to 0
AMAL2	SASKATOON SERVICEBERRY	0	5 to 10	0 to 0
EPVI	MORMONTEA	0	3 to 5	0 to 0
ERMI4	SLENDER WILD BUCKWHEAT	0	3 to 5	0 to 0
ARNO4	BLACK SAGEBRUSH	0	3 to 5	0 to 0
OPPO	CENTRAL PRICKLYPEAR	3	1 to 3	3 to 5
ARTRT	BASIN BIG SAGEBRUSH	3	1 to 3	3 to 5
SSSS	OTHER SHRUBS	3	3 to 5	3 to 5

3. Trees

National Symbol	Common Name	Grp	% Composition by weight	Group % Allowable
PIED	PINYON	0	12 to 15	0 to 0
JUOS	UTAH JUNIPER	0	3 to 5	0 to 0

5. Production

Grasses and grasslikes: 35 to 45 % of total

Forbs: 10 to 15 % of total

Shrubs: 40 to 50 % of total

Trees: 10 to 20 % of total

Lichen community: 0 lbs/acre (NOT ANNUAL PRODUCTION)

Moss community: 0 lbs/acre

6. Cover

Lichen community: 0 % cover

Moss community: 0 % cover

VI. PLANT GROWTH CURVES

ID	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
NUMBER: UT3441	0	0	0	10	30	45	5	5	5	0	0	0

NAME: PNC
DESC: EXCELLENT CONDITION

VII. TOTAL ANNUAL PRODUCTION (EXCELLENT CONDITION)

FAVORABLE	700	TO	800
AVERAGE	500	TO	600
UNFAVORABLE	300	TO	400

IX. PLANT COMMUNITY DYNAMICS:

THIS SITE RECEIVES VERY LITTLE OR NO GRAZING BY LIVESTOCK BECAUSE OF STEEP SLOPES. WHEN THE POTENTIAL NATURAL PLANT COMMUNITY IS BURNED, PINYON, JUNIPER, AND BIRCHLEAF MOUNTAINMAHOGANY DECREASE WHILE SERVICEBERRY AND SALINA WILDRYE INCREASE.

X. ASSOCIATED SITES

Sites that occur in association with this site:

SITE NUMBER: 034XY338UT
SITE NAME: UPLAND VERY STEEP LOAM (PINYON UTAH JUNIPER)

RANGE SITE NAME: UPLAND VERY STEEP STONY LOAM (PINYON-UTAH JUNIPER)
RANGE SITE NUMBER: 034XY344UT

XII. LIVESTOCK VALUES

BECAUSE OF STEEP SLOPES THIS SITE IS GRAZED LITTLE OR NONE BY LIVESTOCK.

XIII. WOOD PRODUCT VALUES

THIS SITE PRODUCES FIRE WOOD, POSTS, AND CHRISTMAS TREES. THE SITE INDEX IS 24.

XIV. WILDLIFE SPECIES LIST

a. Site factors influencing wildlife species:

THIS SITE PRODUCES FOOD AND COVER FOR WILDLIFE.

b. Guide to site use by selected wildlife species:

WILDLIFE USING THIS SITE INCLUDE JACKRABBIT, WOODRAT, PINYON JAY, COYOTE, MULE DEER, AND ELK.

XV. WATERSHED VALUES

THE SOIL IS IN HYDROLOGIC GROUP C. THE RUNOFF CURVE NUMBERS ARE 74 THROUGH 86 DEPENDING ON THE CONDITION OF THE WATERSHED.

XVI. RECREATION AND NATURAL BEAUTY VALUES

THIS SITE HAS AESTHETIC APPEAL BUT VERY LITTLE RECREATION POTENTIAL.

XVII. THREATENED AND ENDANGERED PLANTS

THIS SECTION WILL BE ADDED AS INFORMATION IS AVAILABLE.

XVIII. ARCHAEOLOGICAL VALUES

THIS SECTION WILL BE ADDED AS INFORMATION IS AVAILABLE.

RANGE SITE NAME: UPLAND VERY STEEP STONY LOAM (PINYON-UTAH JUNIPER)
RANGE SITE NUMBER: 034XY344UT

APPENDIX I

Reference Data

1. Site Documentation (number and kind of site inventory records)

0	SCS-ECS-5	0	STATE-ECS-FORM
0	SCS-RANGE-417	0	BLM FORM
0	OTHER		

2. Distribution and extent.

County	State
ROOSEVELT FO	UTAH
PRICE FO	UTAH

3. Location of typical example of this site.

7600' N 400'W OF SE CORNER OF T 16 S R 17 E

Approved by: /s/ Pat L. Shaver
STATE RANGE CONSERVATIONIST
SCS UTAH

Date Approved: June 25, 1994

Approved by: /s/ Pat L. Shaver
WNTC RANGE CONSERVATIONIST
SCS WNTC PORTLAND OR

Date Approved: July 25, 1994

RANGE SITE NAME: UPLAND VERY STEEP STONY LOAM (PINYON-UTAH JUNIPER)
RANGE SITE NUMBER: 034XY344UT

APPENDIX II

1. Soil taxonomic unit representative of this site:

   Soil Taxon

   WHETROCK STX-L DRY 50-80% ERODED

   Soil Survey Area Number

   047

   Taxonomic Classification

   LOAMY-SKELETAL, MIXED ARIDIC CALCIBOROLLS

2. Type location for soils taxonomic unit representative of this site:

   MEASURED FROM THE CORNER OF THE TOWNSHIP AND RANGE

Non Technical Soil Description(s) (NASIS derived)

Soil Survey Area **UT616** **Carbon Area, Utah, Parts of Carbon and Emery Counties**

Mapunit 21 **CROYDON LOAM,8 TO 30 PERCENT SLOPES**

Soil Component Name CROYDON 90 % of the mapunit

Slope range (%): 8 to 30 Depth class: Deep Drainage class: Well drained

Permeability: Slow Available water capacity class: Moderate

Average total available water in top five feet (in.): 8.1

Land capability subclass, non-irrigated: 6c Land capability subclass, irrigated: Not rated

Ecological Site: High Mountain Loam (Aspen)

Runoff class: Not Rated Depth to seasonal high water table: NA -

Flooding frequency: None Other restrictions (in): Bedrock (paralithic) 40 - 60

Horizon Information

	Depth (in)	Textures		pH range	Sodium	Salinity (mmhos/cm)
A11, A120	16			5.6 - 6.5	NA -	NA -
		L	loam			
A2	16 - 23			5.6 - 7.3	NA -	NA -
		L	loam			
321t, B2223	48			6.1 - 6.5	NA -	NA -
		CL	clay loam			
R	48 - 52			NA -	NA -	NA -
		WB	weathered bedrock			

pH classes: 3.5-4.4 extremely acid; 4.5-5.0 very strongly acid; 5.1-5.5 strongly acid; 5.6-6.0 moderately acid; 6.1-6.5 slightly acid; 6.6-7.3 neutral; 7.4-7.8 slightly alkaline; 7.9-8.4 moderately alkaline; 8.5-9.0 strongly alkaline; >9.0 very strongly alkaline.

Salinity classes (if applicable): 0-2 non saline; 2-4 very slightly saline; 4-8 slightly saline; 8-16 moderately saline; >=16 saline.

Non Technical Soil Description(s) (NASIS derived)

Soil Survey Area **UT616** **Carbon Area, Utah, Parts of Carbon and Emery Counties**

Mapunit 84 **PODO-ROCK OUTCROP COMPLEX**

Soil Component Name PODO 50 % of the mapunit

Slope range (%): 50 to 70 Depth class: Shallow Drainage class: Well drained

Permeability: Slow Available water capacity class: Very low

Average total available water in top five feet (in.): 0.9

Land capability subclass, non-irrigated: 8e Land capability subclass, irrigated: Not rated

Ecological Site: Upland Very Steep Shallow Loam (Pinyon-Utah Juniper)

Runoff class: Not Rated Depth to seasonal high water table: NA -

Flooding frequency: None Other restrictions (in): Bedrock (lithic) 8 - 20

Horizon Information

	Depth (in)	Textures		pH range	Sodium	Salinity (mmhos/cm)
A1	0 - 5			7.9 - 8.4	NA -	NA -
		BYV-SL	very bouldery sandy loam			
C1, C2	5 - 12			7.9 - 8.4	NA -	NA -
		GR-L	gravelly loam			
		GR-SL	gravelly sandy loam			
R	12 - 16			NA -	NA -	NA -
		UWB	unweathered bedrock			

pH classes: 3.5-4.4 extremely acid; 4.5-5.0 very strongly acid; 5.1-5.5 strongly acid; 5.6-6.0 moderately acid; 6.1-6.5 slightly acid; 6.6-7.3 neutral; 7.4-7.8 slightly alkaline; 7.9-8.4 moderately alkaline; 8.5-9.0 strongly alkaline; >9.0 very strongly alkaline.

Salinity classes (if applicable): 0-2 non saline; 2-4 very slightly saline; 4-8 slightly saline; 8-16 moderately saline; >=16 saline.

Soil Component Name ROCK OUTCROP **30 % of the mapunit**

Slope range (%): 50 to 70 Depth class: Shallow Drainage class: not rated

Permeability: Very slow Available water capacity class: Very low

Average total available water in top five feet (in.): 0.0

Land capability subclass, non-irrigated: 8s Land capability subclass, irrigated: Not rated

Ecological Site: None

Runoff class: Not Rated Depth to seasonal high water table: NA -

Flooding frequency: None Other restrictions (in): Bedrock (lithic) -

Horizon Information

	Depth (in)	Textures	pH range	Sodium	Salinity (mmhos/cm)
H1	0 - 60		NA -	NA -	NA -
		UWB unweathered bedrock			

pH classes: 3.5-4.4 extremely acid; 4.5-5.0 very strongly acid; 5.1-5.5 strongly acid; 5.6-6.0 moderately acid; 6.1-6.5 slightly acid; 6.6-7.3 neutral; 7.4-7.8 slightly alkaline; 7.9-8.4 moderately alkaline; 8.5-9.0 strongly alkaline; >9.0 very strongly alkaline. -

Salinity classes (if applicable): 0-2 non saline; 2-4 very slightly saline; 4-8 slightly saline; 8-16 moderately saline; >=16 saline.

Non Technical Soil Description(s) (NASIS derived)

Soil Survey Area **UT616** **Carbon Area, Utah, Parts of Carbon and Emery Counties**

Mapunit 96 **ROCK OUTCROP-RUBBLELAND-TRAVESSILLA COMPLEX**

Soil Component Name ROCK OUTCROP 35 % of the mapunit

Slope range (%): 30 to 70 Depth class: Shallow Drainage class: not rated

Permeability: Very slow Available water capacity class: Very low

Average total available water in top five feet (in.): 0.0

Land capability subclass, non-irrigated: 8s Land capability subclass, irrigated: Not rated

Ecological Site: None

Runoff class: Not Rated Depth to seasonal high water table: NA -

Flooding frequency: None Other restrictions (in): Bedrock (lithic) -

Horizon Information

	Depth (in)	Textures	pH range	Sodium	Salinity (mmhos/cm)
H1	0 - 60		NA -	NA -	NA -
		UWB unweathered bedrock			

pH classes: 3.5-4.4 extremely acid; 4.5-5.0 very strongly acid; 5.1-5.5 strongly acid; 5.6-6.0 moderately acid; 6.1-6.5 slightly acid; 6.6-7.3 neutral; 7.4-7.8 slightly alkaline; 7.9-8.4 moderately alkaline; 8.5-9.0 strongly alkaline; >9.0 very strongly alkaline.

Salinity classes (if applicable): 0-2 non saline; 2-4 very slightly saline; 4-8 slightly saline; 8-16 moderately saline; >=16 saline.

Soil Component Name RUBBLELAND 30 % of the mapunit

Slope range (%): 30 to 70 Depth class: Shallow Drainage class: Excessively drained

Permeability: Rapid Available water capacity class: Very low

Average total available water in top five feet (in.): 3.0

Land capability subclass, non-irrigated: 8s Land capability subclass, irrigated: Not rated

Ecological Site: None

Runoff class: Not Rated Depth to seasonal high water table: NA -

Flooding frequency: None Other restrictions (in): Bedrock (lithic) -

Horizon Information

	Depth (in)	Textures	pH range	Sodium	Salinity (mmhos/cm)
H1	0 - 60		NA -	NA -	NA -
		FRAG fragmental material			

pH classes: 3.5-4.4 extremely acid; 4.5-5.0 very strongly acid; 5.1-5.5 strongly acid; 5.6-6.0 moderately acid; 6.1-6.5 slightly acid; 6.6-7.3 neutral; 7.4-7.8 slightly alkaline; 7.9-8.4 moderately alkaline; 8.5-9.0 strongly alkaline; >9.0 very strongly alkaline.

Salinity classes (if applicable): 0-2 non saline; 2-4 very slightly saline; 4-8 slightly saline; 8-16 moderately saline; >=16 saline.

Soil Component Name TRAVESSILLA 25 % of the mapunit

Slope range (%): 30 to 70 Depth class: Shallow Drainage class: Well drained

Permeability: Slow Available water capacity class: Very low

Average total available water in top five feet (in.): 2.3

Land capability subclass, non-irrigated: 8e Land capability subclass, irrigated: Not rated

Ecological Site: Upland Very Steep Shallow Loam (Pinyon-Utah Juniper)

Runoff class: Not Rated Depth to seasonal high water table: NA -

Flooding frequency: None Other restrictions (in): Bedrock (lithic) 6 - 20

Horizon Information

	Depth (in)	Textures	pH range	Sodium	Salinity (mmhos/cm)
A1	0 - 3		7.4 - 7.8	NA -	NA -
		GRV-FSL very gravelly fine sandy loam			
C1, C2	3 - 17		7.4 - 8.4	NA -	NA -
		VFSL very fine sandy loam			
		L loam			
R	17 - 21		NA -	NA -	NA -
		UWB unweathered bedrock			

pH classes: 3.5-4.4 extremely acid; 4.5-5.0 very strongly acid; 5.1-5.5 strongly acid; 5.6-6.0 moderately acid; 6.1-6.5 slightly acid; 6.6-7.3 neutral; 7.4-7.8 slightly alkaline; 7.9-8.4 moderately alkaline; 8.5-9.0 strongly alkaline; >9.0 very strongly alkaline.

Salinity classes (if applicable): 0-2 non saline; 2-4 very slightly saline; 4-8 slightly saline; 8-16 moderately saline; >=16 saline.

G-7

FIELD OFFICE TECHNICAL GUIDE: SECTION II-E
LOCATION: MLRA047A
AREA:
STATE: UTAH

RANGE SITE DESCRIPTION

RANGE SITE NAME: MOUNTAIN SHALLOW LOAM (MOUNTAIN BIG SAGEBRUSH)

RANGE SITE NUMBER: 047AY446UT

ORIGINAL DATE: 12/10/1992

AUTHOR'S INITIALS: DLT DJS

I. SOIL NARRATIVE:

THIS SITE IS FOUND ON ROLLING TO STEEP MOUNTAIN SLOPES AND RIDGES.

SOILS IN THIS SITE ARE STONY OR COBBLY AND SHALLOW OVER BEDROCK (10 TO 20 INCHES). THEY ARE WELL DRAINED. THEY HAVE DARK BROWN SURFACE LAYERS. THE UNDERLYING LAYERS ARE STONY OR COBBLY AND RANGE FROM MODERATELY COARSE TO FINE TEXTURED. THEY FORMED ON STRONGLY SLOPING TO VERY STEEP MOUNTAIN SLOPES IN MATERIAL WEATHERED FROM SANDSTONE, SHALE, LIMESTONE, QUARTZITE AND IGNEOUS ROCKS. INTAKE RATE IS MODERATE AND WATER MOVEMENT THROUGH THE SOIL IS MODERATE TO SLOW ABOVE THE BEDROCK. ROOTS PENETRATE THE SOIL MATERIAL READILY ABOVE THE BEDROCK AND INTO ROCK FRACTURES. WATERHOLDING CAPACITY IS LOW DUE TO THE SHALLOW DEPTH AND ROCK FRAGMENT CONTENT OF THE PROFILE. IT RANGES FROM 1.5 TO 3.0 INCHES WITH A WATER SUPPLYING CAPACITY OF 5 TO 8 INCHES. RUNOFF WILL OCCUR ON THESE SOILS BECAUSE SOIL DEPTH LIMITS WATER STORAGE CAPACITY.

THE CLIMATE OF THIS SITE IS COOL AND QUITE HUMID WITH COLD SNOWY WINTERS AND COOL DRY SUMMERS. THE AVERAGE ANNUAL PRECIPITATION VARIES FROM 16 TO 22 INCHES WITH AN AVERAGE OF AROUND 19. DISTRIBUTION IS 55 TO 60% DURING THE PLANT DORMANT PERIOD (OCTOBER TO MARCH). THIS IS THE MOST DEPENDABLE SUPPLY FOR PLANT GROWTH. LOWER PRECIPITATION AND HIGH EVAPO-TRANSPIRATION RATES DURING JULY, AUGUST, AND SEPTEMBER CAUSES SLOWING DOWN IN GROWTH OF ALL PLANT SPECIES AND DORMANCY IN MOST OF THE GRASSES AND FORBS.

II. LIST OF SOIL TAXONOMIC UNITS OR SOILS MAPPING UNITS FOR ALL SOILS INCLUDED IN THIS SITE:

AGASSIZ CBV-L, 8 TO 25%
GABICA STE-L, 10 TO 50%
AGASSIZ CBV-L, 25 TO 60%
WALLSBURG CBV-SCL, 20 TO 60%
FOXOL CBV-L, 30 TO 70%
WALLSBURG GR-L, 40 TO 60%
FOXOL STE-SL STV-L, 10 TO 60%
BRAD STV-LS, 15 TO 60%
REDCAN FAMILY LOAM, 4 TO 15%
LITTLE POLE CBV-SCL, 6 TO 60%
AGASSIZ ST-SIL, 40 TO 70%
REDCAN CB-L, 40 TO 60%
CURTIS CREEK LOAM, 30 TO 60%

RANGE SITE NAME: MOUNTAIN SHALLOW LOAM (MOUNTAIN BIG SAGEBRUSH)
RANGE SITE NUMBER: 047AY446UT

III. LANDSCAPE FACTORS

A. PHYSIOGRAPHY:

1. ELEVATION/ASPECT:

LOW 5200 ft / ALL HIGH 8500 ft / ALL

2. PERCENT SLOPE:

LOW 15
HIGH 60

IV. CLIMATE FACTORS

A.	FREEZE-FREE PERIOD (FFP):	0 TO	0	(DAYS)
B.	FROST-FREE PERIOD:	50 TO	100	(DAYS)
C.	MEAN ANNUAL PRECIPITATION (MAP):	16 TO	22	(INCHES)
D.	MEAN ANNUAL AIR TEMPERATURE (MAAT):	36 TO	45	(F)
E.	MEAN ANNUAL SOIL TEMPERATURE (MAST):	38 TO	47	(F)

F. MOISTURE AND TEMPERATURE DISTRIBUTION:

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
- PPT -												
HIGH	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0
MEAN	2.71	2.35	2.22	1.80	1.68	1.27	0.79	1.04	1.11	1.69	1.70	1.87
LOW	0.00	0	0.00	0	0	0	0	0.00	0	0.00	0.00	0.00
- TEMP -												
HIGH	34	39	46	56	67	77	86	84	75	63	46	37
MEAN	0	0	0	0	0	0	0	0	0	0	0	0
LOW	10	14	20	28	36	42	49	47	39	30	17	13

V. VEGETATION FACTORS - CLIMAX PLANT COMMUNITY

A. RANGE SITE DESCRIPTION NARRATIVE:

THE DOMINANT ASPECT OF THIS SITE IS THAT OF SHRUBS. THE COMPOSITION BY ANNUAL AIR DRY WEIGHT IS APPROXIMATELY 50% GRASSES, 5% FORBS AND 45% SHRUBS.

B. PERCENT COVER:

1. GROUND COVER AND STRUCTURE:

	% CANOPY COVER (VERTICAL VIEW)	AVERAGE HEIGHT (FT)	% BASAL AREA COVER
GRASSES AND GRASSLIKES	30	2.00	5
FORBS	5	1.00	2
CRYPTOGAMS	0	0.00	0
SHRUBS	20	3.00	8
TREES	0	0.00	0

RANGE SITE NAME: MOUNTAIN SHALLOW LOAM (MOUNTAIN BIG SAGEBRUSH)
RANGE SITE NUMBER: 047AY446UT

C. Plant community composition and production:

1. Herbaceous

a. Grasses and grasslikes

National Symbol	Common Name	Grp	% Composition by weight	Group % Allowable
PSSP6	BLUEBUNCH WHEATGRASS	0	15 to 20	0 to 0
POFE	MUTTONGRASS	0	5 to 10	0 to 0
PASM	WESTERN WHEATGRASS	0	3 to 5	0 to 0
ELEL5	BOTTLEBRUSH SQUIRRELTAIL	0	3 to 5	0 to 0
STCO3	COLUMBIA NEEDLEGRASS	0	3 to 5	0 to 0
LECI4	GREAT BASIN WILDRYE	1	1 to 3	5 to 10
STLE4	LETTERMAN NEEDLEGRASS	1	1 to 3	5 to 10
ORHY	INDIAN RICEGRASS	1	1 to 3	5 to 10
KOMA	PRAIRIE JUNEGRASS	1	1 to 3	5 to 10
PONE3	NEVADA BLUEGRASS	1	1 to 3	5 to 10
FEKI2	KING FESCUE	1	1 to 3	5 to 10
MEBU	BULBOUS ONIONGRASS	1	1 to 3	5 to 10
CAGE2	GEYER SEDGE	1	1 to 3	5 to 10
POSE	SANDBERG BLUEGRASS	1	1 to 3	5 to 10
PPGG	OTHER PERENNIAL GRASSES	1	5 to 10	5 to 10
AAGG	OTHER ANNUAL GRASSES	1	5 to 10	5 to 10

b. Forbs

National Symbol	Common Name	Grp	% Composition by weight	Group % Allowable
CRAC2	LONGLEAF HAWKSBEARD	2	1 to 1	3 to 5
BASA3	ARROWLEAF BALSAMROOT	2	1 to 1	3 to 5
ERBR5	SHORTSTEM WILD BUCKWHEAT	2	1 to 1	3 to 5
CALI4	WYOMING INDIAN PAINTBRUSH	2	1 to 1	3 to 5
ASOC	WESTERN MOUNTAIN ASTER	2	1 to 1	3 to 5
LIPE2	BLUE FLAX	2	1 to 1	3 to 5
ACMI2	COMMON YARROW	2	1 to 1	3 to 5
PHHO	CARPET PHLOX	2	1 to 1	3 to 5
ASAR4	SILVERLEAF MILKVETCH	2	1 to 1	3 to 5
GEVI2	STICKY PURPLE CRANESBILL	2	1 to 1	3 to 5
LUCAC3	SPURRED LUPINE	2	1 to 1	3 to 5
ORTO	TOLMIE OWLCLOVER	2	1 to 1	3 to 5
CISC2	MEADOW THISTLE	2	1 to 1	3 to 5
HAPA	COMMON STICKSEED	2	1 to 1	3 to 5
PPFF	OTHER PERENNIAL FORBS	2	3 to 5	3 to 5
AAFF	OTHER ANNUAL FORBS	2	3 to 5	3 to 5

RANGE SITE NAME: MOUNTAIN SHALLOW LOAM (MOUNTAIN BIG SAGEBRUSH)
RANGE SITE NUMBER: 047AY446UT

2. Shrubs

National Symbol	Common Name	Grp	% Composition by weight	Group % Allowable
ARTRV	MOUNTAIN BIG SAGEBRUSH	0	15 to 20	0 to 0
PUTR2	BITTERBRUSH	0	10 to 15	0 to 0
SYOR2	MOUNTAIN SNOWBERRY	0	3 to 5	0 to 0
CHVIV4	STICKYLEAF LOW RABBITBRUSH	3	1 to 2	3 to 5
AMAL2	SASKATOON SERVICEBERRY	3	1 to 2	3 to 5
ERMI4	SLENDER WILD BUCKWHEAT	3	1 to 2	3 to 5
TECA2	SPINELESS HORSEBRUSH	3	1 to 2	3 to 5
GUSA2	BROOM SNAKEWEED	3	1 to 2	3 to 5
SSSS	OTHER SHRUBS	3	3 to 5	3 to 5

5. Production

Grasses and grasslikes: 45 to 55 % of total

Forbs: 3 to 5 % of total

Shrubs: 35 to 45 % of total

Trees: 0 to 0 % of total

Lichen community: 0.00 lbs/acre (NOT ANNUAL PRODUCTION)

Moss community: 0.00 lbs/acre

6. Cover

Lichen community: 0 % cover

Moss community: 0 % cover

VI. PLANT GROWTH CURVES

ID	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
NUMBER: UT4461	0	0	0	5	20	50	5	10	5	5	0	0
NAME: PNC												
DESC: EXCELLENT CONDITION												
NUMBER: UT4462	0	0	0	0	30	50	0	10	10	0	0	0
NAME: GOOD CONDITION NO. 1												
DESC: NEEDLEGRASSES, BLUEGRASSES AND SAGEBRUSH												

VII. TOTAL ANNUAL PRODUCTION (EXCELLENT CONDITION)

FAVORABLE 1600 TO 1700

AVERAGE 1000 TO 1100

UNFAVORABLE 500 TO 600

RANGE SITE NAME: MOUNTAIN SHALLOW LOAM (MOUNTAIN BIG SAGEBRUSH)
RANGE SITE NUMBER: 047AY446UT

IX. PLANT COMMUNITY DYNAMICS:

AS THIS SITE DETERIORATES DUE TO OVERGRAZING PERENNIAL GRASSES DECREASE AND BIG SAGEBRUSH AND LOW RABBITBRUSH INCREASE. FIRE WILL REDUCE BIG SAGEBRUSH DENSITY BUT LOW RABBITBRUSH WILL INCREASE.

