Canyon Fuel Company, LLC
A Subsidiary of Bowie Resource Holdings, LLC

Dugout Canyon Mine
P.O. Box 1029
Wellington, Utah 84542
(435) 637-6360
Fax (435) 636-2897

July 11, 2016

Mr. Daron Haddock
Coal Program Manager
Coal Regulatory Program
Utah Division of Oil, Gas and Mining
1594 West North Temple, Suite 1210
Salt Lake City, UT 84114-5801

Subject: Dugout Canyon Mine, Incidental Boundary Change, C/007/039, Task ID #5212

Dear Mr. Haddock:

Canyon Fuel Company, LLC herby files application to modify the permit C/007/039. Enclosed, please find a copy of the submittal to address an Incidental Boundary Change. A timely review of this submittal would be greatly appreciated.

Please contact me at (435) 636-2872 or Bill King at (435) 636-2898 should you have any questions or comments regarding the enclosed information.

Sincerely,

David G. Spillman, P.E.
Technical Services Manager

Enclosure

cc: Kirt Tatton, Dugout w/o Enclosures
Bill King, Dugout w/o Enclosures

APPLICATION FOR COAL PERMIT PROCESSING

Permit Change ☒ New Permit ☐ Renewal ☐ Exploration ☐ Bond Release ☐ Transfer ☐

Permittee: Canyon Fuel Company, LLC
Mine: Dugout Canyon Mine **Permit Number:** C/007/039
Title: Submittal to address an Incidental Boundary Change at Dugout Canyon Mine, Task ID # 5212
Description, Include reason for application and timing required to implement:
A timely review of this submittal would be greatly appreciated.

Instructions: If you answer yes to any of the first eight (gray) questions, this application may require Public Notice publication.

☒ Yes ☐ No 1. Change in the size of the Permit Area? Acres: 207 Disturbed Area: _____ ☒ increase ☐ decrease.
☐ Yes ☒ No 2. Is the application submitted as a result of a Division Order? DO# _____
☐ Yes ☒ No 3. Does the application include operations outside a previously identified Cumulative Hydrologic Impact Area?
☐ Yes ☒ No 4. Does the application include operations in hydrologic basins other than as currently approved?
☐ Yes ☒ No 5. Does the application result from cancellation, reduction or increase of insurance or reclamation bond?
☐ Yes ☒ No 6. Does the application require or include public notice publication?
☒ Yes ☐ No 7. Does the application require or include ownership, control, right-of-entry, or compliance information?
☐ Yes ☒ No 8. Is proposed activity within 100 feet of a public road or cemetery or 300 feet of an occupied dwelling?
☐ Yes ☒ No 9. Is the application submitted as a result of a Violation? NOV # _____
☐ Yes ☒ No 10. Is the application submitted as a result of other laws or regulations or policies?
Explain: _____
☐ Yes ☒ No 11. Does the application affect the surface landowner or change the post mining land use?
☒ Yes ☐ No 12. Does the application require or include underground design or mine sequence and timing? (Modification of R2P2)
☐ Yes ☒ No 13. Does the application require or include collection and reporting of any baseline information?
☐ Yes ☒ No 14. Could the application have any effect on wildlife or vegetation outside the current disturbed area?
☐ Yes ☒ No 15. Does the application require or include soil removal, storage or placement?
☐ Yes ☒ No 16. Does the application require or include vegetation monitoring, removal or revegetation activities?
☐ Yes ☒ No 17. Does the application require or include construction, modification, or removal of surface facilities?
☐ Yes ☒ No 18. Does the application require or include water monitoring, sediment or drainage control measures?
☒ Yes ☐ No 19. Does the application require or include certified designs, maps or calculation?
☐ Yes ☒ No 20. Does the application require or include subsidence control or monitoring?
☐ Yes ☒ No 21. Have reclamation costs for bonding been provided?
☐ Yes ☒ No 22. Does the application involve a perennial stream, a stream buffer zone or discharges to a stream?
☐ Yes ☒ No 23. Does the application affect permits issued by other agencies or permits issued to other entities?

Please attach one (1) review copy of the application.

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

David Spillman — Print Name

David Spillman Engineering Manager — Sign Name, Position, Date 7/6/16

Subscribed and sworn to before me this 6th day of July, 2016

Notary Public

My commission Expires: 11.7.19 _____, 20___}
Attest: State of UT _____} } ss:
County of Carbon

NOTARY PUBLIC
MONICA S. CLAUSING
Commission No. 686189
Commission Expires
NOVEMBER 07, 2019
STATE OF UTAH

For Office Use Only:	Assigned Tracking Number:	Received by Oil, Gas & Mining

Form DOGM- C1 (Revised 9/17/2013)

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

Permittee: Canyon Fuel Company, LLC
Mine: Dugout Canyon Mine **Permit Number:** C/007/039
Title: Submittal to address an Incidental Boundary Change at Dugout Canyon Mine, Task ID # 5212

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

			DESCRIPTION OF MAP, TEXT, OR MATERIAL TO BE CHANGED
☐ Add	☒ Replace	☐ Remove	Dugout M&RP, Chapter 1, Pages 1-7, 1-10, 1-11, 1-12
☒ Add	☐ Replace	☐ Remove	Dugout M&RP, Chapter 1, Appendix 1-1, Add Updated LeaseDocument
☐ Add	☒ Replace	☐ Remove	Dugout M&RP, Chapter 1, Plate 1-1, Surface Ownership
☐ Add	☒ Replace	☐ Remove	Dugout M&RP, Chapter 1, Plate 1-2, Coal Ownership
☐ Add	☒ Replace	☐ Remove	Dugout M&RP, Chapter 1, Plate 1-4, Dugout Canyon Mine Permit Area
☐ Add	☒ Replace	☐ Remove	Dugout M&RP, Chapter 2, Plate 2-1, Native Soil Types Present in Permit Area
☒ Add	☐ Replace	☐ Remove	Dugout M&RP, Chapter 2, Appendix 2-2, Soil Resource Assessment
☐ Add	☒ Replace	☐ Remove	Dugout M&RP, Chapter 3, Page 3-1
☐ Add	☒ Replace	☐ Remove	Dugout M&RP, Chapter 3, Plate 3-1, Vegetation
☐ Add	☒ Replace	☐ Remove	Dugout M&RP, Chapter 3, Plate 3-1E, Vegetation Reference Areas
☐ Add	☒ Replace	☐ Remove	Dugout M&RP, Chapter 3, Plate 3-2, "Confidential"
☐ Add	☒ Replace	☐ Remove	Dugout M&RP, Chapter 3, Plate 3-3, Potential Locations fo Cliff Escarpments Permit
☒ Add	☐ Replace	☐ Remove	Dugout M&RP, Chapter 3, Appendix 3-1, Vegetation & Sensitive Species Report
☒ Add	☐ Replace	☐ Remove	Dugout M&RP, Chapter 3, Appendix 3-3, T&E Candidate & Sensitive Report
☐ Add	☒ Replace	☐ Remove	Dugout M&RP, Chapter 4, Plate 4-1, Land Use
☐ Add	☒ Replace	☐ Remove	Dugout M&RP, Chapter 5, Page 5-25
☐ Add	☒ Replace	☐ Remove	Dugout M&RP, Chapter 5, Plate 5-7, Proposed Mining Sequence and Planned Subsidence
☐ Add	☒ Replace	☐ Remove	Dugout M&RP, Chapter 6, Plate 6-1, Geology of Dugout Canyon Mine Permit Area
☐ Add	☒ Replace	☐ Remove	Dugout M&RP, Chapter 6, Plate 6-4, Rock Canyon Seam Overburden Thickness
☐ Add	☒ Replace	☐ Remove	Dugout M&RP, Chapter 6, Plate 6-5, Rock Canyon Seam/ Gilson Seam Interburden Map
☐ Add	☒ Replace	☐ Remove	Dugout M&RP, Chapter 6, Plate 6-6, Rock Canyon Isopach Map "Confidential"
☐ Add	☒ Replace	☐ Remove	Dugout M&RP, Chapter 6, Plate 6-7, Gilson Seam Thickness Isopach man "Confidential"
☐ Add	☒ Replace	☐ Remove	Dugout M&RP, Chapter 7, Plate 7-1, Hydrologic Monitoring Stations
☐ Add	☒ Replace	☐ Remove	Dugout M&RP, Chapter 7, Plate 7-2, Water Rights
☐ Add	☒ Replace	☐ Remove	Dugout M&RP, Chapter 7, Plate 7-3, Castlegate Potentiometric Surface
☐ Add	☒ Replace	☐ Remove	Dugout M&RP, Chapter 7, Plate 7-6, Dugout Creek Watershed Upstream Surface Facilities
☐ Add	☒ Replace	☐ Remove	Dugout M&RP, Exhibit B Appx 4-2, Timber Inventory Map
☐ Add	☒ Replace	☐ Remove	Dugout M&RP, Refuse Pile Ammendment RA Plate 1-1, Dugut Permit Area

Any other specific or special instruction required for insertion of this proposal into the Mining and Reclamation Plan.	**Received by Oil, Gas & Mining**

Canyon Fuel Company, LLC.
A Subsidiary of Bowie Resource Partners, LLC

Dugout Canyon Mine
William King
Mining Engineer
PO Box 1029
Wellington, Utah 84542
(435) 636-2898

Dugout Incidental Boundary Change Information

Date: July 11, 2016

Subject: Incidental Boundary Change, Canyon Fuel Company, LLC. Dugout Canyon Mine, C/007/0039, Task ID # 5212

From: Bill King

To: Daron R. Haddock

CC: Steve Christensen

Dugout Canyon Mine is requesting an Incidental Boundary Change (IBC) to increase (expand) the permit boundary area from 9,801 acres to 10,008 acres, an increase of 207 acres. See Plate 1-4 for Dugout Canyon Permit Area.

The permit boundary will increase to include the following areas:

Township 13 South, Range 12 East, SLBM, Utah
Section 13: N1/2N1/2, containing approximately 160 acres
Township 13 South, Range 13 East, SLBM, Utah
Section 18: Lot 1, containing approximately 47 acres

Leases - The expanded area is located within the Federal Coal Lease U-07064-027821 where Canyon Fuel Company is granted the right to enter and conduct underground mining operations. An updated lease agreement will be added to the Dugout Mining and Reclamation Plan (M&RP), Chapter 1, Appendix 1-1. See plate 1-2 for updated Coal Ownership.

Exploration Plan – Dugout Canyon Mine performed an Exploration Plan (see supportive documents) in 2010 within the Federal Coal Lease UTU-07064-027821. The Exploration Plan covers 5 drill sites where 3 of these drill sites are within the proposed expansion area. The Exploration Plan is formatted to address the specific requirements of 30 CFR Chapter VII subchapters G and K and 43 CFR 3482 and the applicable regulations under R 645-201 and 202 of the Utah Department of Oil, Gas and Mining (UDOGM). The Exploration plan was submitted and accepted by the BLM in 2010.

Mining Plan – Dugout Canyon Mine's method of coal extraction for the proposed expansion area will be using continuous mining equipment through room and pillar, first mining only. The overburden of the proposed area is approximately 1,500 feet to 2,200 feet. Subsidence is non-occurring in areas where first mining continuous miner mining methods are used. See Plate 5-7 for the proposed mine plan. Please note, that in order to achieve the Maximum Economic Recovery (MER) of the coal resource, the proposed mine plan is skirting along the northern and eastern boundaries of the

projected minable coal seam. Thus, its projected that less than 40 aces of the total IBC will actually be mined.

The Bureau of Land Management has authorized Dugout's Resource Recovery and Protection Plan (R2P2), approving the extraction of coal in the proposed expansion area (see supportive documents, confidential).

Subsidence – Information addressing subsidence is provided in Sections 332, 521, 525, 623, 625, 632, 642, 727 and 830 of the Dugout Canyon Mine M&RP. Dugout's current approved mine plan is for continuous mining methods only. The method of coal extraction for the proposed expansion area will be using continuous mining room and pillar first mining only. Subsidence is non-occurring in areas where first mining continuous miner mining methods are used. The potential subsidence boundary with an approximate 30-degree angle of draw is demonstrated on Plate 5-7.

To the best of the knowledge of Canyon Fuel Company, LLC – Dugout Canyon Mine there are no known non-commercial buildings, occupied residential dwellings, structures, State approved water supplies or renewal resource lands related thereto, which may be diminished by subsidence within the proposed expansion area. Should material damage to or diminish to the value or reasonable foreseeable use of structures or renewable resource land occur, repair or compensation are discussed in Section 525 of the M&RP (see supportive documents). Section 728 (see supportive documents) provides a description of the measures to be taken to replace adversely affected State-appropriated water supplies or to mitigate or remedy any subsidence related material damage to the land.

Land Ownership - The legal and equitable owners of the proposed expanded surface are Canyon Fuel Company and Milton & Ardith Thayne Trust. The Milton & Ardith Thayne Trust surface use agreement allows Dugout Mine to facilitate coal mining operations within their land under Federal Coal Leases and pursuant to mine permits granted or to be granted by the Utah Division of Oil, Gas and Mining. This agreement can be found in the Dugout M&RP, Chapter 4, Appendix 4-2 and in the Exploration Plan 2010 Appendix A in supportive documents. The surface land use as designated by the BLM is for a Dugout Grazing Allotment and a Pace Canyon Grazing Allotment. See Plate 1-1 for Surface Ownership. See Plate 4-1 for Land Use.

Hydrologic Monitoring - The expanded area lies within the Cumulative Hydrologic Impact Assessment (CHIA), Book Cliffs Area II. Plate 1-Cumulative Impact Area (CIA) Book Cliff Area II of the CHIA shows the CIA boundary with relationship to Dugout's permit boundary. See supportive documents Plate 1-CIA for the highlighted proposed expansion area. According to the CHIA, page 63 "The Division has found no evidence of material damage from the actual mining operations, nor a probability of material damage from actual or anticipated mining operations in the Book Cliffs Area II CHIA".

Past hydrologic studies have adequately identified the existing surface and groundwater resources associated with the current Dugout permit area boundary. This information does include areas that are adjacent to and beyond this boundary. Also, the current Probable Hydrologic Consequences for Dugout were developed assuming full extraction longwall mining methods. As illustrated in Plate 7-1, Hydrologic Monitoring Stations, the surface and groundwater resources are well identified within and adjacent to the modest IBC area. Furthermore, the established water monitoring locations SC-100, SC-65 and DC-5 are very well positioned to accommodate the water monitoring requirements of the

IBC area. This is particularly true, given the limited amount of mining expected for the area and no secondary mining will be conducted within the IBC.

All groundwater use (seeps and springs) within the permit and adjacent areas are confined to wildlife and stock watering.

Threatened and Endangered Plant and Wildlife Species – There are no known federally or state listed threatened and endangered plant and wildlife species within the proposed expansion area. Mt. Nebo Scientific, Inc. performed an exploration vegetation and sensitive species evaluation in three locations within the proposed expansion area. This report will be added to Dugout's M&RP, Chapter 3, Appendix 3-1.

A Threatened, Endangered, Candidate & Sensitive Vertebrate Species Report was performed by Western Land Services in the proposed expansion area in conjunction with three exploration drill sites within the proposed expansion area. This report will be added to Dugout's M&RP, Chapter 3, Appendix 3-3.

Soils – A soil resource assessment was prepared by Mt. Nebo Scientific in the proposed expansion area for exploration and degas locations. The assessment includes four drill sites, three of which are included the proposed expansion area. This report will be added to Dugout's M&RP, Chapter 2, Appendix 2-2.

Raptor – Information addressing raptors can be found in Sections: 322, 323, 332, 333 and 358 of the Dugout Canyon M&RP. Dugout's M&RP Section: 322 requires a survey of raptor nests in areas where raptor habitat could be affected by subsidence or surface disturbance associated with mining activities. Dugout's current approved mine plan and proposed expansion plan is for first mining continuous mining methods only. Subsidence is non-occurring in areas where continuous miner first mining methods are used.

The Exploration Plan from 2010 (see supportive documents) provides information regarding Raptors. According to the survey no raptors were identified.

Aerial raptor nest surveys were performed from 2001 to 2008 of the area by the Utah Division of Wildlife Resources and are available for review in the confidential folder of the Dugout Canyon Mine's M&RP. An aerial survey map from 2003 is provided to demonstrate areas covered, see supportive documents. Raptor surveys from 2009 to present are conducted surveying known raptor nests. The surveys have identified no raptor within or immediately adjacent the expansion area.

Goshawks – The Exploration Plan from 2010 (see supportive documents) provides information regarding the Northern Goshawk. According to the survey there was no response from a northern goshawk.

Mexican Spotted Owl – The Exploration Plan from 2010 (see supportive documents) provides information regarding the Mexican Spotted Owl. According to the survey the search did not reveal the presence of any Mexican spotted owls.

Cultural Resources – There are no known archeological resources located in the proposed expansion area. An archaeological inventory SPUT-593 was conducted in relation to exploration drilling in the proposed expansion by SENCO-PHENIX Archaeological Consulting services in 2009.

SPUT-593 conducted an intensive 40-acre survey accounting for six exploration drill sites. Four of these sites are within the proposed expansion area while the remaining two sites border the proposed expansion. The report SPUT-593 (confidential) was incorporated into Dugouts M&RP confidential file in April 2011, following concurrence from SHPO. This report has been attached for your convenience see supportive documents.

The proposed expansion area has been heavily logged by tractor logging. See Exhibit B, Appendix 4-2, Timber Inventory Map.

Dugout Canyon Mine will notify the Division should the unlikely event of a cultural or paleontologist resource is discovered during operations. If discovered, any surface operations will cease and the Division will be notified as soon as possible of the discovery.

Dugout M&RP, Chapter 1, Pages 1-7, 1-10, 1-11, 1-12,

Dugout Canyon Mine Permit Number C/007/039

Canyon Fuel Company

Redline Strikeout Copies

Title page for reference only

Section 11: S1/2

Sections 14 and 15: All

Section 17: NE1/4; E1/2SW1/4; SE1/4

Section 20: E1/2NW1/4; SW1/4NW1/4; N1/2NE1/4

Section 21: N1/2NW1/4; NE1/4

Section 22: N1/2; N1/2S1/2

Section 23: W1/2NW1/4

State Lease ML-42649 - (2212 acres) - Approved

T. 13 S., R. 12 E., SLBM, Utah

Section 3: Lots 1, 2, 3, 4, S1/2 (all)

Section 4: Lots 1, 2, 3, 4, S1/2 (all)

Section 5: Lots 1, 2, SE1/4

Section 9: All

Section 10: N1/2

Section 11: N1/2

Federal Coal Lease U-07064-027821 - (~~2,953.71~~ 2,881.15 acres) - Approved 1 January 1957, Expanded 2007, Modified 2009 & 2010, Partially Relinquished 2012

T. 13 S., R. 12 E., SLBM, Utah

Section 13: ~~S1/2~~, All

Section 23: E1/2E1/2, W1/2SE1/4, NE1/4SW1/4, E1/2SE1/4SW1/4

Section 24: All

Section 25: N1/2N1/2, N1/2SW1/4NW1/4

Section 26: N1/2NE1/4, NE1/4SE1/4NE1/4

T. 13 S., R. 13 E., SLBM, Utah

Section 17: S1/2N1/2, S1/2

Section 18: Lots 1 2, 3, 4, E1/2SW1/4; SE1/4, ~~S1/2NE1/4, SE1/4NW1/4~~

Section 19: Lots 1-4, E1/2W1/2, NE1/4, NW1/4SE1/4

~~Section 21: NW1/4NW1/4~~

undisturbed land within the mine facilities disturbed area and 11.2 acres within the refuse pile disturbed area.

The permit boundary encompasses approximately ~~9,751~~ 10,008 acres which includes the acreage as presented in the table below, also refer to Plate 1-1 and RA Plate 1-1 for additional information. Coal ownership acreage within the permit area includes approximately ~~3134~~ 3381 acres of federal coal, approximately ~~5840~~ 5800 acres of state coal, and 827 acres of fee coal as shown in the table below (Plate 1-2 and RA1-1B). Approximately 745 acres which include the surface subsidence area, refuse pile and leach field areas will not be mined although their acreage is included in the surface and coal ownership acreage totals.

Acreage Table
(all acreage is approximate)

Disturbed Area	Acreage	**Surface Ownership**	Acreage	**Coal Ownership**	Acreage
Dugout Cyn. Facility	20.8	Federal	627	Federal	~~3134~~ 3381
Degas (3/24/10)	41.5	State of Utah	920	State	~~5840~~ 5800
AMV Road	14.25	Fee	~~8254~~ 8461	Fee	827
Topsoil Stockpile	0.85				
Leachfield	1.8				
Fan Portal	2.7				
Refuse Pile	26.8				
Total	108.7		~~9801~~ 10008		~~9801~~ 10008
Acres of Land Within Permit Area under Lease and Fee Lands					
State Leases	Acres	Federal Leases	Acres	BLM	Acres
ML-42648	3160	U-07064-027821	~~2953.71~~ 2881	ROW UTU-76601	10
ML-42649	80	Lease Relinquished	440	ROW UTU-77985	47.5
ML-48435-OBA	~~2720~~ 2560			Parcel	2.5
ML-50582-OBA	0	**Fee Acreage**	827		
Total (Rounded)	~~5960~~ 5800		~~3781~~ 4148		60

Approximate Total Acreage within Permit Area	~~5960~~ 5800+~~3781~~ 4148+60 = ~~9801~~ 10008

A legal description of the permit boundary includes:

T. 13 S., R. 12 E., SLBM, Utah

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

T. 13 S., R. 13 E., SLBM, Utah

Section 17	All except N1/2N1/2
Section 18	~~All except N1/2N1/2~~, S1/2, S1/2N1/2, Lot 1
Section 19	All
Section 20	All
Section 21	SW1/4; SW1/4NW1/4; NW1/4NW1/4
Section 28	NW1/4; N1/2SW1/4; SW1/4SW1/4
Section 29	All
Section 30	NW1/4NW1/4; E1/2; E1/2W1/2

T. 14 S., R. 12 E., SLBM, Utah

Section 18	Portion N1/2NE1/4

Topsoil is being stored in T14S, R12E, Section 8, a storage area permitted to Soldier Canyon Mine. See Chapter 2 for additional details concerning the topsoil storage.

As clarification, in 2007 acreage (487.57 acres) was added to existing Federal Coal Lease U-07064-027821, two hundred and forty-seven acres of this added acreage is already included as part of the Dugout permitted area. Acreage was previously added to the permit area in excess of the Federal leased acreage to act as a subsidence buffer zone (207.57 acres) and to accommodate a revised mine plan (40 acres). In addition, State Lease ML-50582-OBA (320 acres, more or less) was issued to Dugout Canyon Mine in 2007. Future surface disturbance of these leases will be permitted as needed to facilitate mining activities. The subsidence buffer zone acreage was added in T13S, R12E Section 13 and T13S, R13E Sections 17 and 18. The acreage added in T13S, R13E Sections 17 and 18 is now part of Federal Coal Lease U-07064-027821. Fifty acres were added to the permit boundary in 2012, this acres included 20 acres in Section 23, 20 acres in Section 25 and 10 acres in Section 26, T13S, R 12E (Federal Coal Lease U-07064-027821). Two hundred and seven acres were added to the permit boundary in 2016, these acres include 160 acres in Section 13, T13S, R12E and 47 acres in Section 18, T13S, R13E (Federal Coal Lease U-07064-027821).

The refuse pile is located on property owned by Canyon Fuel Company, LLC. The property is located approximately 6.5 miles southwest of the Dugout Canyon Mine in portions of the NE1/4, SW 1/4 and SE 1/4 of the NE 1/4, in a portion of the NW 1/4 of the SE1/4, and in the NW1/4 of the NE 1/4 of Section 18, Township 14 South, Range 12 East, Salt Lake Base Meridian.

Dugout M&RP, Chapter 1, Appendix 1-1

Updated Lease Documents

Dugout Canyon Mine Permit Number C/007/039

Canyon Fuel Company

Redline Strikeout Copies

Title page for reference only

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Utah State Office
P.O. Box 45155
Salt Lake City, UT 84145-0155
http://www.blm.gov/ut/st/en.html

SC-00E

TAKE PRIDE IN AMERICA

IN REPLY REFER TO:
3452
UUT-07064-027821
(UT-9223)

MAR 12 2012

ARKLAND
MAR 19 2012
RECEIVED

CERTIFIED MAIL—7011 1150 0000 6739 6722
Return Receipt Requested

DECISION

Canyon Fuel Company, LLC	:	Coal Lease
c/o Ark Land Company	:	UTU-07064-027821
City Place One, Suite 300	:	
St. Louis, MO 63141	:	

Coal Lease Partial Relinquishment Accepted

On June 14, 2011, a partial relinquishment of the above noted federal coal lease was filed in the office by Canyon Fuel Company, LLC. This application was amended on February 23, 2012.

A determination has been made that the partial relinquishment of this lease is approved as of the date of filing. The relinquished lands are subject to the continued obligation of the lessee to make payment of all accrued rentals and royalties and to complete the reclamation of the relinquished lands.

The relinquished and retained lands are described as follows:

Coal lease UTU-07064-027821:

Relinquished Lands
T. 13 S., R. 13 E., SLM, Utah
Sec. 17, S½N½, N½SE¼, SE¼SE¼;
Sec. 18, S½NE¼, SE¼NW¼;
Sec. 21, NW¼NW¼.

Containing 440.00 acres

Retained Lands
Tract 1:
T. 13 S., R. 12 E., SLM, Utah
Sec. 13, S½;
Sec. 23, E½E½, NE¼SW¼, W½SE¼;
Sec. 24, all;
Sec. 25, N½N½;
Sec. 26, N½NE¼;

T. 13 S., R. 13 E., SLM, Utah
Sec. 18, lots 3 and 4, E½SW¼, SE¼;
Sec. 19, lots 1-4, E½W½, NE¼, NW¼SE¼;
Sec. 30, lot 1.

Tract 2:
T. 13 S., R. 13 E., SLM, Utah
Sec. 18, lot 2;

(Retained Lands Continued)

Tract 3:
T. 13 S., R. 12 E., SLM, Utah
Sec. 23, E½SE¼SW¼;
Sec. 25, N½SW¼NW¼;
Sec. 26, NE¼SE¼NE¼.

Tract 4:
T. 13 S., R. 12 E., SLM, Utah
Sec. 13, N½;
T. 13 S., R. 13 E., SLM, Utah
Sec. 18, lot 1;

Containing 2,881.15 acres

This decision may be appealed to the Interior Board of Land Appeals, Office of the Secretary, in accordance with the regulations contained in 43 CFR, Part 4, and the enclosed Form 1842-1. If an appeal is taken, your notice of appeal must be filed in this office (at the above address) within 30 days after receipt of this decision. The appellant has the burden of showing that the decision appealed from is in error.

Within thirty (30) days, Canyon Fuel Company, LLC must provide a map with the lease holdings, as modified, with an accounting of the recoverable tonnage.

If you wish to file a petition (pursuant to regulation 43 CFR 4.21)(58 FR 4939, January 19, 1993)(request) for a stay (suspension) of the effectiveness of this decision during the time that your appeal is being reviewed by the Board, the petition for a stay must accompany your notice of appeal. A petition for a stay is required to show sufficient justification based on the standards listed below. Copies of the notice of appeal and petition for a stay **must** also be submitted to each party named in this decision and to the Interior Board of Land Appeals and to the appropriate Office of the Solicitor (see 43 CFR 4.413) at the same time the original documents are filed in this office. If you request a stay, you have the burden of proof to demonstrate that a stay should be granted.

Standards for Obtaining a Stay

Except as otherwise provided by law or other pertinent regulation, a petition for a stay of a decision pending appeal shall show sufficient justification based on the following standards:

(1) The relative harm to the parties if the stay is granted or denied,
(2) The likelihood of the appellant's success on the merits,
(3) The likelihood of immediate and irreparable harm if the stay is not granted, and
(4) Whether the public interest favors granting the stay.

If you have further questions call Bill Buge at (801) 539-4086.

Juan Palma
State Director

Enclosure
Form 1842-1

cc: Resource Development Coordinating Committee, ATTN: Mineral Leasing Taskforce, 116 State Capital Building, Salt Lake City, Utah 84114

ONRR, ACM, Solid Minerals Staff, Attn: LeeAnn Martin, MS62300B, Box 25165, Denver, CO 80225-0165

Price Field Office (Attn: Steve Falk)

Mr. John Baza, Director, UDOGM, Box 145801, Salt Lake City, Utah 84114-5801

Form 1842-1
(September 2006)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

INFORMATION ON TAKING APPEALS TO THE INTERIOR BOARD OF LAND APPEALS

DO NOT APPEAL UNLESS
1. This decision is adverse to you,
AND
2. You believe it is incorrect

IF YOU APPEAL, THE FOLLOWING PROCEDURES MUST BE FOLLOWED

1. NOTICE OF APPEAL.....	A person who wishes to appeal to the Interior Board of Land Appeals must file in the office of the officer who made the decision (not the Interior Board of Land Appeals) a notice that he wishes to appeal. A person served with the decision being appealed must transmit the *Notice of Appeal* in time for it to be filed in the office where it is required to be filed within 30 days after the date of service. If a decision is published in the FEDERAL REGISTER, a person not served with the decision must transmit a *Notice of Appeal* in time for it to be filed within 30 days after the date of publication (43 CFR 4.411 and 4.413).
2. WHERE TO FILE NOTICE OF APPEAL.....	Bureau of Land Management, Utah State Office, P. O. Box 45155, Salt Lake City, Utah 84145-0151 or Bureau of Land Management, Utah State Office, 440 West 200 South, Suite 500, Salt Lake City, Utah 84101 and
WITH COPY TO SOLICITOR...	Regional Solicitor, Room 6201, 125 South State Street, Salt Lake City, Utah 84111
3. STATEMENT OF REASONS	Within 30 days after filing the *Notice of Appeal*, file a complete statement of the reasons why you are appealing. This must be filed with the United States Department of the Interior, Office of Hearings and Appeals, Interior Board of Land Appeals, 801 N. Quincy Street, MS 300-QC, Arlington, Virginia 22203. If you fully stated your reasons for appealing when filing the *Notice of Appeal*, no additional statement is necessary (43 CFR 4.412 and 4.413).
WITH COPY TO SOLICITOR.....	and Regional Solicitor, Room 6201, 125 South State Street, Salt Lake City, Utah 84111
4. ADVERSE PARTIES.....	Within 15 days after each document is filed, each adverse party named in the decision and the Regional Solicitor or Field Solicitor having jurisdiction over the State in which the appeal arose must be served with a copy of: (a) the *Notice of Appeal*, (b) the Statement of Reasons, and (c) any other documents filed (43 CFR 4.413).
5. PROOF OF SERVICE.....	Within 15 days after any document is served on an adverse party, file proof of that service with the United States Department of the Interior, Office of Hearings and Appeals, Interior Board of Land Appeals, 801 N. Quincy Street, MS 300-QC, Arlington, Virginia 22203. This may consist of a certified or registered mail "Return Receipt Card" signed by the adverse party (43 CFR 4.401(c)).
6. REQUEST FOR STAY.....	Except where program-specific regulations place this decision in full force and effect or provide for an automatic stay, the decision becomes effective upon the expiration of the time allowed for filing an appeal unless a petition for a stay is timely filed together with a *Notice of Appeal* (43 CFR 4.21). If you wish to file a petition for a stay of the effectiveness of this decision during the time that your appeal is being reviewed by the Interior Board of Land Appeals, the petition for a stay must accompany your *Notice of Appeal* (43 CFR 4.21 or 43 CFR 2801.10 or 43 CFR 2881.10). A petition for a stay is required to show sufficient justification based on the standards listed below. Copies of the *Notice of Appeal* and Petition for a Stay **must** also be submitted to each party named in this decision and to the Interior Board of Land Appeals and to the appropriate Office of the Solicitor (43 CFR 4.413) at the same time the original documents are filed with this office. If you request a stay, you have the burden of proof to demonstrate that a stay should be granted. **Standards for Obtaining a Stay.** Except as otherwise provided by law or other pertinent regulations, a petition for a stay of a decision pending appeal shall show sufficient justification based on the following standards: (1) the relative harm to the parties if the stay is granted or denied, (2) the likelihood of the appellant's success on the merits, (3) the likelihood of immediate and irreparable harm if the stay is not granted, and (4) whether the public interest favors granting the stay.

Unless these procedures are followed, your appeal will be subject to dismissal (43 CFR 4.402). Be certain that **all** communications are identified by serial number of the case being appealed.

NOTE: A document is not filed until it is actually received in the proper office (43 CFR 4.401(a)). See 43 CFR Part 4, Subpart B for general rules relating to procedures and practice involving appeals.

(Continued on page 2)

43 CFR SUBPART 1821--GENERAL INFORMATION

Sec. 1821.10 Where are BLM offices located? (a) In addition to the Headquarters Office in Washington, D.C. and seven national level support and service centers, BLM operates 12 State Offices each having several subsidiary offices called Field Offices. The addresses of the State Offices can be found in the most recent edition of 43 CFR 1821.10. The State Office geographical areas of jurisdiction are as follows:

STATE OFFICES AND AREAS OF JURISDICTION:

Alaska State Office ---------- Alaska
Arizona State Office --------- Arizona
California State Office ------- California
Colorado State Office -------- Colorado
Eastern States Office --------- Arkansas, Iowa, Louisiana, Minnesota, Missouri and, all States east of the Mississippi River
Idaho State Office ------------ Idaho
Montana State Office --------- Montana, North Dakota and South Dakota
Nevada State Office ---------- Nevada
New Mexico State Office ---- New Mexico, Kansas, Oklahoma and Texas
Oregon State Office ---------- Oregon and Washington
Utah State Office ------------ Utah
Wyoming State Office -------- Wyoming and Nebraska

(b) A list of the names, addresses, and geographical areas of jurisdiction of all Field Offices of the Bureau of Land Management can be obtained at the above addresses or any office of the Bureau of Land Management, including the Washington Office, Bureau of Land Management, 1849 C Street, NW, Washington, DC 20240.

Dugout M&RP, Chapter 1, Plates 1-1, 1-2, 1-4

Dugout Canyon Mine Permit Number C/007/039

Canyon Fuel Company

Redline Strikeout Copies

Title page for reference only

T 12 S
T 13 S
R 12 E
R 13 E
T 13 S
T 14 S
R 12 E
R 13 E

Incidental Boundary Change

DISTURBED AREA BOUNDARY

PIPELINE

LEACH FIELD

DISTURBED AREA BOUNDARY

PACE CANYON FAN BREAKOUT DISTURBED AREA BOUNDARY

J. George & Margaret Conover
Gil L. & Melody H. Conover
George H. Conover
Carolyn Lewis
Linda E. Staker

LEGEND

- MILTON AND ARDITH THAYN TRUST
- UNITED STATES OF AMERICA
- STATE OF UTAH
- CANYON FUEL COMPANY, LLC
- PENTA CREEK, L.L.C. – 65.5%
  MAGNIFICENT SEVEN, L.L.C – 34.5%
- KFJ RANCH PARTNERSHIP
- LOUISE L. IRIART TRUST
- GLEN L. WELLS
- GEORGE H. CONOVER
  J. GEORGE AND MARGARET CONOVER
  GIL L. AND MELODY H. CONOVER
  CAROLYN LEWIS
  LINDA E. STAKER

PERMIT AREA BOUNDARY

REGISTERED PROFESSIONAL ENGINEER
No. 151610
DAVID G. SPILLMAN
STATE OF UTAH

0' 2000'

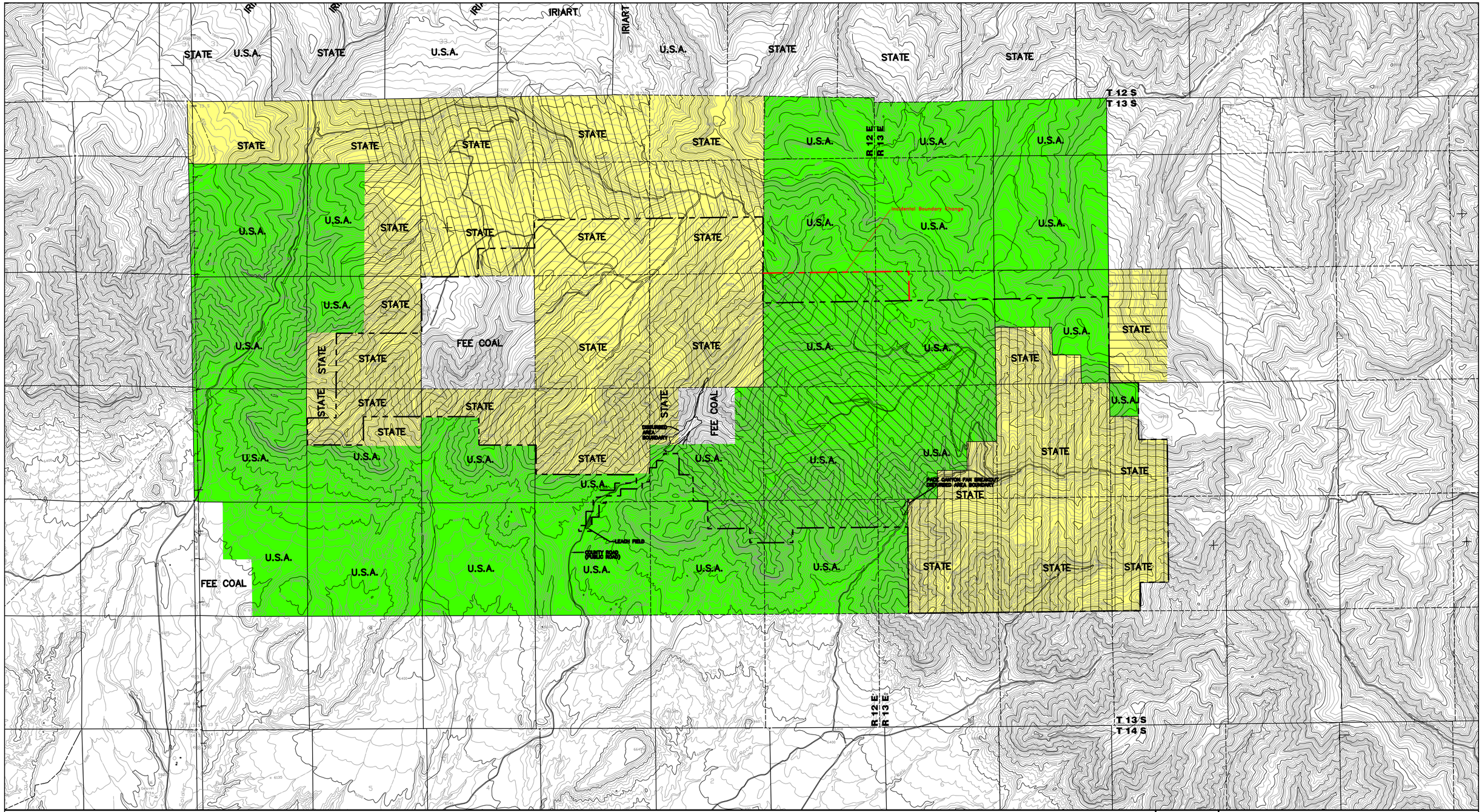
REVISION	
DATE	BY
03-05	VSM
01-26-07	JKS
10/09/07	SC
02/21/08	VSM/SWF
03/02/12	JKS
07/06/16	BK/JKS

Canyon Fuel Company, LLC
Soldier Canyon & Dugout Canyon Mines

SURFACE OWNERSHIP

Dugout Canyon Mine

DRAWN BY: JLP
APPROVED BY: DGS
DATE: MAY 5, 1999
FILE NAME: G:\UC1097\01\DWG\PLATE 1-1.DWG
SCALE: 1"=2000'
DRAWING OR MAP NUMBER: PLATE 1-1



LEGEND

U.S.A. =	UNITED STATES OF AMERICA
STATE =	STATE OF UTAH
FEE COAL =	CANYON FUEL COMPANY, LLC
▬ - - ▬	PERMIT AREA BOUNDARY

SELECTED LEASE IDENTIFICATION

- ML – 42648 (STATE)
- U – 07064 – 027821 (USA)
- ML – 42649 (STATE)
- ML – 48435 – OBA (STATE – SITLA)
- ML – 50582 – OBA (STATE – SITLA)

NOTE:

REFER TO REFUSE PILE AMENDMENT AND METHANE DEGASSIFICATION AMENDMENT FOR INFORMATION PERTAINING TO THEIR AREAS.

REGISTERED PROFESSIONAL ENGINEER
No. 151610
DAVID G. SPILLMAN
STATE OF UTAH

0' 2000'

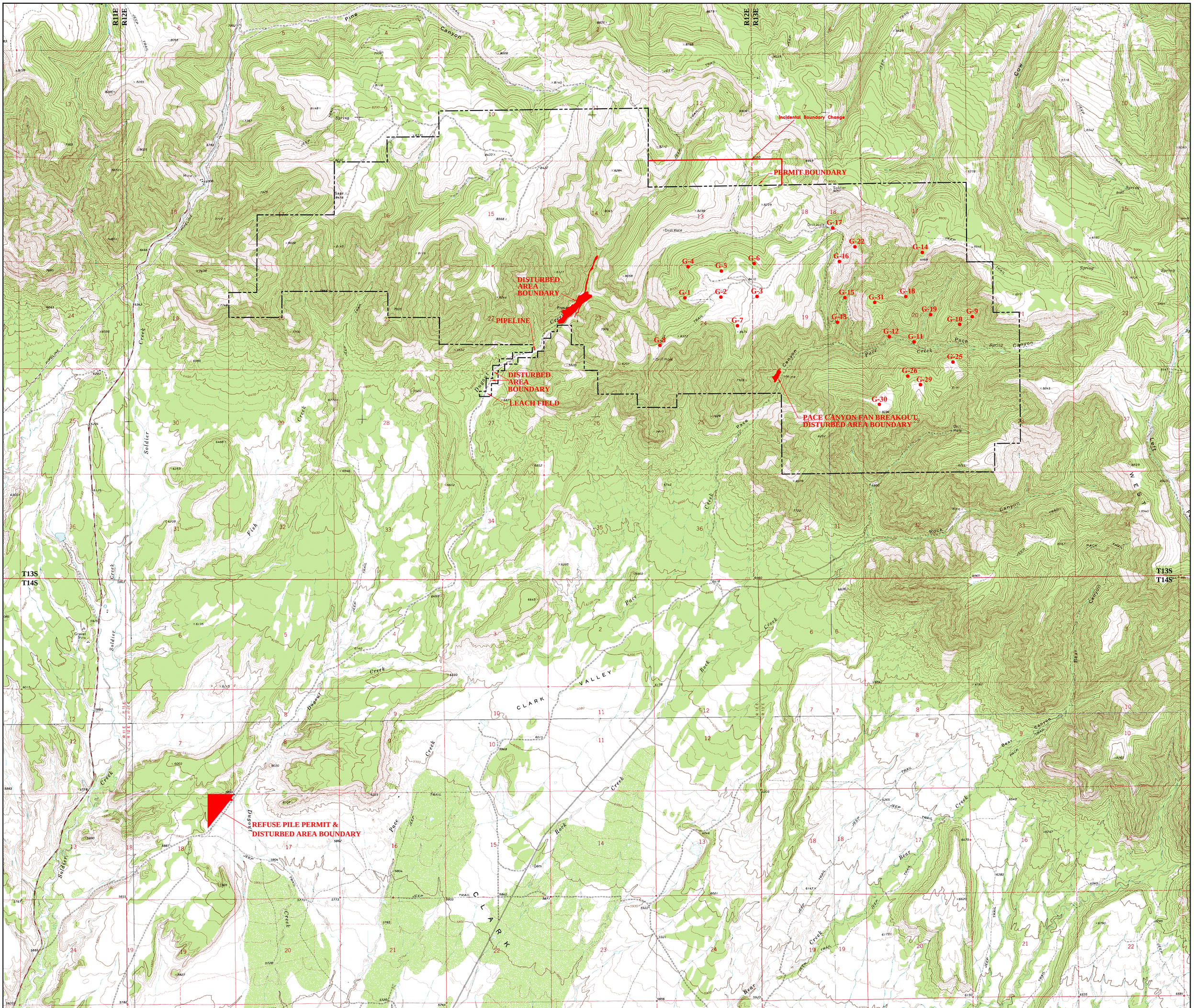
REVISION	
DATE	BY
12/19/03	DGS
01/26/07	JKS
10/10/07	JLP
02/21/08	VSM/SWF
03/02/12	JKS
06/06/12	JKS
06/24/16	JKS
06/27/16	DGS

Canyon Fuel Company, LLC
Soldier Canyon & Dugout Canyon Mines

COAL OWNERSHIP

Dugout Canyon Mine

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



LEGEND

——-——-——	PERMIT AREA BOUNDARY
9,801	PERMITTED ACRES
108.7	DISTURBED ACRES

REGISTERED PROFESSIONAL ENGINEER
No. 151610
DAVID G. SPILLMAN
STATE OF UTAH

0' 2000'

REVISIONS	
DATE	BY
07/05/07	SC
09/04/07	SC
10/02/07	SC
02/21/08	VSM
10/01/08	VSM/SWF
04/23/09	VSM/SWF
06/16/09	VSM/SWF
08/05/09	VSM/SWF
03/25/10	VSM/SWF
03/02/12	JKS
07/06/16	BK/JKS

Canyon Fuel Company, LLC
Soldier Canyon & Dugout Canyon Mines

DUGOUT CANYON MINE PERMIT AREA

Dugout Canyon Mine

DRAWN BY: RR	DATE: FEBRUARY 26, 2003	SCALE: 1" = 2000'
APPROVED BY: VSM	FILE NAME: PLATE 1-4.DWG	DRAWING OR MAP NUMBER PLATE 1-4

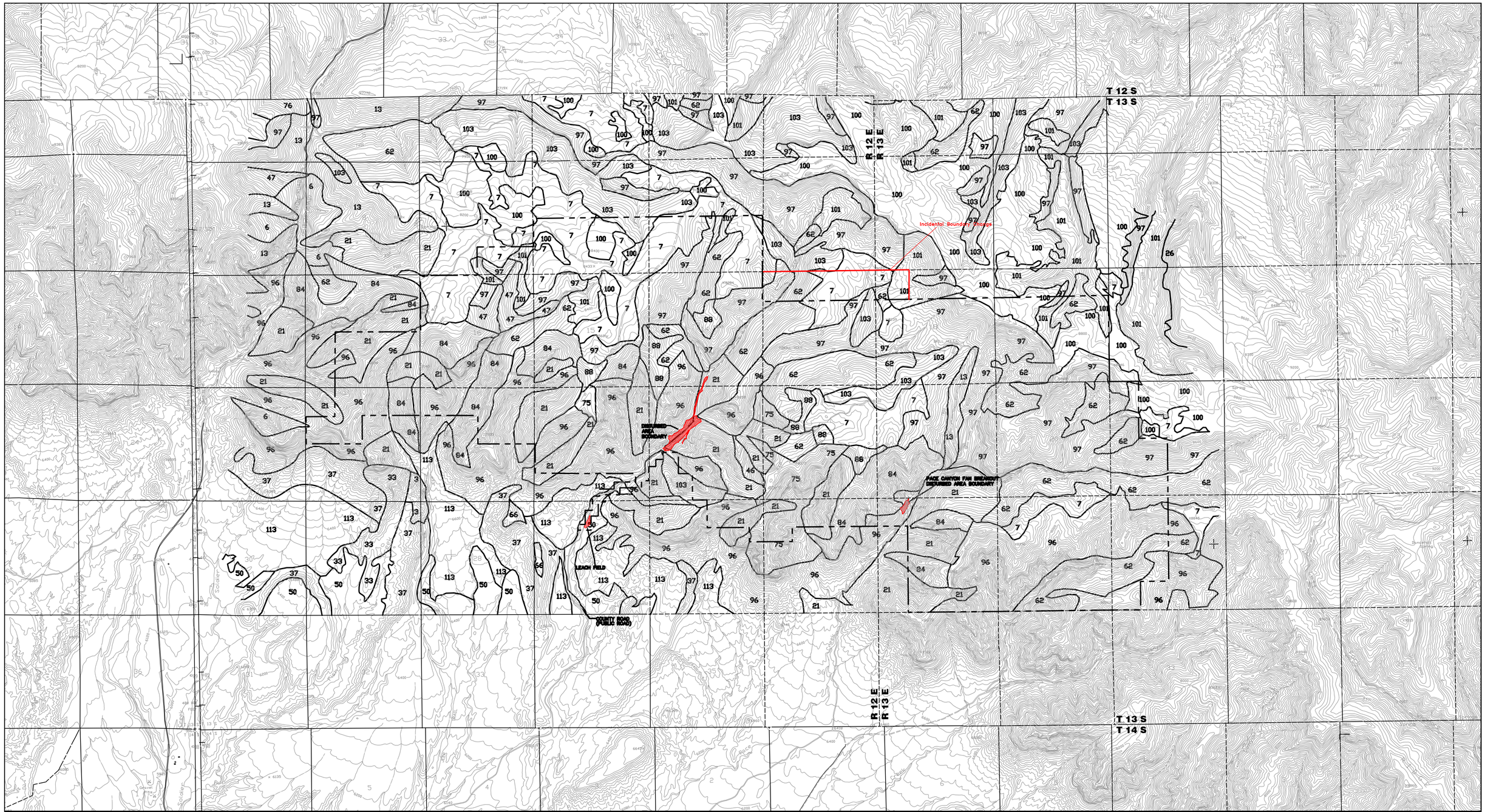
Dugout M&RP, Chapter 2, Plate 2-1

Dugout Canyon Mine Permit Number C/007/039

Canyon Fuel Company

Redline Strikeout Copies

Title page for reference only



NOTE:

REFER TO REFUSE PILE AMENDMENT AND METHANE DEGASSIFICATION AMENDMENT FOR INFORMATION PERTAINING TO THEIR AREAS.

PERMIT AREA BOUNDARY

LEGEND

MAP UNIT	SOILS NAME
7	BEJE – TRAG COMPLEX
6	BEJE–COMODORE COMPLEX, 30 TO 60 PERCENT SLOPES
13	CABBA FAMILY–GUBEN–ROCK OUTCROP COMPLEX
21	CROYDON LOAM, 8 TO 30 PERCENT SLOPES
23	CURECANTI FAMILY – PATHEAD COMPLEX
26	DONEY FAMILY – 50 TO 70 PERCENT SLOPES
36	GERST – STRYCH – BADLAND COMPLEX, 3 TO 50 PERCENT SLOPES
37	GERSTRYCH–BADLAND COMPLEX, 50 TO 70 PERCENT SLOPES
46	GUBEN–PATHEAD EXTREMELY STONY LOAM
47	GUBEN–ROCK OUTCROP COMPLEX, 50 TO 80 PERCENT SLOPES
50	HAVERDAD LOAM, MOIST, 1 TO 5 PERCENT SLOPES
62	MIDFORK FAMILY – COMODORE COMPLEX
66	MIVIDA GRAVELLY FINE SANDY LOAM, 3 TO 8 PERCENT SLOPES
72	PATHEAD – CORECANTI FAMILY ASSOCIATION
75	PERMA FAMILY, 15 TO 40 PERCENT SLOPES
84	PODO–ROCK OUTCROP COMPLEX, 50 TO 70 PERCENT SLOPES
86	RABBITEX – DONEY FAMILY – MIDFORK FAMILY COMPLEX
88	RABBITEX FAMILY – DATINO VARIANT COMPLEX
96	ROCK OUTCROP – RUBBELAND – TRAVESSILLA COMPLEX
97	ROTTULEE FAMILY – TRAQ COMPLEX

MAP UNIT	SOILS NAME
100	SENCHERT LOAM 3 TO 15 PERCENT SLOPES
101	SENCHERT LOAM 30 TO 50 PERCENT SLOPES
103	SENCHERT – TOZA FAMILY COMPLEX
105	SENCHERT FAMILY – SENCHERT COMPLEX
107	SUPERT – WINETTI COMPLEX
109	SILAS – BRYCAN LOAMS
113	STYRCH VERY STONY LOAM, 3 TO 15 PERCENT SLOPES

REGISTERED PROFESSIONAL ENGINEER
No. 151610
DAVID G. SPILLMAN
STATE OF UTAH

0' 2000'

REVISION	
DATE	BY
12/17/03	RR
01/26/07	JKS
10/09/07	JLP
02/21/08	VSM/SWF
03/02/12	JKS
06/06/12	JKS
07/06/16	BK/JKS

Canyon Fuel Company, LLC
Soldier Canyon & Dugout Canyon Mines

NATIVE SOIL TYPES PRESENT IN DUGOUT CANYON MINE PERMIT AREA

Dugout Canyon Mine

DRAWN BY: JLP	DATE: MAY 10, 1999 D-453.ctb	SCALE:	1" = 1000'
APPROVED BY: MWS	FILE NAME: X:\DOGM\Working Files\Dugout\Situ\Plate 2-1.dwg	DRAWING OR MAP NUMBER	PLATE 2-1

Dugout M&RP, Chapter 2, Appendix 2-2

Soil Resource Assessment

Dugout Canyon Mine Permit Number C/007/039

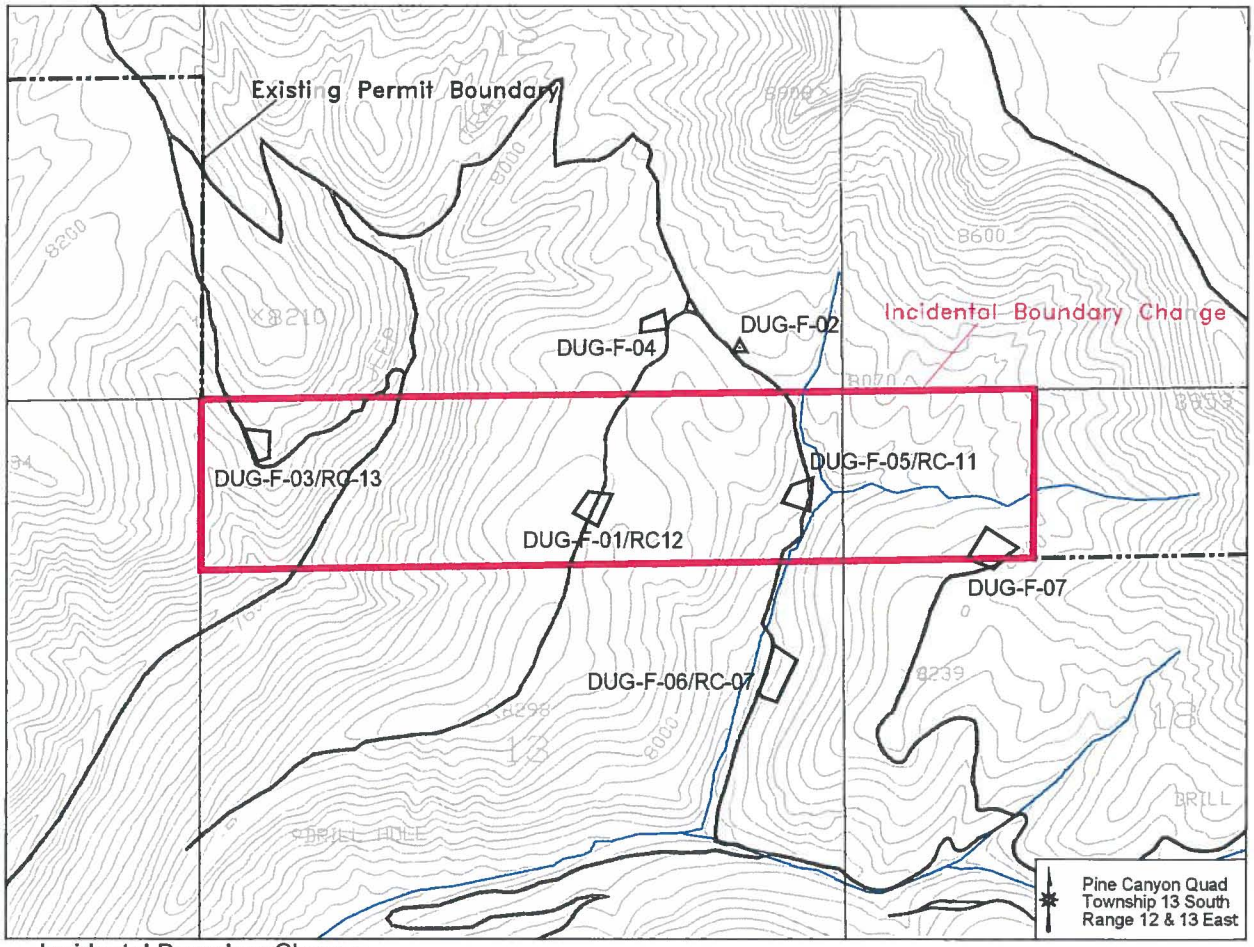
Canyon Fuel Company

Redline Strikeout Copies

Title page for reference only

A soil resource assessment was prepared by Mt. Nebo Scientific in the proposed expansion area for exploration and degas locations. The assessment includes four drill sites, three of which are included the proposed expansion area.

The T&E Sensitive Vertebrate Report covers sites DUG-F-01, DUG-F-03, DUG-F-06 & DUG-F-07. See map below.



Incidental Boundary Change:
Township 13 South, Range 12 East, SLBM, Utah
Section 13: N1/2N1/2, containing approximately 160 acres
Township 13 South, Range 13 East, SLBM, Utah
Section 18: Lot 1, containing approximately 47 acres

Soil Resource Assessment
Exploration and Degas Locations
Dugout Mine Area

Prepared by

MT. NEBO SCIENTIFIC, INC.
330 East 400 South, Suite 6
Springville, Utah 84663
(801) 489-6937

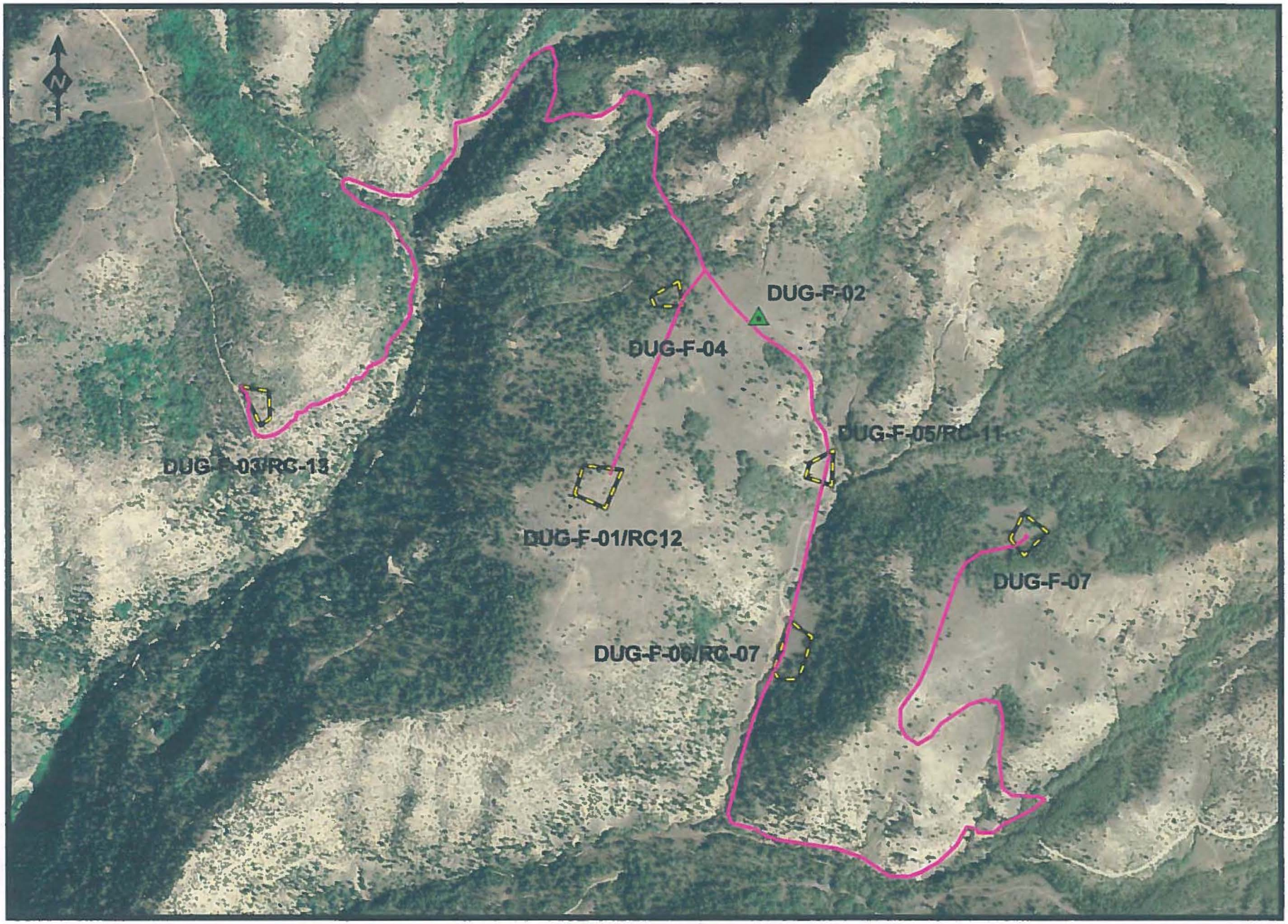
by

Robert E. Long, CPSS
Long Resource Consultants, Inc.
1960 W Deep Creek Road
Morgan, Utah 84050
(801) 791-3447

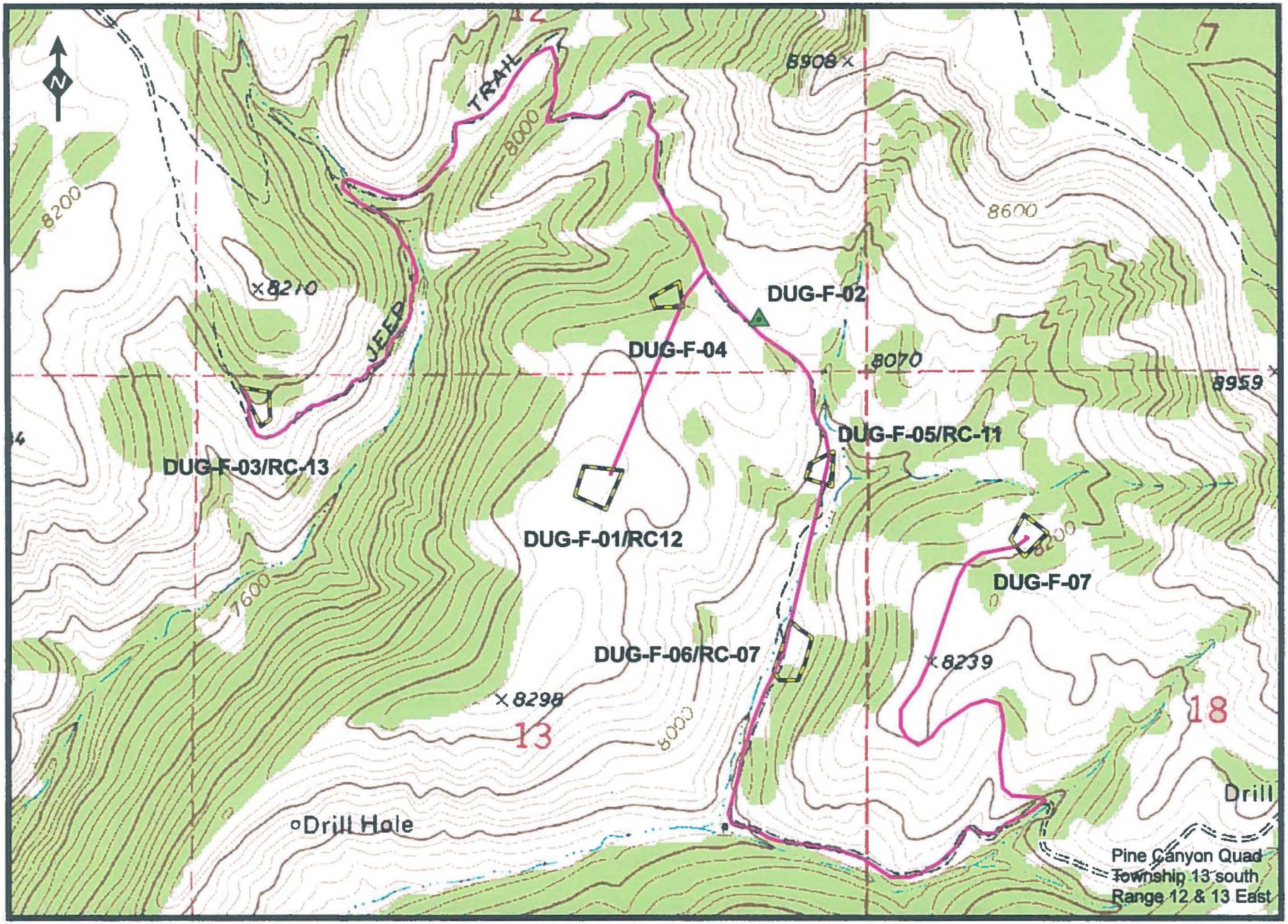
for

CANYON FUEL COMPANY, LLC.
DUGOUT CANYON MINE
P.O. Box 1029
Wellington, Utah 84542

January 29, 2010



Canyon Fuels - Site Locations - 2009 **1:12,000**



Canyon Fuels - Site Locations - 2009 **1:12,000**

Inter-Mountain Laboratories, Inc.
1673 Terra Avenue, Sheridan, Wyoming 82801
(307) 672-8945

Soil Analysis Report

Canyon Fuel Company

Dugout Canyon Mine
P.O. Box 1029
Wellington, UT 84542

Report ID: S0908513001

Project: Dugout Canyon Mine
Date Received: 8/31/2009

Date Reported: 10/8/2009
Work Order: S0908513

Lab ID	Sample ID	Depths Inches	pH s.u.	Saturation %	Electrical Conductivity dS/m	Field Capacity %	Wilt Point %
S0908513-001	RC12/DUG-F-01	0-4	6.3	57.8	0.38	39	24
S0908513-002	RC12/DUG-F-01	4-10	6.2	55.3	0.41	35	23
S0908513-003	RC12/DUG-F-01	10-22	6.8	63.2	0.48	40	26
S0908513-004	RC12/DUG-F-01	22-26	7.2	56.4	0.52	36	24
S0908513-005	RC7/DUG-F-06	0-12	7.5	56.8	0.54	38	20
S0908513-006	RC7/DUG-F-06	12-25	7.6	47.6	0.33	32	16
S0908513-007	RC7/DUG-F-06	25-37	7.7	47.3	0.29	31	16
S0908513-008	RC13/DUG-F-03	0-6	7.2	50.6	1.08	30	15

These results apply only to the samples tested.