X. ASSOCIATED SITES

Sites that occur in association with this site:

SITE NUMBER: 047AY430UT
SITE NAME: MOUNTAIN LOAM (MOUNTAIN BIG SAGEBRUSH)

SITE NUMBER: 047AY476UT
SITE NAME: MOUNTAIN WINDSWEPT RIDGE (LOW SAGEBRUSH)

XI. COMPETING SITES

Similar sites with their differentiae:

SITE NUMBER: 047AY476UT
SITE NAME: MOUNTAIN WINDSWEPT RIDGE (LOW SAGEBRUSH)
DIFFERENTIAE: LANDSCAPE POSITION

XII. LIVESTOCK VALUES

THIS SITE HAS A LARGE AMOUNT OF GRASSES AND SHRUBS (ABOUT EQUAL AMOUNTS BY TOTAL AIR DRY PRODUCTION). THERE IS ONLY A SMALL AMOUNT OF THE TOTAL YIELD THAT IS FORBS BUT A LARGE NUMBER OF SPECIES. WITH THIS COMPOSITION GOOD FORAGE AND BALANCED ANIMAL NUTRITION IS PROVIDED DURING SPRING, SUMMER AND FALL. CATTLE, SHEEP, GOATS AND HORSES GRAZE THIS SITE TO GOOD ADVANTAGE.

XIII. WOOD PRODUCT VALUES

NO VALUES EXIST FOR LUMBER. SOME OF THE SHRUB SPECIES PRODUCE ENOUGH WOOD FOR CAMPFIRES. PRODUCTION OF WOOD PRODUCTS FOR OTHER USES ARE NOT OF A QUANTITY OR QUALITY TO BE OF VALUE.

XIV. WILDLIFE SPECIES LIST

a. Site factors influencing wildlife species:

THIS SITE PRODUCES EXCELLENT FORAGE FOR DEER AND ELK.

b. Guide to site use by selected wildlife species:

THIS SITE IS FAIR HABITAT FOR MANY KINDS OF WILDLIFE.

XV. WATERSHED VALUES

SOIL SERIES IN THIS SITE ARE GROUPED MAINLY INTO D HYDROLOGIC GROUP. THEY HAVE HIGH RUNOFF POTENTIAL. WHEN THE VEGETATION IS IN CLIMAX (POTENTIAL), THE HYDROLOGIC CURVES ARE 76 TO 73. WHERE RANGE CONDITION HAS DECLINED FROM CLIMAX, FIELD INVESTIGATION IS NEEDED TO DETERMINE HYDROLOGIC CURVE NUMBERS.

XVI. RECREATION AND NATURAL BEAUTY VALUES

THIS SITE HAS GOOD VALUES FOR ESTHETICS AND NATURAL BEAUTY. IT HAS A LARGE NUMBER OF FORBS AND SHRUBS WHICH HAVE FLOWERS IN BLOOM FROM EARLY SPRING THROUGHOUT THE SUMMER AND INTO THE FALL. IT HAS A COMBINATION OF GRASSES, FORBS, SMALL SHRUBS, AND LARGE SHRUBS WHICH OFFER SOME POSSIBILITIES FOR SCREENING AND VALUE AS CAMPING AND PICNICKING AREAS. HUNTING FOR UPLAND GAME, ELK AND MULE DEER IS GOOD TO EXCELLENT ON THIS SITE. FISHING IS OPPORTUNE ON STREAMS THROUGH AND ADJACENT TO THIS SITE.

XVII. THREATENED AND ENDANGERED PLANTS

BOTH THE AMERICAN PEREGINE FALCON AND PRAIRIE FALCON MAY OCCASIONALLY SEEK THEIR PREY ON THIS SITE.

XVIII. ARCHAEOLOGICAL VALUES

TO BE ADDED AS INFORMATION IS PROVIDED.

RANGE SITE NAME: MOUNTAIN SHALLOW LOAM (MOUNTAIN BIG SAGEBRUSH)
RANGE SITE NUMBER: 047AY446UT

APPENDIX I

Reference Data

1. Site Documentation (number and kind of site inventory records)

0	SCS-ECS-5	0	STATE-ECS-FORM
21	SCS-RANGE-417	0	BLM FORM
0	OTHER		

2. Distribution and extent.

County	State
LOGAN F.O.	UTAH
MIDVALE F.O.	UTAH
PROVO F.O.	UTAH
PRICE F.O.	UTAH
RICHFIELD F.O.	UTAH
CEDAR CITY F.O.	UTAH

3. Location of typical example of this site.

SW 1/4; SE 1/4; SE 1/4; SEC. 9 T. 2 S. R. 4 E.

Approved by: /s/ Pat L. Shaver
STATE RANGE CONSERVATIONIST
SCS UTAH

Date Approved: _____

Approved by: /s/ Larry D. Butler
WNTC RANGE CONSERVATIONIST
SCS WNTC PORTLAND OR

Date Approved: _____

APPENDIX II

1. Soil taxonomic unit representative of this site:

   Soil Taxon

   AGASSIZ VCB-L, 8 TO 25 %

   Soil Survey Area Number

   613

   Taxonomic Classification

   LOAMY-SKELETAL, MIXED, FRIGID, LITHIC HAPLOXEROLLS.

2. Type location for soils taxonomic unit representative of this site:

   SW 1/4; SE 1/4; SE 1/4; SEC. 9 T. 2 S. R. 4 E.

3. Listing of soils correlated to this site:

Soil Taxon....: WALLSBURG CBV-SCL, 20 TO 60%
SSA.....: 622
Classification: CLAYEY-SKELETAL, MONTMORILLONITIC, FRIGID LITHIC ARGIXEROLLS

Soil Taxon....: BRAD STV-LS, 15 TO 60%
SSA.....: 613
Classification: SANDY-SKELETAL, MIXED, FRIGID LITHIC HAPLOXEROLLS.

Soil Taxon....: GABICA STE-L, 10 TO 50%
SSA.....: 613
Classification: LOAMY-SKELETAL, MIXED, FRIGID LITHIC ARGIXEROLLS.

Soil Taxon....: REDCAN FAMILY LOAM, 4 TO 15%
SSA.....: 613
Classification: L-SKEL, MIXED (CALCAREOUS), FRIGID, SHALLOW TYPIC XERORTHENT

Non Technical Soil Description(s) (NASIS derived)

Soil Survey Area **UT616** **Carbon Area, Utah, Parts of Carbon and Emery Counties**

Mapunit 7 **BEJE-TRAG COMPLEX**

Soil Component Name BEJE 55 % of the mapunit

Slope range (%): 3 to 15 Depth class: Shallow Drainage class: Well drained

Permeability: Slow Available water capacity class: Very low

Average total available water in top five feet (in.): 2.4

Land capability subclass, non-irrigated: 6s Land capability subclass, irrigated: Not rated

Ecological Site: Mountain Shallow Loam (Mountain Big Sagebrush)

Runoff class: Not Rated Depth to seasonal high water table: NA -

Flooding frequency: None Other restrictions (in): Bedrock (lithic) 10 - 20

Horizon Information

	Depth (in)	Textures		pH range	Sodium	Salinity (mmhos/cm)
A1	0 - 6			6.6 - 7.8	NA -	NA -
		L	loam			
B2t	6 - 14			7.4 - 8.4	NA -	NA -
		SCL	sandy clay loam			
		L	loam			
		CL	clay loam			
R	14 - 18			NA -	NA -	NA -
		UWB	unweathered bedrock			

pH classes: 3.5-4.4 extremely acid; 4.5-5.0 very strongly acid; 5.1-5.5 strongly acid; 5.6-6.0 moderately acid; 6.1-6.5 slightly acid; 6.6-7.3 neutral; 7.4-7.8 slightly alkaline; 7.9-8.4 moderately alkaline; 8.5-9.0 strongly alkaline; >9.0 very strongly alkaline.

Salinity classes (if applicable): 0-2 non saline; 2-4 very slightly saline; 4-8 slightly saline; 8-16 moderately saline; >=16 saline.

Soil Component Name TRAG **20 % of the mapunit**

Slope range (%): 3 to 30 Depth class: Very deep Drainage class: Well drained

Permeability: Moderately slow Available water capacity class: High

Average total available water in top five feet (in.): 10.8

Land capability subclass, non-irrigated: 6e Land capability subclass, irrigated: Not rated

Ecological Site: MOUNTAIN LOAM (SALINA WILDRYE)

Runoff class: Not Rated Depth to seasonal high water table: NA -

Flooding frequency: None Other restrictions (in): NA -

Horizon Information

	Depth (in)	Textures		pH range	Sodium	Salinity (mmhos/cm)
A1	0 - 5			7.4 - 7.8	NA -	NA -
		CL	clay loam			
1,B21t,B25	- 39			7.4 - 7.8	NA -	NA -
		CL	clay loam			
C	39 - 60			7.4 - 8.4	NA -	NA -
		CL	clay loam			

pH classes: 3.5-4.4 extremely acid; 4.5-5.0 very strongly acid; 5.1-5.5 strongly acid; 5.6-6.0 moderately acid; 6.1-6.5 slightly acid; 6.6-7.3 neutral; 7.4-7.8 slightly alkaline; 7.9-8.4 moderately alkaline; 8.5-9.0 strongly alkaline; >9.0 very strongly alkaline.

Salinity classes (if applicable): 0-2 non saline; 2-4 very slightly saline; 4-8 slightly saline; 8-16 moderately saline; >=16 saline.

ATTACHMENT 2-2

TOPSOIL CALCULATIONS

add to the back of existing information

G-7

This site is on a ridge line with very limited soil resources.

12" of soil will be stripped from all areas disturbed by construction of the degas hole drilling pad.

Pad Area = 33,774 ft²

Soil Volume = (33,774 ft²)(1 ft) = 33,774 ft³ = 1251 CY

Stockpile Design

Height (ft)	Area (ft²)	Volume (ft³)
0	0	
		538
1	1076	
		1465
2	1854	
		2205
3	2557	
		2849
4	3141	
		3394
5	3648	
		3830
6	4012	
		17165
11	2854	
		2750
12	2646	
		34,196 ⇒ 1266.5 CY

1266.5 CY > 1251 CY ∴ ok

CHAPTER 3

BIOLOGY

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310 INTRODUCTION

This chapter presents a description of the biological resources found on the Dugout Canyon degas well site areas.

311 Vegetative, Fish and Wildlife Resources

Vegetative, fish, and wildlife resource conditions in and adjacent to the proposed degassification wells are discussed in Section 320 of this submittal and the approved M&RP.

312 Potential Impacts to Vegetative, Fish, and Wildlife Resources

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

313 Description of Reclamation Plan

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

320 ENVIRONMENTAL DESCRIPTION

321 Vegetation Information

This section and the approved M&RP contain the environmental descriptions of the vegetation for the permit and adjacent areas.

321.100 Plant Communities Within the Proposed Permit Area

During June 2003, the degassification well sites were surveyed by Patrick Collins, Mt. Nebo Scientific). The report and survey for the areas are included in Attachment 3-1. The site for G-6 was moved to a pre-disturbed exploration well pad, the plant communities described in Mr. Collins report reflect the undisturbed portions on the north and south edges of the well pad. Vegetation information for G-7 was obtained from a report prepared by the NRCS Range Management Specialist, Dean Stacy (refer to Attachment 2-1 and 3-1) and the Patrick Collins survey prepared for well site G-3. A photograph of the G-7 site is included in Attachment 3-1. Well site G-3 and the access road can be seen on the photograph.

321.200 Land Productivity Prior to Mining

Productivity of the well site lands prior to mining are shown in Table 3-1. Refer to Appendix 3-1 for a copy of the NRCS letter pertaining to productivity.

TABLE 3-1

Land Productivity

Well No.	Productivity (lbs.) Per Acre
G-1 (Previously Disturbed)	100
G-2	1,500*
G-3	1,500*
G-4 (Previously Disturbed)	150
G-5	1500*
G-6 (Majority Previously Disturbed)	300*
G-7	1100

Sagebrush, Snowberry, Grass Reference Area	1,500*
Aspen, Maple, Douglas Fir Reference Area	300*

* Community composition is experiencing a declining trend, with decrease in herbaceous production, increase in shrub/tree production.

322 Fish and Wildlife Information

Fish and wildlife information associated with the degas wells is provided in this chapter. A summary of the fish and wildlife resource information for the permit and adjacent areas is contained in Sections 322.100 through 322.200 of the approved M&RP.

322.100 Level of Detail

The scope and level of detail within the "Methane Degassification Amendment" are sufficient to design the protection and enhancement plan for wildlife and fish associated with the degas wells. Additional information pertaining to fish and wildlife in the permit area is located in the M&RP.

322.200 Site-Specific Resource Information

Raptors - An aerial raptor nest survey was done of the area by the Utah Division of Wildlife Resource (DWR, Chris Colt, Leroy Mead) and CFC personnel in May of 2003, refer to the Confidential Folder. A second survey was completed in May of 2004, the information will be incorporated into the 2004 Annual Report .

No raptor nests were recorded during the survey (2003) in the area (portions of N1/2SE1/4NW1/4 and N1/2SW1/4NE1/4 of Section 24; a portions of N1/2SW1/4NW1/4 Section 19, Township 13 South, Range 13 East) of the degas wells. Refer to Figure 1-1 for mapped well locations.

During the 2004 raptor survey, there were no active or tended nests identified in the vicinity of the degas wells. A raptor survey will be conducted of the well site areas, each year that the wells are in operation.

Bats - No known open mine shafts, caves, adits or other man made structures that might provide habitats for bats are known to exist in the degas project area. The sites are open and the lack of a food source would force the bats to seek habitat and nourishment elsewhere.

Mexican Spotted Owl - In the Summer of 2003, a calling point survey was conducted in the degas well area by EIS Environmental and Engineering Consulting. The survey report concluded that " within the project area, a thorough search did not reveal the presence of any Mexican spotted owls". The report is included in Attachment 3-2. A second survey was completed in May of 2004, the information is incorporated into Appendix 3-3 of the M&RP .

Threatened and Endangered Plant and Wildlife Species - There are no known federally or state listed threatened and endangered plant and wildlife species within the sites planned for degassification wells.

There are no known groundwater or surface water flows to the Colorado or Green Rivers with potential for impact by the drilling of the degas wells. Potential adverse affects to the four Colorado River endangered fish species (refer to table below) would not be likely since there is no direct route to the Colorado River or Green River from the proposed well locations. Per the Windy Gap Process (referenced by personal communication Jerriann Ernstsen, 8/19/03) consumption estimates for the degas wells: evaporation from ventilation - zero, drill holes will not intersect the coal seam being mined, therefore no access to mine ventilation until after area is sealed; coal preparation - zero, no coal preparation at degas sites (see Sections 522 and 523) ; sediment pond evaporation - zero, no

sediment pond at degas sites (see Section 732.200); subsidence effects on springs - zero, no anticipated subsidence at degas sites (see Section525); alluvial aquifer abstractions into mines - zero, no alluvial aquifer abstractions associated with degas drill holes (see Sections 513.500 and 600); postmining inflow to workings - zero, no workings for postmining inflow associated with degas wells (see Sections 513.500 and 600); coal moisture loss - zero, no coal therefore no moisture loss (see Sections 522 and 523); direct diversion - zero, no direct diversions associated with degas wells (see Sections 522 and 523). Mitigation will not be required since the estimated loss for the construction and reclamation of the degas holes is zero acre feet per year.

Federal and State Listed, Threatened, Endangered and Candidate Species
Plants and Wildlife
Carbon County, Utah
October 2002

Common Name	Scientific Name	Status	Habitat Present*
Plants			
Uinta Basin Hookless Cactus	Sclerocactus glaucus	T	No habitat available
Graham Beardtongue	Penstemon grahamii	C	No habitat available
Fish			
Humpback Chub	Gila cypha	E	No habitat available
Roundtail Chub**	Gila robusta	T	No habitat available
Bonytail	Gila elegans	E	No habitat available
Colorado Pikeminnow	Ptychocheilus lucius	E	No habitat available
Razorback Sucker	Xyrauchen texanus	E	No habitat available
Birds			
Bald Eagle See Confidential Folder	Haliaeetus leucocephalus	T	No habitat available,
Yellow-billed Cuckoo	Coccyzus americanus	C	No habitat available
Ferruginous Hawk**	Buteo Regalis	T	No habitat available
Southwestern Willow Flycatcher**	Empidonax traillii extimus	E	No habitat available
Mexican Spotted Owl	Strix occidentalis lucida	T	See Attachment 3-2 and Appendix 3-3 (M&RP)
Mammals			
Black-footed Ferret	Mustela nigripes	EX	No habitat available

* Habitat availability in Carbon County/Dugout Mine/Degas Well Sites.

** Utah State Listed Species - Information verified with Bill Bates, DWR (personal communication 7/17/03)

E = A taxon that is listed by the U.S. Fish and Wildlife Service as "endangered" with the possibility of worldwide extinction.

T = A taxon that is listed by the U.S. Fish and Wildlife Service as "threatened" with becoming endangered.

C = A taxon for which the U.S. Fish and Wildlife Service has on file sufficient information on biological vulnerability and threats to justify it being a "candidate" for listing as and endangered or threatened.

Source: Utah Division of Wildlife Resources data base - created 10/24/02

Refer to Appendix 3-3 of the M&RP for a listing of Federal and State Listed, Threatened, Endangered and Candidate Species, Plants and Wildlife of Carbon County, Utah (2003).

322.300 Fish and Wildlife Service Review

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

323 Maps and Aerial Photographs

Location of the well sites can be seen in Figure 1-1 of this submittal.

323.100 Location and Boundary of Proposed Reference Area

Reference areas for the degassification wells were established during the vegetative study conducted in the Summer of 2003. Well sites G-2, G-3, G-4, G-5 and G-7 will be compared to the Sagebrush/Snowberry/Grass reference area and G-1 and G-6 to the Aspen/Maple/Douglas Fir reference area. Refer to Attachment 3-1 and Figure 3-1 for the location of the reference areas.

323.200 Elevation and Locations of Monitoring Stations

Refer to Section 323.200 of the approved M&RP.

323.300 Facilities for Protection and Enhancement

Section 333.300 and 358.500 of the approved M&RP contain additional discussion pertaining to protective measures to be taken by Dugout Canyon on behalf of wildlife.

323.400 Vegetation Type and Plant Communities

Vegetative types and plant communities are outlined in the vegetative report in Attachment 3-1. Figure 3-2 gives details of the vegetation types located adjacent to the well sites.

330 OPERATION PLAN

331 Measures Taken to Disturb the Smallest Particle Area

The well sites will be sized to disturb the smallest acreage possible and still meet the requirements for the drilling equipment. The drainage control required will be built to satisfy the environmental requirements.

332 Description of Anticipated Impacts of Subsidence

Refer to Section 525.

333 Plan to Minimize Disturbances and Adverse Impacts

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

- Minimizing the total area of disturbance,
- Design, construction, and operation of the well sites to minimize impacts
- Exclusion of wildlife from potentially hazardous areas, and
- Reclamation of disturbed areas when they are no longer needed.

All water associated with the drilling of these wells will be appropriated and hauled and/or pumped to the sites by a licensed contractor. Since the drilling of degas wells does not involve the mining of coal, the USWFS consumption requirements for underground operations do not apply (i.e., evaporation form ventilation, coal preparation, sediment pond evaporation, subsidence of springs, alluvial aquifer abstractions into the mine, postmining inflow to workings, coal moisture loss, direct diversions).

333.100 Minimize Disturbance to Endangered or Threatened Species

Dugout Canyon will apply all methods necessary to minimize disturbances or any adverse effects to threatened or endangered species. See Section 322.200.

333.200 Species and Habitats

All species and habitats within the permit area will be protected to the best of Dugout Canyon's ability.

333.300 Protective Measures

Refer to Section 333.300 of the approved M&RP.

340 RECLAMATION PLAN

341 Revegetation

Revegetation of the sites will occur in two phases at drill site G-1, G-2 and G-3. The first phase is to redistribute topsoil and seed the well area not needed for access and operation of the gas exhaust blower. The second phase will consist of plugging the well and distributing the remaining topsoil and seeding on the remaining pad area. Refer to Section 242.100 for additional detail. Following drilling sites G-4, G-5, G-6 and G-7 will be reclaimed in one phase due to the quantity of soil moved during the site construction.

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

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

The well sites will be fenced to discourage wildlife and livestock from grazing the reclaimed areas until bond release.

341.100 Schedule and Timetable

The reclamation timetable is shown in Figures 5-15 (G-2 and G-3)and 5-26 (G-4, G-5, G-6 and G-7) of this submittal and the reclamation monitoring schedule is found in Chapter 3, Table 3-3 of the approved M&RP.

341.200 Descriptions

Species and Amounts of Seed - The well sites will be planted with the seed mix listed on Table 3-2. The seed mix will be used in both contemporaneous and final reclamation phases. The seed will be incorporated with a small amount of wood fiber mulch and applied by hydroseeding equipment or broadcast. Refer to Section 234.200 for topsoil stockpile seeding description.

Methods Used for Planting and Seeding - The degassification sites will be graded to final contour, then ripped to relieve compaction. The depth of ripping will be from 18 to 24 inches. Following ripping, topsoil will be applied to the ripped surface and left in a gouged and roughened state.

Mulching Techniques - Wood fiber mulch will be applied on top of the seed with hydroseeding equipment at the rate of 2,000 pounds per acre and anchored with a tackifier in amounts specified by the manufacturer.

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

Measures Proposed for Revegetation Success - Refer to Section 356.

341.300 Greenhouse Studies, Field Trials or Other Equivalent Studies

Refer to the Section 341.300 of the approved M&RP.

342 Fish and Wildlife

342.100 Enhancement Measures

Post bond release enhancement measure will include the establishment of vegetation for wildlife food, cover, and the break up of large blocks of monoculture to diversify habitat. In consultation with UDWR (Tony Wright, July 6, 2004) and UDOGM (Jerriann Ernstsen, July 6, 2004) a mitigation project was designated for the Northern Saw Whet Owl to compensate for drilling during the exclusionary period. The project will be completed prior to October 1, 2004. The project will include the construction and installation of 6 to 10 nest boxes on property owned by Canyon Fuel Company, LLC. Because of the UDWR knowledge and experience their personnel will choose the location and install the boxes. Information (goals, procedures, agencies, dates, box locations - township, range, section) concerning the owl mitigation project will be included in the annual report for 2004.

342.200 Plants Used for Wildlife Habitat

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

Cover - Cover will be comparable to the cover on the associated reference area.

342.300 Cropland

Cropland is not a postming land use.

342.400 Residential, Public Service, and Industrial Land Use

No residential, industrial or public service use is planned.

350 PERFORMANCE STANDARDS

351 General Requirements

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

352 Contemporaneous Reclamation

Reclamation activities prior to final reclamation will to the extent feasible, be preformed contemporaneously. Contemporaneous reclamation will be performed at the well sites following construction of the wells. Refer to Section 341 for additional details.

353 Revegetation: General Requirements

A vegetative cover will be established on all reclaimed areas to allow for the designated postmining land use of grazing. Refer to Section 411 for additional information.

353.100 Vegetative Cover

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

Native Species - The reclamation vegetation mixture will be comprised of species indigenous to the area and capable of achieving the postmining land use. Diversity of species should allow utilization of plants by wildlife and domestic livestock. The recommended seed mix is comprised of native species.

Extent of Cover - The vegetative cover will be at least equal in extent to the cover at the designated reference areas.

Stabilizing - The vegetative cover mixture is capable of stabilizing the soil surfaces from erosion.

353.200 Reestablished Plant Species

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

Seasonal Characteristics - The revegetation plant species will have the same growing season as the adjacent areas.

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

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

Federal and Utah Laws or Regulations - The seed mix purchased to revegetate the degassification well sites will contain no poisonous or noxious plant (see Section 234.200). No species will be introduced in the area without being approved by the Division.

Table 3-2

Reclamation Seed Mix

SPECIES	# pls/acre	# pls/sq. ft.**
Grasses, Forbs, and Shrubs		
Kentucky Bluegrass (1,390,000 seeds/lb)*	0.5	16
Mountain Brome (64,000 seeds/lb)*	2.0	3
Sandberg Bluegrass (1,100,000 seeds/lb)*	1.0	25
Bluebunch Wheatgrass (126,000 seeds/lb)*	4.0	12
Bottlebrush Squirreltail (192,000 seeds/lb)*	1.0	4
Rocky Mountain Penstemon (478,000 seeds/lb)*	1.0	11
Mountain Lupine (12,000 seeds/lb)*	3.0	1
Mtn. Snowberry (54,000 seeds/lb)*	4.0	5
Wyoming Big Sage (2,500,000 seeds/lb)*	0.5	29
TOTAL	17	106

* Native Plants

** Rounded nearest whole seed

Grass seed quantities will be doubled if the area is broadcast seeded.

353.300 Vegetative Exception

Dugout Canyon does not require vegetative exception at this time.

353.400 Cropland

The permit area contains no land designated as cropland.

354 Revegetative: Timing

Dugout Canyon will follow the recommended guidelines for revegetation and planting during the first normal period for favorable planting conditions after replacement of the topsoil. In Utah the planting period is usually Fall due to the precipitation events.

355 Revegetation: Mulching and Other Soil Stabilizing Practices

Mulch and/or other soil stabilizing practices (roughing, etc.) will be used on all areas that have been regraded and covered by topsoil (Section 341.200). Dugout Canyon Mine will exercise care to guard against erosion during and after application of topsoil.

356 Revegetation: Standards for Success

356.100 Success of Revegetation

The success of revegetation will be judged on the effectiveness of the vegetation for postmining land use, the extent of cover on each degassification well site compared to their respective reference areas.

Sampling Techniques - Dugout Canyon will comply with the standards for success, statistically valid sampling techniques for measuring success, and the approved methods outline in the Division's "Vegetation Information Guidelines, Appendix A" for sampling.

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

Standards for Success - The standards for success will include criteria representative of undisturbed lands in the area of the degas wells as means to evaluate ground cover, production and stocking of the reclaimed site.

356.200 Standards for Success

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

Grazing Land and Pasture Land - The ground cover and production of living plants on the revegetated area will be at least equal to the reference area.

Cropland - There is no area designated as cropland within the degassification well sites.

Fish and Wildlife Habitat - The postmining land use for the degas well sites will be grazing, except on pre-existing roads. Pre-existing roads will be returned to their approximate original contour and compacted.

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

Previously Disturbed Areas - Site G-1, G-4 and G-6 have been previously disturbed. Sites G-2, G-3, G-5 and G-7 have not been previously disturbed. Standards of success for all sites will be applied in accordance with the postmining land use of grazing as described in this section.

356.300 Siltation Structures

Siltation structures will be maintained until the disturbed areas have been stabilized and revegetated. For additional details on siltation structures, see Sections 542 and 763 of this amendment.

356.400 Removal of Siltation Structures

The land on which siltation structures are located will be revegetated in accordance with the reclamation plan discussed in Section 353 and 357. Refer to Section 763 for addition information pertaining to the removal of siltation structures.

357 Revegetation: Extended Responsibility Period

Dugout Canyon will be responsible for the success of revegetation for a period of 10 years following seeding of the reclaimed area or upon Division bond release.

357.100 Extended Period Begins

The period of extended responsibility will begin after disturbed areas have been reseeded.

357.200 Vegetation Parameters

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

357.300 Husbandry Practices

The use of husbandry practices are not being requested by Dugout Canyon for the degas well sites.

358 Protection of Fish, Wildlife, and Related Environmental Values

Dugout Canyon will minimize disturbances and adverse impacts on wildlife and their related environments as outline in Section 333 of the approved M&RP and Section 342 of this submittal. See Chapter 7, Section 731.100 of the approved M&RP for methods to protect water sources in the area.

358.100 Existence of Endangered or Threatened Species

The well sites will not be constructed or operated where they might jeopardize the existence of any endangered or threatened species. Refer to Section 322.200 and Attachments 3-1, 3-2 and 3-3 for additional information pertaining to threatened, endangered, and sensitive species.

State or federally listed endangered or threatened species will be reported to the Division upon its discovery.

358.200 Bald and Golden Eagles

Dugout Canyon understands that there is no permission implied by these regulations for taking of bald or golden eagles, their nests, or eggs. If found, nests will be reported to the Division.

358.300 Taking of Endangered or Threatened Species

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

358.400 Replacement of Wetland or Riparian Vegetation

The sites contain no wetland or riparian vegetation.

358.500 Manmade Wildlife Protection Measure

Electric Power Lines - No utilities will exist at the well sites.

Potential Barriers - No potential barriers will exist at any of the well sites, except for the perimeter fence. No ponds exist at the well sites. Refer to Sections 231.100 and 242 for information pertaining to the mud pit.

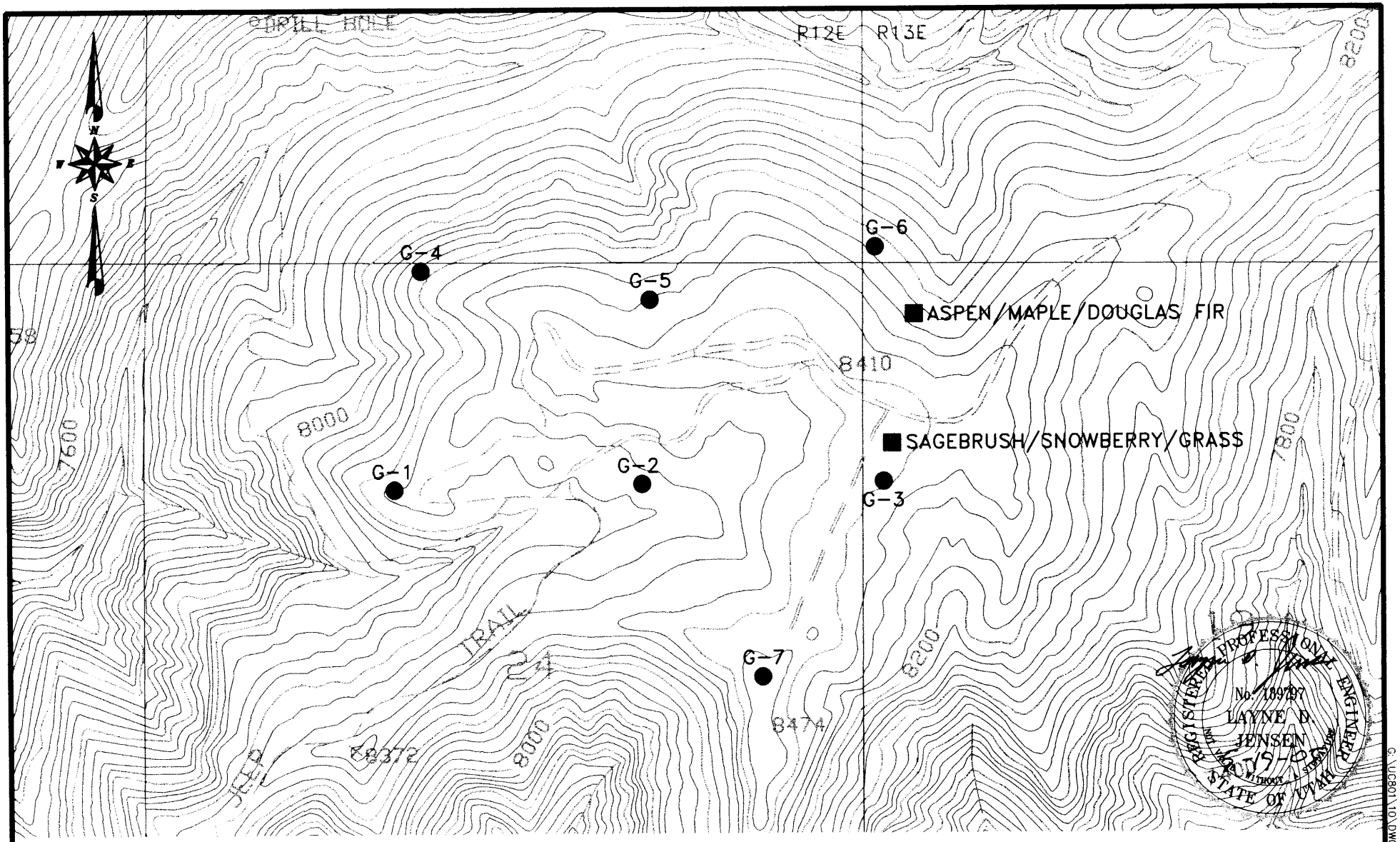


FIGURE 3–1. VEGETATION REFERENCE AREAS

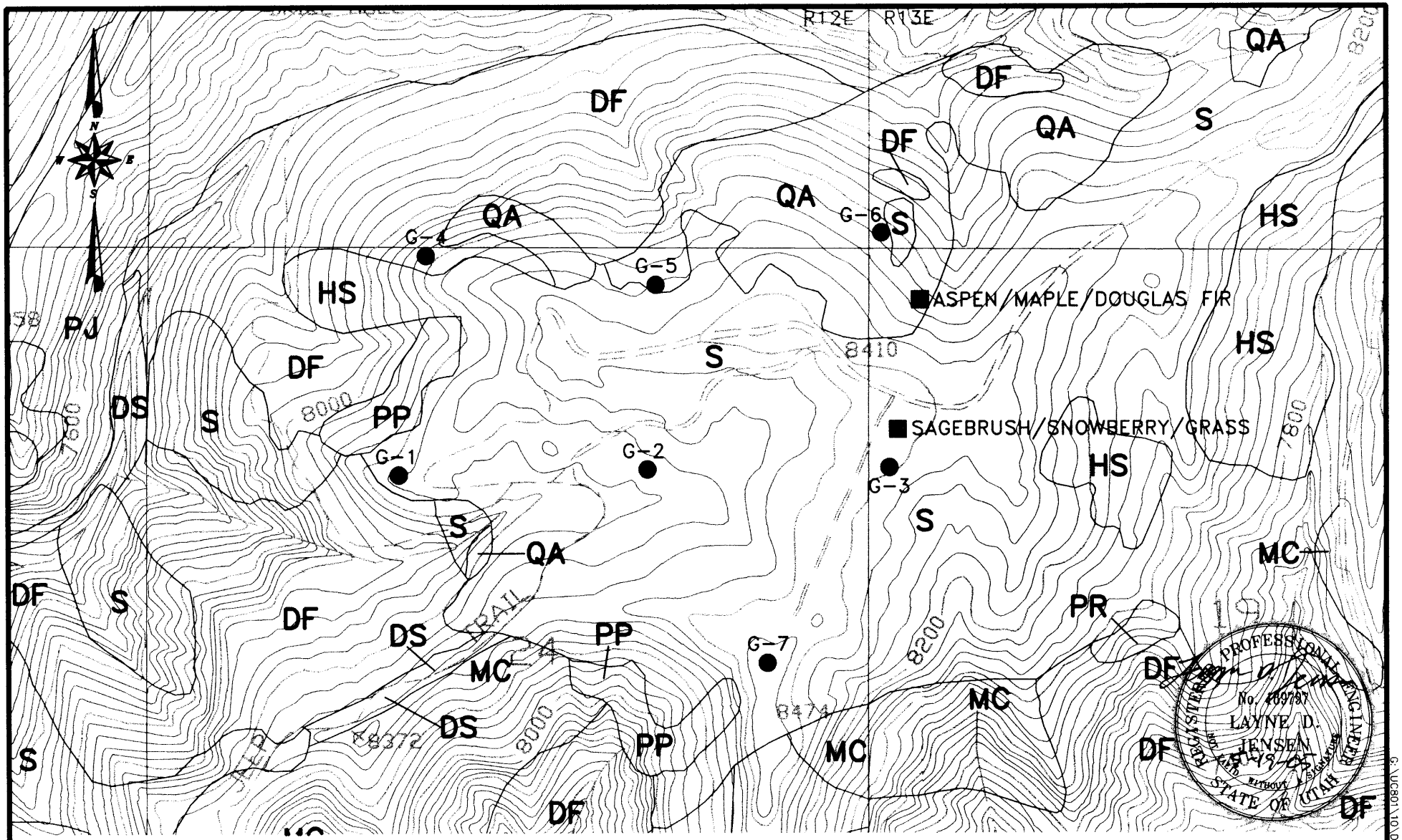


FIGURE 3-2. ADJACENT VEGETATION

ATTACHMENT 3-1

VEGETATION INVENTORY

NRCS LETTER

add to the back of existing information

United States Department of Agriculture

NRCS
Natural Resources Conservation Service
350 N. 400 E.
Price, UT 84501
(435) 637-0041
FAX (435) 637-3146

NRCS Utah

November 8, 2004

Ms Vicky Miller
Canyon Fuel Company, LLC
Dugout Canyon Mine
P.O. Box 1029
Wellington, UT 84542

DEC 10 2004

Re: Production estimates and soils information for Proposed Degas Well G-7, as well as proposed surface facilities within Pace Canyon (T 13S., R 13E., Sec 30 N1/2 of the NW1/4).

Ms. Miller,

Following our meetings regarding the two above mentioned locations, I have collection Ecological Site Description (ESD) data for the different locations as well as the NRCS Non Technical Soil Descriptions for the areas of concern. As we have discussed, as weather conditions have made the area impassible, onsite visits were not possible this year. However, I vividly recall the areas as I conducted productions estimates for degas wells G-1 – G-6 the previous year. I have included the following information for your review:

- **Proposed Degas well G-7**
  - *ESD*: "Mountain Shallow Loam (Mountain Big Sagebrush)" Based off of field visits throughout the 2004 growing season and precipitation amounts received, I have concluded that the area would have experienced average production. Please review page 4 of the "Mountain Big Sagebrush" ESD for production estimates for the site.
  - Non Technical Soil Descriptions "Beji-Trag Complex"

- **Proposed Surface Facilities in Pace Canyon**
  - *Western facing slopes ESD*: "High Mountain Loam (Aspen)" Based off normal year with a "medium canopy cover class", refer to page 3 of the "Aspen" ESD for production estimates for the site.
  - *Eastern facing slopes ESD*: "Upland Very Steep Stony Loam (Pinyon/Utah Juniper)" Based off an average year for production, refer to page 4 of "Pinyon/Utah Juniper" ESD for production estimates.

RECEIVED
DIV OF OIL, GAS & MINING

- Although much of the area has been previously disturbed I have also included the Non Technical Soil Descriptions for "Croydon Loam, 8-30 Percent Slopes", "Podo-Rock Outcrop Complex", "Rock Outcrop-Rubbleland-Travessilla Complex".

If you have any questions or comments please feel free to contact me at any time.

Sincerely,

M. Dean Stacy
Range Management Specialist

CC: Tim Julander, Acting District Conservationist
Gary Roeder, Area Resource Conservationist
file

NRCS Natural Resources Conservation Service

NRCS Utah

United States Department of Agriculture

Natural Resources Conservation Service

Price Office
350 North 400 East
Price, Utah
84501

Phone:
435 637-0041

FAX
435 637-3146

December 3, 2004

Ms Vicky Miller
Dugout Canyon Mine
P.O. Box 1029
Wellington, Utah 84542

DEC 10 2004

RE: Soils (prime farmland) for Proposed Degas Well G-7, and surface facilities within Pace Canyon (T 13S., R13E., Sec 30 N1/2 of the NW1/4).

Dear Ms. Miller

After a site visit the Natural Resources Conservation Service has determined that there are no prime farmlands in the site area because the soils contain more than 10 percent surface rock fragments or the site has already been converted to non agricultural purposes or the percent slope x K (erodibility factor) exceeds 2.

If you need any further assistance please let us know.

Leland Sasser

Leland Sasser NRCS Soil Scientist

Cc: Michael J. Domeier State Soil Scientist

FIELD OFFICE TECHNICAL GUIDE: SECTION IIE
LOCATION: MLRA 047A
AREA:
STATE: UTAH

FORESTLAND SITE DESCRIPTION

FOREST SITE NAME: HIGH MOUNTAIN LOAM (ASPEN)

FOREST SITE NUMBER: 047AY508UT

ORIGINAL DATE: 08/23/1993

AUTHOR'S INITIALS: DLT TW

Pace Canyon
Surface Facilities

A. FOREST CHARACTERISTICS

1. FOREST COMMUNITY TYPE

Overstory: QUAKING ASPEN (POPULUS TREMULOIDES)

Understory: MOUNTAIN BROME, SLENDER WHEATGRASS

Site Index: 40 to 50

2. ENVIRONMENT

THIS SITE OCCURS ON GENTLY SLOPING TO STEEP MOUNTAIN SLOPES OF 5 TO 10 PERCENT, BUT MOSTLY 5 TO 40 PERCENT. ELEVATION RANGES FROM 6200 TO 9500 FEET. IT IS FOUND ON ALL EXPOSURES BUT IS PRIMARILY ON THE NORTH AND EAST AT 6200 TO 7500 FEET. THE AVERAGE ANNUAL PRECIPITATION IS 25 TO 35 INCHES, THE MEAN ANNUAL AIR TEMPERATURE IS 36 TO 46 DEGREES F, AND THE MEAN SOIL TEMPERATURE IS 38 to 48 DEGREES F. THE FROST-FREE PERIOD IS 30 TO 80 DAYS. SITE INDEX OF ASPEN IS BASED ON AN 80-YEAR GROWTH CYCLE.

REFERENCES:
MUEGGLER, WATLER F., 1988 ASPEN COMMUNITY TYPES OF THE INTER-
MOUNTAIN REGION, GENERAL TECHNICAL REPORT, INT-250, PAGE 20,
POTR/TALL/FORB
NEVADA SOIL CONSERVATION SERVICE FOREST SUITABILITY GROUP
DESCRIPTION 028BY067NV

3. SOILS

SOILS ARE DEEP AND WELL DRAINED. SURFACE LAYERS ARE DARK 14 TO 26 INCHES THICK. THE SURFACE LAYERS ARE MAINLY LOAM, SILT LOAM, OR CLAY LOAMS AND IN PLACES ARE STONY, GRAVELLY, COBBLY, OR VERY COBBLY. THE SUBSOIL AND SUBSTRATUM ARE MAINLY LOAM, CLAY LOAM, SILTY CLAY LOAM, OR CLAY, AND ARE STONY, COBBLY, OR GRAVELLY. THEY ARE GENERALLY SLIGHTLY ACID TO VERY STRONGLY ACID. THEY FORMED ON GENTLY SLOPING TO VERY STEEP MOUNTAIN SLOPES IN MATERIAL WEATHERED FROM SANDSTONE, SHALE, LIMESTONE, QUARTZITE, AND IGNEOUS ROCKS. THE SURFACE HAS A THIN 1 TO 3

INCH LAYER OF LEAVES, TWIGS, AND DUFF. THE AMOUNT OF ROCK IS VARIABLE IN THE PROFILE. INTAKE RATE IS MODERATE TO RAPID AND WATER MOVEMENT THROUGH THE SOIL IS MODERATE TO SLOW. ROOTS PENETRATE THE SOIL READILY. WATER HOLDING CAPACITY IS HIGH AT 10 TO 14 INCHES FOR A 6-FOOT PROFILE. WATER SUPPLYING CAPACITY IS 16 TO 30 INCHES.

LIST OF SOIL TAXONOMIC UNITS OR SOILS MAPPING UNITS FOR ALL SOILS INCLUDED IN THIS SITE:

ERCAN FAMILY GR-L 25-60% SKUTUM L 8-50%
BAIRD HOLLOW L 6-60% HAILMAN L, CB-L 6-60%
MULT L CL CB-L 5-40% ROUNDY L, CB-L 5-60%
CROYDON L 30-60% FLYGARE L 30-60%
LUCKY STAR SIL 15-60% RICHENS L 3-15%
SCAVE L 15-60% RED SPUR L 10-30%
YELJACK L, NORTH 10-30%

4. NATURE OF THE FOREST COMMUNITY

a.

QUAKING ASPEN IS THE DOMINANT OVERSTORY PLANT. OVERSTORY TREE CANOPY COVER WILL VARY FROM 25 TO 70 PERCENT, BUT IS MOST COMMON FROM 40 TO 55 PERCENT. SHADE TOLERANT PLANTS SUCH AS BLUE WILDRYE, BEARDED WHEATGRASS, MOUNTAIN BROME, NODDING BLUEGRASS, SWEETANICE, MEADOWRUE, AND EDIBLE VALERIAN ARE THE DOMINANT UNDERSTORY SPECIES.

b. Productivity Rating of Major Understory Species:

Productivity Rating Index: This rating provides an index to the relative importance of species in the understory community as affected by overstory canopy cover.

PRODUCTIVITY INDEX

1	Always present: MORE THAN 50% OF TOTAL UNDERSTORY PRODUCTION
2	Always present: 25 TO 50% OF TOTAL UNDERSTORY PRODUCTION
3	Generally present: 10 TO 24% OF TOTAL UNDERSTORY PRODUCTION
4	Frequently present: 5 TO 9 % OF TOTAL UNDERSTORY PRODUCTION
5	Occasionally present: 1 TO 5% OF TOTAL UNDERSTORY PRODUCTION
6	Rarely present: LESS THAN 1% OF TOTAL UNDERSTORY PRODUCTION

FOREST SITE NAME: HIGH MOUNTAIN LOAM (ASPEN)
FOREST SITE NUMBER: 047AY508UT

Plant Symbol	Plant Name	OVERSTORY CANOPY CLASS 0-10%	11-20%	21-35%	36-60%
BRCA5	MOUNTAIN BROME	3	3	2	1
ELGL	BLUE WILDRYE	3	3	2	1
ELTR7	SLENDER WHEATRASS	3	3	3	2
PORE	NODDING BLUEGRASS	3	2	2	2
CAGE2	GEYER SEDGE	3	3	2	2
STNE3	COLUMBIA NEEDLEGRASS	4	3	3	3
POPR	KENTUCKY BLUEGRASS	3	3	3	3
LALA3	THICKLEAF PEAVINE	3	3	2	2
VAED	TOBACCO ROOT	4	3	2	1
OSOC	SWEETANICE	4	3	2	1
AGUR	NETTLELEAF GIANT HYSSOP	4	4	3	2
THFE	FENDLER MEADOWRUE	4	3	2	1
SYOR2	MOUNTAIN SNOWBERRY	4	3	2	2
MARE11	CREEPING OREGON GRAPE	4	4	3	2
PRVI	CHOKECHERRY	6	5-	5	4

c. Total Average Understory Production by Overstory Canopy Class:

	CANOPY COVER CLASS Open 0-10%	Sparse 11-20%	Medium 21-35%	Dense 36-60%
	lbs/acre (air - dry weight			
Favorable Years	1700	1300	800	600
Normal Years	1200	900	600	400
Unfavorable Years	900	600	400	200

d. Major Sucessional Stages of Forest Development:

HERBACEOUS:

VEGETATION IS DOMINATED BY GRASSES AND FORBS UNDER FULL SUNLIGHT. THIS STAGE IS EXPERIENCED AFTER A MAJOR DISTURBANCE SUCH AS CROWN FIRE OR TREE HARVEST. SKELETON FOREST (DEAD TREES) REMAINING AFTER FIRE OR RESIDUAL TREES LEFT FOLLOWING HARVEST HAVE LITTLE OR NO AFFECT ON THE COMPOSITION AND PRODUCTION OF THE HERBACEOUS VEGETATION.