Abbreviations for extractants: PE= Saturated Paste Extract, H20Sol= water soluble,AB-DTPA= Ammonium Bicarbonate-DTPA, AAO= Acid Ammonium Oxalate
Abbreviations used in acid base accounting: T.S.= Total Sulfur, AB= Acid Base, ABP= Acid Base Potential, PyrS= Pyritic Sulfur, Pyr+Org= Pyritic Sulfur + Organic Sulfur, Neutral. Pot.= Neutralization Potential
Miscellaneous Abbreviations: SAR= Sodium Adsorption Ratio, CEC= Cation Exchange Capacity, ESP= Exchangeable Sodium Percentage

Reviewed by: Karen A Secor
Karen Secor, Soil Lab Supervisor

Inter-Mountain Laboratories, Inc.
1673 Terra Avenue, Sheridan, Wyoming 82801
(307) 672-8945

Soil Analysis Report

Canyon Fuel Company

Dugout Canyon Mine
P.O. Box 1029
Wellington, UT 84542

Report ID: S0908513001

Project: Dugout Canyon Mine
Date Received: 8/31/2009

Date Reported: 10/8/2009
Work Order: S0908513

Lab ID	Sample ID	Depths	PE Calcium	PE Magnesium	PE Potassium	PE Sodium	SAR	Sand	Silt	Clay	Texture
		Inches	meq/L	meq/L	meq/L	meq/L		%	%	%	
S0908513-001	RC12/DUG-F-01	0-4	1.88	0.63	0.36	0.22	0.20	19.0	40.0	41.0	Silty Clay
S0908513-002	RC12/DUG-F-01	4-10	2.31	0.79	0.12	0.40	0.32	17.0	33.0	50.0	Clay
S0908513-003	RC12/DUG-F-01	10-22	3.40	0.76	0.05	0.30	0.21	11.0	27.0	62.0	Clay
S0908513-004	RC12/DUG-F-01	22-26	3.84	0.91	0.06	0.25	0.17	11.0	35.0	54.0	Clay
S0908513-005	RC7/DUG-F-06	0-12	4.06	0.65	0.58	0.13	0.08	31.0	38.0	31.0	Clay Loam
S0908513-006	RC7/DUG-F-06	12-25	1.96	0.33	0.20	0.16	0.15	25.0	42.0	33.0	Clay Loam
S0908513-007	RC7/DUG-F-06	25-37	1.44	0.48	0.22	0.17	0.17	27.0	40.0	33.0	Clay Loam
S0908513-008	RC13/DUG-F-03	0-6	10.4	1.05	1.56	0.28	0.12	43.0	32.0	25.0	Loam

These results apply only to the samples tested.

Abbreviations for extractants: PE= Saturated Paste Extract, H20Sol= water soluble,AB-DTPA= Ammonium Bicarbonate-DTPA, AAO= Acid Ammonium Oxalate
Abbreviations used in acid base accounting: T.S.= Total Sulfur, AB= Acid Base, ABP= Acid Base Potential, PyrS= Pyritic Sulfur, Pyr+Org= Pyritic Sulfur + Organic Sulfur, Neutral. Pot.= Neutralization Potential
Miscellaneous Abbreviations: SAR= Sodium Adsorption Ratio, CEC= Cation Exchange Capacity, ESP= Exchangeable Sodium Percentage

Reviewed by: Karen A Secor

Karen Secor, Soil Lab Supervisor

Inter-Mountain Laboratories, Inc.
1673 Terra Avenue, Sheridan, Wyoming 82801
(307) 672-8945

Soil Analysis Report

Canyon Fuel Company

Dugout Canyon Mine
P.O. Box 1029
Wellington, UT 84542

Report ID: S0908513001

Project: Dugout Canyon Mine
Date Received: 8/31/2009

Date Reported: 10/8/2009
Work Order: S0908513

Lab ID	Sample ID	Depths	Nitrogen Nitrate	Selenium	Boron	Phosphorus	TKN	Available Sodium	Exchangeable Sodium	Total Carbon	TOC
		Inches	ppm	ppm	ppm	ppm	%	meq/100g	meq/100g	%	%
S0908513-001	RC12/DUG-F-01	0-4	1.2	<0.02	0.60	43.8	0.18	0.04	0.02	4.0	3.8
S0908513-002	RC12/DUG-F-01	4-10	1.7	<0.02	0.61	20.2	0.02	0.06	0.04	2.0	1.9
S0908513-003	RC12/DUG-F-01	10-22	0.8	<0.02	0.49	12.5	<0.01	0.11	0.09	1.2	1.0
S0908513-004	RC12/DUG-F-01	22-26	2.4	<0.02	0.28	18.2	<0.01	0.07	0.06	3.4	1.6
S0908513-005	RC7/DUG-F-06	0-12	1.7	<0.02	0.64	42.3	0.05	0.04	0.03	4.3	3.7
S0908513-006	RC7/DUG-F-06	12-25	1.9	<0.02	0.40	40.9	<0.01	0.03	0.03	2.1	1.9
S0908513-007	RC7/DUG-F-06	25-37	1.5	<0.02	0.42	36.2	<0.01	0.04	0.03	1.9	1.8
S0908513-008	RC13/DUG-F-03	0-6	1.0	<0.02	0.46	21.7	0.50	0.02	<0.01	7.9	4.1

These results apply only to the samples tested.

Abbreviations for extractants: PE= Saturated Paste Extract, H20Sol= water soluble,AB-DTPA= Ammonium Bicarbonate-DTPA, AAO= Acid Ammonium Oxalate
Abbreviations used in acid base accounting: T.S.= Total Sulfur, AB= Acid Base, ABP= Acid Base Potential, PyrS= Pyritic Sulfur, Pyr+Org= Pyritic Sulfur + Organic Sulfur, Neutral. Pot.= Neutralization Potential
Miscellaneous Abbreviations: SAR= Sodium Adsorption Ratio, CEC= Cation Exchange Capacity, ESP= Exchangeable Sodium Percentage

Reviewed by: Karen A Secor

Karen Secor, Soil Lab Supervisor

Inter-Mountain Laboratories, Inc.
1673 Terra Avenue, Sheridan, Wyoming 82801
(307) 672-8945

Soil Analysis Report

Canyon Fuel Company

Dugout Canyon Mine
P.O. Box 1029
Wellington, UT 84542

Report ID: S0908513001

Project: Dugout Canyon Mine
Date Received: 8/31/2009

Date Reported: 10/8/2009
Work Order: S0908513

Lab ID	Sample ID	Depths Inches	Neutral. Potential t/1000t
S0908513-001	RC12/DUG-F-01	0-4	13.2
S0908513-002	RC12/DUG-F-01	4-10	9.79
S0908513-003	RC12/DUG-F-01	10-22	12.8
S0908513-004	RC12/DUG-F-01	22-26	150
S0908513-005	RC7/DUG-F-06	0-12	52.9
S0908513-006	RC7/DUG-F-06	12-25	12.8
S0908513-007	RC7/DUG-F-06	25-37	12.0
S0908513-008	RC13/DUG-F-03	0-6	311

These results apply only to the samples tested.

Abbreviations for extractants: PE= Saturated Paste Extract, H20Sol= water soluble,AB-DTPA= Ammonium Bicarbonate-DTPA, AAO= Acid Ammonium Oxalate
Abbreviations used in acid base accounting: T.S.= Total Sulfur, AB= Acid Base, ABP= Acid Base Potential, PyrS= Pyritic Sulfur, Pyr+Org= Pyritic Sulfur + Organic Sulfur, Neutral. Pot.= Neutralization Potential
Miscellaneous Abbreviations: SAR= Sodium Adsorption Ratio, CEC= Cation Exchange Capacity, ESP= Exchangeable Sodium Percentage

Reviewed by: Karen A Secor
Karen Secor, Soil Lab Supervisor

DUG-F-01 / RC-12

Exploration and De-gas Site

Location:	Easting	541014
	Northing	4394520
	Zone	12 S
	NAD	1983
	Township	13 South
	Range	12 East
	Section13	
	Meridian	Salt Lake
	USGS Quad:	Pine Canyon, Utah

Elevation: 8,250 feet

General Site Description

The proposed location is on a small north facing bench on the summit of a mountain ridge between the forks of Dugout Canyon with east northeast and northwest facing slopes.

An existing “two-track” road crosses the site from the north-northeast to south-southwest.

NRCS Soil map Unit

NRCS map unit 7: Beje-Trag complex

Beje and Trag soils have mollic epipedons over argillic horizons. Beje soils have a bedrock (lithic) contact within 20 inches of the surface. Trag soils are greater than 60 inches deep.

Both Beje and Trag soils were identified within the proposed location. Trag soils were observed in the concave area along the east edge of the location. Beje soils were observed adjacent to limestone outcrops along the roadway.

Topsoil Resource

Pino soils are the dominant soil type at this location. They are similar to Trag soils, but with fine textures. Soil pedon DUG-F-01 is representative of Pino soils within the proposed location boundaries. This soil is moderately deep. It soil has a dark surface (mollic) 10 inches thick. The subsoil (argillic) is 18 inches thick and comprises the lower 6 inches of the surface. The lower subsoil (calcic) contains secondary carbonates and is 4 inches thick over the limestone bedrock. The taxonomic classification of Pino soils is:

Fine, mixed, superactive, frigid Typic Argiustolls

Topsoil salvage will be limited by clayey soils, depth to carbonates (Bk horizon) and the limestone bedrock. Limestone cobbles (10 to 25 percent) may be present in the Pino soil areas, but are not limiting. Salvage depths vary across the site, depending on the depth to bedrock. Topsoil salvage depth ranges from 16 to 24 inches with an average of 18 to 20 inches. The salvage depth in the representative soil profile is 22 inches, based on the field description.

Laboratory Analysis of Pino Soils

The representative Pino soil profile (RC12/DUG-F-1) was sampled and submitted for analysis. Results of this analysis are contained in the Inter-Mountain Labs report ID S0908513001. The analysis included pH, saturation percent, ECe, field capacity, wilting point, SAR, particle size analysis, soluble potassium, nitrate nitrogen, TKN, selenium, boron, phosphorus, exchangeable sodium, total organic carbon, and neutralization potential. The silty clay and clay textures are the only limiting features identified by the laboratory analysis.

Reclamation

Reclamation potential of this site is *Good to Fair*, if adequate quantities of topsoil can be salvaged. The clayey textures will be limiting.

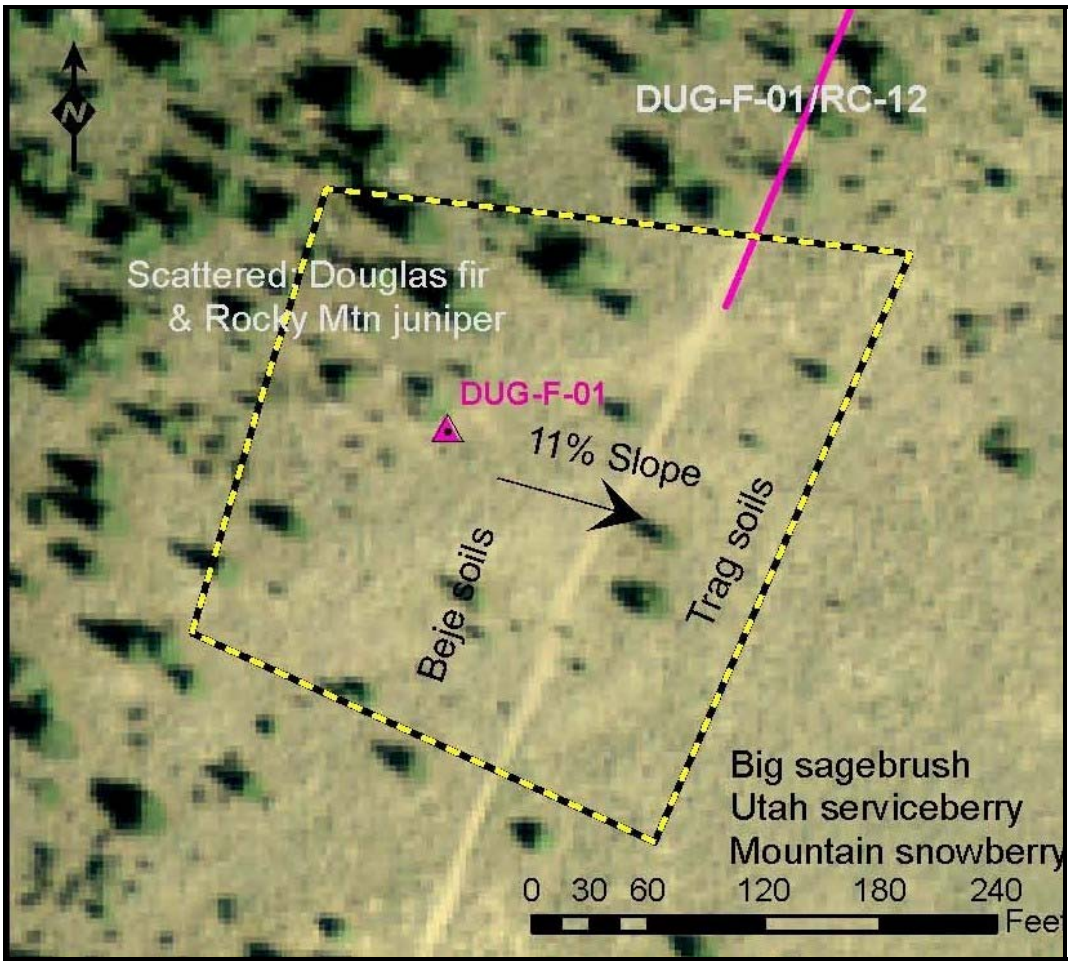
Vegetation

Big sagebrush is the dominant vegetation type at the DUG-F-01/RC-12 with widely scattered Douglas fir and Rocky Mountain junipers. The following plant species were observed within the proposed location. The vegetation report written by Mt Nebo Scientific contains a more detailed quantitative description of the site vegetation.

Big sagebrush	Salina wildrye	Douglas fir
Utah Serviceberry	bluegrass	Rocky Mountain juniper
Common juniper	Lupine	Mountain snowberry

Site Map

The base aerial photo for the DUG-F-01/RC-12 site map is 2006 HRO 1 meter color orthophotography (Utah GIS Portal 2009). Scale is 1 foot equals 100 feet.



Site Photos

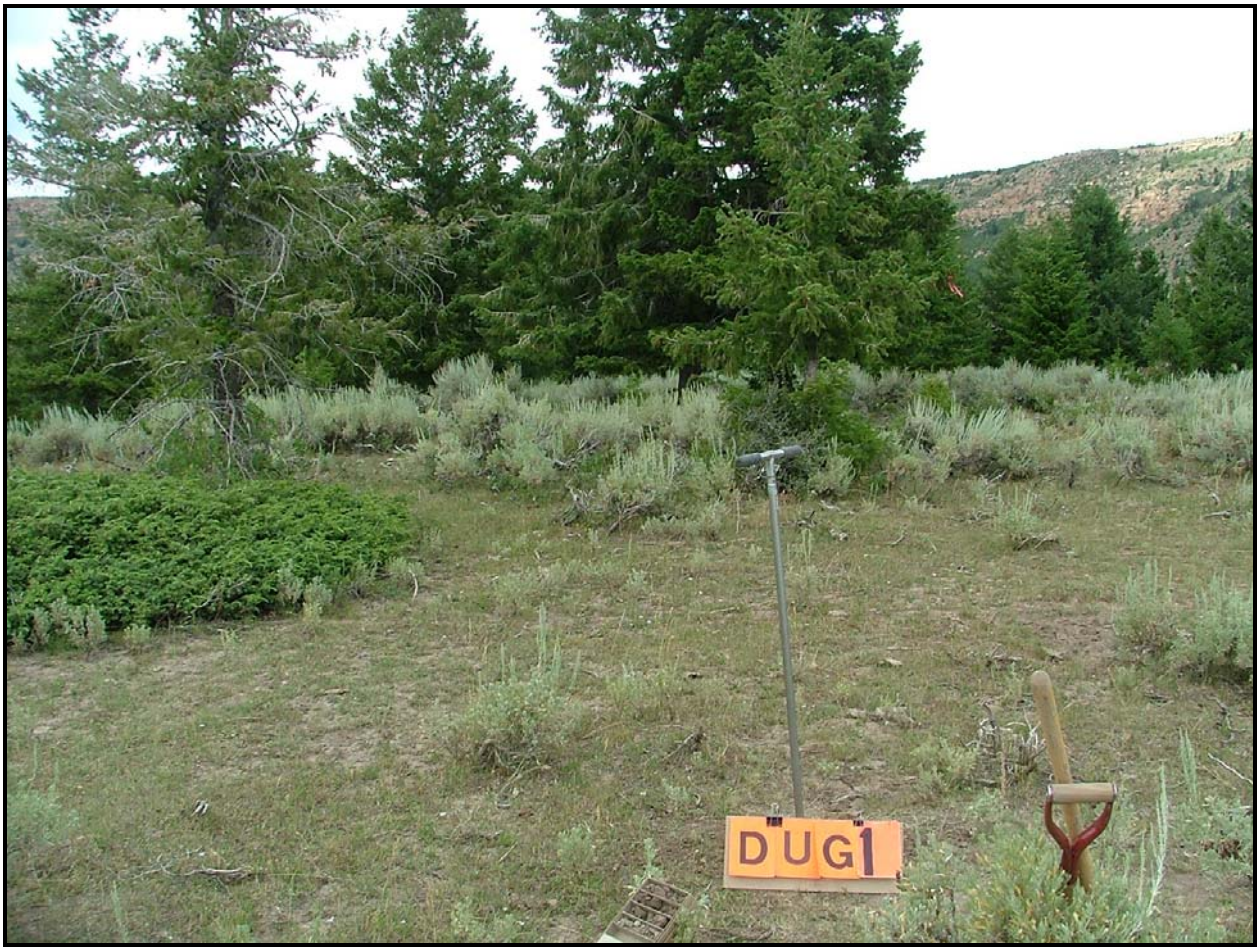


Photo 1. Looking north across soil profile location at scattered Douglas fir on north and west sides of proposed location.

Photo 2. Looking east across soil profile location near center of proposed location. Site is dominated by big sagebrush, mountain snowberry, and Utah serviceberry.

Photo 3. Looking south across proposed location at scattered Douglas fir and Rocky mountain juniper. Slope is approximately 11 percent toward the east southeast (from right to left in photo).

Photo 4. Looking west across soil profile location near center of proposed location. The site is situated on summit of ridge between forks of Dugout Canyon.

Photo 5. Soil profile box of moderately deep Trag soil (fine-loamy, mixed, superactive, frigid Typic Argiustolls) near center of DUG-F-01/RC-12 location.

Representative Description of Pino Soils

The following soil profile description is representative of Pino soils at the DUG-F-01/RC-12 location.

Site ID: DUG-F-01/RC-12
Description Date: 8/5/2009

Describer: Robert Long
Site Notes: Pedon Notes:

1. The values for electrical conductivity, pH, and particle size analysis are the result of laboratory analysis.
2. This soil is similar to Trag soils, but it is moderately deep and fine textured (58% clay in the control section). This soil profile correlates to the Pino series.

Soil Name As Described/Sampled: moderately deep Trag
Soil Name As Correlated: Pino
Classification: Fine, smectitic, superactive, frigid Typic Argiustolls
Pedon Type: Within range of series
Pedon Purpose: Full pedon description
Taxon Kind: Series
SSURGO MU:

MLRA: 48B – Dissected plateaus
County: UT007 - Carbon
State: UT - Utah
7.5' Quad: 39110-F5 - Pine Canyon, Utah
UTM: 541014E, 4394520N -- Datum NAD83, Zone 12
Location Description: This soil profile description is on an open ridge of big sage, mountain snowberry, and common juniper with encroaching Utah juniper, and Douglas fir. The site is protected from southwest and west winds by Douglas fir and aspen on the west facing slope.
Legal Description: Section 13, Township 13 South, Range 12 East of the Salt Lake Meridian

Landscape: mountains
Landform: ridge
Geomorphic Component: Mountaintop
Profile Pos: Summit

Slope: 11 percent
Elevation: 2507 meters (8225.1 feet)
Aspect: 60°
Shape: up/down: Linear; **across:** Convex
Complexity: Simple

Flooding: None
Ponding: None
Drainage: Well drained
Runoff: Medium
Permeability: Slow
Erosion: Class 1 - Sheet erosion

Primary Earth Cover: Shrub cover; **Secondary Earth Cover:** Other grass/herbaceous cover
Existing Vegetation: ARTRW8 - Wyoming big sagebrush (*Artemisia tridentata ssp. wyomingensis*); LESAS - Salina wildrye (*Leymus salinus ssp. salinus*); POA - bluegrass (*Poa*); JUCO6 - common juniper (*Juniperus communis*); PSME - Douglas-fir (*Pseudotsuga menziesii*); AMUT - Utah serviceberry (*Amelanchier utahensis*); JUOS - Utah juniper (*Juniperus osteosperma*)

Parent Materials: residuum
Bedrock:
Particle Size Control Section: 4 to 22 cm (1.6 to 8.7 inches)
Diagnostic Features: Mollic epipedon: 0 to 10 cm (0 to 3.9 inches), Argillic horizon: 4 to 22 cm (1.6 to 8.7 inches), Calcic horizon: 22 to 26 cm (8.7 to 10.2 inches) and Lithic contact: 26 cm (10.2 inches) (Restrictive layer)
Restrictions: Lithic bedrock: 26 cm (10.2 inches)

Slope	Elevation	Aspect	MAAT	MSAT	MWAT	MAP	Frost-Free Days	Drainage Class	Slope Length	Upslope Length
11 percent	2507 meters (8225.1 feet)	60°	7° C (45° F)			485 millimeters (19.1 inches)	80 days	well		

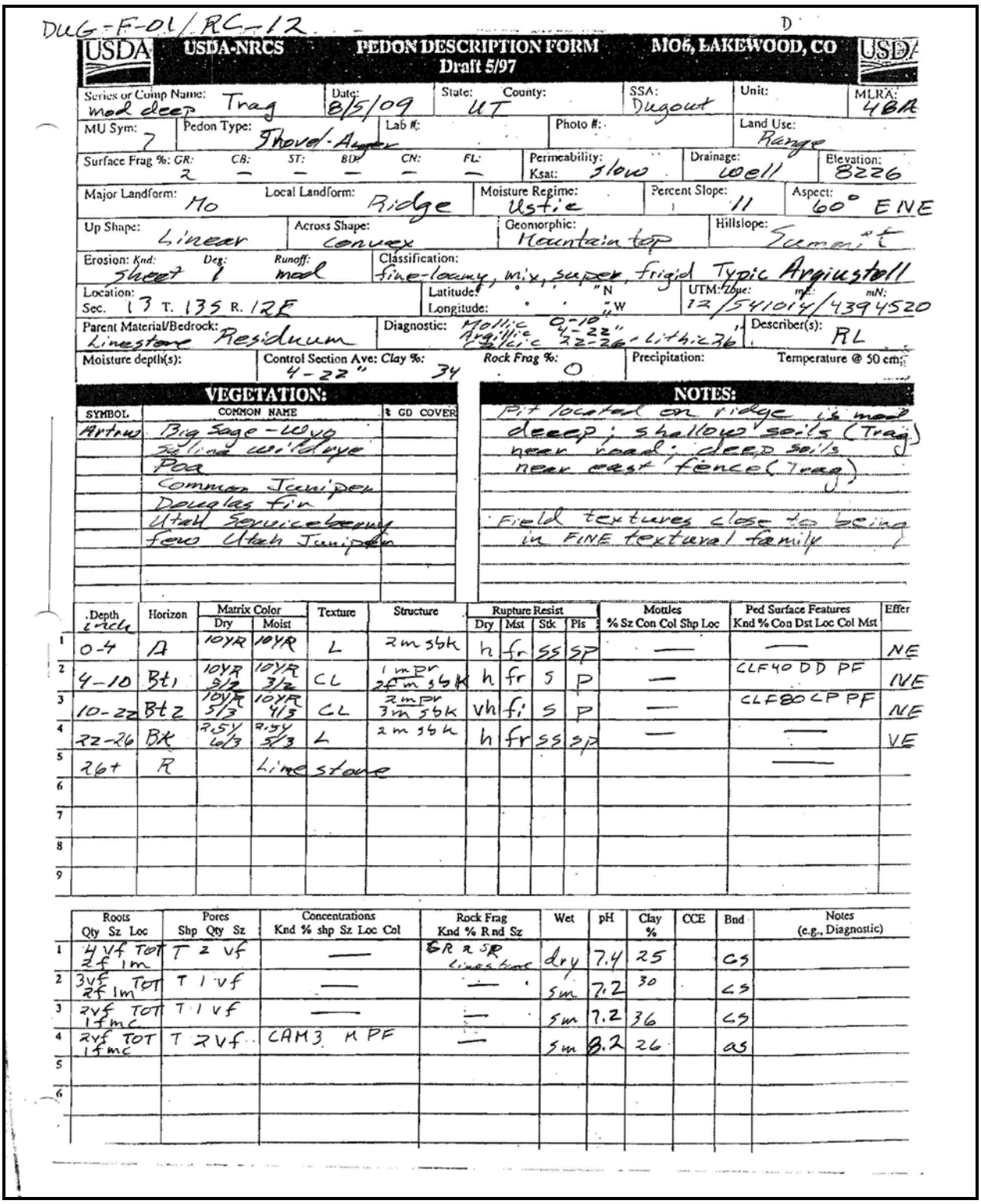
A --- 0 to 10 cm (0 to 4 inches); grayish brown (10YR 5/2) dry, silty clay; very dark grayish brown (10YR 3/2) moist; 19 percent sand; 40 percent silt; 41 percent clay; moderate medium subangular blocky structure; friable, hard, slightly sticky, slightly plastic; common very fine roots throughout, common fine roots throughout and common medium roots throughout; common very fine tubular pores; 2 percent nonflat subrounded 2 to 76 millimeters (0.1 to 3 inches) limestone fragments; electrical conductivity of 0.38 mmhos/cm by EC meter, saturated paste; noneffervescent by HCl, 1 normal; slightly acid, pH 6.3; clear smooth boundary.

Bt1 --- 10 to 25 cm (4 to 10 inches); grayish brown (10YR 5/2) dry, clay; very dark grayish brown (10YR 3/2) moist; 17 percent sand; 33 percent silt; 50 percent clay; weak medium prismatic parting to moderate medium subangular blocky structure; friable, hard, moderately sticky, moderately plastic; common very fine roots throughout, common fine roots throughout and common medium roots throughout; common very fine tubular pores; 40 percent (common) discontinuous distinct clay films on all faces of peds; electrical conductivity of 0.41 mmhos/cm by EC meter, saturated paste; noneffervescent by HCl, 1 normal; slightly acid, pH 6.2; clear smooth boundary.

Bt2 --- 25 to 56 cm (10 to 22 inches); brown (10YR 5/3) dry, clay; brown (10YR 4/3) moist; 11 percent sand; 27 percent silt; 62 percent clay; moderate medium prismatic parting to strong medium subangular blocky structure; firm, very hard, moderately sticky, moderately plastic; common very fine roots throughout, common fine roots throughout, common medium roots throughout and common coarse roots throughout; common very fine tubular pores; 80 percent (many) continuous prominent clay films on all faces of peds; electrical conductivity of 0.48 mmhos/cm by EC meter, saturated paste; noneffervescent by HCl, 1 normal; neutral, pH 6.8; clear smooth boundary.

Bk --- 56 to 66 cm (22 to 26 inches); light yellowish brown (2.5Y 6/3) dry, clay; light olive brown (2.5Y 5/3) moist; 11 percent sand; 35 percent silt; 54 percent clay; moderate medium subangular blocky structure; friable, hard, moderately sticky, moderately plastic; common very fine roots throughout, common fine roots throughout, common medium roots throughout and common coarse roots; common very fine tubular pores; 3 percent (common) masses of carbonate infused into matrix along faces of peds; electrical conductivity of 0.52 mmhos/cm by EC meter, saturated paste; violently effervescent by HCl, 1 normal; neutral, pH 7.2; abrupt smooth boundary.

R --- 66 cm (26 inches); by HCl, 1 normal; Limestone.



DUG-F-01/RC-12

D

USDA-NRCS PEDON DESCRIPTION FORM Draft 5/97 — MO6, LAKEWOOD, CO

Series or Comp Name: mod deep Trag	Date: 8/5/09	State: UT	County:	SSA: Dugout	Unit:	MLRA: 48A
MU Sym: 7	Pedon Type: Shovel-Auger	Lab #:	Photo #:	Land Use: Range		
Surface Frag %: GR: 2 CB: — ST: — BD: — CN: — FL: —	Permeability: Ksat: slow	Drainage: well	Elevation: 8226			
Major Landform: Mo	Local Landform: Ridge	Moisture Regime: Ustic	Percent Slope: 11	Aspect: 60° ENE		
Up Shape: Linear	Across Shape: convex	Geomorphic: Mountain top	Hillslope: Summit			
Erosion: Knd: sheet Deg: 1	Runoff: mod	Classification: fine-loamy, mix, superactive, frigid Typic Argiustoll				
Location: Sec. 13 T. 13S R. 12E	Latitude: ° ' " N Longitude: ° ' " W	UTM: Zone: 12 mE: 541014 mN: 4394520				
Parent Material/Bedrock: Limestone Residuum	Diagnostic: Mollic 0-10" Argillic 4-22" Calcic 22-26" Lithic 26"	Describer(s): RL				
Moisture depth(s):	Control Section Ave: Clay %: 4-22" 34	Rock Frag %: 0	Precipitation:	Temperature @ 50 cm:		

VEGETATION:

SYMBOL	COMMON NAME	% GD COVER
Artrw	Big Sage - Wyo	
	Rabbit Brush	
	Poa	
	Common Juniper	
	Douglas Fir	
	Utah Serviceberry	
	few Utah Juniper	

NOTES:

Pit located on ridge is mod deep; shallow soils (Trag) near road; deep soils near east fence (Trag)

Field textures close to being in FINE textural family

	Depth (inch)	Horizon	Matrix Color Dry	Matrix Color Moist	Texture	Structure	Rupture Resist Dry	Rupture Resist Mst	Rupture Resist Stk	Rupture Resist Pls	Mottles % Sz Con Col Shp Loc	Ped Surface Features Knd % Con Dst Loc Col Mst	Effer
1	0-4	A	10YR 3/2	10YR 2/2	L	2m sbk	h	fr	SS	SP	—	—	NE
2	4-10	Bt1	10YR 3/2	10YR 3/2	CL	1mpr 2f m sbk	h	fr	S	P	—	CLF40 DD PF	VE
3	10-22	Bt2	10YR 5/3	10YR 4/3	CL	2mpr 3m sbk	vh	fi	S	P	—	CLF80 CP PF	NE
4	22-26	Bk	2.5Y 6/3	2.5Y 5/3	L	2m sbk	h	fr	SS	SP	—	—	VE
5	26+	R		Lime	stone							—	
6													
7													
8													
9													

	Roots Qty Sz Loc	Pores Shp Qty Sz	Concentrations Knd % shp Sz Loc Col	Rock Frag Knd % Rnd Sz	Wet	pH	Clay %	CCE	Bnd	Notes (e.g., Diagnostic)
1	4vf TOT 2f 1m	T 2 vf	—	GR 2 SR limestone	dry	7.4	25		CS	
2	3vf 2f 1m TOT	T 1 vf	—	—	sm	7.2	30		CS	
3	2vf TOT 1fmc	T 1 vf	—	—	sm	7.2	36		CS	
4	2vf TOT 1fmc	T 2vf	CAM3 M PF	—	sm	8.2	26		as	
5										
6										

DUG-F-02

Exploration Site

Location:

Easting	541356
Northing	4394914
Zone	12 S
NAD	1983
Township	13 South
Range	12 East
Section	13
Meridian	Salt Lake
USGS Quad:	Pine Canyon, Utah

Elevation: 8,190 feet

General Site Description

This site is located on a east northeast (70°) facing concave saddle on the ridge between the left and right forks of Dugout Creek. The slope on the site is approximately 8 percent to the east northeast. A low ridge forms the southwest side of the site with northeast facing slopes of 20 to 25 percent.

The size of the investigation area is 0.74 acres. The main access road traverses the north side of the site.

The area appears to be shielded from most prevailing winds (southwest). Snowbanks may accumulate on this site.

NRCS Soil map Unit

NRCS map unit 7: Beje-Trag complex

Beje and Trag soils have mollic epipedons over argillic horizons. Beje soils have a bedrock (lithic) contact within 20 inches of the surface. Trag soils are greater than 60 inches deep.

Both Beje and Trag soils were identified within the proposed location. Trag soils were observed in the concave area along the east edge of the location. Beje soils were observed adjacent to limestone outcrops along the roadway.

Topsoil Resource

Topsoil salvage will be limited by the depth to carbonates (Bk horizon) and the limestone bedrock. Limestone cobbles, stones, and flags (10 to 25 percent) may be present in the Beje soil areas, but not limiting. Salvage depths vary across the site, depending on the depth to bedrock. The topsoil salvage depth ranges from 16 to 24 inches with an average of 12 to 18 inches.

The reclamation potential for the DUG-F-02 site is good.