SHRUB-HERBACEOUS:

HERBACEOUS VEGETATION AND WOOD SHRUBS DOMINATE THE SITE. VARIOUS AMOUNTS OF TREE SEEDLINGS (LESS THAN 20 INCHES IN HEIGHT) MAY BE PRESENT UP TO THE POINT WHERE THEY ARE OBVIOUSLY A MAJOR COMPONENT OF THE VEGETAL STRUCTURE. QUAKING ASPEN IS VERY INTOLERANT OF SHADE. NATURAL PRUNING IS EXCELENT AND LONG, CLEAN STEMS ARE USUALLY PRODUCED WHEN SIDE SHADE IS PRESENT.

SAPLING:

IN THE ABSENCE OF DISTURBANCE, THE TREE SEEDLINGS DEVELOP INTO SAPLINGS (20 INCHES TO 4.5 FEET IN HEIGHT) WITH A RANGE IN CANOPY COVER OF ABOUT 5 TO 10 PERCENT. VEGETATION CONSISTS OF GRASSES, FORBS, AND SHRUBS IN ASSOCIATION WITH TREE SAPLINGS.

IMMATURE FOREST:

THE VISUAL ASPECT AND VEGETAL STRUCTURE ARE DOMINATED BY QUAKING ASPEN GREATER THAN 4.5 FEET IN HEIGHT. SEEDLINGS AND SAPLINGS ARE PRESENT IN THE UNDERSTORY. UNDERSTORY VEGETATION IS MODERATELY INFLUENCED BY A TREE OVERSTORY CANOPY OF ABOUT 10 TO 20 PERCENT.

MATURE FOREST:

THE VISUAL ASPECT AND VEGETAL STRUCTURE ARE DOMINATED BY QUAKING ASPEN THAT HAVE REACHED OR ARE NEAR MAXIMAL HEIGHTS FOR THE SITE. TREES HAVE DEVELOPED TALL, STRAIGHT, CLEAR STEMS WITH SHORT, HIGH ROUNDED CROWNS. TREE CANOPY COVER RANGES FROM 20 TO 40 PERCENT. UNDERSTORY VEGETATION IS STRONGLY INFLUENCED BY TREE COMPETITION, OVERSTORY SHADING, DUFF ACCUMULATION, ETC. FEW SEEDLINGS AND/OR SAPLINGS OF QUAKING ASPEN OCCUR IN THE UNDERSTORY.

Climax Forest:

IN THE ABSENCE OF WILDFIRE OR OTHER NATURALLY OCCURRING DISTURBANCES, THE TREE CANOPY ON THIS SITE CAN BECOME VERY DENSE. THIS STAGE IS DOMINATED BY QUAKING ASPEN THAT HAVE REACHED MAXIMAL HEIGHTS FOR THE SITE. TREES HAVE STRAIGHT, CLEAR STEMS WITH SHORT, HIGH ROUNDED CROWNS. UNDERSTORY VEGETATION IS SPARSE TO ABSENT DUE TO TREE COMPETITION, OVERSTORY SHADING, DUFF ACCUMULATION, ETC. TREE CANOPY COVER IS AT A MAXIMUM FOR THE SITE AND IS COMMONLY GREATER THAN 50 PERCENT.

5. PRODUCTIVE CAPACITY

Productivity Class: 1.0

CMAI: 16 to 21 cu ft/ac./yr

1.1 to 1.5 cu m/ha./yr

Fuelwood Production:

8 TO 10 CORDS PER ACRE PER YEAR. FIREWOOD IS COMMONLY MEASURED BY CORDS OR A STACKED UNIT EQUIVALENT TO 128 CUBIC FEET. ASSUMING AN AVERGE OF 90 CUBIC FEET OF SOLID VOLUME WOOD PER CORD, THERE ARE ABOUT 196,400 BRITISH THERMAL UNITS (BTU'S) PER CUBIC FOOT OR ABOUT 17 MILLION BTU'S OF HEAT VALUE IN A CORD OF QUAKING ASPEN.

SAW TIMBER: 200 TO 300 BOARD-FEET PER ACRE PER YEAR.

6. WATERSHED

THE SOILS ARE IN HYDROLOGIC GROUPS B AND C. THE RUNOFF CURVE NUMBERS ARE 61 TO 86 DEPENDING ON THE OVERALL WATERSHED CONDITION.

7. WILDLIFE

WILDLIFE SPECIES SEEKING FOOD AND COVER IN THIS FOREST SITE INCLUDE MOOSE, ELK, MULE DEER, BEAR, PORCUPINE, SHOWSHOE HARE, OWL, AND WOODPECKER.

8. THREATENED AND ENDANGERED SPECIES

THIS SECTION WILL BE COMPLETED AS INFORMATION IS AVAILABLE.

9. LIMITATIONS AND CONSIDERATIONS

A. POTENTIAL FOR SHEET AND RILL EROSION IS MODERATE TO SEVERE DEPENDING ON SLOPE.

B. MODERATE TO SEVERE EQUIPMENT LIMITATIONS ON WET SOILS DURING CRITICAL TIMES OF THE YEAR.

C. PROPER SPACING IS THE KEY TO A WELL MANAGED, MULTIPLE USE AND MULTI-PRODUCT ASPEN FOREST.

10. ESSENTIAL REQUIREMENTS

A. ADEQUATELY PROTECT FROM HIGH INTENSITY WILDFIRE.

B. PROTECT SOILS FROM ACCELERATED EROSION.

C. APPLY PROPER GRAZING MANAGEMENT PRACTICES (SEE MANAGEMENT GUIDES).

11. SILVICULTURAL PRACTICES

A. HARVEST CUT SELECTIVELY OR IN SMALL PATCHES (SIZE DEPENDENT UPON SITE CONDITIONS) TO ENHANCE FORAGE PRODUCTION.

1. THINNING AND IMPROVMENT CUTTING--REMOVAL OF POORLY FORMED, DISEASED, AND LOW VIGOR TREES FOR FUELWOOD.

2. HARVEST CUTTING--SELECTIVELY HARVEST SURPLUS TREES TO ACHIEVE DESIRED SPACING. HARVEST STANDS IN SMALL BLOCKS OF 1/5 TO 1/2 ACRE WITH SLASH LEFT IN PLACE TO SHELTER EMERGING ASPEN SUCKERS FROM BROWSING.

3. SPACING GUIDE: A SPACING OF ABOUT 15 X 15 FEET IS CONSIDERED DESIRABLE FOR MULTIPLE USE MANAGEMENT DURING PERIOD OF STAND MATURITY.

B. SELECTIVE TREE REMOVAL ON SUITABLE SITES TO ENHANCE FORAGE PRODUCTION AND MANAGE SITE REPRODUCTION.

12. FORAGE PRODUCTS

a. Livestock Grazing

THIS SITE IS SUITED TO CATTLE AND SHEEP GRAZING DURING THE SUMMER AND FALL. LIVESTOCK WILL OFTEN CONCENTRATE ON THIS SITE TAKING ADVANTAGE OF THE SHADE AND SHELTER OFFERED BY THE TREE OVERSTORY. GRAZING MANAGEMENT SHOULD ALLOW ASPEN SAPLINGS TO ATTAIN A MINIMUM HEIGHT OF 55 TO 60 INCHES BEFORE USE TO PREVENT DESTRUCTIVE BROWSING BY LIVESTOCK. HARVESTING TREES UNDER A SOUND MANAGEMENT PROGRAM FOR FUELWOOD OR OTHER PRODUCTS CAN OPEN UP THE TREE CANOPY TO ALLOW INCREASED PRODUCTION OF UNDERSTORY SPECIES DESIRABLE FOR GRAZING WHILE REJUNEVATING THE ASPEN FOREST.

b. Initial Stocking Rates

STOCKING RATES VERY WITH SUCH FACTORS AS KIND AND CLASS OF GRAZING ANIMAL, SEASON OF USE AND FLUCTUATIONS IN CLIMATE. ACTUAL USE RECORDS FOR INDIVIDUAL SITES, TOGETHER WITH A DETERMINATION OF THE DEGREE TO WHICH THE SITES HAVE BEEN GRAZED AND AN EVALUATION OF TREND IN SITE CONDITION, OFFER THE MOST RELIABLE BASIS FOR DEVELOPING INITIAL STOCKING RATES.

SELECTION OF AN INITIAL STOCKING RATES FOR GIVEN GRAZING UNITS IS A PLANNING DECISION. THIS DECISION SHOULD BE MADE ONLY AFTER CAREFUL CONSIDERATION OF THE TOTAL RESOURCES AVAILABLE, EVALUATION OF ALTERNATIVES FOR USE AND TREATMENT, AND ESTABLISHMENT OF OBJECTIVES BY THE DECISIONMAKER.

c. Forage Value Rating

Plant Symbol	Common Name	Relative Forage Value to: Cattle	Horses	Sheep	Deer
BRCA5	MOUNTAIN BROME	P	P	D	D
ELGL	BLUE WILDRYE	P	P	D	D
ELTR7	SLENDER WHEATGRASS	P	P	D	D
PORE	NODDING BLUEGRASS	P	P	P	D
CAGE2	GEYER SEDGE	P	P	U	D
STNE3	COLUMBIA NEEDLEGRASS	P	P	D	D
POPR	KENTUCKY BLUEGRASS	P	P	P	P
LALA3	THICKLEAF PEAVINE	P	D	P	P
VAED	TOBACCO ROOT	D	U	P	P
OSOC	SWEETANICE	D	D	P	P
GABO2	NORTHERN BEDSTRAW	U	U	D	D
RUOC2	WESTERN CONEFLOWER	U	U	P	D
SESE2	BUTTERWEED	U	U	P	D
AGUR	NETTLELEAF GIANT HYSSOP	D	D	P	U
THFE	FENDLER MEADOWRUE	U	U	D	D

FIELD OFFICE TECHNICAL GUIDE: SECTION II E
LOCATION: MLRA 034
AREA:
STATE: UTAH

RANGE SITE DESCRIPTION

RANGE SITE NAME: UPLAND VERY STEEP STONY LOAM (PINYON UTAH JUNIPER)

RANGE SITE NUMBER: 034XY344UT

ORIGINAL DATE: 05/15/1981

REVISION DATE: 01/13/1994

AUTHOR'S INITIALS: JLB GWL

I. SOIL NARRATIVE:

THIS SITE OCCURS ON BACKSLOPES IN MOUNTAIN CANYONS. THE SOIL IS 20 TO 40 INCHES DEEP AND WELL DRAINED. IT FORMED IN COLLUVIUM AND RESIDUUM DERIVED MAINLY FROM SANDSTONE AND SHALE. THE SURFACE HORIZON IS A MOLLIC EPIPEDON 7 TO 8 INCHES THICK. THE ROOT ZONE IS 15 TO 18 INCHES THICK. THE AVAILABLE WATER CAPACITY IS 0.06 TO 0.12 INCHES PER INCH. FIFTY TO 70 PERCENT OF THE SOIL SURFACE IS COVERED BY ROCK FRAGMENTS. AVERAGE ANNUAL SOIL LOSS IN POTENTIAL IS APPROXIMATELY 3 TONS PER ACRE. AVERAGE ANNUAL PRECIPITATION IS 14 TO 16 INCHES. APPROXIMATELY 60 PERCENT OCCURS AS RAIN FROM MARCH THROUGH OCTOBER. MUCH OF THIS SUMMER PRECIPITATION OCCURS AS CONVECTION THUNDERSTORMS. ON THE AVERAGE, NOVEMBER THROUGH FEBRUARY ARE THE DRIEST MONTHS AND JULY THROUGH OCTOBER ARE THE WETTEST MONTHS. THE SOIL TEMPERATURES ARE IN THE MESIC AND FRIGID REGIMES. THE AVERAGE FREEZE-FREE PERIOD IS 90 TO 110 DAYS. IN AVERAGE YEARS, PLANTS BEGIN GROWTH AROUND MARCH AND APRIL AND END GROWTH IN OCTOBER. PLANTS USUALLY REMAIN GREEN UNTIL FROST IN OCTOBER EXCEPT IN DRIER THAN AVERAGE YEARS. THERE IS USUALLY AN ACTIVE GREENUP PERIOD IN THE FALL. THE MOST RAPID GROWTH OCCURS DURING APRIL, MAY, AND JUNE.

II. LIST OF SOIL TAXONOMIC UNITS OR SOILS MAPPING UNITS FOR ALL SOILS INCLUDED IN THIS SITE:

WHETROCK STX-L DRY 50-90% ERODED CABBA FAMILY 40-70%
STRYCH STVL-L 50-70%

III. LANDSCAPE FACTORS

A. PHYSIOGRAPHY:

1. ELEVATION/ASPECT:

LOW 4400 ft / ALL HIGH 7600 ft / ALL

2. PERCENT SLOPE:

LOW 50 HIGH 90

RANGE SITE NAME: UPLAND VERY STEEP STONY LOAM (PINYON-UTAH JUNIPER)
RANGE SITE NUMBER: 034XY344UT

IV. CLIMATE FACTORS

A. FREEZE-FREE PERIOD (FFP): 90 TO 110 (DAYS)

B. FROST-FREE PERIOD: 0 TO 0 (DAYS)

C. MEAN ANNUAL PRECIPITATION (MAP): 14 TO 16 (INCHES)

D. MEAN ANNUAL AIR TEMPERATURE (MAAT): 42 TO 44 (F)

E. MEAN ANNUAL SOIL TEMPERATURE (MAST): 45 TO 47 (F)

F. MOISTURE AND TEMPERATURE DISTRIBUTION:

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
- PPT -												
HIGH	0.00	0	0	0	0	0	0	0	0	0	0	0
MEAN	0.47	0.89	1.36	1.10	1.29	1.32	1.28	0.93	1.90	1.12	1.16	0.72
LOW	0.00	0	0	0	0	0	0	0	0	0	0	0
- TEMP -												
HIGH	30	36	48	60	67	78	83	83	72	60	44	32
MEAN	17	24	36	46	53	63	69	68	58	48	33	21
LOW	4	12	24	33	39	48	54	53	45	35	22	9

V. VEGETATION FACTORS - CLIMAX PLANT COMMUNITY

A. RANGE SITE DESCRIPTION NARRATIVE:

THE DOMINANT ASPECT OF THIS SITE IS PINYON AND JUNIPER. THE UNDERSTORY COMPOSITION BY AIR-DRY WEIGHT IS 40 PERCENT PERENNIAL GRASSES, 10 PERCENT FORBS, AND 50 PERCENT SHRUBS.

B. PERCENT COVER:

1. GROUND COVER AND STRUCTURE:

	% CANOPY COVER (VERTICAL VIEW)	AVERAGE HEIGHT (FT)	% BASAL AREA COVER
GRASSES AND GRASSLIKES	20	2.00	10
FORBS	5	1.00	2
CRYPTOGAMS	0	0	0
SHRUBS	30	5.00	15
TREES	25	12.00	10

RANGE SITE NAME: UPLAND VERY STEEP STONY LOAM (PINYON-UTAH JUNIPER)
RANGE SITE NUMBER: 034XY344UT

C. Plant community composition and production:

1. Herbaceous

a. Grasses and grasslikes

National Symbol	Common Name	Grp	% Composition by weight	Group % Allowable
ORHY	INDIAN RICEGRASS	0	10 to 15	0 to 0
STCO4	NEEDLEANDTHREAD	0	5 to 10	0 to 0
PSSP6	BLUEBUNCH WHEATGRASS	0	5 to 10	0 to 0
LESAS	SALINA WILDRYE	0	3 to 5	0 to 0
BOGR2	BLUE GRAMA	1	1 to 3	3 to 5
CAGE2	GEYER SEDGE	1	1 to 3	3 to 5
POFE	MUTTONGRASS	1	1 to 3	3 to 5
PPGG	OTHER PERENNIAL GRASSES	1	3 to 5	3 to 5
AAGG	OTHER ANNUAL GRASSES	1	3 to 5	3 to 5

b. Forbs

National Symbol	Common Name	Grp	% Composition by weight	Group % Allowable
EROV	CUSHION WILD BUCKWHEAT	2	3 to 5	10 to 15
SIOF	HEDGE MUSTARD	2	3 to 5	10 to 15
MAGR2	GUMWEED TANSYASTER	2	3 to 5	10 to 15
CRFL5	PLATEAU YELLOW CATSEYE	2	3 to 5	10 to 15
PEPA6	THICKLEAF BEARDTONGUE	2	3 to 5	10 to 15
PHHO	CARPET PHLOX	2	3 to 5	10 to 15
PPFF	OTHER PERENNIAL FORBS	2	10 to 15	10 to 15
AAFF	OTHER ANNUAL FORBS	2	10 to 15	10 to 15

2. Shrubs

National Symbol	Common Name	Grp	% Composition by weight	Group % Allowable
CEMO2	BIRCHLEAF MOUNTAINMAHOGANY	0	15 to 20	0 to 0
AMAL2	SASKATOON SERVICEBERRY	0	5 to 10	0 to 0
EPVI	MORMONTEA	0	3 to 5	0 to 0
ERMI4	SLENDER WILD BUCKWHEAT	0	3 to 5	0 to 0
ARNO4	BLACK SAGEBRUSH	0	3 to 5	0 to 0
OPPO	CENTRAL PRICKLYPEAR	3	1 to 3	3 to 5
ARTRT	BASIN BIG SAGEBRUSH	3	1 to 3	3 to 5
SSSS	OTHER SHRUBS	3	3 to 5	3 to 5

3. Trees

National Symbol	Common Name	Grp	% Composition by weight	Group % Allowable
PIED	PINYON	0	12 to 15	0 to 0
JUOS	UTAH JUNIPER	0	3 to IN	PORATE

5. Production

Grasses and grasslikes:	35 to 45 % of total
Forbs:	10 to 15 % of total
Shrubs:	40 to 50 % of total
Trees:	10 to 20 % of total
Lichen community:	0 lbs/acre (NOT ANNUAL PRODUCTION)
Moss community:	0 lbs/acre

6. Cover

Lichen community:	0 % cover
Moss community:	0 % cover

VI. PLANT GROWTH CURVES

ID	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
NUMBER: UT3441	0	0	0	10	30	45	5	5	5	0	0	0
NAME: PNC												
DESC: EXCELLENT CONDITION												

VII. TOTAL ANNUAL PRODUCTION (EXCELLENT CONDITION)

FAVORABLE	700	TO	800
AVERAGE	500	TO	600
UNFAVORABLE	300	TO	400

IX. PLANT COMMUNITY DYNAMICS:

THIS SITE RECEIVES VERY LITTLE OR NO GRAZING BY LIVESTOCK BECAUSE OF STEEP SLOPES. WHEN THE POTENTIAL NATURAL PLANT COMMUNITY IS BURNED, PINYON, JUNIPER, AND BIRCHLEAF MOUNTAINMAHOGANY DECREASE WHILE SERVICEBERRY AND SALINA WILDRYE INCREASE.

X. ASSOCIATED SITES

Sites that occur in association with this site:

SITE NUMBER: 034XY338UT
SITE NAME: UPLAND VERY STEEP LOAM (PINYON UTAH JUNIPER)

RANGE SITE NAME: UPLAND VERY STEEP STONY LOAM (PINYON-UTAH JUNIPER)
RANGE SITE NUMBER: 034XY344UT

XII. LIVESTOCK VALUES

BECAUSE OF STEEP SLOPES THIS SITE IS GRAZED LITTLE OR NONE BY LIVESTOCK.

XIII. WOOD PRODUCT VALUES

THIS SITE PRODUCES FIRE WOOD, POSTS, AND CHRISTMAS TREES. THE SITE INDEX IS 24.

XIV. WILDLIFE SPECIES LIST

a. Site factors influencing wildlife species:

THIS SITE PRODUCES FOOD AND COVER FOR WILDLIFE.

b. Guide to site use by selected wildlife species: -

WILDLIFE USING THIS SITE INCLUDE JACKRABBIT, WOODRAT, PINYON JAY, COYOTE, MULE DEER, AND ELK.

XV. WATERSHED VALUES

THE SOIL IS IN HYDROLOGIC GROUP C. THE RUNOFF CURVE NUMBERS ARE 74 THROUGH 86 DEPENDING ON THE CONDITION OF THE WATERSHED.

XVI. RECREATION AND NATURAL BEAUTY VALUES

THIS SITE HAS AESTHETIC APPEAL BUT VERY LITTLE RECREATION POTENTIAL.

XVII. THREATENED AND ENDANGERED PLANTS

THIS SECTION WILL BE ADDED AS INFORMATION IS AVAILABLE.

XVIII. ARCHAEOLOGICAL VALUES

THIS SECTION WILL BE ADDED AS INFORMATION IS AVAILABLE.

RANGE SITE NAME: UPLAND VERY STEEP STONY LOAM (PINYON-UTAH JUNIPER)
RANGE SITE NUMBER: 034XY344UT

APPENDIX I

Reference Data

1. Site Documentation (number and kind of site inventory records)

0	SCS-ECS-5	0	STATE-ECS-FORM
0	SCS-RANGE-417	0	BLM FORM
0	OTHER		

2. Distribution and extent.

County	State
ROOSEVELT FO	UTAH
PRICE FO	UTAH

3. Location of typical example of this site.

7600' N 400'W OF SE CORNER OF T 16 S R 17 E

Approved by: /s/ Pat L. Shaver
STATE RANGE CONSERVATIONIST
SCS UTAH

Date Approved: June 25, 1994

Approved by: /s/ Pat L. Shaver
WNTC RANGE CONSERVATIONIST
SCS WNTC PORTLAND OR

Date Approved: July 25, 1994

RANGE SITE NAME: UPLAND VERY STEEP STONY LOAM (PINYON-UTAH JUNIPER)
RANGE SITE NUMBER: 034XY344UT

APPENDIX II

1. Soil taxonomic unit representative of this site:

   Soil Taxon

   WHETROCK STX-L DRY 50-80% ERODED

   Soil Survey Area Number

   047

   Taxonomic Classification

   LOAMY-SKELETAL, MIXED ARIDIC CALCIBOROLLS

2. Type location for soils taxonomic unit representative of this site:

   MEASURED FROM THE CORNER OF THE TOWNSHIP AND RANGE

Non Technical Soil Description(s) (NASIS derived)

Soil Survey Area **UT616** **Carbon Area, Utah, Parts of Carbon and Emery Counties**

Mapunit 21 **CROYDON LOAM,8 TO 30 PERCENT SLOPES**

Soil Component Name CROYDON 90 % of the mapunit

Slope range (%): 8 to 30 Depth class: Deep Drainage class: Well drained

Permeability: Slow Available water capacity class: Moderate

Average total available water in top five feet (in.): 8.1

Land capability subclass, non-irrigated: 6c Land capability subclass, irrigated: Not rated

Ecological Site: High Mountain Loam (Aspen)

Runoff class: Not Rated Depth to seasonal high water table: NA -

Flooding frequency: None Other restrictions (in): Bedrock (paralithic) 40 - 60

Horizon Information

	Depth (in)	Textures		pH range	Sodium	Salinity (mmhos/cm)
A11, A120	- 16	L	loam	5.6 - 6.5	NA -	NA -
A2	16 - 23	L	loam	5.6 - 7.3	NA -	NA -
321t, B2223	- 48	CL	clay loam	6.1 - 6.5	NA -	NA -
R	48 - 52	WB	weathered bedrock	NA -	NA -	NA -

pH classes: 3.5-4.4 extremely acid; 4.5-5.0 very strongly acid; 5.1-5.5 strongly acid; 5.6-6.0 moderately acid; 6.1-6.5 slightly acid; 6.6-7.3 neutral; 7.4-7.8 slightly alkaline; 7.9-8.4 moderately alkaline; 8.5-9.0 strongly alkaline; >9.0 very strongly alkaline.

Salinity classes (if applicable): 0-2 non saline; 2-4 very slightly saline; 4-8 slightly saline; 8-16 moderately saline; >=16 saline.

Non Technical Soil Description(s) (NASIS derived)

Soil Survey Area **UT616** **Carbon Area, Utah, Parts of Carbon and Emery Counties**

Mapunit 84 **PODO-ROCK OUTCROP COMPLEX**

Soil Component Name PODO **50 %** of the mapunit

Slope range (%): 50 to 70 Depth class: Shallow Drainage class: Well drained

Permeability: Slow Available water capacity class: Very low

Average total available water in top five feet (in.): 0.9

Land capability subclass, non-irrigated: 8e Land capability subclass, irrigated: Not rated

Ecological Site: Upland Very Steep Shallow Loam (Pinyon-Utah Juniper)

Runoff class: Not Rated Depth to seasonal high water table: NA -

Flooding frequency: None Other restrictions (in): Bedrock (lithic) 8 - 20

Horizon Information

	Depth (in)	Textures		pH range	Sodium	Salinity (mmhos/cm)
A1	0 - 5			7.9 - 8.4	NA -	NA -
		BYV-SL	very bouldery sandy loam			
C1, C2	5 - 12			7.9 - 8.4	NA -	NA -
		GR-L	gravelly loam			
		GR-SL	gravelly sandy loam			
R	12 - 16			NA -	NA -	NA -
		UWB	unweathered bedrock			

pH classes: 3.5-4.4 extremely acid; 4.5-5.0 very strongly acid; 5.1-5.5 strongly acid; 5.6-6.0 moderately acid; 6.1-6.5 slightly acid; 6.6-7.3 neutral; 7.4-7.8 slightly alkaline; 7.9-8.4 moderately alkaline; 8.5-9.0 strongly alkaline; >9.0 very strongly alkaline.

Salinity classes (if applicable): 0-2 non saline; 2-4 very slightly saline; 4-8 slightly saline; 8-16 moderately saline; >=16 saline.

Soil Component Name ROCK OUTCROP 30 % of the mapunit

Slope range (%): 50 to 70 Depth class: Shallow Drainage class: not rated

Permeability: Very slow Available water capacity class: Very low

Average total available water in top five feet (in.): 0.0

Land capability subclass, non-irrigated: 8s Land capability subclass, irrigated: Not rated

Ecological Site: None

Runoff class: Not Rated Depth to seasonal high water table: NA -

Flooding frequency: None Other restrictions (in): Bedrock (lithic) -

Horizon Information

	Depth (in)	Textures	pH range	Sodium	Salinity (mmhos/cm)
H1	0 - 60		NA -	NA -	NA -
		UWB unweathered bedrock			

pH classes: 3.5-4.4 extremely acid; 4.5-5.0 very strongly acid; 5.1-5.5 strongly acid; 5.6-6.0 moderately acid; 6.1-6.5 slightly acid; 6.6-7.3 neutral; 7.4-7.8 slightly alkaline; 7.9-8.4 moderately alkaline; 8.5-9.0 strongly alkaline; >9.0 very strongly alkaline.

Salinity classes (if applicable): 0-2 non saline; 2-4 very slightly saline; 4-8 slightly saline; 8-16 moderately saline; >=16 saline.

Non Technical Soil Description(s) (NASIS derived)

Soil Survey Area **UT616** **Carbon Area, Utah, Parts of Carbon and Emery Counties**

Mapunit 96 **ROCK OUTCROP-RUBBLELAND-TRAVESSILLA COMPLEX**

Soil Component Name ROCK OUTCROP 35 % of the mapunit

Slope range (%): 30 to 70 Depth class: Shallow Drainage class: not rated

Permeability: Very slow Available water capacity class: Very low

Average total available water in top five feet (in.): 0.0

Land capability subclass, non-irrigated: 8s Land capability subclass, irrigated: Not rated

Ecological Site: None

Runoff class: Not Rated Depth to seasonal high water table: NA -

Flooding frequency: None Other restrictions (in): Bedrock (lithic) -

Horizon Information

	Depth (in)	Textures	pH range	Sodium	Salinity (mmhos/cm)
H1	0 - 60		NA -	NA -	NA -
		UWB unweathered bedrock			

pH classes: 3.5-4.4 extremely acid; 4.5-5.0 very strongly acid; 5.1-5.5 strongly acid; 5.6-6.0 moderately acid; 6.1-6.5 slightly acid; 6.6-7.3 neutral; 7.4-7.8 slightly alkaline; 7.9-8.4 moderately alkaline; 8.5-9.0 strongly alkaline; >9.0 very strongly alkaline.

Salinity classes (if applicable): 0-2 non saline; 2-4 very slightly saline; 4-8 slightly saline; 8-16 moderately saline; >=16 saline.

Soil Component Name RUBBLELAND **30 % of the mapunit**

Slope range (%): 30 to 70 Depth class: Shallow Drainage class: Excessively drained

Permeability: Rapid Available water capacity class: Very low

Average total available water in top five feet (in.): 3.0

Land capability subclass, non-irrigated: 8s Land capability subclass, irrigated: Not rated

Ecological Site: None

Runoff class: Not Rated Depth to seasonal high water table: NA -

Flooding frequency: None Other restrictions (in): Bedrock (lithic) -

Horizon Information

	Depth (in)	Textures		pH range	Sodium	Salinity (mmhos/cm)
H1	0 - 60			NA -	NA -	NA -
		FRAG	fragmental material			

pH classes: 3.5-4.4 extremely acid; 4.5-5.0 very strongly acid; 5.1-5.5 strongly acid; 5.6-6.0 moderately acid; 6.1-6.5 slightly acid; 6.6-7.3 neutral; 7.4-7.8 slightly alkaline; 7.9-8.4 moderately alkaline; 8.5-9.0 strongly alkaline; >9.0 very strongly alkaline.

Salinity classes (if applicable): 0-2 non saline; 2-4 very slightly saline; 4-8 slightly saline; 8-16 moderately saline; >=16 saline.

Soil Component Name TRAVESSILLA **25 % of the mapunit**

Slope range (%): 30 to 70 Depth class: Shallow Drainage class: Well drained

Permeability: Slow Available water capacity class: Very low

Average total available water in top five feet (in.): 2.3

Land capability subclass, non-irrigated: 8e Land capability subclass, irrigated: Not rated

Ecological Site: Upland Very Steep Shallow Loam (Pinyon-Utah Juniper)

Runoff class: Not Rated Depth to seasonal high water table: NA -

Flooding frequency: None Other restrictions (in): Bedrock (lithic) 6 - 20

Horizon Information

	Depth (in)	Textures		pH range	Sodium	Salinity (mmhos/cm)
A1	0 - 3			7.4 - 7.8	NA -	NA -
		GRV-FSL	very gravelly fine sandy loam			
C1, C2	3 - 17			7.4 - 8.4	NA -	NA -
		VFSL	very fine sandy loam			
		L	loam			
R	17 - 21			NA -	NA -	NA -
		UWB	unweathered bedrock			

pH classes: 3.5-4.4 extremely acid; 4.5-5.0 very strongly acid; 5.1-5.5 strongly acid; 5.6-6.0 moderately acid; 6.1-6.5 slightly acid; 6.6-7.3 neutral; 7.4-7.8 slightly alkaline; 7.9-8.4 moderately alkaline; 8.5-9.0 strongly alkaline; >9.0 very strongly alkaline.

Salinity classes (if applicable): 0-2 non saline; 2-4 very slightly saline; 4-8 slightly saline; 8-16 moderately saline; >=16 saline.

G-7

FIELD OFFICE TECHNICAL GUIDE: SECTION II-E
LOCATION: MLRA047A
AREA:
STATE: UTAH

RANGE SITE DESCRIPTION

RANGE SITE NAME: MOUNTAIN SHALLOW LOAM (MOUNTAIN BIG SAGEBRUSH)

RANGE SITE NUMBER: 047AY446UT

ORIGINAL DATE: 12/10/1992

AUTHOR'S INITIALS: DLT DJS

I. SOIL NARRATIVE:

THIS SITE IS FOUND ON ROLLING TO STEEP MOUNTAIN SLOPES AND RIDGES.

SOILS IN THIS SITE ARE STONY OR COBBLY AND SHALLOW OVER BEDROCK (10 TO 20 INCHES). THEY ARE WELL DRAINED. THEY HAVE DARK BROWN SURFACE LAYERS. THE UNDERLYING LAYERS ARE STONY OR COBBLY AND RANGE FROM MODERATELY COARSE TO FINE TEXTURED. THEY FORMED ON STRONGLY SLOPING TO VERY STEEP MOUNTAIN SLOPES IN MATERIAL WEATHERED FROM SANDSTONE, SHALE, LIMESTONE, QUARTZITE AND IGNEOUS ROCKS. INTAKE RATE IS MODERATE AND WATER MOVEMENT THROUGH THE SOIL IS MODERATE TO SLOW ABOVE THE BEDROCK. ROOTS PENETRATE THE SOIL MATERIAL READILY ABOVE THE BEDROCK AND INTO ROCK FRACTURES. WATERHOLDING CAPACITY IS LOW DUE TO THE SHALLOW DEPTH AND ROCK FRAGMENT CONTENT OF THE PROFILE. IT RANGES FROM 1.5 TO 3.0 INCHES WITH A WATER SUPPLYING CAPACITY OF 5 TO 8 INCHES. RUNOFF WILL OCCUR ON THESE SOILS BECAUSE SOIL DEPTH LIMITS WATER STORAGE CAPACITY.

THE CLIMATE OF THIS SITE IS COOL AND QUITE HUMID WITH COLD SNOWY WINTERS AND COOL DRY SUMMERS. THE AVERAGE ANNUAL PRECIPITATION VARIES FROM 16 TO 22 INCHES WITH AN AVERAGE OF AROUND 19. DISTRIBUTION IS 55 TO 60% DURING THE PLANT DORMANT PERIOD (OCTOBER TO MARCH). THIS IS THE MOST DEPENDABLE SUPPLY FOR PLANT GROWTH. LOWER PRECIPITATION AND HIGH EVAPO-TRANSPIRATION RATES DURING JULY, AUGUST, AND SEPTEMBER CAUSES SLOWING DOWN IN GROWTH OF ALL PLANT SPECIES AND DORMANCY IN MOST OF THE GRASSES AND FORBS.

II. LIST OF SOIL TAXONOMIC UNITS OR SOILS MAPPING UNITS FOR ALL SOILS INCLUDED IN THIS SITE:

AGASSIZ CBV-L, 8 TO 25%
GABICA STE-L, 10 TO 50%
AGASSIZ CBV-L, 25 TO 60%
WALLSBURG CBV-SCL, 20 TO 60%
FOXOL CBV-L, 30 TO 70%
WALLSBURG GR-L, 40 TO 60%
FOXOL STE-SL STV-L, 10 TO 60%
BRAD STV-LS, 15 TO 60%
REDCAN FAMILY LOAM, 4 TO 15%
LITTLE POLE CBV-SCL, 6 TO 60%
AGASSIZ ST-SIL, 40 TO 70%
REDCAN CB-L, 40 TO 60%
CURTIS CREEK LOAM, 30 TO 60%

RANGE SITE NAME: MOUNTAIN SHALLOW LOAM (MOUNTAIN BIG SAGEBRUSH)
RANGE SITE NUMBER: 047AY446UT

III. LANDSCAPE FACTORS

A. PHYSIOGRAPHY:

1. ELEVATION/ASPECT:

LOW 5200 ft / ALL HIGH 8500 ft / ALL

2. PERCENT SLOPE:

LOW 15
HIGH 60

IV. CLIMATE FACTORS

A.	FREEZE-FREE PERIOD (FFP):	0 TO	0	(DAYS)
B.	FROST-FREE PERIOD:	50 TO	100	(DAYS)
C.	MEAN ANNUAL PRECIPITATION (MAP):	16 TO	22	(INCHES)
D.	MEAN ANNUAL AIR TEMPERATURE (MAAT):	36 TO	45	(F)
E.	MEAN ANNUAL SOIL TEMPERATURE (MAST):	38 TO	47	(F)
F.	MOISTURE AND TEMPERATURE DISTRIBUTION:			

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
- PPT -												
HIGH	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0
MEAN	2.71	2.35	2.22	1.80	1.68	1.27	0.79	1.04	1.11	1.69	1.70	1.87
LOW	0.00	0	0.00	0	0	0	0	0.00	0	0.00	0.00	0.00
- TEMP -												
HIGH	34	39	46	56	67	77	86	84	75	63	46	37
MEAN	0	0	0	0	0	0	0	0	0	0	0	0
LOW	10	14	20	28	36	42	49	47	39	30	17	13

V. VEGETATION FACTORS - CLIMAX PLANT COMMUNITY

A. RANGE SITE DESCRIPTION NARRATIVE:

THE DOMINANT ASPECT OF THIS SITE IS THAT OF SHRUBS. THE COMPOSITION BY ANNUAL AIR DRY WEIGHT IS APPROXIMATELY 50% GRASSES, 5% FORBS AND 45% SHRUBS.

B. PERCENT COVER:

1. GROUND COVER AND STRUCTURE:

	% CANOPY COVER (VERTICAL VIEW)	AVERAGE HEIGHT (FT)	% BASAL AREA COVER
GRASSES AND GRASSLIKES	30	2.00	5
FORBS	5	1.00	2
CRYPTOGAMS	0	0.00	0
SHRUBS	20	3.00	8
TREES	0	0.00	0

C. Plant community composition and production:

1. Herbaceous

a. Grasses and grasslikes

National Symbol	Common Name	Grp	% Composition by weight	Group % Allowable
PSSP6	BLUEBUNCH WHEATGRASS	0	15 to 20	0 to 0
POFE	MUTTONGRASS	0	5 to 10	0 to 0
PASM	WESTERN WHEATGRASS	0	3 to 5	0 to 0
ELEL5	BOTTLEBRUSH SQUIRRELTAIL	0	3 to 5	0 to 0
STCO3	COLUMBIA NEEDLEGRASS	0	3 to 5	0 to 0
LECI4	GREAT BASIN WILDRYE	1	1 to 3	5 to 10
STLE4	LETTERMAN NEEDLEGRASS	1	1 to 3	5 to 10
ORHY	INDIAN RICEGRASS	1	1 to 3	5 to 10
KOMA	PRAIRIE JUNEGRASS	1	1 to 3	5 to 10
PONE3	NEVADA BLUEGRASS	1	1 to 3	5 to 10
FEKI2	KING FESCUE	1	1 to 3	5 to 10
MEBU	BULBOUS ONIONGRASS	1	1 to 3	5 to 10
CAGE2	GEYER SEDGE	1	1 to 3	5 to 10
POSE	SANDBERG BLUEGRASS	1	1 to 3	5 to 10
PPGG	OTHER PERENNIAL GRASSES	1	5 to 10	5 to 10
AAGG	OTHER ANNUAL GRASSES	1	5 to 10	5 to 10

b. Forbs

National Symbol	Common Name	Grp	% Composition by weight	Group % Allowable
CRAC2	LONGLEAF HAWKSBEARD	2	1 to 1	3 to 5
BASA3	ARROWLEAF BALSAMROOT	2	1 to 1	3 to 5
ERBR5	SHORTSTEM WILD BUCKWHEAT	2	1 to 1	3 to 5
CALI4	WYOMING INDIAN PAINTBRUSH	2	1 to 1	3 to 5
ASOC	WESTERN MOUNTAIN ASTER	2	1 to 1	3 to 5
LIPE2	BLUE FLAX	2	1 to 1	3 to 5
ACMI2	COMMON YARROW	2	1 to 1	3 to 5
PHHO	CARPET PHLOX	2	1 to 1	3 to 5
ASAR4	SILVERLEAF MILKVETCH	2	1 to 1	3 to 5
GEVI2	STICKY PURPLE CRANESBILL	2	1 to 1	3 to 5
LUCAC3	SPURRED LUPINE	2	1 to 1	3 to 5
ORTO	TOLMIE OWLCLOVER	2	1 to 1	3 to 5
CISC2	MEADOW THISTLE	2	1 to 1	3 to 5
HAPA	COMMON STICKSEED	2	1 to 1	3 to 5
PPFF	OTHER PERENNIAL FORBS	2	3 to 5	3 to 5
AAFF	OTHER ANNUAL FORBS	2	3 to 5	3 to 5

2. Shrubs

National Symbol	Common Name	Grp	% Composition by weight	Group % Allowable
ARTRV	MOUNTAIN BIG SAGEBRUSH	0	15 to 20	0 to 0
PUTR2	BITTERBRUSH	0	10 to 15	0 to 0
SYOR2	MOUNTAIN SNOWBERRY	0	3 to 5	0 to 0
CHVIV4	STICKYLEAF LOW RABBITBRUSH	3	1 to 2	3 to 5
AMAL2	SASKATOON SERVICEBERRY	3	1 to 2	3 to 5
ERMI4	SLENDER WILD BUCKWHEAT	3	1 to 2	3 to 5
TECA2	SPINELESS HORSEBRUSH	3	1 to 2	3 to 5
GUSA2	BROOM SNAKEWEED	3	1 to 2	3 to 5
SSSS	OTHER SHRUBS	3	3 to 5	3 to 5

5. Production

Grasses and grasslikes: 45 to 55 % of total

Forbs: 3 to 5 % of total

Shrubs: 35 to 45 % of total

Trees: 0 to 0 % of total

Lichen community: 0.00 lbs/acre (NOT ANNUAL PRODUCTION)

Moss community: 0.00 lbs/acre

6. Cover

Lichen community: 0 % cover

Moss community: 0 % cover

VI. PLANT GROWTH CURVES

ID	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
NUMBER: UT4461	0	0	0	5	20	50	5	10	5	5	0	0
NAME: PNC												
DESC: EXCELLENT CONDITION												
NUMBER: UT4462	0	0	0	0	30	50	0	10	10	0	0	0
NAME: GOOD CONDITION NO. 1												
DESC: NEEDLEGRASSES, BLUEGRASSES AND SAGEBRUSH												

VII. TOTAL ANNUAL PRODUCTION (EXCELLENT CONDITION)

FAVORABLE 1600 TO 1700

AVERAGE 1000 TO 1100

UNFAVORABLE 500 TO 600

RANGE SITE NAME: MOUNTAIN SHALLOW LOAM (MOUNTAIN BIG SAGEBRUSH)
RANGE SITE NUMBER: 047AY446UT

IX. PLANT COMMUNITY DYNAMICS:

AS THIS SITE DETERIORATES DUE TO OVERGRAZING PERENNIAL GRASSES DECREASE AND BIG SAGEBRUSH AND LOW RABBITBRUSH INCREASE. FIRE WILL REDUCE BIG SAGEBRUSH DENSITY BUT LOW RABBITBRUSH WILL INCREASE.

X. ASSOCIATED SITES

Sites that occur in association with this site:

SITE NUMBER: 047AY430UT
SITE NAME: MOUNTAIN LOAM (MOUNTAIN BIG SAGEBRUSH)

SITE NUMBER: 047AY476UT
SITE NAME: MOUNTAIN WINDSWEPT RIDGE (LOW SAGEBRUSH)

XI. COMPETING SITES

Similar sites with their differentiae:

SITE NUMBER: 047AY476UT
SITE NAME: MOUNTAIN WINDSWEPT RIDGE (LOW SAGEBRUSH)
DIFFERENTIAE: LANDSCAPE POSITION

XII. LIVESTOCK VALUES

THIS SITE HAS A LARGE AMOUNT OF GRASSES AND SHRUBS (ABOUT EQUAL AMOUNTS BY TOTAL AIR DRY PRODUCTION). THERE IS ONLY A SMALL AMOUNT OF THE TOTAL YIELD THAT IS FORBS BUT A LARGE NUMBER OF SPECIES. WITH THIS COMPOSITION GOOD FORAGE AND BALANCED ANIMAL NUTRITION IS PROVIDED DURING SPRING, SUMMER AND FALL. CATTLE, SHEEP, GOATS AND HORSES GRAZE THIS SITE TO GOOD ADVANTAGE.

XIII. WOOD PRODUCT VALUES

NO VALUES EXIST FOR LUMBER. SOME OF THE SHRUB SPECIES PRODUCE ENOUGH WOOD FOR CAMPFIRES. PRODUCTION OF WOOD PRODUCTS FOR OTHER USES ARE NOT OF A QUANTITY OR QUALITY TO BE OF VALUE.

XIV. WILDLIFE SPECIES LIST

a. Site factors influencing wildlife species:

THIS SITE PRODUCES EXCELLENT FORAGE FOR DEER AND ELK.

b. Guide to site use by selected wildlife species:

THIS SITE IS FAIR HABITAT FOR MANY KINDS OF WILDLIFE.

XV. WATERSHED VALUES

SOIL SERIES IN THIS SITE ARE GROUPED MAINLY INTO D HYDROLOGIC GROUP. THEY HAVE HIGH RUNOFF POTENTIAL. WHEN THE VEGETATION IS IN CLIMAX (POTENTIAL), THE HYDROLOGIC CURVES ARE 76 TO 73. WHERE RANGE CONDITION HAS DECLINED FROM CLIMAX, FIELD INVESTIGATION IS NEEDED TO DETERMINE HYDROLOGIC CURVE NUMBERS.

XVI. RECREATION AND NATURAL BEAUTY VALUES

THIS SITE HAS GOOD VALUES FOR ESTHETICS AND NATURAL BEAUTY. IT HAS A LARGE NUMBER OF FORBS AND SHRUBS WHICH HAVE FLOWERS IN BLOOM FROM EARLY SPRING THROUGHOUT THE SUMMER AND INTO THE FALL. IT HAS A COMBINATION OF GRASSES, FORBS, SMALL SHRUBS, AND LARGE SHRUBS WHICH OFFER SOME POSSIBILITIES FOR SCREENING AND VALUE AS CAMPING AND PICNICKING AREAS. HUNTING FOR UPLAND GAME, ELK AND MULE DEER IS GOOD TO EXCELLENT ON THIS SITE. FISHING IS OPPORTUNE ON STREAMS THROUGH AND ADJACENT TO THIS SITE.

XVII. THREATENED AND ENDANGERED PLANTS

BOTH THE AMERICAN PEREGINE FALCON AND PRAIRIE FALCON MAY OCCASIONALLY SEEK THEIR PREY ON THIS SITE.

XVIII. ARCHAEOLOGICAL VALUES

TO BE ADDED AS INFORMATION IS PROVIDED.

RANGE SITE NAME: MOUNTAIN SHALLOW LOAM (MOUNTAIN BIG SAGEBRUSH)
RANGE SITE NUMBER: 047AY446UT

APPENDIX I

Reference Data

1. Site Documentation (number and kind of site inventory records)

0	SCS-ECS-5	0	STATE-ECS-FORM
21	SCS-RANGE-417	0	BLM FORM
0	OTHER		

2. Distribution and extent.

County	State
LOGAN F.O.	UTAH
MIDVALE F.O.	UTAH
PROVO F.O.	UTAH
PRICE F.O.	UTAH
RICHFIELD F.O.	UTAH
CEDAR CITY F.O.	UTAH

3. Location of typical example of this site.

SW 1/4; SE 1/4; SE 1/4; SEC. 9 T. 2 S. R. 4 E.

Approved by: /s/ Pat L. Shaver
STATE RANGE CONSERVATIONIST
SCS UTAH

Date Approved: _____

Approved by: /s/ Larry D. Butler
WNTC RANGE CONSERVATIONIST
SCS WNTC PORTLAND OR

Date Approved: _____

RANGE SITE NAME: MOUNTAIN SHALLOW LOAM (MOUNTAIN BIG SAGEBRUSH)
RANGE SITE NUMBER: 047AY446UT

APPENDIX II

1. Soil taxonomic unit representative of this site:

   Soil Taxon

   AGASSIZ VCB-L, 8 TO 25 %

   Soil Survey Area Number

   613

   Taxonomic Classification

   LOAMY-SKELETAL, MIXED, FRIGID, LITHIC HAPLOXEROLLS.

2. Type location for soils taxonomic unit representative of this site:

   SW 1/4; SE 1/4; SE 1/4; SEC. 9 T. 2 S. R. 4 E.

3. Listing of soils correlated to this site:

Soil Taxon....: WALLSBURG CBV-SCL, 20 TO 60%
SSA.....: 622
Classification: CLAYEY-SKELETAL, MONTMORILLONITIC, FRIGID LITHIC ARGIXEROLLS

Soil Taxon....: BRAD STV-LS, 15 TO 60%
SSA.....: 613
Classification: SANDY-SKELETAL, MIXED, FRIGID LITHIC HAPLOXEROLLS.

Soil Taxon....: GABICA STE-L, 10 TO 50%
SSA.....: 613
Classification: LOAMY-SKELETAL, MIXED, FRIGID LITHIC ARGIXEROLLS.