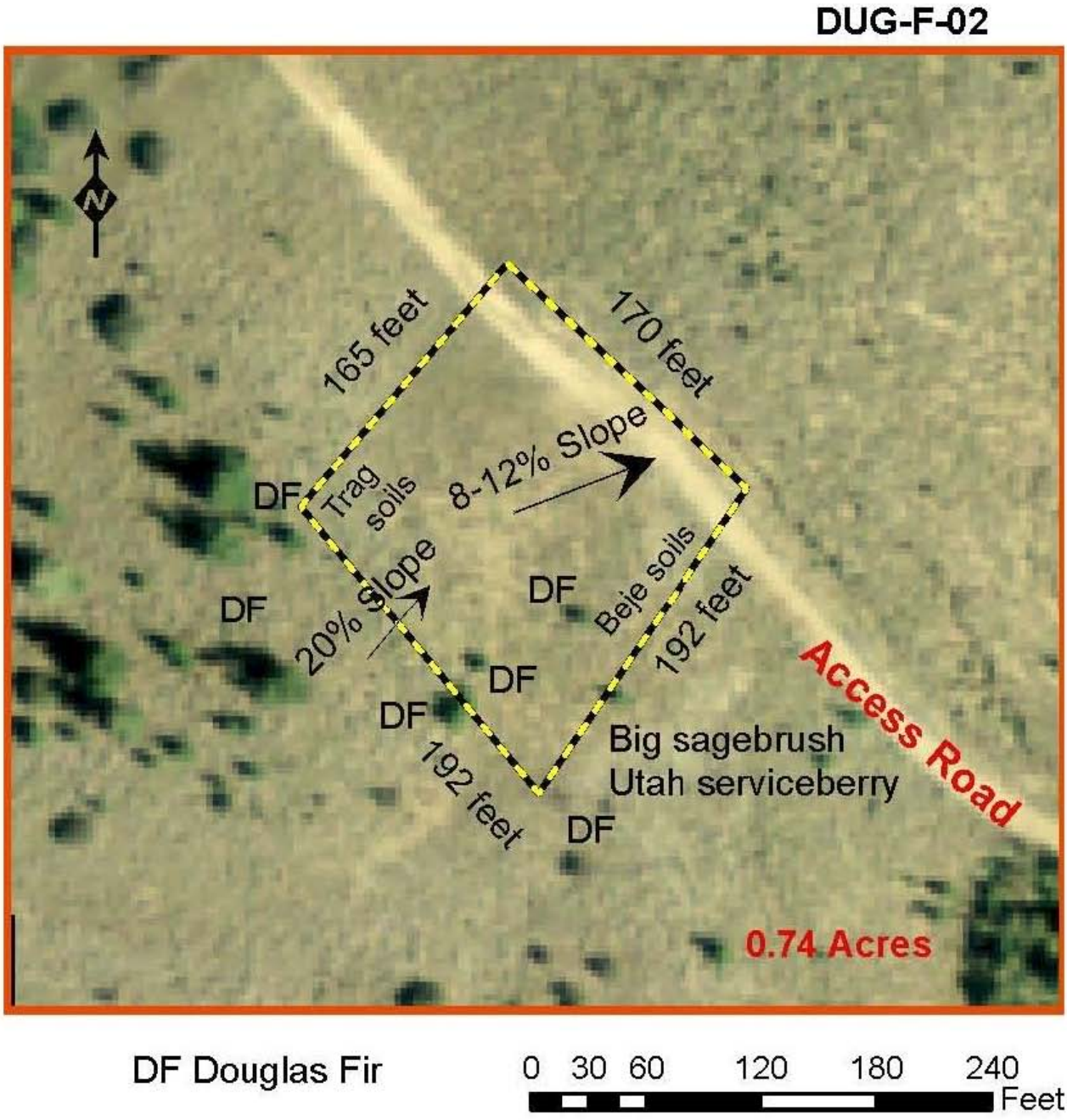
Vegetation

Big sagebrush is the dominant vegetation type at the DUG-F-02 with widely scattered young Douglas fir. Mature Douglas fir trees are located along the southwest side of the site. The vegetation report written by Mt Nebo Scientific contains a more detailed quantitative description of the site vegetation. The following plant species were observed within the proposed location.

Big sagebrush	Salina wildrye	Douglas fir – few young scattered
Utah Serviceberry	bluegrass	
	Lupine	
	yarrow	

Site Map

The base aerial photo for the DUG-F-02 site map is 2006 HRO 1 meter color orthophotography (Utah GIS Portal 2009). Scale is 1 foot equals 100 feet.



Site Photos

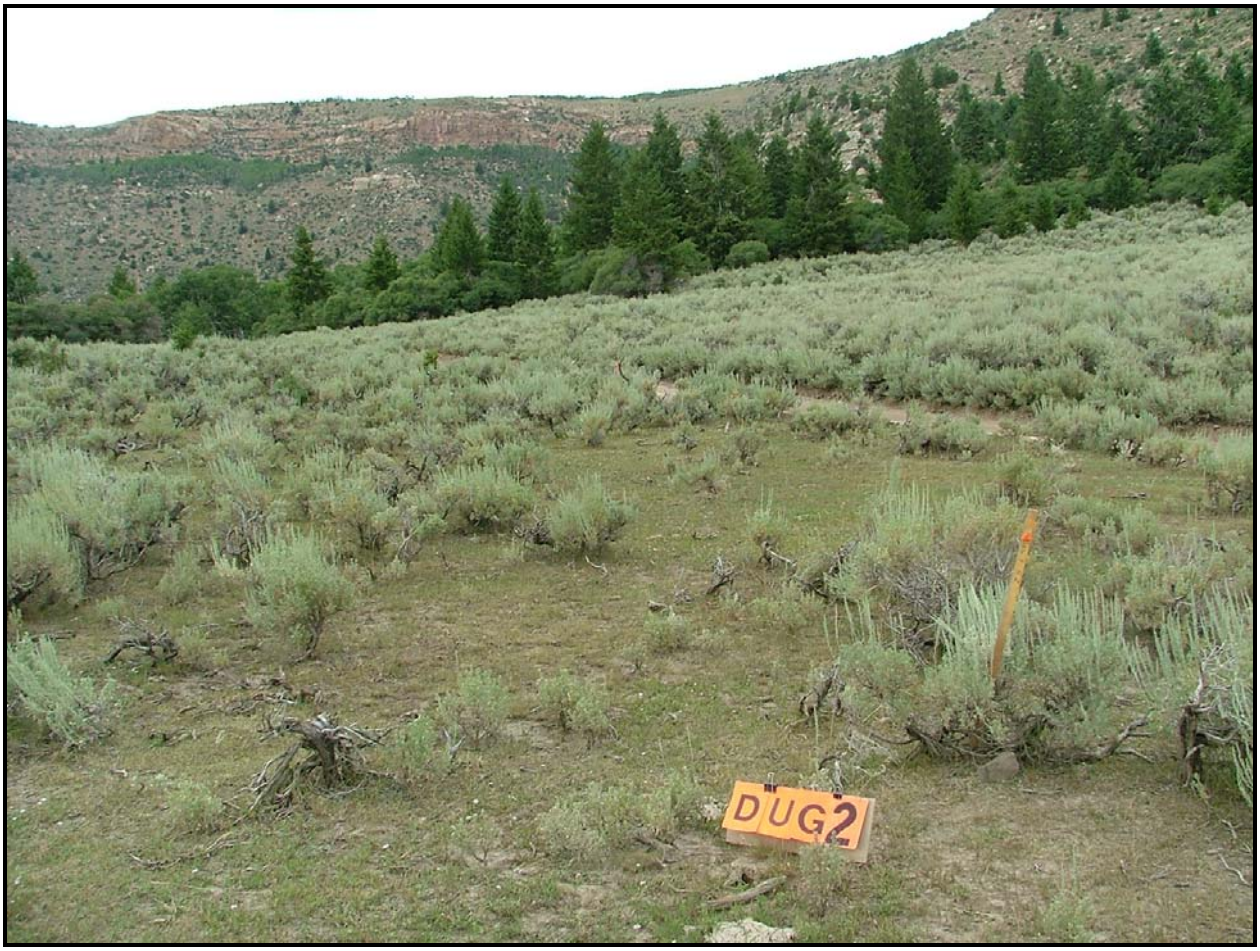


Photo 1. Looking north across DUG-F-02 site that is dominated by big sagebrush. Main access road runs along the north edge of the site (bare strip from left to right in center of photo).

Photo 2. Looking east across DUG-F-02 site. Dominant vegetation is big sagebrush with salina wildrye, bluegrass, lupine, and yarrow also present. Main access road runs along the northeast side of the site.

Photo 3. Looking uphill to the south at 8 percent. Young Douglas fir are scattered in the east and south portions of the site.

Photo 4. View to the west across center of DUG-F-02 site. Douglas fir to the south and west provide some protection from southwest winds.

DUG-F-03 / RC-13

Exploration and De-gas Site

Location:

Easting	540234
Northing	4394700
Zone	12
NAD	1983
Township	13 South
Range	12 East
Section	NW/NW 13
Meridian	Salt Lake
USGS Quad:	Pine Canyon, Utah

Elevation: 7,990 feet

General Site Description

The DUG-F-03 site is located on a portion of a mountain sideslope ridge that forms a structural bench. The site faces south (175°) with a 10 percent slope. The sides of the location have slopes of 20 to 50 percent and greater sloping to the southwest, south, and southeast. Parent material is Northorn limestone. The evaluated area was approximately 1.87 acres.

An existing access road approaches this site from the east and runs along the south and west sides of the location. This road has not been maintained and will need some grading and removal of rocks, so that equipment can access the location.

NRCS Soil map Unit

NRCS map unit 7: Beje-Trag complex

Beje and Trag soils have mollic epipedons over argillic horizons. Beje soils have a bedrock (lithic) contact within 20 inches of the surface. Trag family soils are moderately deep (20 to 40 inches) to very deep (> 60 inches).

Topsoil Resource

Beje soils are the dominate soil type at the DUG-F-03/RC-13 location. They are less than less than 20 inches deep to fractured limestone. The representative Beje soil profile (RC13/DUG-F-03) was only 6 inches deep to fractured limestone. The surface horizon appeared to have been partially eroded in the past. Topsoil salvage depth in Beje soils is limited by the depth to fractured limestone and ranges from 6 to 10 inches. Beje soils were observed in the road cut along the south side of the location and on the moderately steep to steep sideslopes.

Trag family soils were observed in swales and along the shoulder of the structural bench, but are of limited extent. Trag family soils at this location have an increase of secondary lime below the argillic horizon. Topsoil salvage for Trag family soils is similar to Beje soils at this location.

Wildmount family soils were described in the road cut along the west side of the site (DUG-F-03/RC-13 SP-2). These soils are deep to fractured shale and contain 45 percent coarse fragments in the control section (10 to 52 inches). These soils do not have an argillic horizon, but they do have a strong calcic horizon. Wildmount family soils are of limited extent and were only observed along the west road cut.

Laboratory Analysis of Beje Soils

The representative Beje soil profile (RC13/DUG-F-03) was sampled and submitted for analysis. Results of this analysis are contained in the Inter-Mountain Labs report ID S0908513001. The analysis included pH, saturation percent, ECe, field capacity, wilting point, SAR, particle size analysis, soluble potassium, nitrate nitrogen, TKN, selenium, boron, phosphorus, exchangeable sodium, total organic carbon, and neutralization potential. No limiting features were identified with the laboratory analysis.

Reclamation potential of this site is *Good to Fair*, if adequate quantities of topsoil can be salvaged. Topsoil salvage will be limited by the depth to limestone.

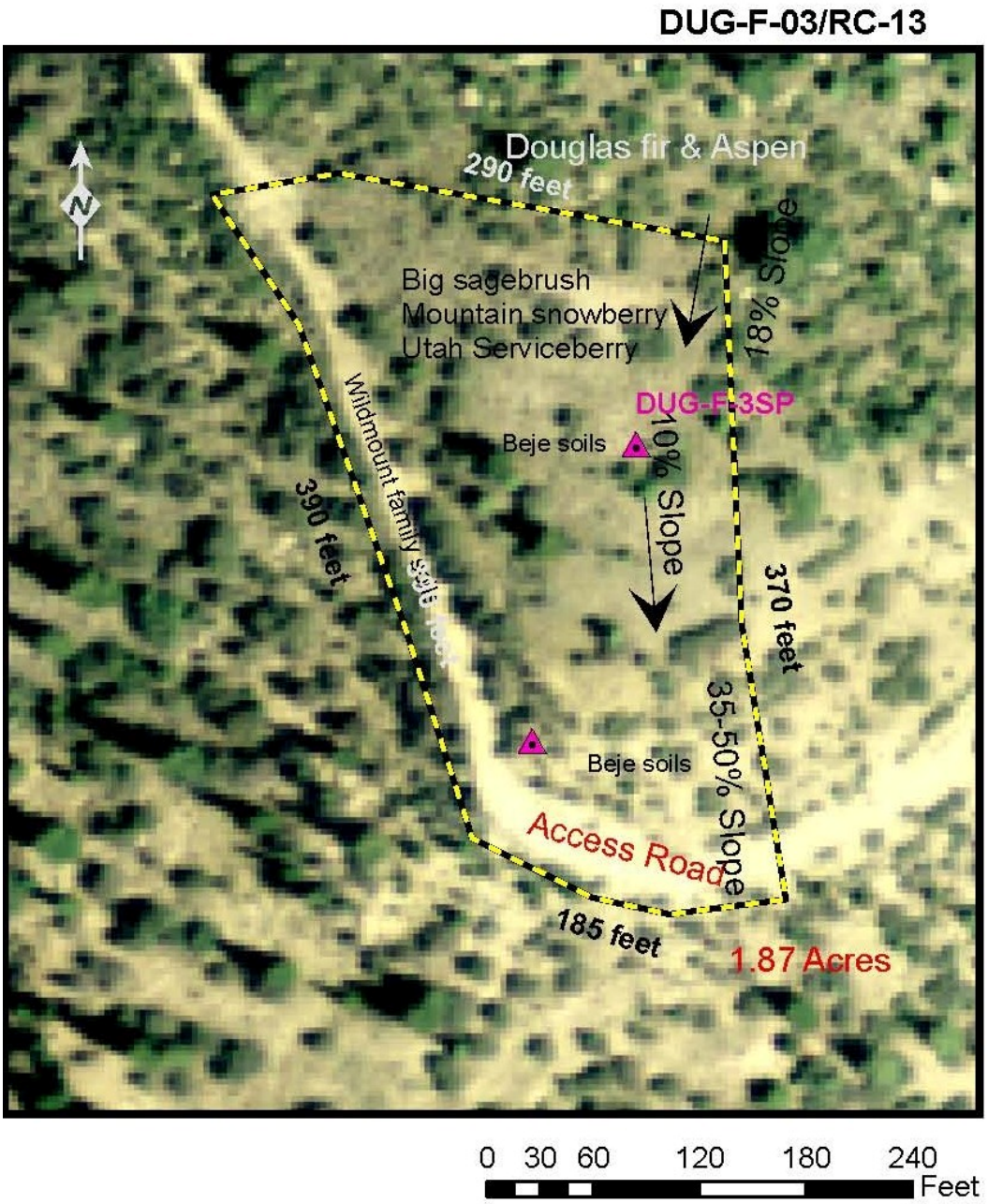
Vegetation

Big sagebrush and Utah serviceberry are the dominant vegetation type at the DUG-F-03/RC-13 location with widely scattered Douglas fir and Rocky Mountain junipers. The following plant species were observed within the proposed location. The vegetation report written by Mt Nebo Scientific contains a more detailed quantitative description of the site vegetation.

Big sagebrush	Salina wildrye	Douglas fir - few
Utah Serviceberry	bluegrass	Rocky Mountain juniper - few
Mountain snowberry	Lupine	Alderleaf Mahoganey

Site Map

The base aerial photo for the DUG-F-03/RC-12 site map is 2006 HRO 1 meter color orthophotography (Utah GIS Portal 2009). Scale is 1 foot equals 100 feet.



Vegetation at the DUG-F-03/RC-13 location is dominated by Wyoming big sage (light gray areas) and clumps of Utah serviceberry (dark green and black areas) with a few Rocky mountain

junipers and Douglas fir.

Site Photos

Photo 1. Looking north across center of DUG-F-03/RC-13. Wyoming big sage, Utah serviceberry, mountain snowberry dominates this portion of the site. Slope is approximately 18 percent in the northeast corner and 10 percent in the center of the site. The large Douglas firs in the background are outside the evaluated area.

Photo 2. Looking east across center of site that is dominated by Wyoming big sage, mountain snowberry, and Utah serviceberry. Representative Beje soil profile was described near center of site (shovel marks location on right). The Beje soil at this location consisted of 6 inches of topsoil over fractured limestone.

Photo 3. Looking south at representative soil profile (Beje) location near center of DUG-F-03/RC-13 location. Wyoming big sage, Utah serviceberry, and Rocky mountain juniper dominate vegetation in the center of the location.

Photo 4. Looking west across center of site that is dominated by big sage and Utah serviceberry.

Photo 5. Looking west up access road on west edge of site. Wildmount family soils occur along this portion of the road cut. Soil pit DUG-3 SP-2 was described in this area.

Photo 6. Profile of Wildmount family soil (DUG-3 SP-2) described in road cut on west edge of location. This soil does not have a mollic epipedon, but does have a strong calcic horizon above the shale bedrock.

Photo 7. Looking upslope to the west at the southwest corner of the location where the road makes a 90° turn. Soils are shallow to interbeded shale, sandstone, and limestone. Utah serviceberry and Alderleaf mahogany are the dominant vegetation.

Photo 8. Looking east down access road from corner. Soils are shallow to limestone, sandstone, and shale.

Photo 9. Looking down access road to northeast near mid point. Soils are shallow and moderately deep to shale and limestone. This observation point is east of the DUG-F-03/RC13 location. Utah serviceberry and Alderleaf mahogany are the dominant vegetation with scattered Douglas fir and Rocky Mountain juniper.

Photo 10. Looking northeast down the lower third of the access road. Soil depths vary from shallow to very deep in the mixed slope colluvium and residuum. Douglas fir and aspen dominate this portion of the access road. The main roadway is a few hundred feet beyond the curve.

Beje soil profile

Photo 11. Beje soils are dominate at the DUG-F-03/RC-13 location. This soil profile had fractured limestone at 6 inches below the surface. Beje soils are mollic and have an argillic horizon.

Wildmount family soil

Photo 12. Box sample of Wildmount family soil described in south road cut (DUG-3 SP-2). This soil is of minor extent on the overall location, but of importance on this part of the road cut. The soil is not mollic and has a strong calcic horizon over shale.

Representative Soil Profile Descriptions

Beje

The representative soil profile for Beje soils is RC13/DUG-F-03. This soil profile was described on August 12, 2009.

Site ID: DUG-F-03/RC-13
Description Date: 8/12/2009

Describer: Robert Long
Soil Name As Described/Sampled: Beje
Classification: Loamy, mixed, superactive, frigid Lithic Argiustolls
Pedon Type: Within range of map unit
Pedon Purpose: Full pedon description
Taxon Kind: Series
SSURGO MU: 7, Beje – Trag complex

MLRA: 48B – Dissected Plateaus
County: UT007 - Carbon
State: UT - Utah
7.5' Quad: 39110-F5 - Pine Canyon, Utah
UTM: 540234E, 4394700N -- Datum NAD83, Zone 12
Legal Description: Section 13, Township 13 South, Range 12 East of the Salt Lake Meridian

Landscape: canyon
Landform: structural bench
Geomorphic Component: Mountain flank
Profile Pos: Backslope

Slope: 10 percent
Elevation: 2435 meters (7988.8 feet)
Aspect: 175°
Shape: up/down: Linear; **across:** Convex
Complexity: Simple

Flooding: None
Ponding: None
Drainage: Well drained

Runoff: Medium

Permeability: Moderate
Erosion: Class 1 - Sheet erosion
Primary Earth Cover: Shrub cover; **Secondary Earth Cover:** Shrubby rangeland
Existing Vegetation: ARTRW8 - Wyoming big sagebrush (*Artemisia tridentata ssp. wyomingensis*); SYOR2 - mountain snowberry (*Symphoricarpos oreophilus*); AMUT - Utah serviceberry (*Amelanchier utahensis*); JUSC2 - Rocky Mountain juniper (*Juniperus scopulorum*); PSME - Douglas-fir (*Pseudotsuga menziesii*); POA - bluegrass (*Poa*); LESAS - Salina wildrye (*Leymus salinus ssp. salinus*)
Parent Materials: residuum
Bedrock: Limestone at 15 cm (5.9 inches)
Particle Size Control Section: 0 to 15 cm (0 to 6 inches)

Diagnostic Features: Mollic epipedon: 0 to 15 cm (0 to 6 inches), Argillic horizon: 5 to 15 cm (0.8 to 1.6 inches) and Lithic contact: 15 cm (6 inches) (Restrictive layer)

Restrictions: Lithic bedrock: 15 cm (6 inches)

Slope	Elevation	Aspect	MAAT	MSAT	MWAT	MAP	Frost-Free Days	Drainage Class	Slope Length	Upslope Length
10 percent	2435 meters (7988.8 feet)	175°	7° C (45° F)			485 millimeters (19.1 inches)	80 days	well		

A --- 0 to 5 cm (0 to 2 inches); grayish brown (10YR 5/2) dry, gravelly loam; very dark grayish brown (10YR 3/2) moist; null percent sand; null percent silt; 22 percent clay; moderate fine subangular blocky structure; friable, hard, slightly sticky, slightly plastic; many very fine roots throughout, common fine roots throughout and common medium roots throughout; common very fine tubular pores; 2 percent (common) fine masses of carbonate throughout; 5 percent nonflat subangular very strongly cemented 76 to 250 millimeters (3 to 10 inches) limestone fragments and 25 percent nonflat subangular very strongly cemented 2 to 76 millimeters (0.1 to 3 inches) limestone fragments; slightly effervescent by HCl, 1 normal; neutral, pH 7.2; clear smooth boundary.

Bt --- 5 to 15 cm (2 to 6 inches); brown (10YR 5/3) dry, gravelly loam; very dark grayish brown (10YR 3/2) moist; null percent sand; null percent silt; 25 percent clay; moderate medium single grain; friable, hard, slightly sticky, slightly plastic; common very fine roots throughout, common fine roots throughout and common medium roots throughout; common very fine tubular pores; 10 percent (few) clay films on all faces of peds and 30 percent (common) clay films between sand grains; 2 percent (common) fine masses of carbonate throughout; 5 percent nonflat subangular very strongly cemented 76 to 250 millimeters (3 to 10 inches) limestone fragments and 25 percent nonflat subangular very strongly cemented 2 to 76 millimeters (0.1 to 3 inches) limestone fragments; slightly effervescent by HCl, 1 normal; neutral, pH 7.2; abrupt smooth boundary.

R --- 15 cm (6 inches); by HCl, 1 normal; Fractured Limestone.

Wildmount family

A description of the Wildmount family soil was also described on the south road cut. However, this soil is of minor extent and only observed in the road cut.

Site ID: DUG-F-03/RC-13 -- Soil Pit 2
Description Date: 11/6/2009

Describer: Robert Long
Pedon Notes:

1. This soil profile is similar to Trag soils, but it does not have a mollic epipedon and does not have an argillic horizon. There a few faint clay films in the cambic horizon, but not enough clay increase for an argillic. The moist color value in both the A and Bw is too high for a mollic epipedon.
2. Sand, silt, and clay percents are field estimates.
3. Soil pH measured in the field with reagents.

Soil Name As Described/Sampled: Wildmount family
Classification: Loamy-skeletal, mixed, superactive, frigid Aridic Calciustepts
Pedon Type: Outside range of series
Pedon Purpose: Full pedon description
Taxon Kind: Family
SSURGO MU: 7, Beje – Trag complex

MLRA: 48B – Dissected plateaus
County or Parish: UT007 - Carbon
State or Territory: UT - Utah
7.5' Quad: 39110-F5 - Pine Canyon, Utah
UTM: 540216E, 4394649N -- Datum NAD83, Zone 12
Legal Description: Section 13, Township 13 South, Range 12 East of the Salt Lake Meridian

Landscape: Mountain sideslope, middle third
Landform: canyon and ridge
Geomorphic Component: Side Slope
Profile Pos: Shoulder

Slope: 49 percent
Elevation: 2429 meters (7969.2 feet)
Aspect: 245°
Shape: up/down: Convex; **across:** Convex

Complexity: Simple

Flooding: None
Ponding: None
Drainage: Well drained
Runoff: Medium
Permeability: Moderate
Erosion: Class 2 - Rill erosion

Primary Earth Cover: Shrubby cover; **Secondary Earth Cover:** Shrubby rangeland
Existing Vegetation: CEMOG - birchleaf mountain mahogany (*Cercocarpus montanus var. glaber*); AMUT - Utah serviceberry (*Amelanchier utahensis*); JUSC2 - Rocky Mountain juniper (*Juniperus scopulorum*); THIN6 - intermediate wheatgrass (*Thinopyrum intermedium*); LESAS - Salina wildrye (*Leymus salinus ssp. salinus*)

Parent Materials: sandstone and shale
Bedrock: Limestone, sandstone, and shale, 10 to < 45 cm between fractures at 52 cm (20.5 inches)
Particle Size Control Section: 10 to 52 cm (3.9 to 12.6 inches)
Diagnostic Features: Cambic horizon: 6 to 12 cm (2.4 to 4.7 inches), Calcic horizon: 12 to 52 cm (4.7 to 20.5 inches) and Lithic contact: 52 cm (20.5 inches) (Restrictive layer)
Restrictions: Lithic bedrock: 52 cm (20.5 inches)

Slope	Elevation	Aspect	MAAT	MSAT	MWAT	MAP	Frost-Free Days	Drainage Class	Slope Length	Upslope Length
49 percent	2429 meters (7969.2 feet)	245°	7° C (45° F)			485 millimeters (19.1 inches)	80 days	well		

A --- 0 to 15 cm (0 to 6 inches); grayish brown (10YR 5/2) dry, gravelly loam; brown (10YR 4/3) moist; 43 percent sand; 35 percent silt; 22 percent clay; moderate fine granular parting to moderate medium subangular blocky structure; very friable, slightly hard, slightly sticky, slightly plastic; many very fine roots throughout, common fine roots throughout, common medium roots throughout and common coarse roots throughout; common very fine tubular pores; 5 percent flat angular 150 to 380 millimeters (6 to 15 inches) calcareous sandstone fragments and 20 percent nonflat subrounded 2 to 76 millimeters (0.1 to 3 inches) calcareous sandstone fragments; strongly effervescent by HCl, 1 normal; slightly alkaline, pH 7.7; clear wavy boundary.

Bw --- 15 to 30 cm (6 to 12 inches); light olive brown (2.5Y 5/3) dry, very flaggy loam; olive brown (2.5Y 4/3) moist; 40 percent sand; 36 percent silt; 24 percent clay; structure; very friable, slightly hard,

slightly sticky, slightly plastic; many very fine roots throughout, common fine roots throughout, common medium roots throughout and common coarse roots throughout; common very fine tubular pores; 2 percent (common) carbonate concretions on bottom of rock fragments; 20 percent flat angular 150 to 380 millimeters (6 to 15 inches) calcareous sandstone fragments and 20 percent nonflat subrounded 2 to 76 millimeters (0.1 to 3 inches) calcareous sandstone fragments; strongly effervescent by HCl, 1 normal; moderately alkaline, pH 7.9; clear wavy boundary.

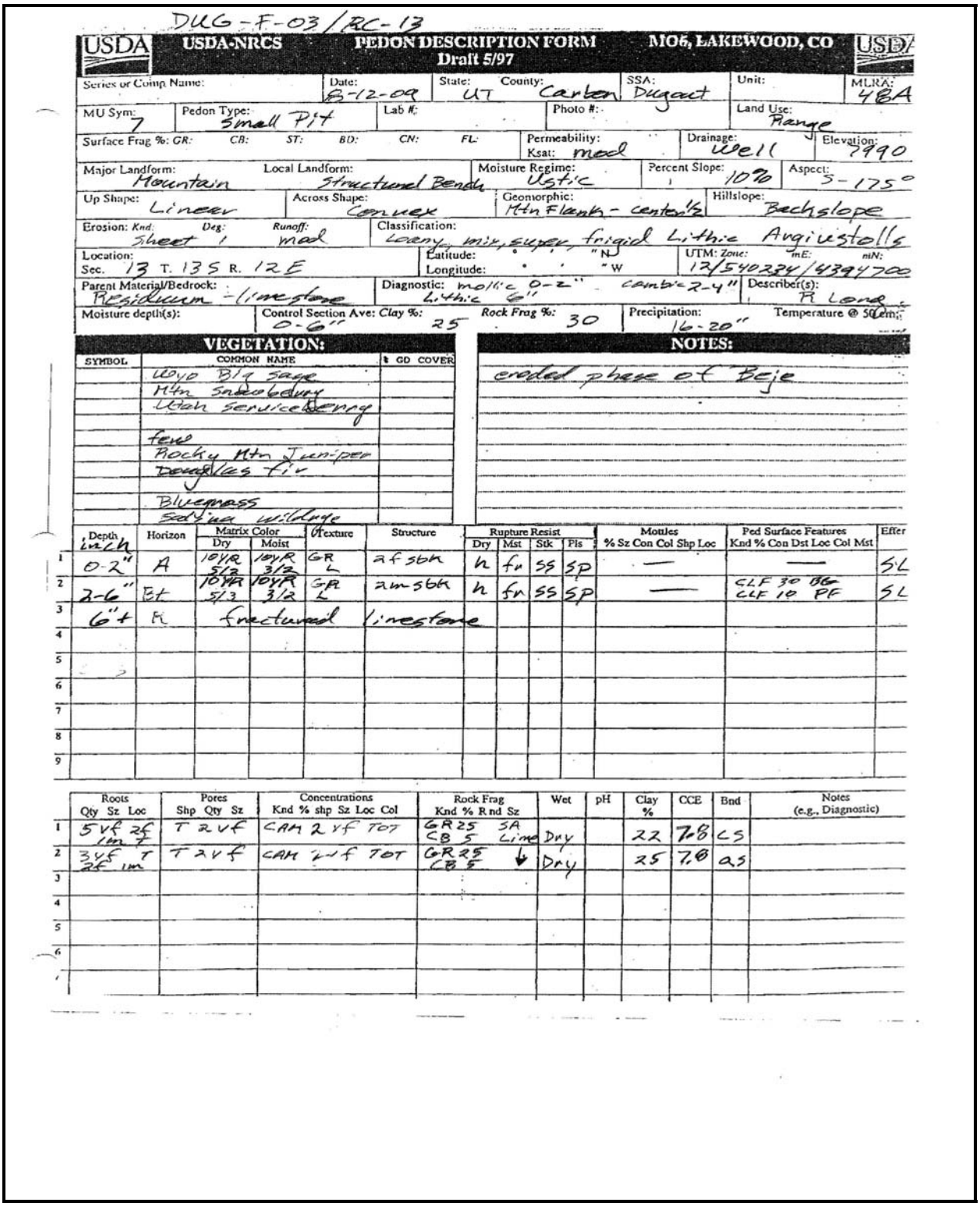
Bk --- 30 to 81 cm (12 to 32 inches); pale yellow (2.5Y 7/4) dry, very gravelly loam; light yellowish brown (2.5Y 6/4) moist; 35 percent sand; 43 percent silt; 22 percent clay; weak fine subangular blocky structure; friable, hard, slightly sticky, slightly plastic; common very fine roots throughout and common fine roots throughout; common very fine tubular pores; 5 percent (common) carbonate concretions on bottom of rock fragments; 50 percent nonflat angular 2 to 76 millimeters (0.1 to 3 inches) calcareous sandstone fragments; violently effervescent by HCl, 1 normal; moderately alkaline, pH 8.2; gradual smooth boundary.

C --- 81 to 135 cm (32to 52 inches); pale yellow (2.5Y 7/3) dry, extremely gravelly loam; light yellowish brown (2.5Y 6/3) moist; 35 percent sand; 43 percent silt; 22 percent clay; medium structure; friable, hard, slightly sticky, slightly plastic; common very fine roots throughout; 5 percent (common) carbonate concretions on bottom of rock fragments; 90 percent nonflat angular 2 to 76 millimeters (0.1 to 3 inches) calcareous sandstone fragments; violently effervescent by HCl, 1 normal; moderately alkaline, pH 8.3; Soft shale; gradual smooth boundary.

Cr—135 cm (52 inches); soft shale.

Field Description Sheets

Beje soil



DUG-F-03/RC-13

USDA-NRCS PEDON DESCRIPTION FORM Draft 5/97 — MO5, LAKEWOOD, CO

Series or Comp Name: | Date: 8-12-09 | State: UT | County: Carbon | SSA: Dugout | Unit: | MLRA: 48A

MU Sym: 7 | Pedon Type: Small Pit | Lab #: | Photo #: | Land Use: Range

Surface Frag %: GR: CB: ST: BD: CN: FL: | Permeability: Ksat: mod | Drainage: well | Elevation: 7990

Major Landform: Mountain | Local Landform: Structural Bench | Moisture Regime: Ustic | Percent Slope: 10% | Aspect: S-175°

Up Shape: Linear | Across Shape: Convex | Geomorphic: Mtn Flank - center 1/3 | Hillslope: Backslope

Erosion: Knd: Sheet Deg: 1 | Runoff: mod | Classification: Loamy, mix, super, frigid Lithic Argiustolls

Location: Sec. 13 T. 13S R. 12E | Latitude: ° ' "N | Longitude: ° ' "W | UTM: Zone: 12 mE: 540284 mN: 4394700

Parent Material/Bedrock: Residuum - limestone | Diagnostic: mollic 0-2" cambic 2-4" lithic 6" | Describer(s): R Long

Moisture depth(s): | Control Section Ave: Clay %: 0-6" 25 Rock Frag %: 30 | Precipitation: 16-20" | Temperature @ 50cm:

VEGETATION:

SYMBOL	COMMON NAME	% GD COVER
	Wyo Big sage	
	Mtn Snowberry	
	Utah serviceberry	
	fern	
	Rocky Mtn Juniper	
	Douglas fir	
	Bluegrass	
	Sedjua willowye	

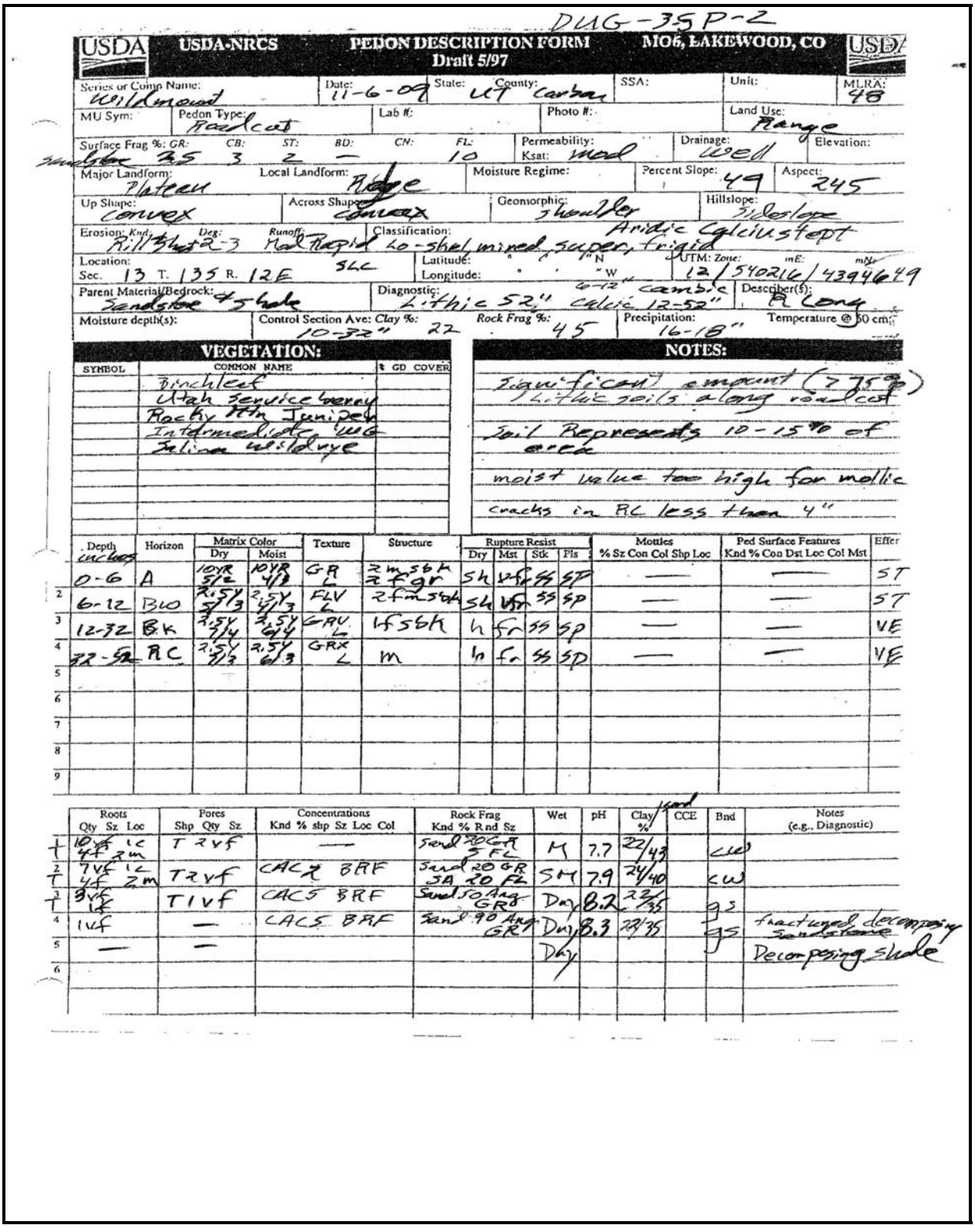
NOTES:

eroded phase of Beje

	Depth inch	Horizon	Matrix Color Dry	Matrix Color Moist	Texture	Structure	Rupture Resist Dry	Rupture Resist Mst	Rupture Resist Stk	Rupture Resist Pls	Mottles % Sz Con Col Shp Loc	Ped Surface Features Knd % Con Dst Loc Col Mst	Effer
1	0-2"	A	10YR 5/2	10YR 3/2	GR L	2f sbk	h	fr	SS	SP	—	—	SL
2	2-6"	Bt	10YR 5/3	10YR 3/2	GR L	2m sbk	h	fr	SS	SP	—	CLF 30 DG CLF 10 PF	SL
3	6"+	R	fractured limestone										
4													
5													
6													
7													
8													
9													

	Roots Qty Sz Loc	Pores Shp Qty Sz	Concentrations Knd % shp Sz Loc Col	Rock Frag Knd % Rnd Sz	Wet	pH	Clay %	CCE	Bnd	Notes (e.g., Diagnostic)
1	5VR 2f 1m f	T 2vf	CAM 2 vf TOT	GR 25 SA CB 5 Lime	Dry		22	7.8	CS	
2	3VF T 2f 1m	T 2vf	CAM 2vf TOT	GR 25 CB 5	Dry		25	7.8	as	
3										
4										
5										
6										
7										

Widmount family – Soil Pit 2



DUG-35P-2

USDA-NRCS PEDON DESCRIPTION FORM MO6, LAKEWOOD, CO
Draft 5/97

Series or Comp Name: Widmount | Date: 11-6-09 | State: UT | County: Carbon | SSA: | Unit: | MLRA: 48
MU Sym: | Pedon Type: Roadcut | Lab #: | Photo #: | Land Use: Range
Surface Frag %: GR: 25 CB: 3 ST: 2 BD: — CN: FL: 10 | Permeability: Ksat: Mod | Drainage: Well | Elevation:
Major Landform: Plateau | Local Landform: Ridge | Moisture Regime: | Percent Slope: 49 | Aspect: 245
Up Shape: convex | Across Shape: convex | Geomorphic: Shoulder | Hillslope: Sideslope
Erosion: Knd: Rill Deg: 2-3 | Runoff: Mod Rapid | Classification: Lo-shal, mixed, superactive, frigid Aridic Calciustept
Location: Sec. 13 T. 13S R. 12E SLC | Latitude: °N | Longitude: °W | UTM: Zone: 12 mE: 540216 mN: 4394649
Parent Material/Bedrock: Sandstone & Shale | Diagnostic: Lithic 52" Calcic 12-52" 6-12" cambic | Describer(s): R Long
Moisture depth(s): | Control Section Ave: Clay %: 10-32" 22 | Rock Frag %: 45 | Precipitation: 16-18" | Temperature @ 50 cm:

VEGETATION:

SYMBOL	COMMON NAME	% GD COVER
	Birchleaf	
	Utah Serviceberry	
	Rocky Mtn Juniper	
	Intermediate WG	
	Indian ricegrass	

NOTES:

Significant amount (7.5%) Lithic soils along roadcut
Soil Represents 10-15% of area
moist value too high for mollic
cracks in BC less than 4"

	Depth (inches)	Horizon	Matrix Color Dry	Matrix Color Moist	Texture	Structure	Rupture Resist Dry	Rupture Resist Mst	Rupture Resist Stk	Rupture Resist Pls	Mottles % Sz Con Col Shp Loc	Ped Surface Features Knd % Con Dst Loc Col Mst	Effer
1	0-6	A	10YR 5/2	10YR 4/2	GR L	2m sbk 2 fgr	sh	vfr	ss	sp	—	—	ST
2	6-12	BW	2.5Y 5/3	2.5Y 4/3	FLV L	2fm sbk	sh	vfr	ss	sp	—	—	ST
3	12-32	BK	2.5Y 7/4	2.5Y 6/4	GRV L	1fsbk	h	fr	ss	sp	—	—	VE
4	32-52	RC	2.5Y 7/3	2.5Y 6/3	GRX L	m	h	fr	ss	sp	—	—	VE
5													
6													
7													
8													
9													

	Roots Qty Sz Loc	Pores Shp Qty Sz	Concentrations Knd % shp Sz Loc Col	Rock Frag Knd % Rnd Sz	Wet	pH	Clay % (sand)	CCE	Bnd	Notes (e.g., Diagnostic)
1	10vf 1c 4f 2m	T 2vf	—	Sand 20 GR 5 FL	M	7.7	22/43		cw	
2	7vf 1c 4f 2m	T 2vf	CAC 2 BRF	Sand 20 GR 5A 20 FL	SM	7.9	24/40		cw	
3	3vf 1f	T 1vf	CAC 5 BRF	Sand 50 Ang GR	Dry	8.2	22/35		gs	
4	1vf	—	CAC 5 BRF	Sand 90 Ang GR	Dry	8.3	22/35		gs	fractured decomposing sandstone
5	—	—			Dry					Decomposing Shale
6										

DUG-F-06 / RC-07

Exploration and De-gas Site

Location:

Easting	541494
Northing	4394115
Zone	12 N
NAD	1983
Township	13 South
Range	12 East
Section	13 SE/4 of NE/4
Meridian	Salt Lake
USGS Quad:	Pine Canyon, Utah

Elevation: 7,780 feet

General Site Description

The proposed location is on the mountain toeslope and footslope of a west-northwest (300°) facing concave slope of 15 to 35 percent slope. The lower portion of the toeslope forms a terrace above Dugout Creek which runs along the western side of the location. The dominant slope is 15 to 20 percent. The steeper slopes are along the eastern side of the slope. The evaluated area was approximately 1.87 acres

A well maintained road runs along the western edge of the terrace that forms the western side of the location. There is an existing slash pile on the west side of the road.

This site is located in the Price River geologic formation.

NRCS Soil map Unit

NRCS map unit 103: Senchert-Toze complex

Senchert and Toze soils are very deep and deep dark surface horizons (pachic). Both soils are fine-loamy. Senchert soils have an argillic horizon. Toze soils have a calcic horizon. Both soils were observed on the DUG-F-03/RC-07 location.

Toze soils dominant the lower terrace in the Wyoming big sage.

Senchert soils occur on the moderately steep to steep slopes in areas with Douglas fir and aspen.

Topsoil Resource
Soil pedon DUG-F-06 is representative of Toze soils within the proposed location boundaries. A representative profile of the Toze soil was described and sampled. The mollic epipedon is 25 inches thick. Secondary carbonates are present below 37 inches.

Topsoil salvage is deeper on the big sage covered footslope with 24 to 36 inches possible. The salvage depth decreases as the slope increases with 12 to 20 inches of topsoil possible, depending on location. Surface flags and stones are present in areas with moderately deep soils.

Laboratory Analysis of Toze Soils

The representative Toze soil profile (RC7/DUG-F-06) was sampled and submitted for analysis. Results of this analysis are contained in the Inter-Mountain Labs report ID S0908513001. The analysis included pH, saturation percent, ECe, field capacity, wilting point, SAR, particle size analysis, soluble potassium, nitrate nitrogen, TKN, selenium, boron, phosphorus, exchangeable sodium, total organic carbon, and neutralization potential. No limiting features were identified by the laboratory analysis.

Reclamation

Reclamation potential of this site is good, based on the potential quantity of available topsoil.

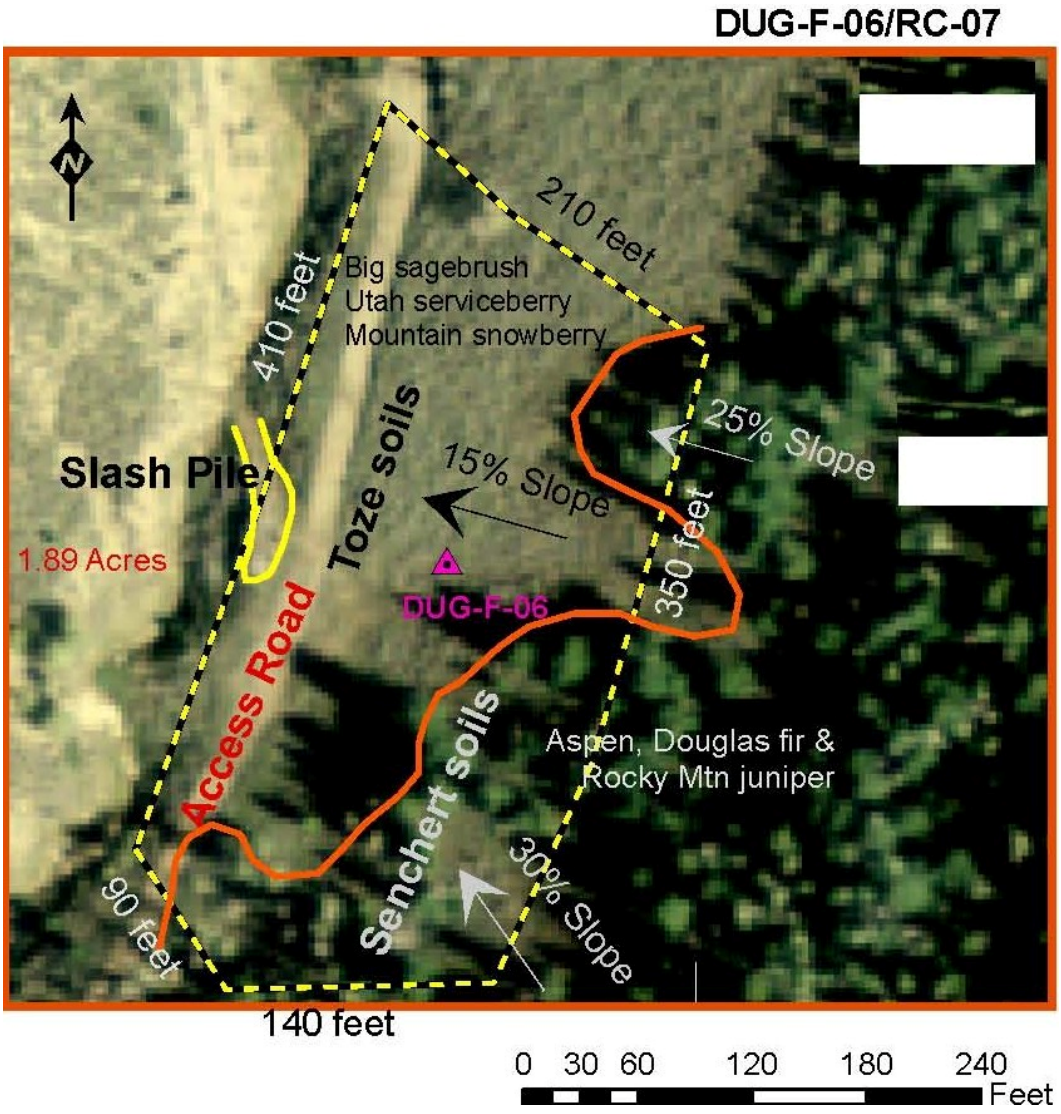
Vegetation
Big sagebrush is dominant vegetation type on the DUG-F-06/RC-07 footslopes with widely Douglas fir, aspen, and Rocky Mountain juniper on the steeper slopes. The following plant species were observed within the proposed location. Canada thistle and houndstooth were observed. The vegetation report written by Mt Nebo Scientific contains a more detailed quantitative description of the site vegetation.

Big sagebrush	Salina wildrye	Douglas fir
Mountain snowberry	Bluegrass	Rocky Mountain juniper
	Lupine	Aspen
	Canada thistle	

Houndstooth

Site Map

The base aerial photo for the DUG-F-06/RC-07 site map is 2006 HRO 1 meter color orthophotography (Utah GIS Portal 2009). Scale is 1 foot equals 100 feet.



Vegetation at the DUG-F-06/RC-07 location is dominated by big sagebrush on the footslopes (light gray). Douglas fir, Rocky mountain juniper, and aspen are the dominant vegetation on the steep upper slopes (green and black). A well maintained road is located along the west edge of the location. Orange line is approximate break between shrub and woodland areas.

Site Photos

Photo 1. Looking north across soil profile location with west-northwest facing slope of 15 to 20 percent. Big sagebrush is the dominate vegetation on the footslope.

Photo 2. Looking east toward steeper slope along east edge of location. Dominant vegetation along the east edge is Douglas fir and aspen.

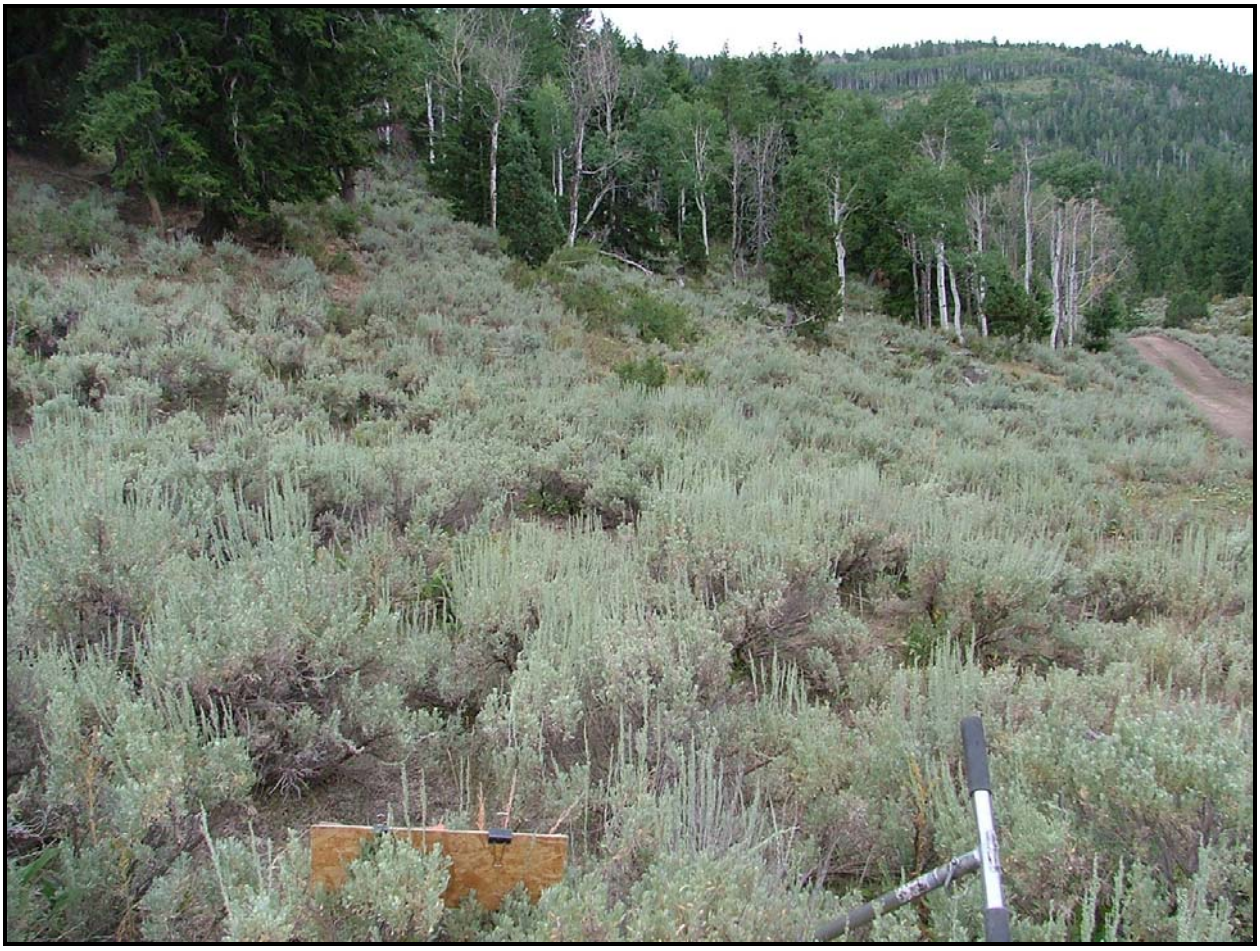


Photo 3. Looking south across big sage toeslope with Douglas fir and aspen on steeper slopes along east and south edges of location.

Photo 4. Looking west across big sage toeslope at well maintained road along west edge of location. Slash pile is located just past road. Dugout Creek is in swale (not visible) between truck and aspens on far slopes.

Photo 5. Profile box for Toze soil described as representative for DUG-F-06/RC-07 location. The mollic epipedon is 37 inches thick (top 4 trays). Secondary carbonates were present below 37 inches (bottom 2 trays).

Representative Soil Profile Descriptions

The representative soil profile for Toze soils is RC7/DUG-F-06. This soil profile was described on August 12, 2009.

Site ID: DUG-F-06/RC-07
Description Date: 8/5/2009

Describer: Robert Long

Site Notes:

1. Average annual and summer temperatures are estimates based on the official series description.
2. Annual precipitation estimate is based on Utah precipitation map.

Pedon Notes:

1. Values for particle size analysis, pH, and electrical in the upper 37 inches are from laboratory analysis.
2. The A1 and A2 horizons (0 to 12 inches) were combined for laboratory analysis.
3. Particle size analysis values below 37 inches are field estimates.
4. Soil pH for horizons below 37 inches were determined in the field with reagents.

Soil Name As Described/Sampled: Toze
Soil Name As Correlated:
Classification: Fine-loamy, mixed, superactive Pachic Haplocryolls
Pedon Type: Modal pedon for map unit
Pedon Purpose: Full pedon description
Taxon Kind: Series
SSURGO MU:

MLRA: 48B – Dissected Plateaus
County or Parish: UT007 - Carbon
State or Territory: UT - Utah
7.5' Quad: 39110-F5 - Pine Canyon, Utah
UTM: 541494E, 4394115N -- Datum NAD83, Zone 12
Location Description: This site is located on an alluvial fan in the bottom of a canyon.
Legal Description: Section 13, Township 13 South, Range 13 East of the Salt Lake Meridian
Landscape: mountains
Landform: alluvial fan
Geomorphic Component: Lower third of mountain flank
Profile Pos: Footslope

Slope: 20 percent
Elevation: 2401 meters (7877.3 feet)
Aspect: 305°
Shape: up/down: Concave; **across:** Concave
Complexity: Simple

Flooding: None
Ponding: None
Drainage: Well drained
Runoff: Medium
Permeability: Moderate
Erosion: Class 2 - Sheet erosion

Primary Earth Cover: Shrub;
Existing Vegetation: ARTRW8 - Wyoming big sagebrush (*Artemisia tridentata ssp. wyomingensis*); SYOR2 - mountain snowberry (*Symphoricarpos oreophilus*); LESA4 - saline wildrye (*Leymus salinus*); POA - bluegrass (*Poa*); CIRSI - thistle (*Cirsium*)

Parent Materials: Alluvium
Bedrock: None observed.
Particle Size Control Section: 10 to 40 cm (3.9 to 15.7 inches)
Diagnostic Features: Mollic epipedon: 0 to 37 cm (0 to 14.6 inches), Cambic horizon: 25 to 55 cm (9.8 to 21.7 inches) and Calcic horizon: 37 to 60 cm (14.6 to 23.6 inches)

Slope	Elevation	Aspect	MAAT	MSAT	MWAT	MAP	Frost-Free Days	Drainage Class	Slope Length	Upslope Length
20 percent	2401 meters (7877.3 feet)	305°	1° C (34° F)	13° C (55° F)		600 millimeters (23.6 inches)	65 days	well		

A1 --- 0 to 10 cm (0 to 4 inches); very dark grayish brown (10YR 3/2) moist, clay loam; grayish brown (10YR 5/2) dry; 31 percent sand; 38 percent silt; 31 percent clay; moderate medium subangular blocky parting to moderate very fine platy structure; friable, slightly hard, slightly sticky, slightly plastic; common very fine roots throughout, common fine roots throughout and common medium roots throughout; common very fine tubular pores; electrical conductivity of 0.54 mmhos/cm by EC meter, saturated paste; noneffervescent by HCl, 1 normal; slightly alkaline, pH 7.5; clear smooth boundary.

A2 --- 10 to 30 cm (4 to 12 inches); very dark gray (10YR 3/1) moist, clay loam; dark grayish brown (10YR 4/2) dry; 31 percent sand; 38 percent silt; 31 percent clay; moderate medium subangular blocky parting to moderate fine platy structure; friable, hard, slightly sticky, slightly plastic; many very fine roots throughout, common fine roots throughout and common medium roots throughout; common very fine tubular pores; electrical conductivity of 0.54 mmhos/cm by EC meter, saturated paste; noneffervescent by HCl, 1 normal; slightly alkaline, pH 7.5; clear smooth boundary.

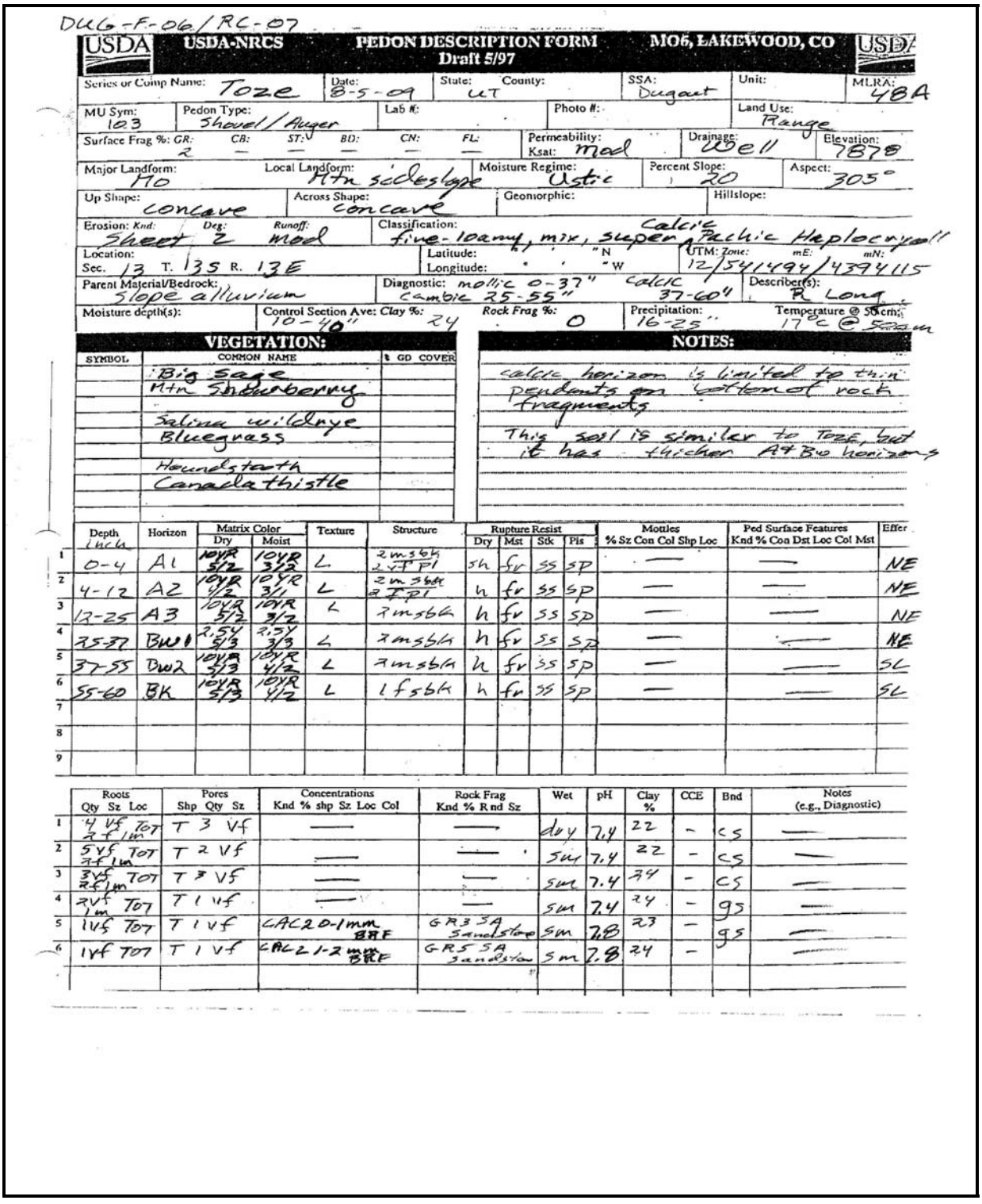
A3 --- 30 to 64 cm (12 to 25 inches); very dark grayish brown (10YR 3/2) moist, clay loam; grayish brown (10YR 5/2) dry; 25 percent sand; 42 percent silt; 33 percent clay; moderate medium subangular blocky structure; friable, hard, slightly sticky, slightly plastic; common very fine roots throughout, common fine roots throughout and common medium roots throughout; common very fine tubular pores; electrical conductivity of 0.33 mmhos/cm by EC meter, saturated paste; noneffervescent by HCl, 1 normal; slightly alkaline, pH 7.6; clear smooth boundary.

Bw1 --- 64 to 94 cm (25 to 37 inches); dark olive brown (2.5Y 3/3) moist, clay loam; light olive brown (2.5Y 5/3) dry; 27 percent sand; 40 percent silt; 33 percent clay; moderate medium subangular blocky structure; friable, hard, slightly sticky, slightly plastic; common very fine roots throughout and common medium roots throughout; common very fine tubular pores; electrical conductivity of 0.29 mmhos/cm by EC meter, saturated paste; noneffervescent by HCl, 1 normal; slightly alkaline, pH 7.7; gradual smooth boundary.

Bw2 --- 94 to 140 cm (37 to 55 inches); dark grayish brown (10YR 4/2) moist, loam; brown (10YR 5/3) dry; 27 percent sand; 50 percent silt; 23 percent clay; moderate medium subangular blocky structure; friable, hard, slightly sticky, slightly plastic; common very fine roots throughout; common very fine tubular pores; 2 percent (common) fine carbonate concretions on bottom of rock fragments; 3 percent nonflat subangular 2 to 76 millimeters (0.1 to 3 inches) calcareous sandstone fragments; slightly effervescent by HCl, 1 normal; slightly alkaline, pH 7.8; gradual smooth boundary.

Bk --- 140 to 152 cm (55 to 60 inches); dark grayish brown (10YR 4/2) moist, loam; brown (10YR 5/3) dry; 26 percent sand; 50 percent silt; 24 percent clay; weak fine subangular blocky structure; friable, hard, slightly sticky, slightly plastic; common very fine roots throughout; common very fine tubular pores; 2 percent (common) fine carbonate concretions on bottom of rock fragments; 5 percent nonflat subangular 2 to 76 millimeters (0.1 to 3 inches) calcareous sandstone fragments; slightly effervescent by HCl, 1 normal; slightly alkaline, pH 7.8.

Soil Profile Description



DUG-F-06/RC-07

USDA-NRCS PEDON DESCRIPTION FORM Draft 5/97 MO6, LAKEWOOD, CO

Series or Comp Name: Toze	Date: 8-5-09	State: UT	County:	SSA: Dugout	Unit:	MLRA: 48A
MU Sym: 103	Pedon Type: Shovel/Auger	Lab #:	Photo #:	Land Use: Range		
Surface Frag %: GR: 2 CB: — ST: — BD: — CN: — FL: —			Permeability: Ksat: mod	Drainage: Well	Elevation: 7878	
Major Landform: MO	Local Landform: Mtn sideslope	Moisture Regime: Ustic	Percent Slope: 20	Aspect: 305°		
Up Shape: concave	Across Shape: concave	Geomorphic:	Hillslope:			
Erosion: Knd: Sheet	Deg: 2	Runoff: mod	Classification: fine-loamy, mix, super A Calcic Pachic Haplocryoll			
Location: Sec. 13 T. 13S R. 13E	Latitude: ° ' " N	Longitude: ° ' " W	UTM: Zone: 12 mE: 541494 mN: 4394115			
Parent Material/Bedrock: slope alluvium	Diagnostic: mollic 0-37" cambic 25-55"	calcic 37-60"	Describer(s): R Long			
Moisture depth(s):	Control Section Ave: Clay %: 10-40" 24	Rock Frag %: 0	Precipitation: 16-25"	Temperature @ 50cm: 17°C @ 50cm		

VEGETATION:

SYMBOL	COMMON NAME	% GD COVER
	Big sage	
	Mtn Shadberry	
	Salina wildrye	
	Bluegrass	
	Houndstarth	
	Canada thistle	

NOTES:

calcic horizon is limited to thin pendants on bottom of rock fragments

This soil is similar to Toze, but it has thicker A+Bw horizons

	Depth Incls	Horizon	Matrix Color Dry	Matrix Color Moist	Texture	Structure	Rupture Resist Dry	Rupture Resist Mst	Rupture Resist Stk	Rupture Resist Pls	Mottles % Sz Con Col Shp Loc	Ped Surface Features Knd % Con Dst Loc Col Mst	Effer
1	0-4	A1	10YR 5/2	10YR 3/2	L	2msbk 2vfpl	sh	fr	ss	sp	—	—	NE
2	4-12	A2	10YR 5/2	10YR 3/1	L	2msbk 2fpl	h	fr	ss	sp	—	—	NE
3	12-25	A3	10YR 5/2	10YR 3/2	L	2msbk	h	fr	ss	sp	—	—	NE
4	25-37	Bw1	2.5Y 5/3	2.5Y 3/3	L	2msbk	h	fr	ss	sp	—	—	NE
5	37-55	Bw2	10YR 5/3	10YR 4/3	L	2msbk	h	fr	ss	sp	—	—	SL
6	55-60	BK	10YR 5/3	10YR 4/2	L	1fsbk	h	fr	ss	sp	—	—	SL
7													
8													
9													

	Roots Qty Sz Loc	Pores Shp Qty Sz	Concentrations Knd % shp Sz Loc Col	Rock Frag Knd % Rnd Sz	Wet	pH	Clay %	CCE	Bnd	Notes (e.g., Diagnostic)
1	4 vf Tot 2 f 1m	T 3 vf	—	—	dry	7.4	22	-	cs	—
2	5 vf Tot 3 f 1m	T 2 vf	—	—	sm	7.4	22	-	cs	—
3	3 vf Tot 2 f 1m	T 3 vf	—	—	sm	7.4	24	-	cs	—
4	2 vf Tot 1m	T 1 vf	—	—	sm	7.4	24	-	gs	—
5	1 vf Tot	T 1 vf	CAC 20-1mm BRF	GR 3 SA Sandstone	sm	7.8	23	-	gs	—
6	1 vf Tot	T 1 vf	CAC 1-2mm BRF	GR 5 SA Sandstone	sm	7.8	24	-		—

DUG-F-07

De-gas Site

Location:

Easting	541014
Northing	4394520
Zone	12 S
NAD	1983
Township	13 South
Range	12 East
Section	13
Meridian	Salt Lake
USGS Quad:	Pine Canyon, Utah

Elevation: 8,180 feet

General Site Description

This site is located on a north facing convex area surrounded by Douglas fir and aspen on the southeast and northwest sides. The slope is 8 to 12 percent to the northwest (340°) on this convex hillslope. The center of the site is dominated by big sagebrush. The site has been disturbed by cattle grazing.