Soil Taxon....: REDCAN FAMILY LOAM, 4 TO 15%
SSA.....: 613
Classification: L-SKEL, MIXED (CALCAREOUS), FRIGID, SHALLOW TYPIC XERORTHENT

Non Technical Soil Description(s) (NASIS derived)

Soil Survey Area **UT616** **Carbon Area, Utah, Parts of Carbon and Emery Counties**

Mapunit 7 **BEJE-TRAG COMPLEX**

Soil Component Name BEJE 55 % of the mapunit

Slope range (%): 3 to 15 Depth class: Shallow Drainage class: Well drained

Permeability: Slow Available water capacity class: Very low

Average total available water in top five feet (in.): 2.4

Land capability subclass, non-irrigated: 6s Land capability subclass, irrigated: Not rated

Ecological Site: Mountain Shallow Loam (Mountain Big Sagebrush)

Runoff class: Not Rated Depth to seasonal high water table: NA -

Flooding frequency: None Other restrictions (in): Bedrock (lithic) 10 - 20

Horizon Information

	Depth (in)	Textures		pH range	Sodium	Salinity (mmhos/cm)
A1	0 - 6			6.6 - 7.8	NA -	NA -
		L	loam			
B2t	6 - 14			7.4 - 8.4	NA -	NA -
		SCL	sandy clay loam			
		L	loam			
		CL	clay loam			
R	14 - 18			NA -	NA -	NA -
		UWB	unweathered bedrock			

pH classes: 3.5-4.4 extremely acid; 4.5-5.0 very strongly acid; 5.1-5.5 strongly acid; 5.6-6.0 moderately acid; 6.1-6.5 slightly acid; 6.6-7.3 neutral; 7.4-7.8 slightly alkaline; 7.9-8.4 moderately alkaline; 8.5-9.0 strongly alkaline; >9.0 very strongly alkaline.

Salinity classes (if applicable): 0-2 non saline; 2-4 very slightly saline; 4-8 slightly saline; 8-16 moderately saline; >=16 saline.

Soil Component Name TRAG **20%** of the mapunit

Slope range (%): 3 to 30 Depth class: Very deep Drainage class: Well drained

Permeability: Moderately slow Available water capacity class: High

Average total available water in top five feet (in.): 10.8

Land capability subclass, non-irrigated: 6e Land capability subclass, irrigated: Not rated

Ecological Site: MOUNTAIN LOAM (SALINA WILDRYE)

Runoff class: Not Rated Depth to seasonal high water table: NA -

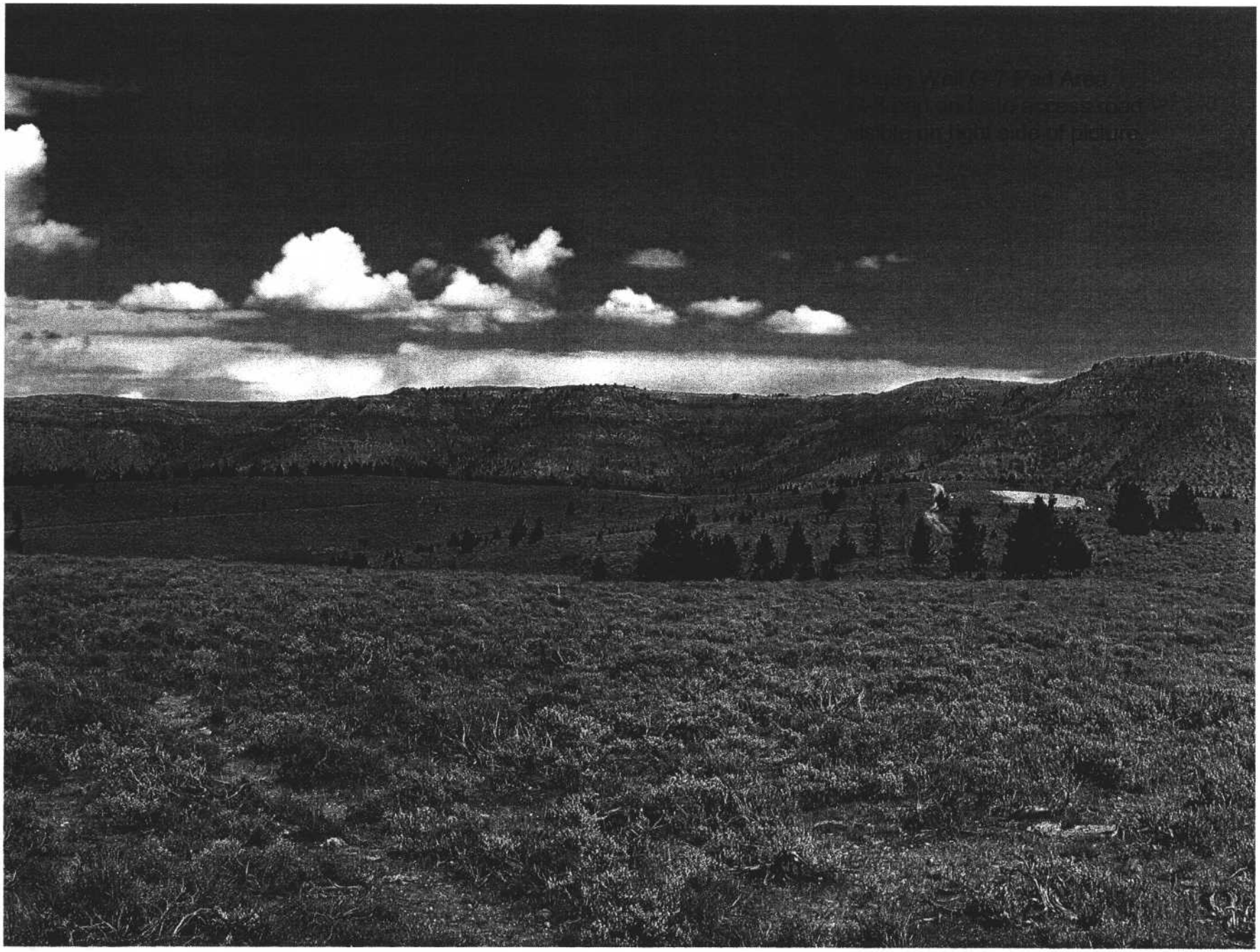
Flooding frequency: None Other restrictions (in): NA -

Horizon Information

	Depth (in)	Textures		pH range	Sodium	Salinity (mmhos/cm)
A1	0 - 5			7.4 - 7.8	NA -	NA -
		CL	clay loam			
1,B21t,B25	- 39			7.4 - 7.8	NA -	NA -
		CL	clay loam			
C	39 - 60			7.4 - 8.4	NA -	NA -
		CL	clay loam			

pH classes: 3.5-4.4 extremely acid; 4.5-5.0 very strongly acid; 5.1-5.5 strongly acid; 5.6-6.0 moderately acid; 6.1-6.5 slightly acid; 6.6-7.3 neutral; 7.4-7.8 slightly alkaline; 7.9-8.4 moderately alkaline; 8.5-9.0 strongly alkaline; >9.0 very strongly alkaline.

Salinity classes (if applicable): 0-2 non saline; 2-4 very slightly saline; 4-8 slightly saline; 8-16 moderately saline; >=16 saline.



ATTACHMENT 3-3

INFORMATION MOVED TO THE CONFIDENTIAL FOLDER IN 2005

CHAPTER 4

LAND USE AND AIR QUALITY

TABLE OF CONTENTS

LIST OF ATTACHMENTS

410 LAND USE

411 Environmental Description

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

411.100 Preming Land Use

The area is utilized for the landowners private use, including hunting and as open range for livestock and wildlife.

411.110 Land Use Map and Narrative

Refer to the same section of the approved M&RP.

411.120 Land Capability

The major plant communities at the well sites are identified in Section 321. No cultivated lands lie within the well boundaries, due to the limiting terrain and lack of water for irrigation. Refer to Section 321.200, Table 3-1 of this submittal for forage production per acre for each well site.

The well site areas are located on the flatter mesa tops and rolling terrain. This type of terrain receives heavier pressure because of more available forage and easier movement by livestock.

411.130 Land Use Description

The wells are located on land administered by Milton & Ardith Thayn Trust and zoned by Carbon County for mining and grazing (MG-1).

No industrial or municipal facilities are located on or immediately adjacent to the well sites.

411.140 Cultural and Historic Resources Information

Cultural and Historic Resource Maps - Archaeological surveys were conducted in 2003 of the well sites G-1 through G-6. Nothing was found that required future investigation. There are no cemeteries, public parks, or units of the National System of Trails or the Wild and Scenic Rivers System located within the well site boundaries. The reports can be found in Attachment 4-1 of this submittal, Appendix 4-1 and 4-3 of the M&RP and in the Confidential Folder. Well site G-7 was inventoried by AERC in 1980 (see below), a letter from John Senulis of Senco-Phenix to SHPO has been written requesting proof of clearance for the G-7 site. A copy of the Senco-Phenix letter and SHPO letter will be included in the confidential folder when they are received.

Previous research in 1980 by "AERC surveyed several sample blocks in Sections 13 and 24, T13S, R12E and Sections 18, 19 and 30 T13S, R13E. They also surveyed the access road into the Snow Mine site. One archeological site (42CB292) was located. The site was described as "Coal mine located in Pace Canyon consists of one known mine portal which has been closed. Site of historic Snow Mine in Pace Canyon which was active in 1906 but had its primary production period from 1932-1940." The site was relatively pristine at the time and still contained a standing coal loadout and foundation with depth potential. Avoidance was recommended pending further historic research. As noted the site has since been extensively modified" (Attachment 4-1, Senco-Phenix, June 24, 2003, SPUT-455, page 2).

Access to the degas holes will not impact or disturb what remains of the archeological site (42CB292). The road in the bottom of Pace Canyon passes the archeological site, but the closed portal is not visible from the road, therefore there is nothing to draw attention to the site. The loadout referenced in the survey no longer exist at the site.

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

411.200 Previous Mining Activity

Dugout Canyon has no knowledge of the removal of coal or other minerals in the well site areas.

412 Reclamation Plan

412.100 Postming Land-Use Plan

All uses of the land prior to the wells construction/operation and the capacity of the land to support prior alternate uses will remain available throughout the life of the sites.

Dugout Canyon intends the postmining land use to be livestock and wildlife grazing and other uses as dictated by the land owner (hunting, roads, etc.). Final reclamation activities will be completed in a manner to provide the lands able to parallel the premining land use.

412.200 Land Owner or Surface Manager Comments

Milton & Ardith Thayn Trust is the landowner. Canyon Fuel Company, LLC has a surface land owner agreement with the Thayne Trust for the drilling of degassification holes (Attachment 4-2). Prior to drilling the landowner will be contacted and the requirements related to drilling as outlined in the surface land owner agreement will be met. A copy of the letter will be included in Attachment 4-2.

413 Performance Standards

413.100 Postmining Land Use

Postmining land uses are discussed in Section 412.100. The postmining lands will be reclaimed in a timely manner and capable of supporting such uses (see Chapters 2, 3, 5, and 7).

413.200 Determining Premining Uses of Land

Refer to Section 411.100.

413.300 Criteria for Alternative Postming Land Uses

No alternative postmining land uses have been planned.

414 Alternative Land Use

No alternative postmining land uses have been planned.

420 AIR QUALITY

421 Air Quality Standards

Dugout Canyon activities will be conducted in compliance with the requirements of the Federal Clean Air Act and the Utah Air Conservation Rules.

422 Compliance Efforts

See Fugitive Dust Control Plan, Section 424.

423 Monitoring Program

Refer to the same section in the approved M&RP.

424 Fugitive Dust Control Plan

Operational areas that are used by mobile equipment will be water sprayed to control fugitive dust. The application of water will be of sufficient frequency and quantity to maintain the surface material in a damp/moist condition unless it is below freezing.

425 Additional Division Requirements

Refer to the same section of the approved M&RP.

ATTACHMENT 4-1

Information Moved to Confidential Folder in 2005

Place this document in the

CONFIDENTIAL BINDER

Add to

CHAPTER 4, DEGASSIFICATION WELLS

ATTACHMENT 4-1

SENCO-PHENIX

March 9, 2005

Mr. James Dykman, Deputy SHPO
Utah State Historical Society
300 Rio Grande
Salt Lake City, UT 84101-1182

Dear Jim,

The Dugout Mine of Canyon Fuel, LLC is proposing to drill the G-7 and G-8 drill holes in Section 24, Township 13 South, Range 12 East, Carbon County, Utah. Both drill holes will be on Private land. There have been a number of archeological projects in Section 24 as follows:

- 1980, AERC performed block survey on the areas where the drill holes will be located. No cultural resources were located. (Hauck and Weder, 1980)
- 1983, Metcalf-Zier surveyed several drill hole sites and access roads in Section 24. No cultural resources were located. (Metcalf, 1983)
- 2001, SENCO-PHENIX surveyed several drill hole sites and access roads in Section 24, No cultural resources were located. (Senulis, 2001)
- 2003, SENCO-PHENIX surveyed several more drill hole sites and access roads in Section 24, No cultural resources were located. (Senulis, 2003)

Previous file search has revealed that no cultural resources have ever been recorded in Section 24. We feel therefore, no historic properties will be affected and no further cultural resource inventory is necessary prior to the drilling program. Archeological clearance is recommended without additional cultural resource survey work.

Sincerely,

John A Senulis

John A Senulis
Principal Investigator

Jas: bhoh

Attachment

Cc: Miller, Dugout Canyon Mine, DOGM

References

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

1980 *Intensive Archeological Surface Evaluation of the Proposed Sage Point-Dugout Canyon Project in Carbon County, Utah*, Archeological-Environmental Research Corporation Paper Number 19, Salt Lake City. (79-475)

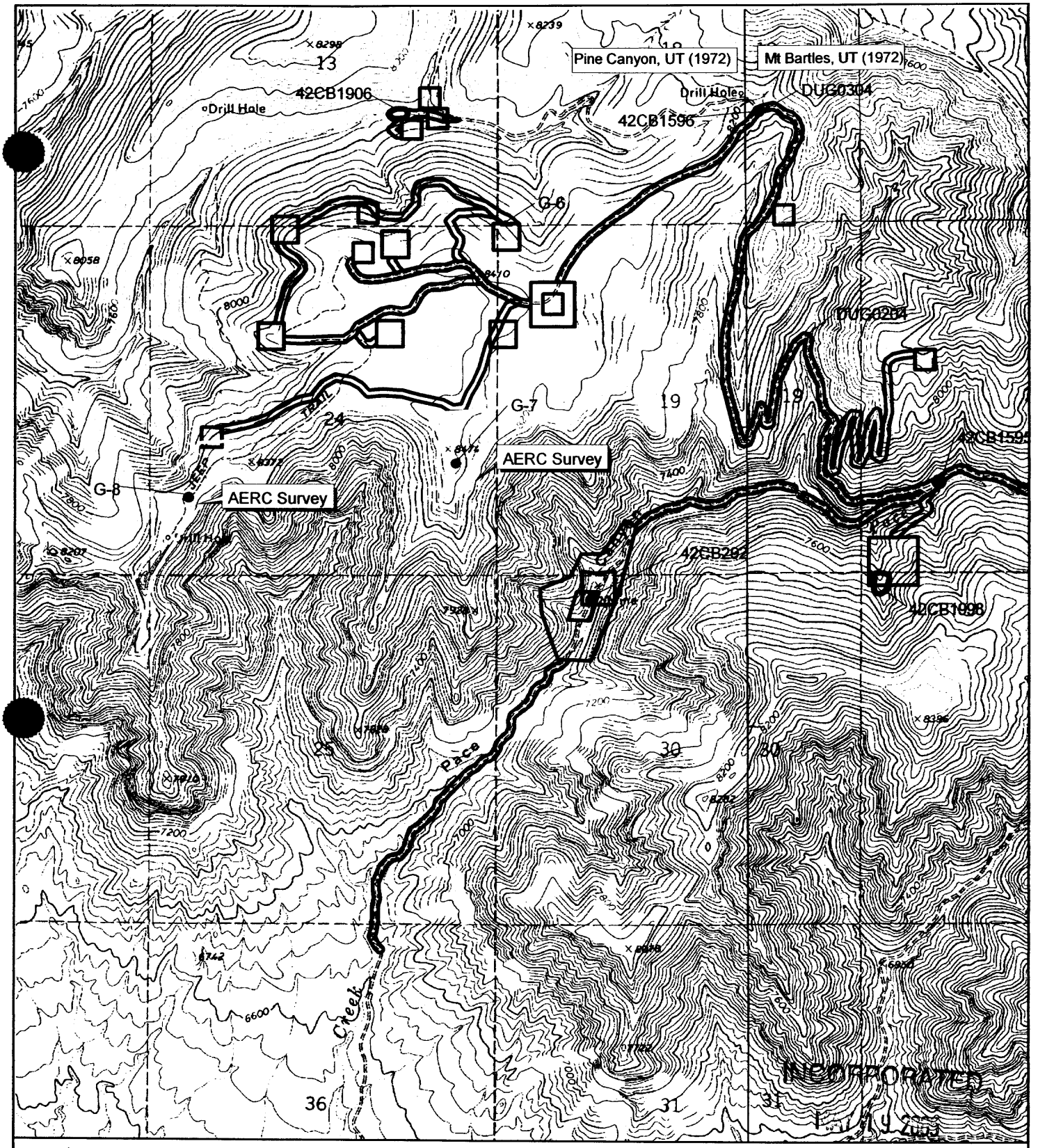
Metcalf, Michael D.

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

Senulis, John A.

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

2003 *An Intensive Cultural Resource Survey and Inventory of the 2003 Dugout Canyon Mine Drill Holes and Access Corridors*, SENCO-PHENIX Archeological Consultants, Price, Utah. (03-455)


Pine Canyon, UT (1972)
Mt Bartles, UT (1972)
42CB1906
Drill Hole
42CB1596
DUG0304
G-6
DUG0284
G-7
AERC Survey
G-8
AERC Survey
42CB292
42CB1998
INCORPORATED
13
24
19
18
25
30
36
31
N
Current Survey
Previous Survey
AERC Survey
Eligible Sites
Ineligible Sites
Scale 1:24,000
1"= 2,000'
SENCO-PHENIX
G-7 & G-8 Drill Holes
Dugout Mine of Canyon Fuel, LLC
Section 24 T13S, R12E
Carbon County, Utah
March2005
SPUT-492

ATTACHMENT 4-2

SURFACE LAND OWNER AGREEMENT

add to the back of existing information

Ark Land Company Interoffice Memo

March 10, 2004

To: Sue Prader

From: Mike Stevenson

Subject: **2005 Drilling Activities on Thayn Lands**

In 2005 the Dugout Canyon Mine currently plans to conduct exploration, de-gassing, and permitting activities on the Thayn Lands.

As many as two (2) exploration bore holes (DUG0105/DUG0205) will be drilled on the Thayn Lands, see enclosed map. The current plan is to drill both holes from the same surface site due to surface access restrictions. In addition, Dugout would like to complete these holes as Methane Drainage Holes. This will save future costs, permitting efforts, and reduce surface disturbance. These holes will require the use of the access roads, preparation/building of the drill sites, and reclamation of the drill sites and roads as directed by the landowner and permit regulations. In addition, the drilling activities will require obtaining and hauling water.

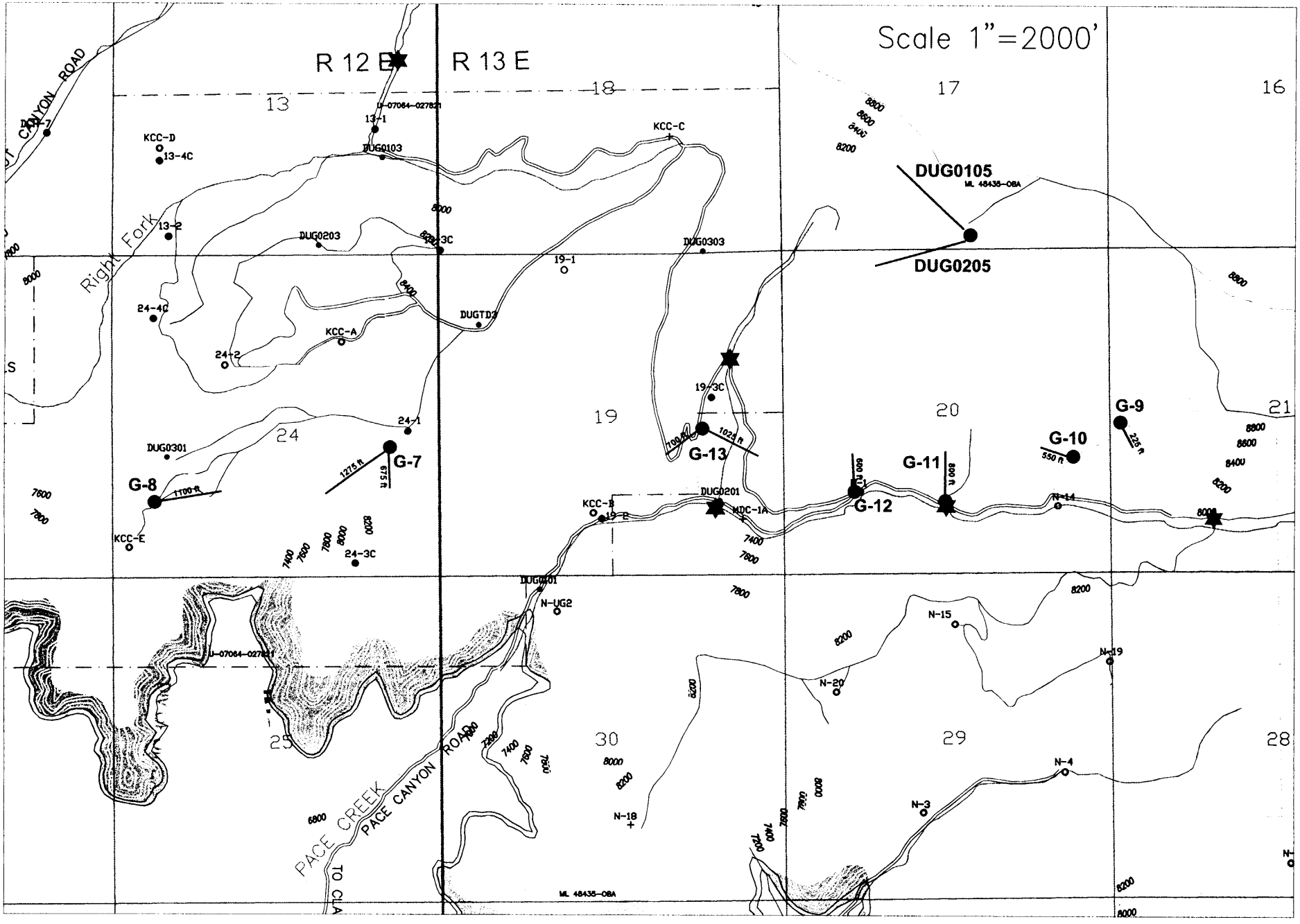
As many as nine (9) Methane Drainage Holes will be drilled to remove methane and other gases from the longwall panel gob areas, see map (G-7 thru G-13). As shown on the map several of these sites will have one or more holes drilled from the same site. This is due to limited surface access. Similar to the exploration drilling, these boreholes will require road improvements as needed, site building/preparation, reclamation, and water hauling. Permitting activities similar to those required for the exploration drilling will also be conducted in association with the degas drilling. It has not been determined if all nine (9) of the degas boreholes will be drilled or when. However, the G-7 hole may be drilled as early as May, 2005. The remaining holes, including the exploration holes, will be drilled later in the year depending on permitting and drill rig availability.

In conjunction with the exploration activities listed above, there will be permitting activities including, but not limited to, endangered plant and animal surveys, environmental assessment activities, and cultural surveys. All of these activities will be conducted by third party contractors and require no surface disturbance.

Associated with the degas activities will be the installation of one or more exhauster-blower units on the degas sites to remove the gases from the mine. The number and duration of the installations are unknown at this time. While the exhauster-blower units are in operation, the units will require frequent inspections to maintain the units. These inspections may range from daily to weekly depending on the effort required to maintain the units.

The Dugout Mine is planning to install a mine ventilation fan in the Pace Canyon. While the fan installation site is located on BLM surface, access to the fan site follows the main road access to the general area and crosses the Thayn Lands. The Dugout Mine currently expects to begin construction of the site in April 2005.

Please notify the Thayn Trust of these proposed drilling activities.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KCC-D
KCC-E
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N-15
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24-2
24-3C
24-4C
Right Fork
PACE CREEK
PACE CANYON ROAD
TO CLA
ML 48435-08A

ARK LAND COMPANY

DOUGLAS M. DOWNING
Vice President - Land

March 28, 2005

Mr. Milton Thayn
Milton and Ardith Thayn Trust
7730 East Highway 6
Price, UT 84601

RE: Surface Use Agreement dated November, 1999 between Ark Land Company (successor to Canyon Fuel Company, LLC) and Milton and Ardith Thayn Trust (SC-170)

Dear Mr. Thayn:

In 2005 the Dugout Canyon Mine currently plans to conduct exploration, de-gassing, and permitting activities on the Thayn Lands.

As many as two (2) exploration bore holes will be drilled on the Thayn Lands, see enclosed map. The current plan is to drill both holes from the same surface site due to surface access restrictions. In addition, Dugout would like to complete these holes as Methane Drainage Holes. This will save future costs, permitting efforts, and reduce surface disturbance. These holes will require grading of the access roads, preparation/building of the drill sites, and reclamation of the drill sites and roads as directed by the landowner and permit regulations. In addition, the drilling activities will require obtaining and hauling water from various streams and locations on the Thayn Lands, see map.

As many as nine (9) Methane Drainage Holes will be drilled to remove methane and other gases from the longwall panel gob areas, see map. As shown on the map several of these sites will have one or more holes drilled from the same site. This is due to limited surface access. Similar to the exploration drilling, these boreholes will require road grading/improvements, site building/preparation, reclamation, and water hauling. Permitting activities similar to those required for the exploration drilling will also be conducted in association with the degas drilling. It has not been determined if all nine (9) of the degas boreholes will be drilled or when. However, the G-7 hole may be drilled as early as May, 2005. The remaining holes, including the exploration holes, will be drilled later in the year depending on permitting and drill rig availability.

In conjunction with the exploration activities listed above, there will be permitting activities including, but not limited to, endangered plant and animal surveys, environmental assessment activities, and cultural surveys. All of these activities will be conducted by third party contractors and require no surface disturbance.

A Subsidiary of
ARCH COAL, INC.
1 CityPlace Drive, Suite 300 St. Louis, Missouri 63141 (314) 994-2700 Fax (314) 994-2940
Direct (314) 994-2954 e-mail: ddowning@archcoal.com

Associated with the degas activities will be the installation of one or more exhauster-blower units on the degas sites to remove the gases from the mine. The number and duration of the installations are unknown at this time. While the exhauster-blower units are in operation, the units will require frequent inspections to maintain the units. These inspections may range from daily to weekly depending on the effort required to maintain the units.

The Dugout Mine is planning to install a mine ventilation fan in the Pace Canyon. While the fan installation site is located on BLM surface, access to the fan site follows the main road access to the general area and crosses the Thayn Lands. The Dugout Mine currently expects to begin construction of the site in April 2005. These activities may include upgrades and enhancements to the access road that crosses Thayn Lands.

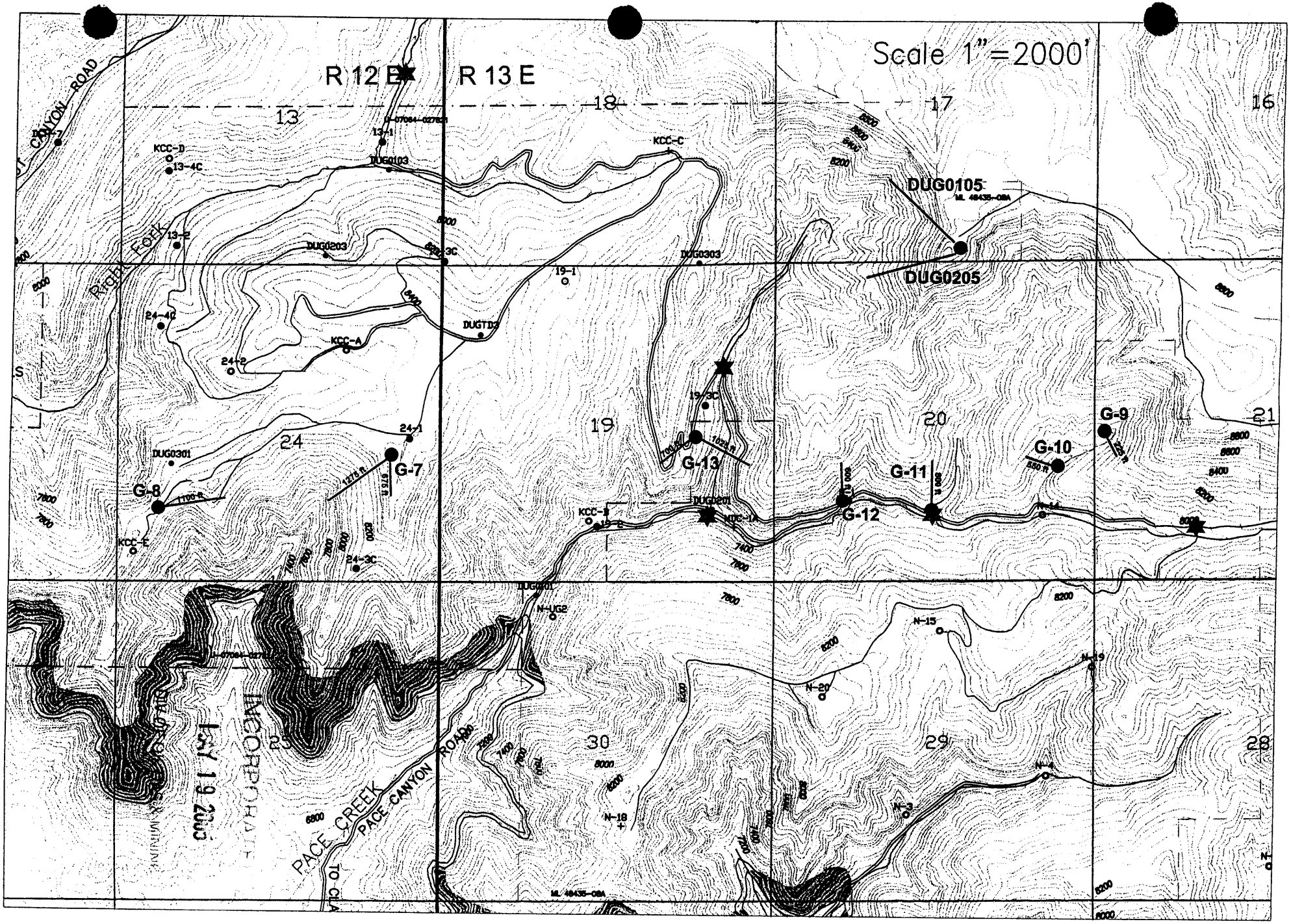
If you have any questions, please feel free to contact Mike Stevenson at 435-448-2634.

Sincerely yours,

Douglas M. Downing

Enc.

cc E. DiClaudio
M. Stevenson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DUG0303
DUG0301
DUG0201
G-7
G-8
G-9
G-10
G-11
G-12
G-13
KCC-A
KCC-B
KCC-C
KCC-D
KCC-E
PACE CREEK
PACE CANYON ROAD
RIGHT FORK
INCORPORATED
MAY 16 2003

CHAPTER 5

ENGINEERING

TABLE OF CONTENTS

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TABLE OF CONTENTS(Continued)

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Section **Page**

LIST OF FIGURES

510 INTRODUCTION

This chapter provides a discussion of general engineering aspects, an operation plan, a reclamation plan, design criteria, and performance standards related to the degassification well sites. The activities associated with the construction and reclamation of the well sites have been or will be designed, located, constructed, maintained, and reclaimed in accordance with the operation and reclamation plans.

511 General Requirements

The permit application includes descriptions of construction, maintenance, and reclamation operations of the proposed well sites with maps and plans. Potential environmental impact as well as methods and calculations utilized to achieve compliance with the design criteria are also presented.

512 Certification

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

512.100 Cross Sections and Maps

Cross sections for the degassification well pads are shown on Figures 5-2, 5-6, 5-10, 5-18, 5-21, 5-24 and typical road cross sections are shown on Figures 5-13 and 5-14.

512.200 Plans and Engineering Designs

Excess Spoil - No excess spoil will be generated from the well sites.

Durable Rock Fills - No durable rock fills will exist at the well sites.

Coal Mine Waste - No coal mine waste will exist at the well sites.

Impoundments - Refer to Section 733.200 of this submittal.

Primary Roads - Short sections of road are required to access well sites G-2 and G-5. These access roads are classified as primary roads. Topsoil will be stripped from the road alignment and stored with the topsoil stripped from the pad area prior to grading the new access road. Well sites G-1(not drilled), G-3,G-4, G-6 and G-7 are on existing roads, no access roads will be constructed.

Variance from Approximate Original Contour - No variance from approximate original contour is required for the well sites.

513 Compliance with MSHA Regulations and MSHA Approval

513.100 Coal Processing Waste Dams and Embankments

No coal processing waste dams and embankments will exist at the well sites.

513.200 Impoundments and Sedimentation Ponds

Refer to Section 733.200 of this submittal.

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

No underground waste, coal processing waste, and excess spoil will exist at the well sites.

513.400 Refuse Piles

No refuse piles will exist at the well sites.

513.500 Underground Openings to the Surface

The well will be equipped with a valve that will be closed and locked when not in use. A typical well head is shown in Figure 5-16.

513.600 Discharge to Underground Mine

No discharge to the underground mine will occur at the well sites.

513.700 Surface Coal Mining and Reclamation Activities

No surface coal mining, or reclamation activities associated with surface coal mining will occur at the well sites.

513.800 Coal Mine Waste Fire

No coal waste will be developed, therefore, no coal waste fires will occur at the well sites.

514 Inspection

514.100 Excess Spoil

No excess spoil will be stored at the well sites.

514.200 Refuse Piles

No refuse piles will exist at the well sites.

514.300 Impoundments

Refer to Section 733.200 of this submittal.

515 Reporting and Emergency Procedures

515.100 Slides

Refer to Section 515.100 in the approved M&RP.

515.200 Impoundments Hazards

No impoundments will exist at the well sites.

515.300 Temporary Cessation of Operations

If temporary cessation of the mining operations does occur, the wells will remain open. Once liberation of the methane gas is completed, the wells will be sealed as discussed in Section 542.700 of this submittal.

520 OPERATION PLAN

521 General

See Figures 5-1, 5-5, 5-9, 5-17, 5-20, 5-23 and 5-27 for the contour map showing pre-disturbance and drilling phase contours. These figures also show the disturbed area boundary and the new access road contours. Figures 5-3, 5-7, 5-11, 5-19, 5-22, 5-25 and 5-29 show the layout of the well sites during the drilling phase. Figures 5-4, 5-8, 5-12 show the layout of the well sites during the operational phase and the area to be reclaimed at the completion of drilling. Cross sections for each site can be found on Figures 5-2, 5-6, 5-10, 5-18, 5-21, 5-24 and 5-28.

521.100 Cross Sections and Maps

Existing Surface and Subsurface Facilities Features - No buildings are located on or within 1,000 feet of any of the well sites.

Landowner, Right-of-Entry, and Public Interest - The land which the wells will be drilled on is owned by the Milton and Ardith Thayn Trust. Canyon Fuels, LLC has reached an agreement with the Thayn trustees to allow access for the construction and drilling of the wells (see Attachment 4-2).

Mining Sequence and Planned Subsidence - Refer to Section 525.

Land Surface Configuration - Surface contours of undisturbed well sites are included in Figures 5-1, 5-5, 5-9, 5-17, 5-20, 5-23 and 5-27.

Surface Facilities - No permanent surface facilities will exist at the well sites.

521.200 Signs and Markers

Mine and Permit Identification Signs - A mine and permit identification sign will be displayed at each well site. This sign will be a design that can be easily seen and read, will be made of durable material, will conform to local regulations, and will be maintained until after the release of all bonds for the well site areas. The sign will contain the following information:

- Mine name,
- Company name,
- Company address and telephone number
- MSHA identification number, and
- Permanent program permit identification number

Perimeter Markers - The perimeter of all areas affected will be clearly marked before beginning mining activities. The markers will be a design that can be easily seen and read, will be made of durable material, will conform to local regulations, and will be maintained until after the release of all bonds for the permit area.

Buffer Zone Markers - Stream buffer zone markers will not be required at any of the three well sites.

Topsoil Markers - Markers will be placed on all topsoil stockpiles. These markers will be a design that can be easily seen and read, will be made of durable material, will conform to local regulations, and will be maintained until topsoil is redistributed on the well sites.

Construction Markers - Not applicable.

522 Coal Recovery

No coal recovery will be performed at the well sites.

523 Mining Methods

No mining will be performed at the well sites.

524 Blasting and Explosives

No explosives are to be used at the well sites.

525 Subsidence

No subsidence will occur at the well sites, as a result of drilling and development of the degassification well sites. Subsidence could occur at the well site because of underground mining see Section 525 of the approved M&RP.

526 Mine Facilities

526.100 Mine Structures and Facilities

No buildings exist or are proposed at the well sites; therefore, no existing building will be used in connection with or to facilitate this proposed coal mining and reclamation plan.

526.200 Utility Installation and Support Facilities

No utilities are to be installed at the well sites. A portable methane exhaust unit will be temporarily installed to draw methane to the surface from the mined panel. The exhaust blower will be started by using propane from portable tanks. Once started and running, the unit will be powered by burning the extracted methane gas. Excess methane will be vented to the atmosphere. The blower is approximately 12-feet long by 6-feet wide and about 10-feet tall. It is not known how long the degassification of the longwall panel will take.

527 Transportation Facilities

527.100 Road Classification

Well sites will be developed near existing private roads as shown on Figures 1-1, 5-1, 5-5, 5-9, 5-17, 5-20, 5-23 and 5-27. The new access roads will be classified as primary roads and will be maintained by the permittee (see Figure 5-14).

527.200 Description of Transportation Facilities

The well sites were chosen close to existing roads in the area to limit surface disturbance. The existing roads were constructed and are maintained by the land owner. The existing roads are approximately 20 feet wide and are shown on Figures 5-1, 5-5, 5-9, 5-17, 5-20, 5-23 and 5-27. See Figure 5-13 for a typical cross section of the existing roads.

528 Handling and Disposal of Coal, Excess Spoil, and Coal Mine Waste

No disposal of coal, excess spoil, and coal mine waste will occur at the well sites.

529 Management of Mine Openings

The perimeter of the sites, including the topsoil stockpiles will be fenced with gates on the access roads. The well casing will have a valve that is closed and locked. The valve will also prevent access by animals or other material. Mine openings will be monitored in accordance with Federal and State Regulations.

During the life of the methane wells, the sites will be inspected as needed by mine personnel to verify the continued operation of the pumping equipment and general site conditions.

530 OPERATIONAL DESIGN CRITERIA AND PLANS

531 General

This section contains the general plans for the construction of sediment controls and general construction and maintenance of the well sites.

The decision to construct each well will be based on the amount of methane encountered during mining. If small amounts of methane are encountered and the mine's ventilation system can dilute the methane, no well will be drilled. The proposed well site locations are shown on Figure 1-1.

532 Sediment Control

Sediment control measures for the well sites are described in Sections 732 and 742 of this submittal. Runoff control structures at the well sites have been designed to convey runoff in a non-erosive manner. Sediment yields in the well permit area are minimized by:

- Disturbing the smallest practicable area during the construction of the well site and
- Contemporaneously reclaiming areas suitable for such reclamation.

533 Impoundments

No impoundments will exist at the well sites.

534 Roads

Refer to Section 527 of this submittal.

535 Spoil

No spoil will be generated at the well sites.

536 Coal Mine Waste

No coal mine waste will be stored at the well sites.

537 Regraded Slopes

537.100 Division Approval

No mining or reclamation activities will be conducted in the permit area that requires approval of the Division for alternative specifications or for steep cut slopes.

537.200 Regrading of Settled and Revegetated Fills

Upon completion of the well site, the areas not required for the exhaust blower will be regraded to approximate original contour. Because of the nature of the well site, settling is not anticipated. However, if settlement does occur, these areas will be regraded.

540 RECLAMATION PLAN

541 General

541.100 Commitment

Upon the permanent cessation of methane venting, Dugout Canyon Mine will seal the wells and permanently reclaim all affected areas in accordance with the R645 regulations and this reclamation plan.

541.200 Surface Coal Mining and Reclamation Activities

Not applicable.

541.300 Underground Coal Mining and Reclamation Activities

Upon completion of the methane venting activities the wells will be reclaimed.

541.400 Environmental Protection Performance Standards

The plan presented is designed to meet the requirements of R645-301 and the environmental protection performance standards of the State Program.

542 Narratives, Maps, and Plans

542.100 Reclamation Timetable

A timetable for the completion of each major step in the reclamation plan is presented in Figure 5-15 (G-2 and G-3) and 5-26 (G-4, G-5, G-6 and G-7).

542.200 Plan for Backfilling, Soil Stabilization, Compacting, and Grading

Following completion of the venting activities, the well site will be prepared for contouring and soil distribution. Details regarding topsoil placement and revegetation are provided in Section 242 and Section 353, respectively.

Sedimentation Pond Removal and Interim Sediment Control - See Section 542.500 of this submittal.

542.300 Final Surface Configuration Maps and Cross Sections

The sites will be regraded to the approximate original contour, the contours representing the pre-disturbance topography also represent the reclamation topography. Refer to Figures 5-2, 5-6, 5-10, 5-18, 5-21, 5-24 and 5-28 to see cross sections representing the final surface configuration.

542.400 Removal of Temporary Structures

The well sites will not have surface structures.

542.500 Removal of Sedimentation Pond

No sediment pond will be constructed at the well sites.

542.600 Roads

The roads which existed prior to the drilling program will be retained after reclamation. The access roads established during the drilling program will be reclaimed after methane extraction has been completed. See Section 242 for additional detail concerning the reclamation plan.

542.700 Final Abandonment of Mine Openings and Disposal Areas

All openings will be sealed in accordance with Federal and State Regulations. The casings will be plugged at the bottom to hold concrete. A lean concrete mixture will be poured into the casing until the concrete is within five (5) feet of the surface. At that time the casing will be cut off at ground level and the rest of the casing will be filled with lean concrete. The concrete will be allowed to harden before final reclamation is completed.

542.800 Estimated Cost of Reclamation

Refer to the Appendix 5-6 of the existing M&RP. It is anticipated that the cost of reclamation of the well sites is adequately covered by the Dugout Canyon Reclamation Bond, refer to Chapter 8 for additional detail.

550 RECLAMATION DESIGN CRITERIA AND PLANS

551 Casing and Sealing of Underground Openings

Permanent sealing is described in Section 542.700.

552 Permanent Features

552.100 Small Depressions

No permanent small depressions will be created as part of the well site construction and reclamation.

552.200 Permanent Impoundments

See Section 515.200 of this submittal.

553 Backfilling and Grading

553.100 Disturbed Area Backfilling and Grading

Approximate Original Contour - The well sites will be returned to their approximate original contour after reclamation is completed.

Erosion and Water Pollution - Sediment controls will consist of gouging the surface to create depressions and mounds which store and impede the movement of water. As vegetation becomes established on the reclaimed surface, erosion potential will be further minimized.

Post-Mining Land Use - The disturbed area will be reclaimed in a manner that supports the approved post-mining land use. Refer to Sections 411 and 412 for additional detail.

553.200 Spoil and Waste

Spoil - No spoil will be generated within the well sites.

Coal Processing Waste - No coal processing waste will be generated within the well sites.

553.250 Refuse Piles

No refuse piles will exist at the well sites.

553.300 Exposed Coal Seams, Acid and Toxic Forming Materials and Combustible Materials

No coal seams will be left exposed at the well sites. All wells will be sealed according to Federal and State regulations.

553.400 Cut and Fill Terraces

No cut and fill terraces will be constructed at the well sites.

553.500 Highwall From Previously Mined Areas

No highwalls exist or will be built at the well sites.

553.600 Previously Mined Area

No previously mined areas exist at the well sites.

553.700 Backfilling and Grading - Thin Overburden

No surface mining and reclamation activities involving thin overburden will occur at the well sites.

553.800 Backfilling and Grading - Thick Overburden

No surface mining and reclamation activities involving thick overburden will occur at the well sites.

553.900 Regrading of Settled and Revegetated Rills

If settlement or rills occur at the well sites, they will be regraded and revegetatived. Refer to Section 244.300.

560 PERFORMANCE STANDARDS

Dugout Canyon Mine well sites will be conducted in accordance with the approved permit and the requirements of R645-301-510 through R645-301-553.

FIGURE 5-26

Reclamation Schedule - Well G-4, G-5 and G-6 and G-7

Task	Weeks to Complete from Start of Reclamation Activities		
	1	2	3
Plug Well			
Regrade Site to Original Contour			
Rip Subsoil			
Place Topsoil and Roughen			
Seed and Mulch			
The schedule assumes that weather conditions are conducive. Schedule is for each individual well not wells collectively. If necessary the timing may be extended.			

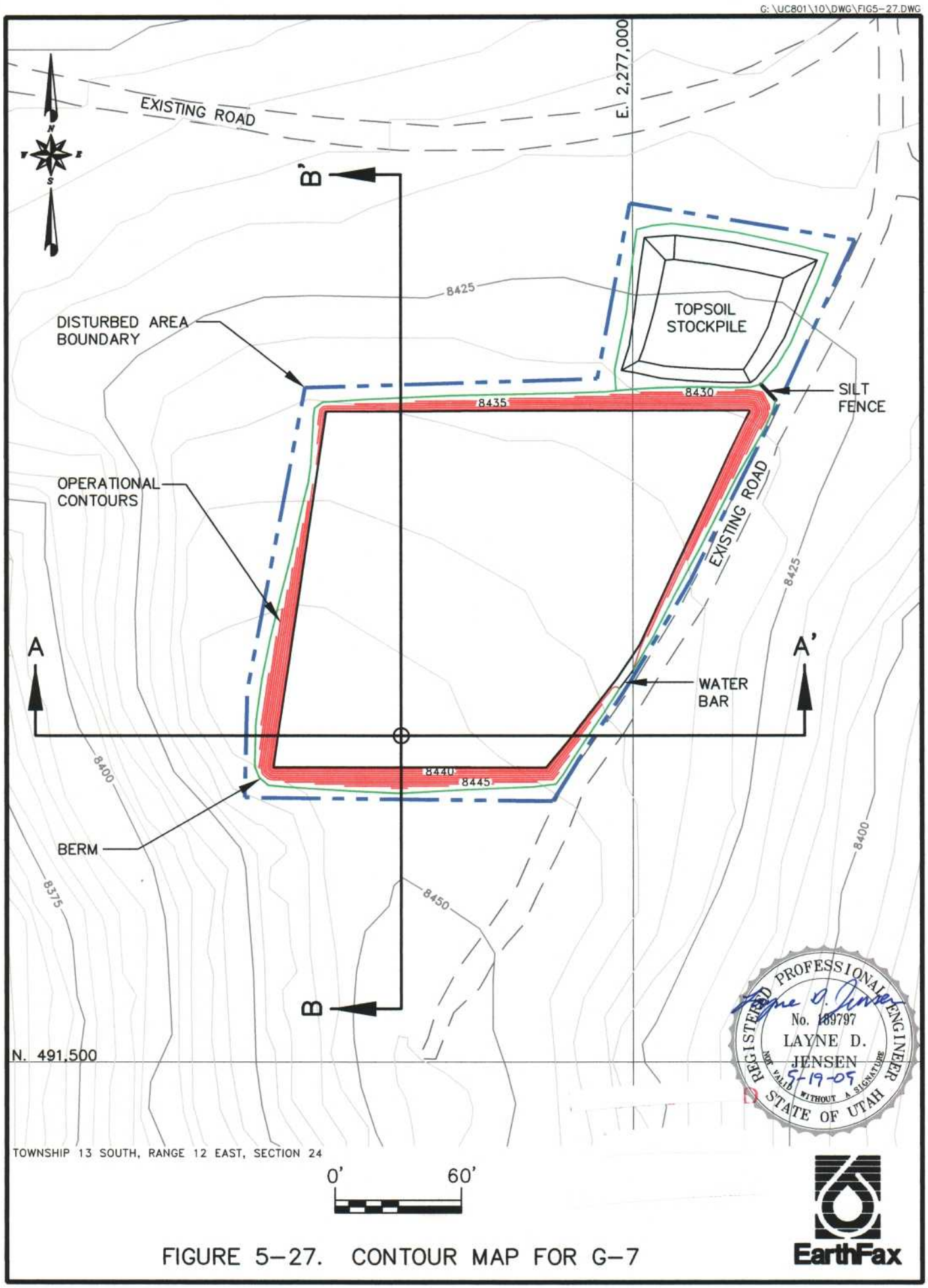
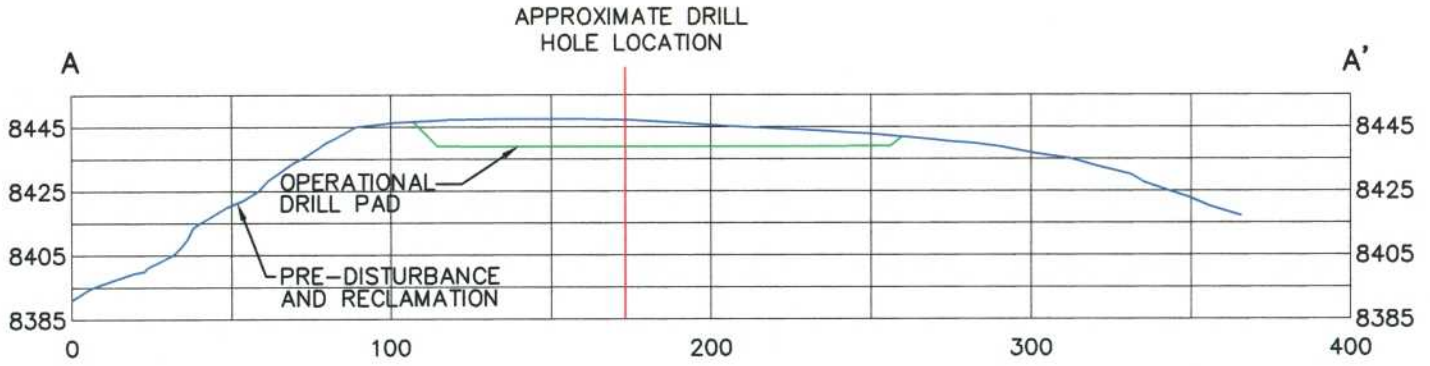