The investigation area was 1.07 acres.

NRCS Soil map Unit

NRCS map unit 101: Senchert loam, 30 to 50 percent slopes

Senchert soils are moderately deep (20 to 40 inches) to calcareous sandstone. They have a deep mollic epipedon (16 to 35 inches thick) and an argillic horizon. These soils are cold (cryic), due to the elevation and northwest aspect. The taxonomic classification of Senchert soils is:

Fine-loamy, mixed, superactive Pachic Argicryolls

The DUG-F-07 site conditions do not fit the map unit slope range. This map unit is more representative of the steep slope northeast of the site.

Topsoil Resource

Senchert family soils are representative of soils at the DUG-F-07 site. Some soils at this site may be deeper than 40 inches. Soils in the wooded areas have an organic surface (Oi horizon) of partially decomposing needles, twigs, and leave. Topsoil salvage will be limited by the depth to bedrock. The potential topsoil salvage depth is 18 to 24 inches.

Reclamation potential for this site is good, based on the potential quantity of available topsoil.

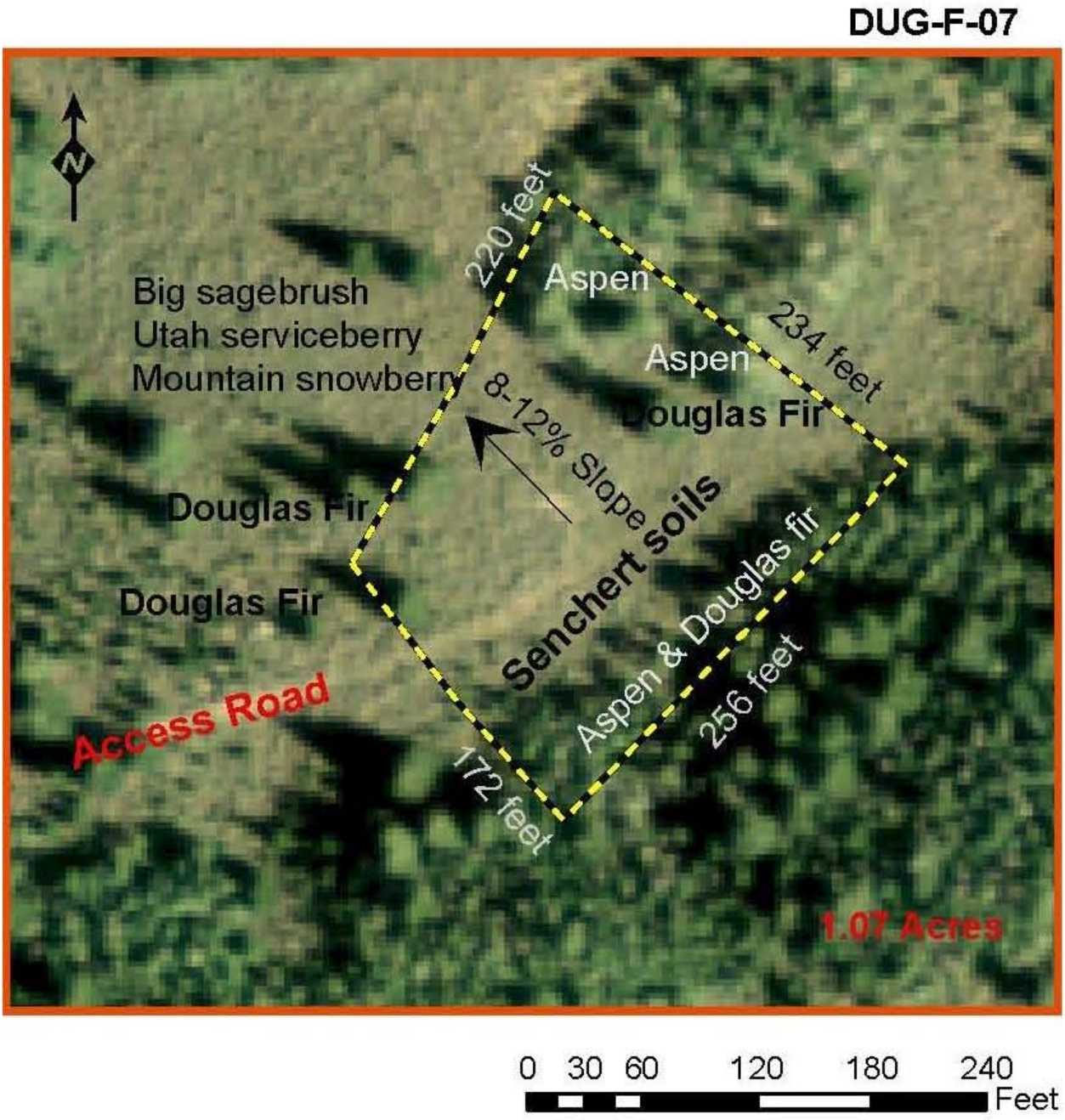
Vegetation

Big sagebrush is dominant vegetation type at the DUG-F-07 with wooded areas of Douglas fir and aspen on the southeast and northwest. The vegetation report written by Mt Nebo Scientific contains a more detailed quantitative description of the site vegetation. The following plant species were observed within the proposed location.

Mountain big sagebrush	bluegrass	Douglas fir
Mountain snowberry	Salina wildrye	Aspen
	Lupine	
	houndstooth	

Site Map

The base aerial photo for the DUG-F-07 site map is 2006 HRO 1 meter color orthophotography (Utah GIS Portal 2009). Scale is 1 foot equals 100 feet.



Site Photos

Photo 1. Looking north across mountain big sagebrush clearing with aspen and Douglas fir on the north and southeast sides.

Photo 2. Looking east at wooded area of Douglas fir and aspen on the east edge of site. The site slopes to the northwest at 8 to 12 percent.

Photo 3. View south down access road to DUG-F-07. Young Douglas fir are established in area previously dominated by mountain big sagebrush.

Photo 4. Looking downhill across big sagebrush at 8 to 12 percent slope toward west. Aspen and Douglas fir are in northwest corner of site.

Dugout M&RP, Chapter 3, Page 3-1

Dugout Canyon Mine Permit Number C/007/039

Canyon Fuel Company

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CHAPTER 3
BIOLOGY

310 INTRODUCTION

This chapter presents a description of the biological resources found on the Dugout Canyon permit and adjacent areas. Additional information can be found in the following amendments: Methane Degassification Amendment (August 2003), Refuse Pile Amendment (February 2003), and the Leachfield Addendum A-1 (March 2001). The remainder of the State Lease ML-48435-OBA (SITLA Lease) was incorporated into the Dugout Canyon Mine permit area in 2005. Future surface disturbance of these leases will be permitted as needed to facilitate mining activities.

As clarification, in 2007 acreage (487.57 acres) was added to existing Federal Coal Lease U-07064-027821, two hundred and forty-seven acres of this added acreage is already included as part of the Dugout permitted area. Acreage was previously added to the permit area in excess of the Federal leased acreage to act as a subsidence buffer zone (207.57 acres) and to accommodate a revised mine plan (40 acres). In addition, State Lease ML-50582-OBA (320 acres, more or less) was issued to Dugout Canyon Mine in 2007. In 2012, acreage totally 50 acres was added to the permit boundary from Federal Coal Lease U-07064-027821 in Sections 23, 25, and 26 of T13SR12E. In 2016, 207 acres was added to the permit boundary from the Federal Coal Lease U007064-027821 in Sections 13 of T13S, R12E and Section 18 of Lot 1, T13S, R13E. Refer to Plate 1-2 for the location of the acreage incorporated into the permit boundary and Chapter 1, Section 114 for the legal description of the permit area.

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

311 Vegetative, Fish and Wildlife Resources

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

312 Potential Impact to Vegetative, Fish and Wildlife Resources

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

Dugout M&RP, Chapter 3, Plates 3-1, 3-1E, 3-2, 3-3

Dugout Canyon Mine Permit Number C/007/039

Canyon Fuel Company

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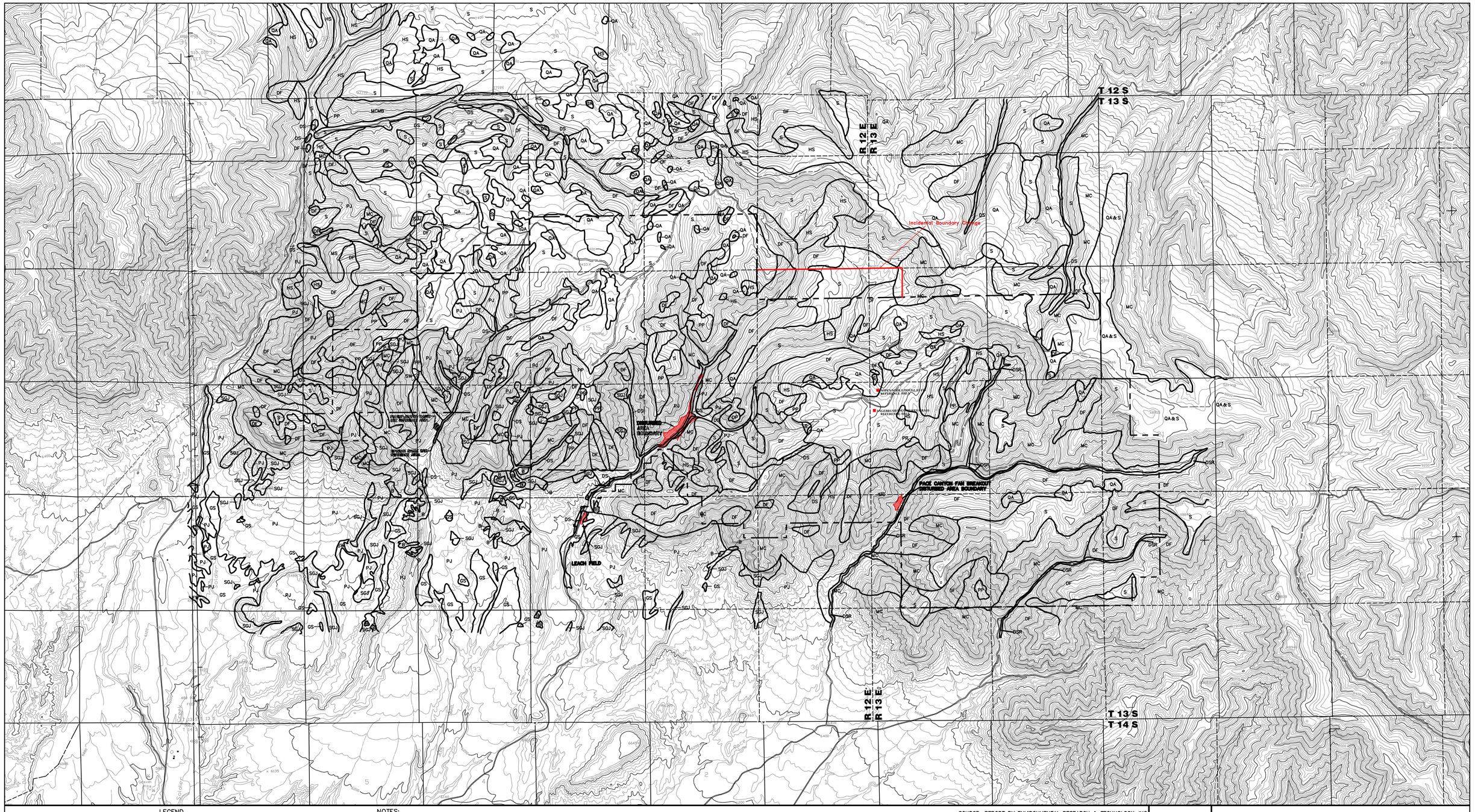


LEGEND

B	BARREN GROUND	PJ	PINION JUNIPER
DF	DOUGLAS FIR	PP	PONDEROSA PINE
DS	DECIDUOUS STREAMBANK	QA	QUAKING ASPEN
FW	FARMLAND WEEDS	RG	RUSH GRASS
GS	GREASEWOOD–SAGEBRUSH	S	SAGEBRUSH
HS	HIGH SHRUBS	SCW	SALT CEDAR–WILLOW
MC	MIXED CONIFER	SGJ	SHRUB–GRASS–JUNIPER
MCMB	MIXED CONIFER–MOUNTAIN BRUSH	DSR	DECIDUOUS STREAM BANK VEGETATION AND LIMITED RIPARIAN VEGETATION

PERMIT AREA BOUNDARY

NOTES:

1. SOME MAPPED VEGETATION UNITS INCLUDE SMALL SCATTERED AREAS OF VEGETATION OTHER THAN THAT FOR WHICH THE VEGETATION UNIT IS LABELED. "THE SOILS IN ANY ONE MAP UNIT DIFFER FROM PLACE TO PLACE IN SLOPE, DEPTH, DRAINAGE, AND OTHER CHARACTERISTICS THAT AFFECT MANAGEMENT. THE GENERAL MAP UNITS IN THIS SURVEY HAVE BEEN GROUPED INTO GENERAL KINDS OF LANDSCAPE FOR BROAD INTERPRETIVE PURPOSES." PAGE 5.

2. THE VEGETATION COMMUNITY UNIT MAPPING ON THIS PLATE IS OF LESSER INTENSITY THAN THAT OF PLATE 3–1A. PERCEIVED DIFFERENCES BETWEEN THIS PLATE AND PLATE 3–1A ARE ATTRIBUTED TO THE LEVEL OF SAMPLING AND SCALE DIFFERENCE BETWEEN THE PLATES.

3. AREAS OF VEGETATION ADJACENT TO THE DISTURBED AREA BOUNDARY WERE GROUND TRUTHED IN 1998.

4. "MOST INCLUDED SOILS HAVE PROPERTIES SIMILAR TO THOSE OF THE DOMINANT SOIL OR SOILS IN THE MAP UNIT, AND THUS THEY DO NOT AFFECT USE AND MANAGEMENT. THESE ARE CALLED NONCONTRASTING, OR SIMILAR, INCLUSIONS. THEY MAY OR MAY NOT BE MENTIONED IN THE MAP UNIT DESCRIPTION. OTHER INCLUDED SOILS AND MISCELLANEOUS AREAS, HOWEVER, HAVE PROPERTIES AND BEHAVIOR DIVERGENT ENOUGH TO AFFECT USE OR TO REQUIRE DIFFERENT MANAGEMENT. THESE ARE CALLED CONTRASTING, OR DISSIMILAR, INCLUSIONS. THEY GENERALLY ARE IN SMALL AREAS AND COULD NOT BE MAPPED SEPARATELY BECAUSE OF THE SCALE USED." PAGE 13.

5. SEE REFUSE PILE DOCUMENT FOR VEGETATION TYPES AND REFERENCE AREA LOCATION.

6. REFER TO REFUSE PILE AMENDMENT AND METHANE DEGASSIFICATION AMENDMENT FOR SPECIFIC INFORMATION PERTAINING TO THEIR AREAS.

7. ADDITIONAL VEGETATION REFERENCE AREAS SHOWN ON PLATE 3–1E.

SOURCE: REPORT BY ENVIRONMENTAL RESEARCH & TECHNOLOGY, INC
DR. STEVEN RICHARDSON, 1980
AERIAL PHOTOGRAPHS, SOIL SURVEY OF CARBON AREA, UTAH

REGISTERED PROFESSIONAL ENGINEER
No. 151610
DAVID G. SPILLMAN
STATE OF UTAH

0' 2000'

REVISION	
DATE	BY
6/12/01	JCB
12/17/03	RR
01/26/07	JKS
10/10/07	JLP
02/21/08	VSM/SWF
03/06/12	JKS
06/06/12	JKS
07/06/16	BK/JKS

Canyon Fuel Company, LLC
Soldier Canyon & Dugout Canyon Mines

VEGETATION

Dugout Canyon Mine

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

PERMIT BOUNDARY

Incidental Boundary Change

DISTURBED AREA BOUNDARY

PINYON JUNIPER RANGE SITE REFERENCE AREA

RIPARIAN RANGE SITE REFERENCE AREA

PIPELINE

DISTURBED AREA BOUNDARY

LEACH FIELD

PINYON JUNIPER/SAGEBRUSH REFERENCE AREA

REFUSE PILE PERMIT & DISTURBED AREA BOUNDARY

ASPEN/MAPLE/DOUGLAS FIR

SAGEBRUSH/SNOWBERRY/GRASS

MOUNTAIN BRUSH/SNOWBERRY

CONIFER/ASPEN

MOUNTAIN BRUSH/CONIFER

CONIFER/MOUNTAIN BRUSH/PINION JUNIPER

PINYON JUNIPER REFERENCE AREA

PACE CANYON FAN BREAKOUT DISTURBED AREA BOUNDARY

LEGEND

- DEGAS WELL REFERENCE AREA
- PACE CANYON FAN BREAKOUT REFERENCE AREA
- REFUSE PILE REFERENCE AREA
- MINE FACILITIES REFERENCE AREA

REGISTERED PROFESSIONAL ENGINEER AND LAND SURVEYOR
No. 151610
DAVID G. SPILLMAN
STATE OF UTAH

REVISION	
DATE	BY
01/26/05	LDJ
03/14/06	LDJ
05/08/06	LDJ
05/06/12	JKS

Canyon Fuel Company, LLC
Soldier Canyon & Dugout Canyon Mines

DUGOUT CANYON MINE
PACE CANYON FAN PORTAL, DEGAS WELL, REFUSE PILE AND MINE FACILITIES VEGETATION REFERENCE AREAS

Dugout Canyon Mine

DRAWN BY: SWF
APPROVED BY: VSM
DATE: FEBRUARY 26, 2003
SCALE: 1"=1000'
FILE NAME: G:\UC801\19\PLATE3-1E-TOTAL.DWG
DRAWING OR MAP NUMBER: PLATE 3-1E

T 12 S
T 13 S

R 12 E
R 13 E

Incidental Boundary Change

DISTURBED AREA BOUNDARY

PACE CANYON FAN BREAKOUT
DISTURBED AREA BOUNDARY

LEACH FIELD

COUNTY ROAD
(PUBLIC ROAD)

R 12 E
R 13 E

T 13 S
T 14 S

NOTES:

1. SEE PLATE 6-1 FOR GEOLOGIC FORMATIONS
2. REFER TO REFUSE PILE AMENDMENT AND METHANE DEGASSIFICATION AMENDMENT FOR INFORMATION PERTAINING TO THEIR AREAS.

LEGEND

PERMIT AREA BOUNDARY

REGISTERED PROFESSIONAL ENGINEER
No. 151610
DAVID G. SPILLMAN
STATE OF UTAH

0' 2000'

REVISIONS	
DATE	BY
10/27/03	RR
01/26/07	JKS
10/09/07	SC
02/21/08	VSM/SWF
03/06/12	JKS
07/06/16	BK/JKS

Canyon Fuel Company, LLC
Soldier Canyon & Dugout Canyon Mines

POTENTIAL LOCATIONS OF CLIFF ESCARPMENTS WITHIN PERMIT BOUNDARY AND ADJACENT AREA

Dugout Canyon Mine

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

Dugout M&RP, Chapter 3, Appendix 3-1

Vegetation and Sensitive Species Report

Dugout Canyon Mine Permit Number C/007/039

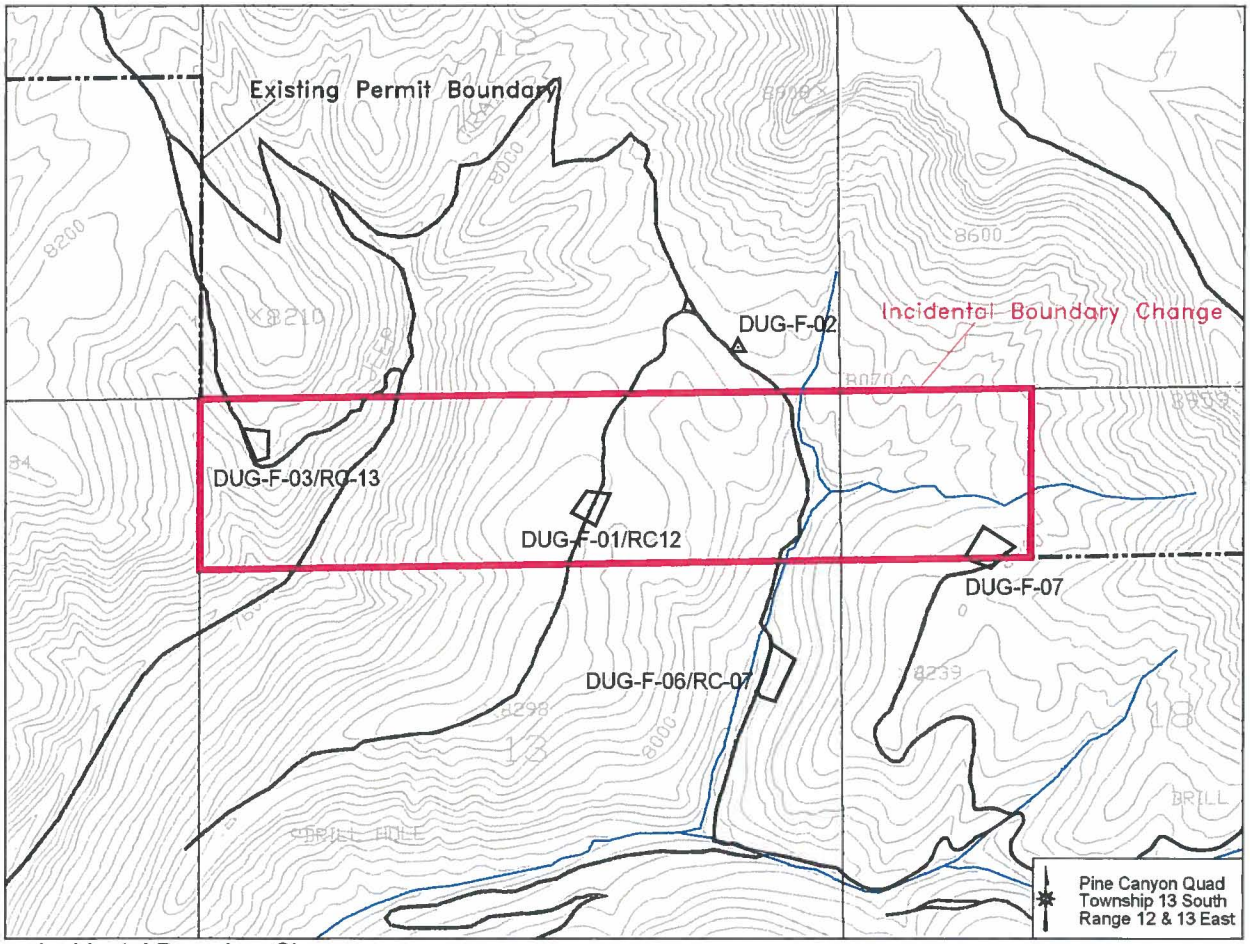
Canyon Fuel Company

Redline Strikeout Copies

Title page for reference only

Mt. Nebo Scientific, Inc. performed an exploration vegetation and sensitive species evaluation in three locations within the proposed expansion area. This report will be added to Dugout's M&RP, Chapter 3, Appendix 3-1.

The Vegetation & Sensitive Species Report covers sites DUG-F-01, DUG-F-02, DUG-F-03, DUG-F-06 & DUG-F-07. See map below.



Incidental Boundary Change:

Township 13 South, Range 12 East, SLBM, Utah
Section 13: N1/2N1/2, containing approximately 160 acres
Township 13 South, Range 13 East, SLBM, Utah
Section 18: Lot 1, containing approximately 47 acres

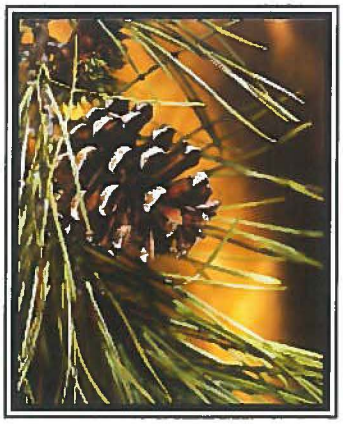
Vegetation and Sensitive Species of Drill Sites:
F-01, F-02, F-03, F-06, F-07
&
Reference Areas

for the

Dugout Canyon Mine

in

Carbon County, Utah



Prepared by

MT. NEBO SCIENTIFIC, INC.
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(801) 489-6937

Patrick D. Collins, Ph.D.

for

CANYON FUEL COMPANY, LLC
Dugout Canyon Mine
P.O. Box 1029
Wellington, UT 84542

February 2010

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Introduction

This is the next document in a sequence of vegetation reports prepared for Canyon Fuel Company to assess impacts caused by the drilling activities. For the past few years, the Dugout Canyon Mine in Carbon County, Utah has been constructing drill sites for exploration and de-gasification as safety precautions for mining coal. In doing so, drill pad construction necessitates disturbance to the existing vegetation on the proposed pads and where applicable, access roads to them. Permitting of the "de-gas" drill sites and exploration holes have been done in consecutive order on a site-by-site basis and have been driven by their location and role in the mine plan.

History of Vegetation Sampling in the Area

Earlier reports have been submitted to address the plant communities that were impacted by the previously-constructed drill sites. A recent history of vegetation studies in the area is shown below.

Recent History of Vegetation Reports for the Exploration & De-Gas Drill Sites for the Dugout Canyon Mine: 2003-2010

REPORT TITLE	REPORT DATE
Vegetation of the Dugout Canyon Mine De-gas Borehole Sites (G-1, G-2, G-3, G-4, G-5 and G-6)	July 2003
Vegetation of the De-gas Borehole Sites: G-8, G-9, G-10 & Reference Areas	August 2005
Vegetation of the De-gas Borehole Sites: G-11, G-12 & Reference Areas	November 2005
Vegetation of the De-gas Borehole Sites: G-13, G-14, G-15, G-16, G-17 & Reference Areas	March 2006
Vegetation of the De-gas Borehole Site G-19 & Reference Area	May 2007
Vegetation of the De-gas Borehole Sites: G-21, G-22 & Reference Areas	July 2008
Vegetation of the De-gas Drill Sites: G-25, G-26, G-29 & Reference Areas	October 2008
Vegetation of Drill Sites: DUG-07/R-02, DUG-08, DUG-09, DUG-10, H-01 and Reference Areas	March 2009
Vegetation and Sensitive Species at Drill Site G-30 & Reference Area	November 2009
Vegetation and Sensitive Species of Drill Sites: DUG-01, DUG-03/G-27, DUG-04, DUG-05, R-01, R-04, G-28 & Reference Areas	December 2009
Vegetation and Sensitive Species of Drill Sites: F-01, F-02, F-03, F-06, F-07 & Reference Areas	February 2010 (this document)

The contents of this document, or the last report shown on the above table, describes the expected impacts to the plant communities and also information regarding potential impacts to threatened, endangered and sensitive species for drill sites F-01, F-02, F-03, F-06, F-07 and their respective reference areas.

Drill Pad Construction

In order to develop each drill pad, a small amount of land has been proposed to be disturbed at each site location. Most of the proposed drill pads have been approximately 200 ft. x 300 ft in size, but some are about half that size. The plant communities proposed for disturbance at each site has been described and sampled with the results provided in this report. A sensitive plant species survey was also conducted in each area.

Revegetation Success Standards

Reference areas have been chosen to represent future standards for final revegetation success of the disturbed sites once they are reclaimed. These reference areas were chosen with respect to their similarities in geology, soils, slopes, aspects and plant community composition to the areas that are proposed for disturbance.

Vegetation sampling has been conducted on proposed de-gas and exploration drill sites for the past several years. Consequently, many of the plant communities that were sampled previously on the earlier drill sites are the same, or very similar to, those that have been proposed for new drilling activities. Because earlier drill sites have reference areas associated with them, and because some of these reference areas are very similar to the plant communities that were proposed for disturbance subsequent to establishment of the reference areas, the same reference areas will be used for revegetation success standards for other drill sites at the time of final

reclamation. A list of the reference areas established to-date along with the drill sites associated with them is shown below.

A list of reference areas and the drill sites that will use them for revegetation success standards. Also included are the dates of the reports where they were described. (Blue color denotes sites described in this report).

REFERENCE AREA	DRILL SITE	REPORT DATE
Sagebrush/Snowberry/Grass	G-2, G-3, G-5 DUG-05, G-28	July 2003 December 2009
Aspen/Maple/Douglas Fir	G-1, G-4, G-6 H-01	July 2003 March 2009
Grass/Forb	G-8	August 2005
Mtn. Brush/Conifer	G-9, G-10 G-11 R-01	August 2005 November 2005 December 2009
Conifer/Pinyon-Juniper/Mtn. Brush	G-12 G-13, G-15	November 2005 March 2006
Conifer/Aspen	G-14 G-19 G-21	March 2006 May 2007 July 2008
MB/Sagebrush	G-16, G17 G-22 G-26, G-29 DUG-07/R-02, DUG-10 G-30 **F-01, F-02, F-03, F-06, F-07**	March 2006 July 2008 October 2008 March 2009 November 2009 **February 2010**
Pre-Set Standard	G-25 DUG-08, DUG-09 DUG-01, DUG-03/G-27, DUG-04, R-04	October 2008 March 2009 December 2009

Methods

Sample design for the study was consistent with previous quantitative sampling methods in the area. Methodologies used for this study were performed in accordance with the guidelines supplied by the State of Utah, Division of Oil, Gas and Mining (DOGM). Quantitative and qualitative data were recorded within the plant communities proposed for disturbance in July and August 2009. The reference area for these sites was sampled in September 2005.

Proposed drill sites were surveyed, mapped and staked in the field by representatives of Canyon Fuel Company prior to the vegetation sampling. The reference areas chosen were approximately one acre in size and were marked in the field using a GPS instrument. The coordinates for the proposed drill pads and reference areas are provided below.

GPS Coordinates for Dugout Canyon Mine
Drill Sites: F-01, F-02, F-03, F-06, F-07 & Reference Areas
(UTM, ZONE 12S, NAD 27)

Waypoint Name	Coordinates (m)	Notes
Dug09F01	0541094 E 4394312 N	F-01 Sagebrush/ Grass (Scattered & Mtn. Brush/Conifer)
Dug09F02	0541411 E 4394708 N	F-02 Sagebrush/ Grass
Dug09F03	0540290 E 4394505 N	F-03 Sagebrush/Mtn. Brush (Scattered Conifer & P.J.)
Dug09F06	0541547 E 4393901 N	F-06 Sagebrush/Grass
DUG09F07	0542115 E 4394183 N	F-07 Sagebrush/Grass (Disturbed)
DUG16R	0542993 E 4392921 N	Reference Area Mtn. Brush/Sagebrush/Snowberry

Sampling Design and Transect/Quadrat Placement

Transect lines for vegetation sampling were placed randomly within the boundaries of the proposed disturbed and reference areas. The sample boundary included 100 ft outside the proposed drill site. The transect placement technique was employed with the goal to adequately sample a representative subset of the entire site. Once the transects were established, quadrat locations for sampling were chosen using random numbers from the transect lines with the objective to record data without preconceived bias.

Cover and Composition

Cover estimates were made using ocular methods with meter square quadrats. Species composition, cover by species, and relative frequencies were also assessed from the quadrats. Additional information recorded on the raw data sheets notes such as: slope, exposure, grazing use, disturbance and/or other appropriate notes. Plant nomenclature follows "A Utah Flora" (Welsh et al., 2003).

Woody Species Density

Density of woody plant species for the proposed disturbed and reference areas were estimated using the point-quarter method. In this method, random points were placed on the sample sites and measured into four quarters. The distances to the nearest woody plant species were then

recorded in each quarter. The average point-to-individual distance was equal to the square root of the mean area per individual. The number of individuals per acre was the end results of the calculations.

Sample Size & Adequacy

Sampling adequacy for cover and density was attempted by using the formula given below.

$$nMIN = \frac{t^2 s^2}{(dx)^2}$$

where,

nMIN	= minimum adequate sample
t	= appropriate confidence t-value
s	= standard deviation
x	= sample mean
d	= desired change from mean

With the values used for "t" and "d"above, the goal was to meet sample adequacy with 80% confidence within a 10% deviation from the true mean. In areas where sample viability was unnaturally high (e.g. previous disturbance sites), these parameters sometimes prove to be too stringent.

Statistical Analyses

Student's t-tests were employed to compare the total living cover and total woody species density of each proposed disturbed drill site with its reference area.

Photographs

Color photographs of the sample areas were taken at the time of sampling and have been submitted with this report.

Threatened, Endangered & Sensitive Species

Prior to recording quantitative data on the plant communities, a sensitive plant species survey was conducted. To initiate the studies in the area, appropriate agencies had been consulted (e.g. *Utah Natural Heritage Program*) previously and other sources were reviewed (sensitive species files at *Mt. Nebo Scientific, Inc.*) for potential plant species that are known to be rare, endemic, threatened, endangered or otherwise sensitive in the study area. Additionally, current lists of federally protected species – plant and animal – for Carbon County, Utah were reviewed and potential habitats for these species in the areas proposed for disturbance were addressed.