FIGURE 5–27. CONTOUR MAP FOR G–7



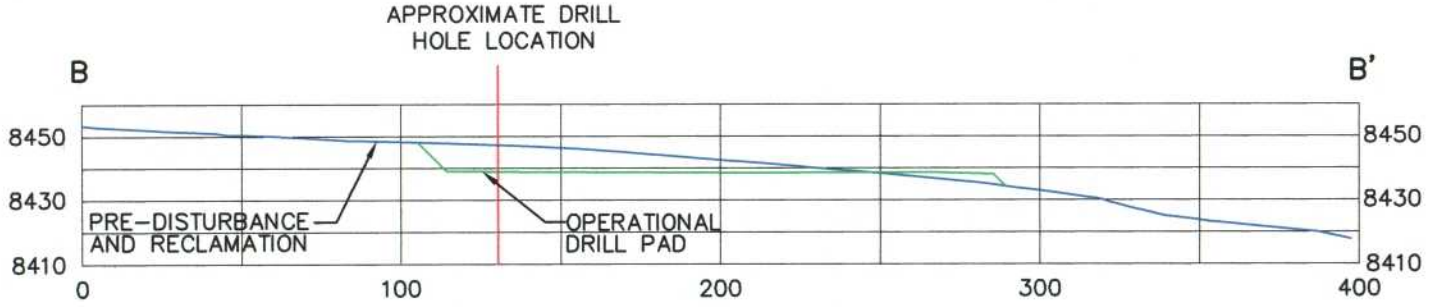


FIGURE 5-28. TYPIVAL CROSS-SECTIONS FOR G-7

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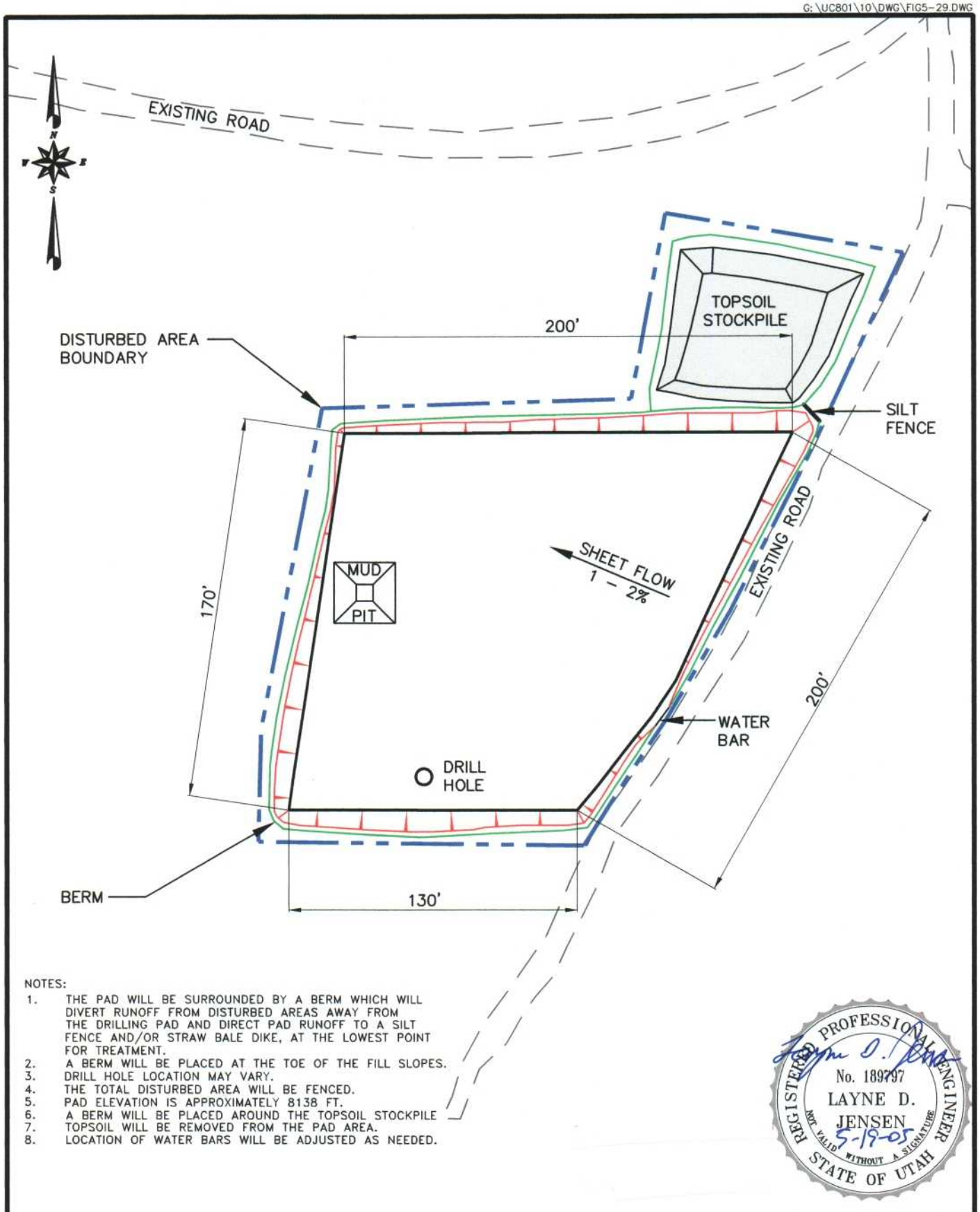
G:\UC801\10\DWG\FIG5-29.DWG



NOTES:

1. THE PAD WILL BE SURROUNDED BY A BERM WHICH WILL DIVERT RUNOFF FROM DISTURBED AREAS AWAY FROM THE DRILLING PAD AND DIRECT PAD RUNOFF TO A SILT FENCE AND/OR STRAW BALE DIKE, AT THE LOWEST POINT FOR TREATMENT.
2. A BERM WILL BE PLACED AT THE TOE OF THE FILL SLOPES.
3. DRILL HOLE LOCATION MAY VARY.
4. THE TOTAL DISTURBED AREA WILL BE FENCED.
5. PAD ELEVATION IS APPROXIMATELY 8138 FT.
6. A BERM WILL BE PLACED AROUND THE TOPSOIL STOCKPILE
7. TOPSOIL WILL BE REMOVED FROM THE PAD AREA.
8. LOCATION OF WATER BARS WILL BE ADJUSTED AS NEEDED.

REGISTERED PROFESSIONAL ENGINEER
No. 189797
LAYNE D. JENSEN
5-19-05
NOT VALID WITHOUT A SIGNATURE
STATE OF UTAH

0' 60'

FIGURE 5-29. APPROXIMATE DRILLING LAYOUT FOR G-7

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CHAPTER 7

HYDROLOGY

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LIST OF ATTACHMENTS

710 INTRODUCTION

711 General Requirements

This chapter presents a description of the following:

- Proposed operations and the potential impacts to the hydrologic balance;
- Methods of compliance with design criteria and the calculations utilized to show compliance; and
- Applicable hydrologic performance standards.

712 Certification

All maps, plans, and cross sections presented in this chapter have been certified by a qualified, registered professional engineer.

713 Inspection

Inspections are not required since no permanent impoundments will exist at the well sites.

720 ENVIRONMENTAL DESCRIPTION

721 General Requirements

This section presents a description of the pre-mining hydrologic resources within the well pad and their adjacent areas that may be affected or impacted by the proposed coal mining and reclamation operations.

722 Cross Sections and Maps

722.100 Location and Extent of Subsurface Water

Figure 7-1 in the approved M&RP shows a generalized hydrostratigraphic cross section of the permit and adjacent areas including the well sites. Section 724.100 of the approved M&RP provides baseline groundwater conditions.

722.200 Location of Surface Water Bodies

Plate 7-2 in the approved M&RP shows the locations of surface-water bodies and existing or pending water rights. Section 724.200 of the approved M&RP provides baseline surface water conditions.

722.300 Locations of Monitoring Stations

Plate 7-1 in the approved M&RP shows the location of surface water and groundwater monitoring stations.

722.400 Locations and Depth of Water Wells

Refer to Section 722.400 and Plate 7-1 of the approved M&RP for information pertaining to the groundwater monitoring wells. Refer to Appendix 7-9 of approved M&RP for details pertaining to the Gilson well.

722.500 Surface Topography

Surface topography features at the well sites and adjacent areas are shown on Figures 1-1, 5-1, 5-5, 5-9, 5-17, 5-20, 5-23 and 5-27. Refer to Plate1-4 in the M&RP for well locations.

723 Sampling and Analysis

Refer to Section 723 of the approved M&RP.

724 Baseline Information

Refer to Section 724 of the approved M&RP.

724.100 Groundwater Information

Refer to Section 724.100 of the approved M&RP.

724.200 Surface Water Information

Refer to Section 724.200 of the approved M&RP.

724.300 Geologic Information

Geologic information related to the well sites and adjacent areas in presented in Chapter 6 of this submittal and in the approved M&RP.

724.400 Climatological Information

Climatological data are summarized in Appendix 4-1 behind the Air Quality Permit of the approved M&RP and RA Attachment 7-5 of the Refuse Pile Amendment.

724.500 Supplemental Information

Refer to Section 724.500 of the approved M&RP.

724.600 Survey of Renewable Resource Lands

Refer to Section 724.600 of the approved M&RP.

724.700 Alluvial Valley Floor Requirements

Information regarding the presence or absence of alluvial valley floors in the well sites and adjacent areas is presented in Chapter 9 of this submittal and the approved M&RP.

725 Baseline Cumulative Impact Area Information

The CHIA currently in place for the Dugout Canyon Mine covers the well sites. The hydrologic and geologic information required for the Division to develop a Cumulative Hydrologic Impact Assessment (CHIA) is presented in the approved M&RP.

726 Modeling

No groundwater or surface water modeling was conducted in support of this submittal.

727 Alternative Water Source Information

Not applicable.

728 Probable Hydrologic Consequences

This section addresses the probable hydrologic consequences of construction and reclamation operations at the well sites. Mitigation measures are discussed generally in this section and in detail in Section 730 of the approved M&RP.

728.100 Potential Impacts of Surface and Groundwater

Potential impacts of the well sites in this area on the quality and quantity of surface and groundwater flow may include contamination from materials associated with the drilling of the wells. The potential impact is addressed in Section 728.300 of this submittal and the approved M&RP.

728.200 Baseline Hydrologic and Geologic Information

Baseline geologic information is presented in Chapter 6 of the approved M&RP. Baseline hydrologic information is presented in Section 724.100 and 724.200 of the approved M&RP.

728.300 PHC Determination

Potential Impacts to the Hydrologic Balance - Potential impacts of the Dugout Canyon Mine on the hydrologic balance of the well sites and adjacent areas are addressed in the subsections of this submittal and the approved M&RP.

Acid and Toxic Forming Materials - No acid or toxic forming materials have been identified in the soils or strata of the Dugout Canyon Mine (Chapter 6, Section 623 of this submittal). Additional information is located in Appendix 6-2 of the approved M&RP.

Groundwater - During drilling of the wells, the groundwater encountered will be affected. Drilling mud will be used to seal the groundwater aquifers. Once drilling is completed, the casing will be grouted in the well hole. This will seal the aquifers to prevent any groundwater from migrating down the outside of the casing into the mine.

Potential Hydrocarbon Contamination - Hydrocarbon products will not be stored at the well sites, however fuels, greases, and other oils may leak from equipment during drilling operations.

Absorbent materials will be used for the collection of leaked fuels, greases, and other oils. The saturated absorbent materials will be disposed of at an appropriate landfill facility.

729 Cumulative Hydrologic Impact Assessment (CHIA)

The Cumulative Hydrologic Impact Assessment currently in place for the Dugout Canyon Mine includes the well sites and adjacent areas.

730 OPERATION PLAN

731 General Requirements

731.100 Hydrologic - Balance Protection

Groundwater Protection - The effect on groundwater at the well sites is expected to be minimal. Groundwater encountered during drilling will be sealed off, refer to Section 728.300.

Surface Water Protection - To protect the hydrologic balance, construction, maintenance, and reclamation operations will be conducted to handle earth materials and runoff in a manner that prevents, to the extent possible, additional contributions of suspended solids to stream flow outside the permit area, and otherwise prevent water pollution.

During initial drilling, the sites will be graded to ensure that storm runoff will flow towards the berms surrounding the entire drilling pad area. The berms will direct the runoff to the lowest point(s) within the pad area where a silt fence and/or straw bale dike(s) will treat the runoff (see Figures 5-1, 5-5, 5-9, 5-17, 5-20, 5-23 and 5-27). The berm placed at the top of the drilling pad cut slopes will divert runoff around the drilling pad. Thus reducing the runoff affected by the drilling pad.

After drilling, the pad size will be reduced for exhausting operations. The pad will be re-graded to cause the storm runoff to sheet flow towards a silt fence and/or straw bale dike. A berm will be placed at the top of the fill slope to direct any runoff from the operational pad to the silt fence and/or straw bale dike(see Figures 5-4, 5-8, 5-12, 5-19, 5-22, 5-25 and 5-29). The silt fences and/or straw bale dikes will be periodically inspected, and accumulated sediment will be removed as needed to maintain functionality. The sediment from the silt fence and/or straw bale dikes will be piled on the pad and will be used for fill during final reclamation of the well site. During the drilling phase a berm and silt fence will be installed at the toe of the fill slope as shown on Figures 5-1, 5-5, 5-9, 5-17, 5-20, 5-23 and 5-27 to treat any runoff from the drilling pad.

731.200 Water Monitoring

No water monitoring will be conducted at the degas well sites. Refer to approved M&RP for a description of water monitoring.

731.300 Acid or Toxic Forming Materials

No acid or toxic forming materials are anticipated at the well sites (see Section 728.300).

731.400 Transfer of Wells

Refer to Section 731.400 of the approved M&RP.

731.500 Discharge

No discharges to underground workings.

731.600 Stream Buffer Zones

Stream Channel Diversions - No stream channel diversions are planned at the well sites.

Buffer Zone Designation - None of the drilling sites are adjacent to a stream, therefore the establishment of a stream buffer zone is not necessary.

731.700 Cross Section and Maps

Not applicable.

731.800 Water Rights and Replacement

Refer to Sections 728.300 and 731.800 of the approved M&RP.

732 Sediment Control Measures

The sediment control measures within the well sites have been designed to prevent additional contributions of sediment to stream flow or to runoff outside the well sites. In addition, the well sites have been designed to minimize erosion to the extent possible.

The structures to be used for runoff control at the well sites are berms, silt fences and/or straw bale dikes.

732.100 Siltation Structures

Berms, silt fences and straw bales dikes will be used to treat runoff.

732.200 Sedimentation Pond

The drilling sites will not have sedimentation ponds.

732.300 Diversions

Refer to Section 731.100 of this submittal.

732.400 Road Drainage

No diversion ditches will be constructed along the primary roads leading to the well sites. See Figures 5-13 and 5-14 for typical road cross sections. Where needed roads accessing the drill sites will have a water bar constructed at the base of the road to divert water off the road prior to the runoff reaching the drilling pad.

733 Impoundments

733.100 General Plans

Not applicable.

733.200 Permanent and Temporary Impoundments

No permanent impoundments will exist at the well sites.

734 Discharge Structures

A berm will surround the entire drill pad at each well site during the drilling phase. The berm will divert undisturbed runoff around the drilling pad and direct runoff from the pad to a silt fence/straw bale dike at the lowest point within the well pad disturbed area. A silt fence and/or straw bale dike will be the discharge structure for each of the well sites during the operational phase.

735 Disposal of Excess Spoil

There will be no excess spoil generated at the well sites.

736 Coal Mine Waste

There will be no coal mine waste generated or stored at the well sites.

737 Non-Coal Mine Waste

There will be no non-coal mine waste disposed at the well sites.

738 Temporary Casing and Sealing of Wells

Refer to Section 542.700 of this submittal.

740 DESIGN CRITERIA AND PLANS

741 General Requirements

This submittal includes general well site plans that incorporate design criteria for the control of drainage.

742 Sediment Control Measures

742.100 General Requirements

Design - Sediment control measures have been formulated to prevent additional contributions of sediment to stream flow or to runoff outside the well site area; and minimize erosion to the extent possible.

Measures and Methods - Sediment control methods will include silt fences, berms, and straw bales to reduce runoff and trap sediment.

742.200 Siltation Structures

General Requirements - Additional contributions of suspended solids and sediment or runoff outside the well site area will be prevented to the extent possible using silt fences, berms, and straw bale dikes. Siltation structures(berms, silt fences and/or straw bale dikes) will be installed before the topsoil is removed from the well site. Construction activities will not occur during major precipitation events.

Design - All hydrology calculations were made using the 10-year, 24-hour precipitation event. Hydrology calculations are in Attachment 7-1. Locations of the berms and silt fences are shown on Figures 5-1, 5-4, 5-5, 5-8, 5-9, 5-12, 5-17, 5-20, 5-23 and 5-27.

742.300 Diversions

No diversion ditches will be constructed as part of the drilling or operational phases.

742.400 Road Drainage

Refer to Section 732.400 of this submittal.

743 Impoundments

No impoundments will exist at the well sites.

744 Discharge Structures

No discharge structures have been planned or designed.

745 Disposal of Excess Spoil

There will be no excess spoil generated at the well sites.

746 Coal Mine Waste

746.100 General Requirements

There will be no coal mine waste used at the well sites.

746.200 Refuse Piles

There will be no refuse piles at the well sites.

746.300 Impounding Structures

Refer to Section 733.200 of this submittal.

746.400 Return of Coal Processing Waste to Abandoned Underground Workings

No coal processing waste will be generated at the well sites.

747 Disposal of Non-Coal Mine Waste

All non-coal mine waste will be dispose of at an approved landfill.

748 Casing and Sealing Wells

Refer to Section 542.700 of this submittal.

750 PERFORMANCE STANDARDS

751 Water Quality Standards and Effluent Limitations

Water encountered during drilling and runoff water will be treated using silt fence and/or straw bale dikes prior to leaving the site. Should it become necessary the water encountered during drilling will be pumped into a tank and hauled from the site for disposal at a licensed facility.

752 Sediment Control Measures

All sediment control measures will be located, maintained, constructed and reclaimed according to plans and designs presented in Section 732, 742, and 760 of this submittal.

752.100 Siltation Structures and Diversions

Siltation structures will be located, maintained, constructed and reclaimed according to plans and designs presented in Section 732, 742, and 763 of the submittal.

752.200 Road Drainage

Refer to Section 732.400 of this submittal.

753 Impoundments and Discharge Structures

Refer to Section 733.200 of this submittal.

754 Disposal of Excess Spoil, Coal Mine Waste and Non-Coal Mine Waste

There will be no excess spoil or coal mine waste generated at the well sites. Refer to Section 747 of this submittal regarding non-coal waste disposal.

755 Casing and Sealing

Refer to Section 542.700 of this submittal.

760 RECLAMATION

761 General Requirements

A detailed reclamation plan for the well sites is presented in Section 540. No structures will exist at the well sites.

762 Roads

Refer to Section 542.600.

762.100 Restoring the Natural Drainage Patterns

The natural drainage patterns will be restored after degassification is completed.

762.200 Reshaping Cut and Fill Slopes

Cut and fill slopes will be reshaped at the well sites.

763 Siltation Structures

763.100 Maintenance of Siltation Structures

All siltation structures will be maintained until removed in accordance with the approved reclamation plan.

763.200 Removal of Siltation Structures

When a siltation structure is removed, the land on which the siltation structure was located will be regraded and revegetated in accordance with the reclamation plan presented in Section 540.

764 Structure Removal

A timetable for the reclamation of the sites is presented in Figures 5-15 (G-2 and G-3) and 5-26 (G-4, G-5, G-6 and G-7).

765 Permanent Casing and Sealing of Wells

Refer to Section 542.700 of this submittal.

ATTACHMENT 7-1

HYDROLOGY CALCULATIONS

add to the back of existing information

G-7

Rainfall Depth = 2.0" 10-yr 24-hr storm

This has the same soil type as G-3. Hydrologic soil group D.

CN = 89 (Dirt Road) Conservative estimate assuming No vegetative cover.

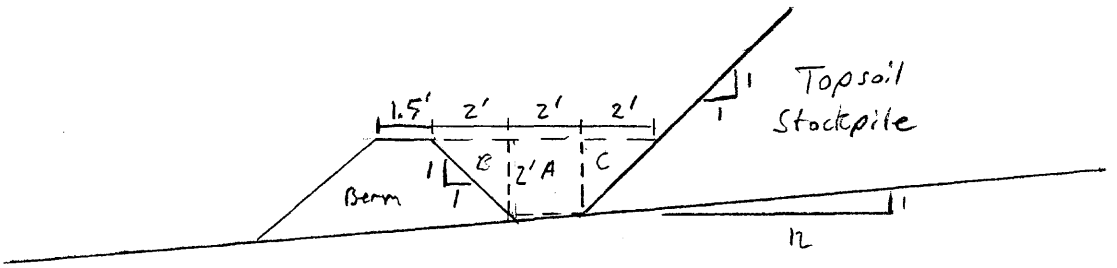
$$\text{Runoff Depth} = \frac{(P - 0.2S)^2}{P + 0.8(S)}$$

$$S = 1000/CN - 10 = 1000/89 - 10 = 1.24$$

$$\text{Runoff Depth} = \frac{(2.0 - 0.2(1.24))^2}{2.0 + 0.8(1.24)} = 1.03"$$

Topsoil Stockpile Area = 6125 ft²

Runoff Volume = $(6125\ ft^2)\left(\frac{1.03"}{12}\right) = 525.7\ ft^3$



$$\text{Area} = \underset{A}{(2\times2)} + \underset{B}{\tfrac{1}{2}(2\times2)} + \underset{C}{\tfrac{1}{2}(2\times2)} = 8\ ft^2$$

The berm should be built on contour. The length of the berm detaining runoff is ~93'. The toe of the berm should be at least 2' from the toe of the stockpile other than the berm on the north side of the stockpile all other berms may be 1' tall

Containment Volume = $(8\ ft^3)(93\ ft) = 744\ ft^3 > 525.7\ ft^3$ ∴ OK

METHANE DEGASSIFICATION AMENDMENT
WELLS G-1, G-2, G-3, G-4, G-5, G-6 AND G-7

DUGOUT CANYON MINE
MARCH 2005

CANYON FUEL COMPANY, LLC

DUGOUT CANYON MINE
METHANE DEGASSIFICATION AMENDMENT
WELLS G-1, G-2, G-3, G-4, G-5, G-6 AND G-7
C/007/039

MARCH 2005