Raw Data

The raw data have been summarized on spreadsheets which are available upon request by Canyon Fuel or DOGM.

Results

Drill Site: F-01

Drill Site F-01 supported a sagebrush/grass plant community (Photo 1). Also present in the community were some mountain brush [i.e. Utah serviceberry (*Amelanchier utahensis*)] and conifer species [i.e. Douglas fir (*Pseudotsuga menziesii*)]. The dominant two plant species of the site by a wide margin included Kentucky bluegrass (*Poa pratensis*) and big sagebrush *(Artemisia tridentata*). For a list of all plant species present in the sample quadrats, refer to Table 1.

The total living cover for this drill site was estimated at 53.50%. Of that living cover 50.50% of it was understory and 3.00% was overstory cover (Table 2-A). The composition of the understory cover consisted of 43.77% trees and shrubs, 28.59% forbs and 27.94% grasses (Table 2-B).

Woody species density was also calculated for the site. The total density was 5,392 individuals

per acre, much of it sagebrush, but other important species were snowberry (*Symphoricarpos oreophilus*) and Utah serviceberry (Table 3).

Drill Site: F-02

This site supported another sagebrush/grass community (Photo 2). The dominate species here were Vasey's sagebrush (*Artemisia tridentata* var. *vaseyana*) and Kentucky bluegrass (Table 4).

As shown in Table 5-A, the total living cover in this area was 52.25%, most of which was understory cover (50.25%) with the remainder from overstory (2.00%). The composition was dominated by trees and shrubs at 54.11%, followed by grasses and forbs at 34.77% and 11.12%, respectively (Table 5-B).

The woody species density at this site was similar to the site described above. The total density was 5,343 individuals per acre and was again dominated by sagebrush and snowberry (Table 6).

Drill Site: F-03

Drill Site F-03 could also be considered a sagebrush/grass community, or a transition community between sagebrush and mountain brush (Photo 3). Additionally, it also supported conifer trees that were dispersed through the area. The dominant plant species at the site were sagebrush, Sandberg's bluegrass (*Poa secunda*), Salina wildrye (*Elymus salinus*), Utah serviceberry and

snowberry (Table 7).

The total living cover in the drill site area was estimated at 54.00%, with 47.25% coming from understory and 6.75% from overstory cover (Table 8-A). Lifeform composition for the understory cover was comprised of 43.10% shrubs, 40.28% grasses and 16.62% forbs (Table 8-B).

The total woody species density of the site was 4,927 individuals per acre and consisted of sagebrush, snowberry and Utah serviceberry (Table 9).

Drill Site: F-06

This site supported another sagebrush/grass community (Photo 4) but had more snowberry in the cover than the previous communities. The dominate plant species in descending order were Vasey's sagebrush, snowberry, basin sagebrush (*Artemisia tridentata* var. *tridentata*) and Sandberg's bluegrass (Table 10).

The total living cover for this community was 61.25%, 60.00% understory and 1.25% overstory cover (Table 11-A). The composition in the community was made up of 67.31% trees and shrubs, 19.14% grasses and 13.55% forbs (Table 11-B).

Woody species density measurements indicated the total to be 4,810 plants per acre with Vasey's

sagebrush, snowberry and basin sagebrush as the dominants (Table 12).

Drill Site: F-07

Similar to the communities described above, this site supported a sagebrush/grass community (Photo 5). The community was within an open area with a Douglas-Fir/Aspen community surrounding it. The area was somewhat disturbed from the dirt access road and heavy grazing activities (Photo 5). Unlike the above sagebrush/grass communities, the most common plant by cover and frequency here was a grass species, Kentucky bluegrass, but it was followed closely by Vasey's sagebrush (Table 13).

The total living cover for Drill Site F-07 was estimated at 57.50% which was comprised of 54.50% understory and 3.00% overstory cover (Table 14-A). Woody species and grasses were nearly equally represented in the composition at 44.08% and 46.53%, respectively; forbs comprised 9.39% (Table 14-B).

Woody species density was dominated by Vasey's sagebrush by a wide margin. The total density was 3,871 plants per acre (Table 15).

Reference Area: Mtn. Brush/Sagebrush/Snowberry

Existing reference areas were considered for their appropriateness to represent future success standards for the sagebrush/grass plant community for the proposed drill sites described in this

report. One such reference area met the qualifications quite well. This previously-studied reference area has been called the Mountain Brush/Sagebrush/Snowberry Reference Area. Consequently, this reference area has been chosen to represent future revegetation success standards for F-01, F-02, F-03, F-06 and F-07 as well as other sites described in previous reports (see page 4).

The most common species in this reference area were big sagebrush, Watson's penstemon (*Penstemon watsonii*), snowberry and serviceberry (Table 16).

The total living combined cover here was 64.50%; 57.00%, was comprised from understory and 7.50% from overstory (Table 17-A). Woody species dominated the composition at 54.44%, followed by forbs at 28.08% and grasses at 17.49% (Table 17-B).

The woody species density was estimated at 5,137 plants per acres and was dominated by big sagebrush and snowberry (Table 18).

Standards for Revegetation Success

The existing Mtn. Brush/Sagebrush/Snowberry Reference Area was chosen to represent standards for future revegetation success. Therefore the total living covers and woody species densities for proposed drill sites F-01, F-02, F-03, F-06 and F-07 were compared to this reference area. When these parameters were compared using the Student's t-test, the differences were not

statistically significant (Figures 1 and 2).

Figure 1. A statistical comparison (Student's t-tests) of the **total living cover** between the proposed disturbed drill sites and their recommended revegetation success standards.

	$\bar{x}$	s	n	t	df	SL
Site F-01						
Previously Disturbed:	53.50	11.95	20			
Reference Area (MB/S/S)	57.00 (u)	12.08	20			
t-test				-0.951	38	N.S.
Site F-02						
Previously Disturbed:	52.25	10.66	20			
Reference Area (MB/S/S)	57.00 (u)	12.08	20			
t-test				-1.319	38	N.S.
Site F-03						
Previously Disturbed:	54.00	14.37	20			
Reference Area (MB/S/S)	57.00 (u)	12.08	20			
t-test				-0.715	38	N.S.
Site F-06						
Proposed Disturbed	61.25	9.07	20			
Reference Area (MB/S/S)	57.00 (u)	12.08	20			
t-test				1.258	38	N.S.
Site F-07						
Proposed Disturbed	57.50	10.43	20			
Reference Area (MB/S/S)	57.00 (u)	12.08	20			
t-test				0.140	38	N.S.

$\bar{X}$ = mean
s = standard deviation
n = sample size
t = Student's t-value
df = degrees of freedom
n/a = not applicable
p = probability

SL= Significance Level
N.S.=Non-Significant
MB/S/S = Mtn. Brush/Sagebrush/Snowberry
u = understory
o = overstory

Figure 2. A statistical comparison (Student's t-tests) of the **woody species density** between the proposed disturbed drill sites and their recommended revegetation success standards.

	$\bar{x}$	s	n	t	df	SL
Site F-01						
Proposed Disturbed	5391.85	2111.94	20			
Reference Area (MB/S/S):	5136.52	2140.91	20			
t-test				0.380	38	N.S.
Site F-02						
Previously Disturbed:	5242.91	1801.85	20			
Reference Area (MB/S/S):	5136.52	2140.91	20			
t-test				0.170	38	N.S.
Site F-03						
Previously Disturbed:	4927.07	2500.01	20			
Reference Area (MB/S/S):	5136.52	2140.91	20			
t-test				-0.285	38	N.S.
Site F-06						
Proposed Disturbed	4809.79	3168.25	20			
Reference Area (MB/S/S):	5136.52	2140.91	20			
t-test				-0.382	38	N.S.
Site F-07						
Proposed Disturbed	3870.79	3175.63	20			
Reference Area (MB/S/S):	5136.52	2140.91	20			
t-test				-1.478	38	N.S.

$\bar{X}$ = mean
s = standard deviation
n = sample size
t = Student's t-value
df = degrees of freedom
n/a = not applicable
p = probability

SL= Significance Level
N.S.=Non-Significant
MB/S/S = Mtn. Brush/Sagebrush/Snowberry

Summary & Conclusions

Drill sites have been proposed in conjunction with coal mining activities for the Dugout Canyon Mine in Carbon County, Utah. As a result, drill pad construction will necessitate disturbance to the plant communities present at the sites. Quantitative sampling the vegetation for total cover, cover by species, frequency, composition and woody species density have provided data that represents the sites prior to any disturbance by the mine operator. This information is valuable to insure that the sites are adequately restored once the drilling and de-gasification activities have been discontinued. Additionally, a reference area has been chosen to represent future revegetation success standards at the time of final reclamation.

Statistical tests suggest that the living covers and woody species densities for drill sites F-01, F-02, F-03, F-06 and F-07 are similar to that of the Mtn. Brush/Sagebrush/Snowberry Reference Area. To conclude, this reference area appears to be a good candidate to represent future revegetation success standards at the time of final reclamation of the drill pads.

Finally, threatened, endangered and candidate plant and animal species known to occur in Carbon County were addressed for potential impacts to them from construction of the drill sites. There will likely be no impacts to these species by the proposed activities.

Table 1: Dugout Mine Drill Site F-01. Total cover, standard deviation and frequency by species (2009).

Sagebrush/ Grass (Scattered & Mtn. Brush/Conifer)	Mean Percent	Standard Deviation	Percent Frequency
OVERSTORY			
SHRUBS			
Juniperus scopulorum	1.25	5.45	5.00
Pseudotsuga menziesii	1.75	6.57	10.00
UNDERSTORY			
SHRUBS			
Amelanchier utahensis	3.00	6.20	25.00
Artemisia tridentata	14.65	10.24	95.00
Juniperus scopulorum	0.50	2.18	5.00
Pseudotsuga menziesii	2.25	8.73	10.00
Rosa woodsii	1.00	2.55	15.00
Symphoricarpos oreophilus	1.25	2.68	20.00
FORBS			
Achillea millefolium	1.75	5.54	15.00
Astragalus sp.	0.50	1.50	10.00
Calochortus nutallii	0.75	2.38	5.00
Castilleja flava	1.25	3.11	15.00
Chaenactis douglasii	0.25	1.09	5.00
Erigeron engelmannii	3.25	4.55	40.00
Gilia aggregata	0.25	1.09	5.00
Lupinus argenteus	1.50	3.57	20.00
Penstemon watsonii	1.85	3.00	30.00
Taraxacum officinale	3.00	3.67	45.00
GRASSES			
Elymus spicatus	0.25	1.09	5.00
Poa pratensis	12.50	7.16	100.00
Poa secunda	0.50	2.18	5.00
Stipa comata	0.25	1.09	5.00

Table 2: Dugout Mine Drill Site F-01.
Total cover, standard deviation and sample size (2009).

Sagebrush/ Grass (Scattered & Mtn. Brush/Conifer)	Mean Percent	Standard Deviation	Sample Size
A. TOTAL COVER			
Overstory (o)	3.00	8.28	20
Understory (u)	50.50	13.12	20
Litter	18.85	9.45	20
Bareground	25.55	16.08	20
Rock	5.10	6.17	20
o + u	53.50	11.95	20
B. % COMPOSITION			
Trees & Shrubs	43.77	21.33	20
Forbs	28.59	18.19	20
Grasses	27.64	15.11	20

Table 3: Dugout Mine Drill Site F-01. Woody Species Density (2009).

SPECIES	Individuals Per Acre
Amelanchier utahensis	606.58
Artemisia tridentata	3639.50
Juniperus scopulorum	67.40
Rosa woodsii	202.19
Pseudotsuga menziesii	134.80
Symphoricarpos oreophilus	741.38
TOTAL	**5391.85**

Table 4: Dugout Mine Drill Site F-02. Total cover, standard deviation and frequency by species (2009).

Sagebrush/ Grass	Mean Percent	Standard Deviation	Percent Frequency
OVERSTORY			
SHRUBS			
Pseudotsuga menziesii	2.00	8.72	5.00
UNDERSTORY			
SHRUBS			
Amelanchier utahensis	3.50	8.96	15.00
Artemisia tridentata vaseyana	22.00	11.34	95.00
Pseudotsuga menziesii	0.75	3.27	5.00
Symphoricarpos oreophilus	0.25	1.09	5.00
FORBS			
Collomia linearis	0.25	1.09	5.00
Erigeron engelmannii	1.00	2.55	15.00
Machaeranthera grindelioides	4.35	6.21	45.00
Salsola pestifer	0.25	1.09	5.00
GRASSES			
Elymus salinus	0.50	2.18	5.00
Poa pratensis	15.25	13.46	80.00
Poa secunda	2.15	3.85	25.00

Table 5: Dugout Mine Drill Site F-02.
Total cover, standard deviation and sample size (2009).

Sagebrush/ Grass	Mean Percent	Standard Deviation	Sample Size
A. TOTAL COVER			
Overstory (o)	2.00	8.72	20
Understory (u)	50.25	8.87	20
Litter	16.05	9.35	20
Bareground	28.30	11.66	20
Rock	5.40	8.68	20
o + u	52.25	10.66	20
B. % COMPOSITION			
Trees & Shrubs	54.11	25.68	20
Forbs	11.12	10.80	20
Grasses	34.77	22.58	20

Table 6: Dugout Mine Drill Site F-02. Woody Species Density (2009).

SPECIES	Individuals Per Acre
Amelanchier utahensis	133.57
Artemisia tridentata var. vaseyana	4808.62
Juniperus osteosperma	66.79
Pseudotsuga menziesii	66.79
Symphoricarpos oreophilus	267.15
TOTAL	**5342.91**

Table 7: Dugout Mine Drill Site F-03. Total cover, standard deviation and frequency by species (2009).

Sagebrush/Mtn. Brush (Scattered Conifer & P.J.)	Mean Percent	Standard Deviation	Percent Frequency
OVERSTORY			
SHRUBS			
Amelanchier utahensis	6.75	13.16	30.00
UNDERSTORY			
SHRUBS			
Amelanchier utahensis	1.15	3.48	10.00
Artemisia tridentata	13.50	13.79	65.00
Chrysothamnus nauseosus	0.25	1.09	5.00
Symphoricarpos oreophilus	6.25	9.34	50.00
FORBS			
Erigeron engelmannii	0.25	1.09	5.00
Hedysarum boreale	1.00	2.00	20.00
Machaeranthera canescens	1.40	4.44	15.00
Penstemon watsonii	4.00	4.64	50.00
Tragopogon dubius	0.85	1.80	20.00
GRASSES			
Elymus salinus	8.50	10.14	55.00
Poa pratensis	0.50	2.18	5.00
Poa secunda	9.60	9.88	60.00

Table 8: Dugout Mine Drill Site F-03.
Total cover, standard deviation and sample size (2009).

Sagebrush/Mtn. Brush (Scattered Conifer & P.J.)	Mean Percent	Standard Deviation	Sample Size
A. TOTAL COVER			
Overstory (o)	6.75	13.16	20
Understory (u)	47.25	11.45	20
Litter	24.50	15.32	20
Bareground	19.00	14.97	20
Rock	9.25	6.57	20
o + u	54.00	14.37	20
B. % COMPOSITION			
Trees & Shrubs	43.10	23.80	20
Forbs	16.62	16.48	20
Grasses	40.28	19.60	20

Table 9: Dugout Mine Drill Site F-03. Woody Species Density (2009).

SPECIES	Individuals Per Acre
Amelanchier utahensis	307.94
Artemisia tridentata	3017.83
Symphoricarpos oreophilus	1601.30
TOTAL	**4927.07**

Table 10: Dugout Mine Drill Site F-06. Total cover, standard deviation and frequency by species (2009).

Sagebrush/Grass	Mean Percent	Standard Deviation	Percent Frequency
OVERSTORY			
Populus tremuloides	1.25	5.45	5.00
UNDERSTORY			
SHRUBS			
Amelanchier utahensis	0.75	3.27	5.00
Artemisia tridentata var. tridentata	9.75	14.53	40.00
Artemisia tridentata var. vaseyana	14.50	13.77	75.00
Juniperus scopulorum	1.00	4.36	5.00
Mahonia repens	0.50	2.18	5.00
Populus tremuloides	1.00	3.00	10.00
Pseudotsuga menziesii	3.25	6.76	20.00
Symphoricarpos oreophilus	10.25	9.15	65.00
FORBS			
Achillea millefolium	1.00	2.55	15.00
Castilleja flava	0.25	1.09	5.00
Cynoglossum officinale	4.25	9.78	40.00
Erigeron engelmannii	1.00	3.39	10.00
Penstemon watsonii	1.50	2.78	25.00
GRASSES			
Poa pratensis	3.75	5.45	35.00
Poa secunda	7.25	6.61	70.00

Table 11: Dugout Mine Drill Site F-06.
Total cover, standard deviation and sample size (2009).

Sagebrush/Grass	Mean Percent	Standard Deviation	Sample Size
A. TOTAL COVER			
Overstory (o)	1.25	5.45	20
Understory (u)	60.00	9.49	20
Litter	24.30	7.93	20
Bareground	13.50	11.16	20
Rock	2.20	1.66	20
o + u	61.25	9.07	20
B. % COMPOSITION			
Trees & Shrubs	67.31	18.78	20
Forbs	13.55	16.37	20
Grasses	19.14	10.80	20

Table 12: Dugout Mine Drill Site F-06. Woody Species Density (2009).

SPECIES	Individuals Per Acre
Amelanchier utahensis	60.12
Artemisia tridentata var. tridentata	961.96
Artemisia tridentata var. vaseyana	2164.40
Juniperus scopulorum	60.12
Populus tremuloides	180.37
Pseudotsuga menziesii	180.37
Symphoricarpos oreophilus	1202.45
TOTAL	**4809.79**

Table 13: Dugout Mine Drill Site F-07. Total cover, standard deviation and frequency by species (2009).

Sagebrush/Grass (Disturbed)	Mean Percent	Standard Deviation	Percent Frequency
OVERSTORY			
SHRUBS			
Populus tremuloides	2.00	8.72	5.00
Pseudotsuga menziesii	1.00	4.36	5.00
UNDERSTORY			
SHRUBS			
Amelanchier utahensis	0.50	2.18	5.00
Artemisia tridentata var. vaseyana	17.50	11.24	85.00
Populus tremuloides	2.50	6.98	15.00
Pseudotsuga menziesii	0.50	2.18	5.00
Rosa woodsii	0.50	1.50	10.00
Symphoricarpos oreophilus	3.00	8.28	15.00
FORBS			
Achillea millefolium	1.25	3.49	15.00
Cynoglossum officinale	0.25	1.09	5.00
Taraxacum officinale	3.50	5.02	35.00
GRASSES			
Elymus salinus	1.25	3.83	10.00
Poa pratensis	21.50	13.79	90.00
Poa secunda	2.25	6.02	15.00

Table 14: Dugout Mine Drill Site F-07.
Total cover, standard deviation and sample size (2009).

Sagebrush/Grass (Disturbed)	Mean Percent	Standard Deviation	Sample Size
A. TOTAL COVER			
Overstory (o)	3.00	9.54	20
Understory (u)	54.50	10.23	20
Litter	22.35	12.30	20
Bareground	21.50	14.48	20
Rock	1.65	1.42	20
o + u	57.50	10.43	20
B. % COMPOSITION			
Trees & Shrubs	44.08	16.14	20
Forbs	9.39	11.66	20
Grasses	46.53	22.93	20

Table 15: Dugout Mine Drill Site F-07. Woody Species Density (2009).

SPECIES	Individuals Per Acre
Amelanchier utahensis	96.77
Artemisia tridentata var. vaseyana	2903.09
Populus tremuloides	145.15
Rosa woodsii	193.54
Pseudotsuga menziesii	193.54
Symphoricarpos oreophilus	338.69
TOTAL	**3870.79**

Table 16. Dugout Mine: Mtn. Brush/Sagebrush Reference Area for Drill Site G-30 (also for DUG-07, DUG-10, G-16, G-17, G-22, G-26 & G-29). Species Cover, Standard Deviation and Sample Size (2005 data).

Mtn. Brush/Sagebrush/Snowberry Reference Area	Mean Percent	Standard Deviation	Percent Frequency
OVERSTORY			
Amelanchier utahensis	6.75	12.58	25.00
Juniperus scopulorum	0.75	3.27	5.00
UNDERSTORY			
TREES & SHRUBS			
Amelanchier utahensis	7.00	16.16	35.00
Artemisia tridentata	15.25	14.79	75.00
Juniperus scopulorum	0.25	1.09	5.00
Symphoricarpos oreophilus	10.50	15.96	50.00
FORBS			
Astragalus sp.	0.25	1.09	5.00
Lupinus argenteus	4.05	4.60	55.00
Penstemon watsonii	10.70	7.89	80.00
GRASSES			
Elymus salinus	0.25	1.09	5.00
Elymus spicatus	2.00	3.67	25.00
Elymus trachycaulus	2.00	3.67	25.00
Poa pratensis	2.25	5.36	20.00
Poa secunda	2.50	6.22	20.00

Table 17. Dugout Mine: Mtn. Brush/Sagebrush Reference Area for Drill Site G-30 (also for DUG-07, DUG-10, G-16, G-17, G-22, G-26 & G-29). Total cover, standard deviation and sample size (2005 data).

Mtn. Brush/Sagebrush/Snowberry Reference Area	Mean Percent	Standard Deviation	Sample Size
A. TOTAL COVER			
Overstory (o)	7.50	12.60	20
Understory (u)	57.00	12.08	20
Litter	18.60	7.52	20
Bareground	15.65	13.13	20
Rock	8.75	9.59	20
o + u	64.50	19.49	20
B. % COMPOSITION			
Trees & Shrubs	54.44	26.60	20
Forbs	28.08	17.03	20
Grasses	17.49	14.43	20

Table 18. Dugout Mine: Mtn. Brush/Sagebrush Reference Area for Drill Site G-30 [also for DUG-07, DUG-10, G-16, G-17, G-22, G-26 & G-29). Woody Species Densities (2005 data)].

Mtn. Brush/Sagebrush/Snowberry Reference Area	
Species	**Individuals Per Acre**
Amelanchier utahensis	834.68
Artemisia tridentata	2375.64
Juniperus scopulorum	64.21
Symphoricarpos oreophilus	1861.99
TOTAL	**5136.52**

Table 19: Federally listed threatened, endangered & candidate species in Carbon County, Utah and notes regarding potential impacts to them as a result of the proposed Drill Sites: F-01, F-02, F-03, F-06 & F-07.

Scientific Name	Common Name	Status*	Site-Specific Notes
Gila cypha	Humpback chub	E	Humpback chub in Utah are now confined to a few white-water areas in the Colorado, Green, and White Rivers. These rivers do not occur in the study area. The drainage control measures of the site limit impacts to the downstream drainage of the Colorado River system. There should be no impacts to this species as a result of construction and operation of the drill sites.
Gila elegans	Bonytail	E	The bonytail is a very rare minnow originally native to the Colorado River system. These rivers do not occur in the study areas. The drainage control measures of the site limit impacts to the downstream drainage of the Colorado River system. There should be no impacts to this species as a result of construction and operation of the drill sites.
Mustela nigripes	Black-footed ferret	Ex	Black-footed ferret habitat is primarily prairie grasslands. The ferret has a diet consisting of almost 90% prairie dogs. This habitat and food source does not occur in the study areas. There should be no impacts to this species as a result of construction and operation of the drill sites.
Phacelia argillacea	Clay phacelia	E	The habitats of clay phacelia are usually found in pinyon-juniper and mountain brush plant communities, and typically in clay soils of the Green River formation. Although the mountain brush community occurs within the study area, the geologic formations of the study area were well below the Green River formation in geologic strata. Additionally, soil types usually associated with this species were not present in the study areas. There should be no impacts to this species as a result of construction and operation of the drill sites.

Table 19: Federally listed threatened, endangered & candidate species in Carbon County, Utah and notes regarding potential impacts to them as a result of the proposed Drill Sites: F-01, F-02, F-03, F-06 & F-07.

Ptychocheilus lucius	Colorado pikeminnow	E	The Colorado pikeminnow is a fish that prefers medium to large rivers. With the loss of habitat they are now restricted to the upper Colorado River system. These rivers do not occur in the study area. The drainage control measures of the site limit impacts to the downstream drainage of the Colorado River system. There should be no impacts to this species as a result of construction and operation of the drill sites.
Sclerocactus glaucus	Uinta Basin hookless cactus	T	*Sclerocactus glaucus* generally occurs on cobblely, gravelly, or rocky surfaces on river terrace deposits along the White and Green Rivers of Utah.. *S. glaucus* occurs on varying exposures, but is more abundant on south facing exposures, and on slopes to about 30 percent grade; it is most abundant at the point where terrace deposits break from level tops to steeper side slopes. Plant communities and species associated with this species are bud sage, shadscale, black sagebrush and horsebrush. These plant communities nor habitats associate with them occur in the study areas, therefore, there should be no impacts to this species as a result of construction and operation of the drill sites.
Xyrauchen texanus	Razorback sucker	E	This species prefers slow backwater habitats and impoundments in the Colorado River system. Utah Division of Wildlife Resources distribution maps of this species for Carbon County shows to occur near the Green River in extreme eastern portion of the county. These rivers do not occur in the study areas. The drainage control measures of the site limit impacts to the downstream drainage of the Colorado River system. There should be no impacts to this species as a result of construction and operation of the drill sites.

* Status
C = Candidate
E = Endangered
T = Threatened
Ex = Extirpated

Color Photographs
Of the
Sample Areas

Photo 1: Drill Site F-01

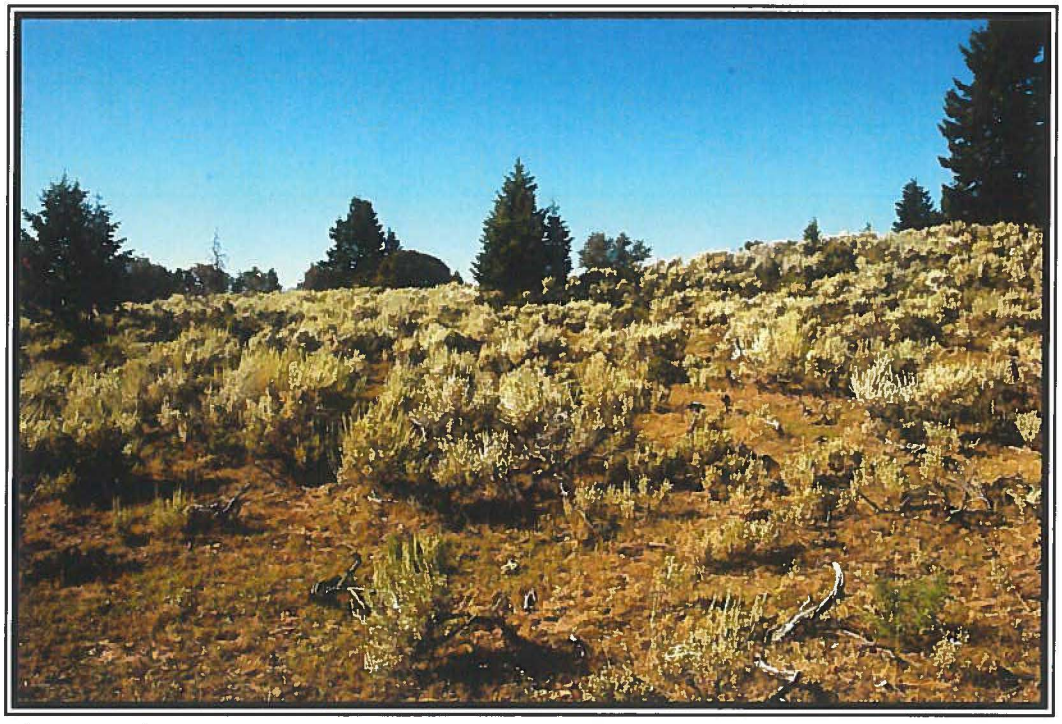


Photo 2: Drill Site F-02

Photo 3: Drill Site F-03

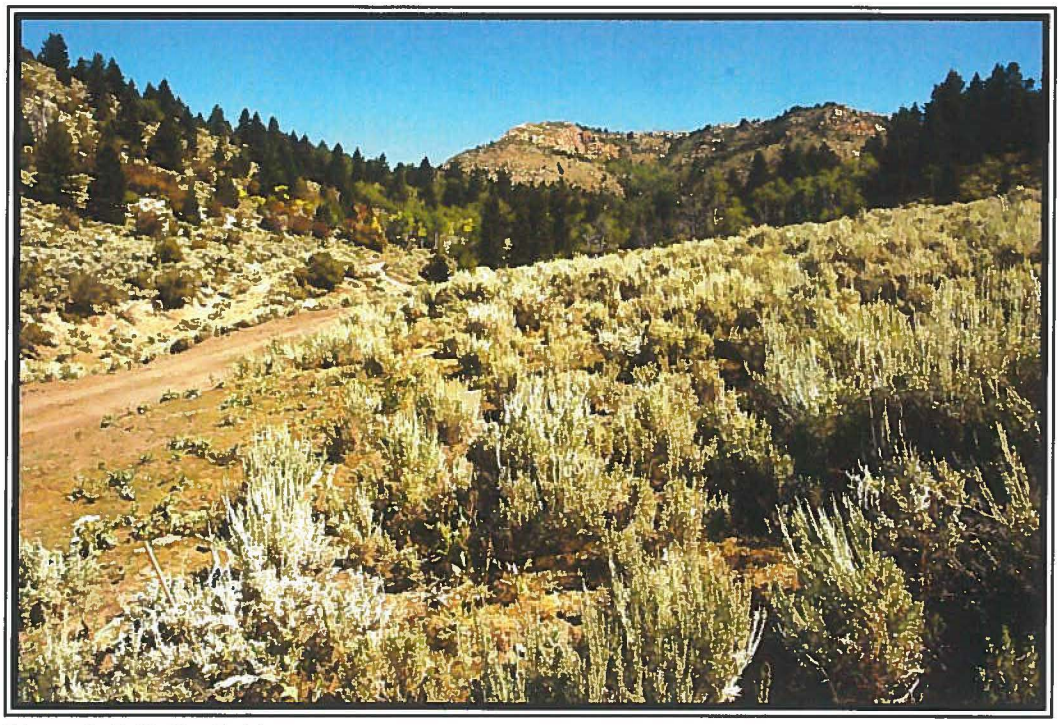


Photo 4: Drill Site F-06

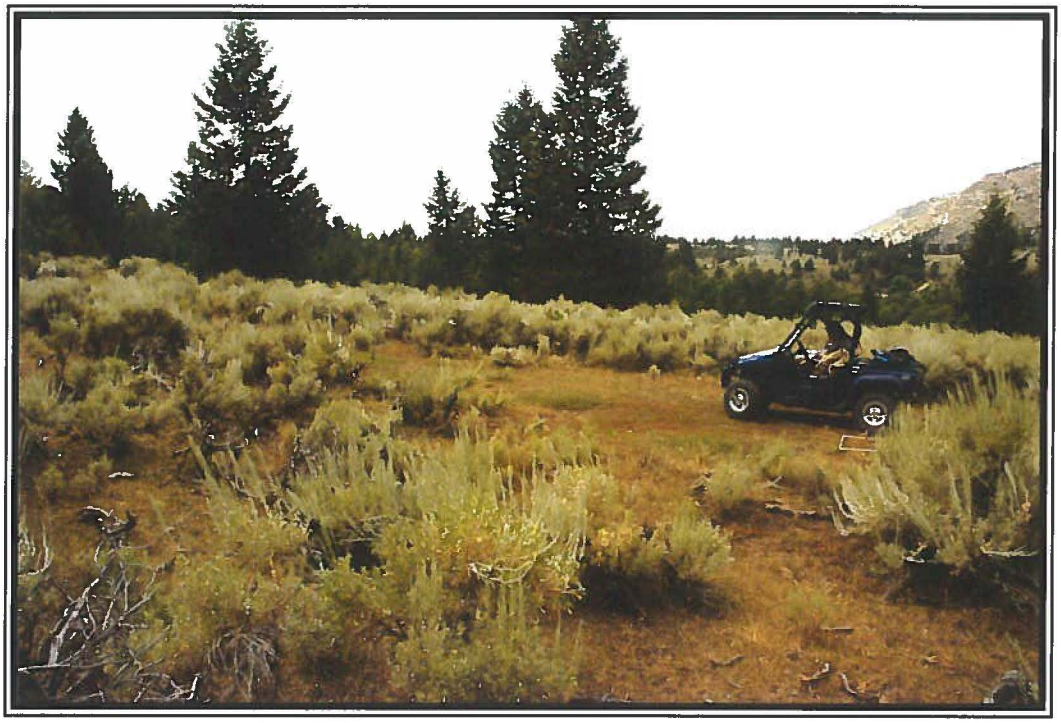


Photo 5: Drill Site F-07

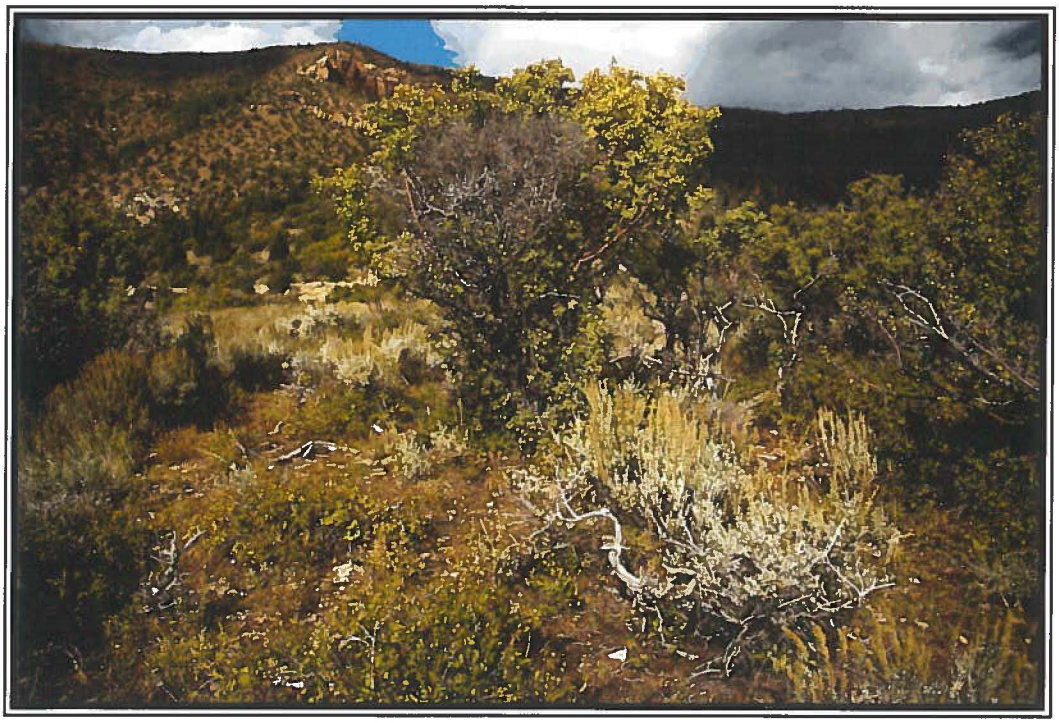


Photo 6: Mtn. Brush/Sagebrush/Snowberry Reference Area

Dugout M&RP, Chapter 3, Appendix 3-3

T&E Candidate & Sensitive Vertebrate Report

Dugout Canyon Mine Permit Number C/007/039

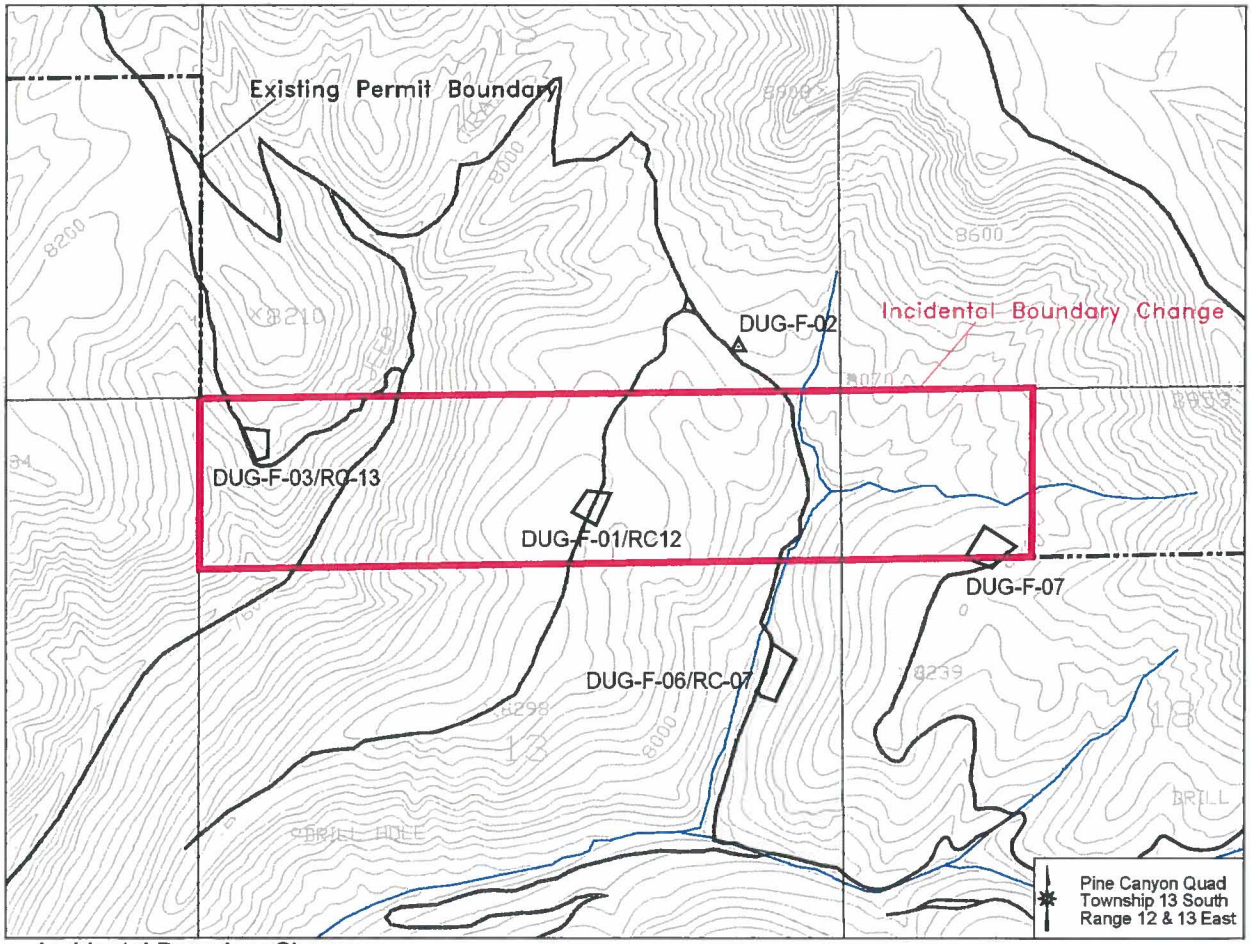
Canyon Fuel Company

Redline Strikeout Copies

Title page for reference only

A Threatened, Endangered, Candidate & Sensitive Vertebrate Species Report was performed by Western Land Services in the proposed expansion area in conjunction with three exploration drill sites within the proposed expansion area.

The T&E Sensitive Vertebrate Report covers sites DUG-F-01, DUG-F-02, DUG-F-03, DUG-F-06 & DUG-F-07. See map below.



Incidental Boundary Change:

Township 13 South, Range 12 East, SLBM, Utah
Section 13: N1/2N1/2, containing approximately 160 acres
Township 13 South, Range 13 East, SLBM, Utah
Section 18: Lot 1, containing approximately 47 acres

THREATENED, ENDANGERED, CANDIDATE & SENSITVE VERTEBRATE SPECIES REPORT

FOR

THE DUGOUT MINE
DE-GAS AND EXPLORATION
DRILLING PROGRAM

Prepared by: Mace Crane Date: 08/15/2009

Mace Crane
Senior Wildlife Biologist, Western Land Services

Introduction and Background

This document evaluates the potential direct, indirect, and cumulative effects of the Dugout mine's de-gas and exploration drilling program on federally listed Endangered, Threatened, Candidate species, and the state of Utah's Sensitive Species; and other important vertebrate wildlife species known or suspected to occur on the surface of the Dugout Canyon Mine. The purpose of this document is to provide a suitable habitat determination and rationale for the effects of a de-gassification and exploration drilling program on these species.

Dugout mine proposes to construct several de-gas and/or exploration well pads in the area (See Appendix 1); to provide a safe working environment for mine operations and to further analyze the coal resource in the area.

Table 1. The following Table outlines the well number and type.

DUG-F-01/RC-12	De-gassification and Exploration
DUG-F-02	De-gassification and Exploration
DUG-F-03/RC-13	De-gassification and Exploration
DUG-F-06/RC-07	De-gassification and Exploration
DUG-F-07	De-gassification and Exploration

Project Area

The proposed drilling program is located in Carbon County, approximately 15 miles north east of Wellington, Utah. Well pads are strategically located throughout the area between Dugout Canyon and Pace Canyon. The project surface ownership is privately held between Canyon Fuel Company LLC and the Thayn Family Trust.

Methodology

Pre-field research for special status vertebrate species was conducted by Western Land Services' (WLS) wildlife biologists to determine habitat suitability. Pre-field research of special status vertebrate species included research of life histories, ecology, distributions, the Utah Division of Wildlife Resources (UDWR) and private GIS databases, and previous survey records.

Potential species occurrence and species distribution data was compiled from the Utah Division of Wildlife Resources'(UDWR) website, UDWR and private GIS databases, the Utah Natural Heritage Program's Biodiversity and Conservation System (BIOTICS) , and previous survey data from the Utah Division of Wildlife Resources and other environmental consultants. Habitat suitability was derived from a digital-spatial vegetation layer generated from aerial photo interpretation and observations made during field reviews.

It was determined by WLS biologists and the Dugout mine environmental engineer, that a field review of the pre-field research would be conducted by the WLS wildlife biologists to confirm initial determinations, conduct a habitat assessment of the project area, determine habitat occupancy and verify GIS data accuracy. The inventory area included the well pads and access roads.

Determinations

On July 1st, 2009 an initial well pad inventory was conducted to validate pre-field research, GIS databases and pre-field habitat assessments. Each site was inventoried for threatened, endangered, candidate, and state sensitive vertebrate species which are known to occur in Carbon County as listed by the Fish and Wildlife Service and UDWR, which was last updated February, 2009.

Table 1. Vertebrate wildlife species reviewed in this document.

Species	Species Occurrence in or near the proposed project area and justification for consideration or non-consideration in this analysis
	Endangered, Threatened & Candidate Species
Humpback Chub (*Gila cypha)*	**Endangered, No Suitable Habitat.** Humpback Chub are now confined to a few white-water areas in the Colorado, Green and White Rivers (UDWR July, 2009). These rivers do not occur in the study area. The nearest body of water known to have fish which could receive storm event runoff is the Price River which is approximately 15 miles, in a straight line, from the project area. Suitable habitat does not exist within the project area. **No impacts** to Humpback Chub are expected (See Appendix 2).
Bonytail (*Gila elegans)*	**Endangered, No Suitable Habitat.** Bonytail prefer eddies, pools, and backwaters near swift current in large rivers (UDWR July, 2009). These rivers do not occur in the study area. The nearest body of water known to have fish which could receive storm event runoff is the Price River which is approximately 15 miles, in a straight line, from the project area. Suitable habitat does not exist within the project area. **No impacts** to Bonytail are expected (See Appendix 2).
Colorado Pikeminnow (*Ptychocheilus lucius)*	**Endangered, No Suitable Habitat.** Adult Colorado pike minnows prefer medium to large rivers, where they can be found in habitats ranging from deep turbid rapids to flooded lowlands (UDWR July, 2009). These rivers do not occur in the study area. The nearest body of water known to have fish which could receive storm event runoff is the Price River which is approximately 15 miles, in a straight line, from the project area. Suitable habitat does not exist within the project area. **No impacts** to Colorado Pikeminnow are expected (See Appendix 2).
Razorback Sucker *(Xyrauchen texanus)*	**Endangered, No Suitable Habitat.** The species prefers slow backwater habitats and impoundments. In fact, the largest current concentration of razorback suckers can be found in Lake Mohave (an impoundment), along the Arizona - Nevada border (UDWR July, 2009). These rivers do not occur in the study area. The nearest body of water known to have fish which could receive storm event runoff is the Price River which is approximately 15 miles, in a straight line, from the project area. Suitable habitat does not exist within the project area. **No impacts** to Razorback sucker are expected (See Appendix 2).
Black-footed Ferret *(Mustela Nigripes)*	**Extirpated-Endangered, No Suitable Habitat.** Black footed ferrets typically inhabit open prairie grasslands which are populated with prairie dogs. Suitable habitat does not exist in or near the project area. **No impacts** to black-footed ferrets are expected (See Appendix 2).

State of Utah Sensitive Species known to occur in Carbon County	
Bald Eagle (*Haliaeetus leucocephalus*)	**No Suitable Habitat**. The availability of an abundant source of food, of foraging perches, and of secure night roost sites away from human activities are important habitat components. Preferred roost habitat includes a protected microclimate that provides shelter from harsh weather and is characterized by tall trees that extend above the forest canopy and locations that provide clear views and open flight paths. There are no know nest sites or winter roosts in or adjacent to the project area. **No impacts** to Bald Eagle are expected.
Bluehead Sucker *(Catostomus discobolus)*	**No Suitable Habitat**. This species occurs in the upper Colorado River system, the Snake River system, and the Lake Bonneville basin (UDWR July, 2009). It is a benthic species which prefers fast flowing waters. This habitat does not exist in or near the project area. **No Impacts** to Bluehead suckers are expected.
Burrowing Owl *(Athene cunicularia)*	**No Suitable Habitat**. Typical burrowing owl habitats are open grassland and prairies (UDWR 2009). They are typically associated with prairie dogs as they utilize previously excavated burrows. Suitable nesting, foraging and dispersal areas do not exist in or near the proposed project area. **No Impacts** to burrowing owl are expected.
Colorado River Cutthroat Trout (*Oncorhynchus Clarkii)*	**No Suitable Habitat.** Colorado River cutthroat trout (CRCT) require cool, clear water and well-vegetated stream banks for cover and bank stability. In stream cover, in the form of deep pools and structures such as boulders and logs, is also important. These habitat characteristics are not present in the project area. **No Impacts** to Colorado River Cutthroat Trout are expected.
Ferruginous Hawk (*Buteo regalis*)	**No Suitable Habitat**. The Ferruginous hawk is Utah Partners in Flight priority species. This species favors arid grasslands with abundant prey and appropriate nesting features. Preferred nesting, foraging or dispersal habitat is not present in the project area. **No Impacts** to Ferruginous Hawk are expected.
Flannel mouth Sucker (*Catostomus latipinnis)*	**No Suitable Habitat**. In Utah, the species occurs in the main-stem Colorado River, as well as in many of the Colorado River's large tributaries (UDWR July, 2009). Flannelmouth suckers prefer large rivers, where they are often found in deep pools of slow-flowing, low gradient reaches. (UDWR July, 2009). These habitats are not present in the project area. **No Impacts** to Flannel mouth suckers are expected.
Greater Sage-grouse (*Centrocercus urophasianus*)	**No Suitable Habitat**. Greater sage grouse are associated with sagebrush plains, foothills, and mountain valleys. Sagebrush is a key life history component and is the predominant plant determining quality habitat. Scattered small acreages of sparse sagebrush are present in minimal acreages inter-mixed with dominate aspen and mixed conifer habitats. Suitable greater sage grouse sagebrush habitat does not exist in or near the proposed project area, nor has greater sage grouse ever been documented in the project are and the project area is outside of the known distribution in the county and state. **No Impacts** to Greater Sage Grouse are expected.

Kit Fox (*Vulpes macrotis)*	**No Suitable Habitat**. Kit foxes live in dens dug in the desert soil. They tend to select sites in barren areas with silty, clay soil, making it easier for the foxes to excavate the den. They often dig dens in clusters having multiple entrances and escape routes. There is no suitable habitat in the project area. **No Impacts** to kit fox are expected.
Long Billed Curlew *(Numenius americanu)*	**No Suitable Habitat**. According to the Utah Division of Wildlife Resources, the long billed curlew is less common in the Colorado river drainage when compared with populations in the central and more northern valleys (UDWR July, 2009). According to Hayward et al., this shorebird prefers a higher and drier climate than most shorebirds. The project area does not contain foraging or nesting habitat for long billed curlews. **No Impacts** to long billed curlews are expected
Northern Goshawk *(Accipiter Gentilis)*	**No Suitable Habitat**. The northern goshawk is associated with coniferous and mixed forests (Rodriguez et al 2008), and it utilizes a wide variety of forested habitat types for nesting (Graham et al. 1999). They generally nest in areas of moderately high canopy closure and flat to moderately sloped terrain, and often near flowing water, where there are adjacent breaks in the canopy (Graham et al. 1999). Northern Goshawks tend to avoid southern exposures and typically prefer northern aspects. Occupancy potential increases dramatically when stands exhibit greater than 70% canopy closure (Squires and Reynolds 1997). Nests sites are typically in the largest trees in the forested stand (USDI 2001), and the territory often contains alternate nest trees, usually within a distance of < 0.7 km (Squires and Reynolds 1997). Northern Goshawks build platform style nests in the tops of mature trees. Trees selected for nesting typically have a crotch, fork, or several limbs on one side to support the platform nest (USFS July 2009, Palmer 1988). The nest area is usually in a mature forest stand that has a multilayered canopy with dense to open understory (Kochert 1986). According to the *Conservation Strategy and Agreement for the Management of Northern Goshawk Habitat in Utah*, the vegetation stand structure (VSS) for a nest area in mixed species and spruce fir forest is 100% old growth forest or a VSS of 6, meaning the diameter at breast height (dbh) is greater than 24 inches. In aspen dominated nesting habitat the nest area should have a VSS of 5 and 6 meaning a dbh of 12 and 14 inches respectively. The project area contains coniferous, mixed forests and aspen; however areas exhibiting some suitable nesting habitat characteristics, according to their respective VSS, are very limited. Structurally, aspen in the areas surrounding the proposed well pads typically lacked nesting structures to support platform type nests. The aspects of several pad locations are south or west in nature. An initial inventory was conducted in areas exhibiting some nesting habitat characteristics on July 1, 2009. The initial assessment resulted in several areas being documented as non-nesting habitat based on the measured VSS, aspect, stand age class, stand density, percent canopy cover, lack of perennial water or a combination of the aforementioned. An additional site visit was completed on July 30th, 2009 and confirmed the remaining well pads were not suitable nesting habitat. **No Impacts** to Northern Goshawk are expected.
Roundtail Chub (*Gila robusta*)	**No Suitable Habitat**. This species prefers large rivers, such as the main stem of the Colorado river, with strong currents and murky dark pools. **No Impacts** to Roundtail Chub are expected.

Smooth Green Snake (*Liochlorophis vernalis*)	**No Suitable Habitat**. Suitable habitat (moist grassy meadows) does not exist in or near the proposed project area. The project area is outside of known species distribution. **No impacts** to smooth green snaked are expected.
Townsend's big eared bat (*Corynorhinus townsendii*)	**No Suitable Habitat**. Roosting habitat includes mines, caves, or buildings in desert scrub to mixed conifer forests (Oliver 2000) (BCI 2009). Suitable roosting habitat is not present in the project area. **No Impacts** to Townsend's big eared bat are expected.
Western Red Bat *(Lasiurus blossevillii)*	**No Suitable Habitat**. The western red bat is a tree roosting species which is closely associated with cottonwood trees in lowland riparian areas at lower elevations (Oliver 2000) (BCI 2009). **No Impacts** to western red bat are expected.
Western Toad (*Bufo Boreas)*	**No Suitable Habitat**. This species inhabits a variety of habitats ranging from slow moving streams in montane forests to desert springs. No habitat for western toad is found within the project area. **No impacts** to western toad are expected.
White-tailed Prairie Dog (*Cynomys leucurus*)	**No Suitable Habitat**. White-tailed prairie dogs are found across the eastern portion of Utah. They are generally found in desert grasslands and shrub grasslands. This does not exist in the project area. **No Impacts** to white-tailed prairie dog are expected.

Conclusions

This analysis is based on the pre-field research and inventory results of the well pads and access roads as previously described. A letter dated July 8, 2009 was received by WLS from the Utah Division of Wildlife Resources' Utah Natural Heritage Program which states, "the Utah Division of Wildlife Resources (UDWR) does not have records of occurrence for any threatened, endangered, or sensitive species within the project area noted above or within a one-mile radius" (See Appendix 2). Two site visits to the project area were completed which confirmed the pre-field research and the UDWR database letter. Therefore, the implementation of the Dug Out mine de-gas and exploration drilling program should not have an effect on threatened, endangered, candidate, or state sensitive species as documented in this report.

Recommended Design Criteria

Recommended project design criteria are as follows: 1. If any endangered, threatened, candidate or sensitive species are discovered prior to or during treatment operations, the environmental engineer will be contacted and appropriate protection measures will be established through the proper state and federal agency coordination. 2. Biological surveys should be conducted each nesting/breeding season, prior to the commencement of construction activities, to protect vertebrate wildlife resources in the project area.

Literature Cited and Documents Reviewed

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Appendix

Appendix 1 - Project map
Appendix 2- Natural Heritage Database Letter

Dugout M&RP, Chapter 4, Plate 4-1

Dugout Canyon Mine Permit Number C/007/039

Canyon Fuel Company

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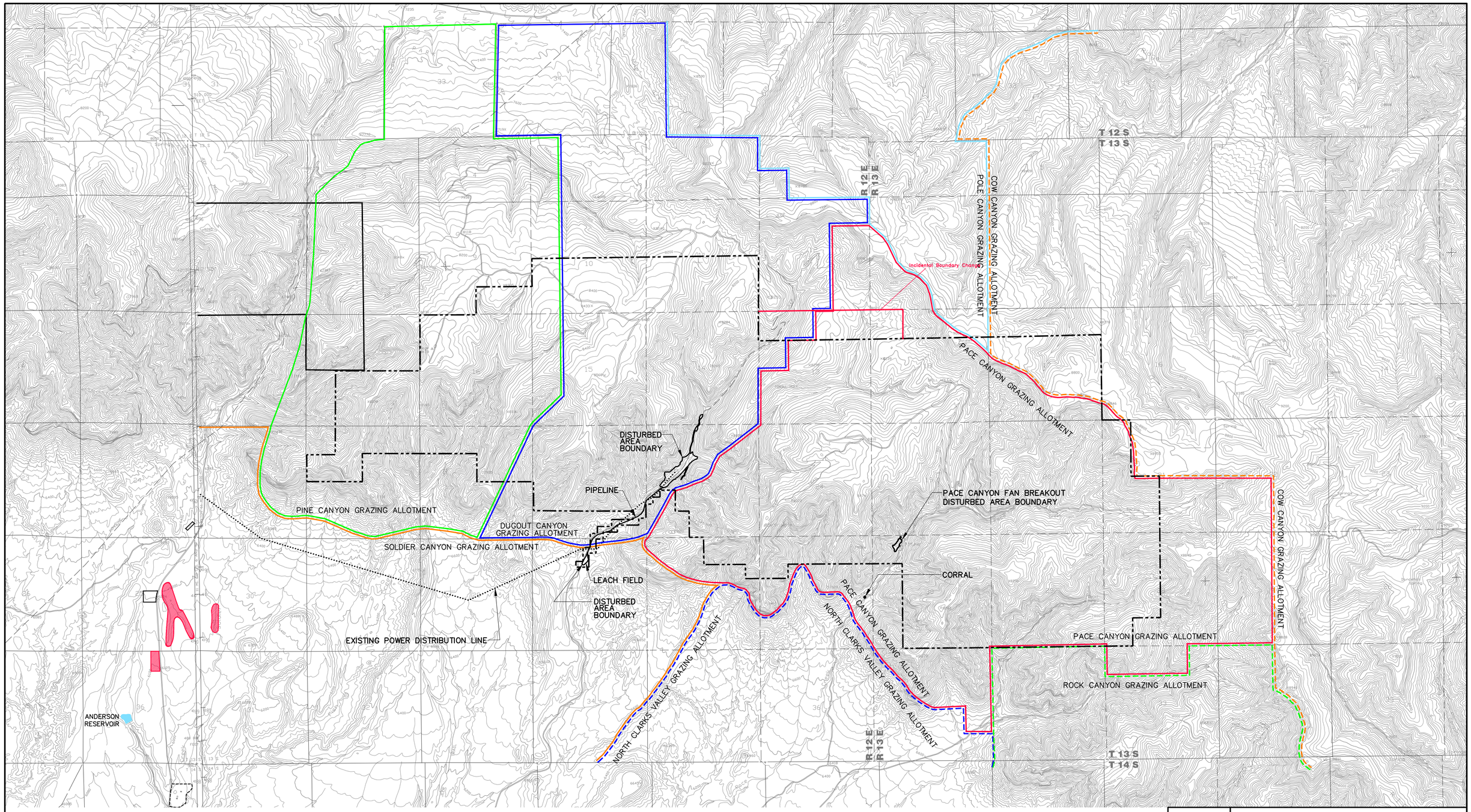

LEGEND

- AGRICULTURE
- MINING
- PERMIT AREA BOUNDARY
- PINE CANYON GRAZING ALLOTMENT
- DUGOUT GRAZING ALLOTMENT
- SOLDIER CANYON GRAZING ALLOTMENT
- PACE CANYON GRAZING ALLOTMENT
- COW CANYON GRAZING ALLOTMENT
- POLE CANYON GRAZING ALLOTMENT
- NORTH CLARKS VALLEY GRAZING ALLOTMENT
- ROCK CANYON GRAZING ALLOTMENT
- ABANDONED AGRICULTURE

NOTE:

1. SEE PLATE 5-1 FOR THE LOCATION OF PREVIOUS MINING.
2. GRAZING ALLOTMENT USE IS DESIGNATED BY BLM.
3. UNDESIGNATED LANDS ARE USED BY OWNERS FOR PRIVATE UNPUBLISHED PURPOSES.
4. REFER TO REFUSE PILE AMENDMENT AND METHANE DEGASSIFICATION AMENDMENT FOR INFORMATION PERTAINING TO THIER AREAS.

REGISTERED PROFESSIONAL ENGINEER
No. 151610
DAVID G. SPILLMAN
STATE OF UTAH

0' 2000'

REVISION	
DATE	BY
03-28-05	VM
01-26-07	JKS
10-10-07	JLP
02/21/08	VSM/SWF
03/06/12	JKS
07/06/16	BK/JKS

Canyon Fuel Company, LLC
Soldier Canyon & Dugout Canyon Mines

LAND USE

Dugout Canyon Mine

DRAWN BY: SWF	DATE: 01/03/05	SCALE: 1" = 2000'
APPROVED BY: LDJ	FILE NAME: G:\UT091\01\DWG\PLATE4-1.DWG	DRAWING OR MAP NUMBER **PLATE 4-1**

Dugout M&RP, Chapter 5, Page 5-25

Dugout Canyon Mine Permit Number C/007/039

Canyon Fuel Company

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Title page for reference only

The mining in RC-5 3rd East pannel located in Section 13, N1/2N1/2 T13, R12 SLBM Utah and Section 18, Lot 1 T13, R13 SLBM Utah, will be done using continuous miners, room and pillar, first mining only. Pillars will remain following the mining of these areas. Refer to Plate 5-7 for the location of these panels and Section 114 for a legal description.

Longwall Mining. Longwall mining will be used for extraction of large, uniform blocks of coal where the panels are more than 2,500 feet in length and where a suitable longwall panel can be laid out. Coal thicknesses of up to 14 feet will be mined in the Dugout Canyon Mine using longwall methods. In areas where coal is thicker than the height capacity of the mining equipment, the unmined coal will be left on the bottom of the bed unless economic or safety conditions warrant otherwise.

The longwall mining system at the Dugout Canyon Mine will consist of three basic integrated sub-systems: self advancing roof support, shearer, and conveyance. Shield-type roof supports will be used. Shield supports are generally considered more suitable for mining conditions such as those encountered at the Dugout Canyon Mine and are designed for expansion, contraction, advancement, and movement in varying thicknesses of coal.

The longwall shearer will utilize a double-ended shearer system for efficiency and flexibility of operation. Such a system consists of two rotary cutting drums mounted on ranging arms which are pivoted to a common body containing the power and drive assemblies. An optimum-tip drive speed is associated with each drum-pick configuration and diameter to assure minimization of fines in the sheared coal. The conveyance system to be used in the mine has been designed to convey extracted coal along the 540 to 1000 foot faces.

Anticipated Production. Anticipated annual production of coal from the Dugout Canyon Mine during the permit term is a follows:

1998 - 0.1 million tons

1999 - 0.7 million tons

2000 - 2.2 million tons

2001 - 3.7 million tons

2002 - 3.9 million tons

2005 - 2009 Anticipated annual average 4,460,000 tons

Dugout M&RP, Chapter 5, Plate 5-7

Dugout Canyon Mine Permit Number C/007/039

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SL-051279-063188

ML-44365

ML-42648

ML-42649

ML-42648

ML-42649

FEE-FISH CREEK

Incidental Boundary Change
Note: There will be no secondary mining beneath the Incidental Boundary Change area.

U-07064-027821

ML-48435

ML 50582-OBA

FEE-DUGOUT CANYON

ML-42648

U-07064-027821

ML-48435

Rock Canyon Fault

SOLDIER CANYON ROAD (CR 164)

PIPELINE

Pine Canyon

Fish Creek

Dugout Canyon

Left Fork Rock Pace Creek

WEST

Mine

PACK TRAIL

JEEP TRAIL

Spring

Springs

Cove

RC-4A RC-4B RC-3A RC-3B RC-3 RC-2 RC-1 A-RC1 RC-1 ZZ-RC1

Francis

OLDEN

streeter

dorey

PRESSET

REYNOSO

SEMBORSKI

GORDON

solaier

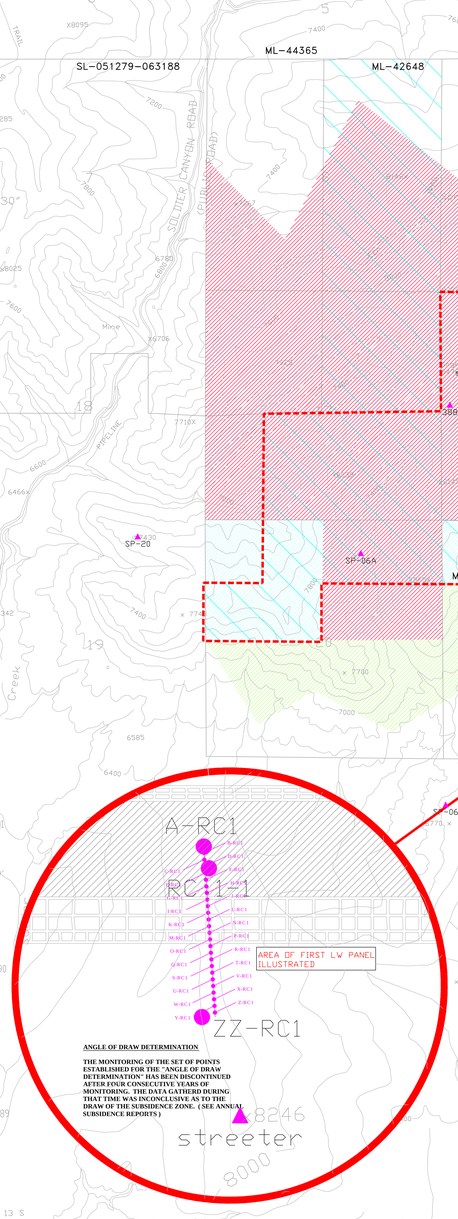
GIL 1 GIL 2 GIL 3 GIL 4 GIL 4a GIL 4b GIL 5 GIL 6 GIL 7 GIL 8 GIL 10 GIL 11 GIL 11b GIL 12 GIL 13

SP-01A SP-01B SP-02A SP-02B SP-03 SP-03A SP-03B SP-03C SP-04 SP-04A SP-05 SP-05A SP-05B SP-06 SP-06A SP-07 SP-08 SP-09 SP-10 SP-11 SP-12 SP-13 SP-13A SP-14A SP-14B SP-15 SP-16 SP-17 SP-17A SP-17B SP-20

3048 3049 3050 3052 3053 3054 3055 3056 3057 3058 3059 3067

388A 388B 388C

8246



ANGLE OF DRAW DETERMINATION

THE MONITORING OF THE SET OF POINTS ESTABLISHED FOR THE "ANGLE OF DRAW DETERMINATION" HAS BEEN DISCONTINUED AFTER FOUR CONSECUTIVE YEARS OF MONITORING. THE DATA GATHERD DURING THAT TIME WAS INCONCLUSIVE AS TO THE DRAW OF THE SUBSIDENCE ZONE. (SEE ANNUAL SUBSIDENCE REPORTS)

MINE PLAN PROJECTIONS

- 02/17 — ROCK CANYON SEAM (OUTLINED IN BLACK)
- 02/17 — GILSON SEAM (OUTLINED IN MAGENTA)
- OLD WORKINGS

SELECTED LEASE IDENTIFICATION

- ML-48435 (STATE) SITLA LEASE
- ML - 42648 (STATE)
- U - 07064 - 027821 (USA)
- ML - 50582 - OBA (STATE)

LEGEND

- LOCATION OF FUTURE SUBSIDENCE MONITORING STATIONS
- LOCATION OF SUBSIDENCE MONITORING STATIONS
- COMPANY SURVEY MONUMENT
- FOUND SECTION CORNER
- POTENTIAL SUBSIDENCE BOUNDARY AT APPROXIMATELY 30° ANGLE OF DRAW
- PERMIT AREA BOUNDARY

NOTE

1. EXACT LOCATIONS OF FUTURE MONITORING STATIONS MAY VARY DEPENDING UPON ACCESSIBILITY, LINE OF SIGHT VISIBILITY, TERRAIN, ETC.
2. REFER TO ANNUAL REPORTS FOR ADDITIONAL SUBSIDENCE INFORMATION.
3. THE PROJECTED MINING ILLUSTRATED BEYOND THE APPROVED PERMIT AREA BOUNDARY IS FOR PLANNING PURPOSES ONLY. ACTUAL MINING OUTSIDE OF CURRENT PERMIT AREA BOUNDARIES WILL ONLY OCCUR AFTER THE APPROPRIATE LEASE MODIFICATIONS ARE MADE AND ALL PERMIT REQUIREMENTS ARE MET.

PROJECTED MINING BY YEARS

- Previous Mining
- 1st Quarter 2016
- 2nd Quarter 2016
- 3rd Quarter 2016
- 4th Quarter 2016
- 2017
- 2018
- 2019
- 2020

LAND OWNERSHIP

- MILTON AND ARDITH THAYN TRUST
- UNITED STATES OF AMERICA
- STATE OF UTAH
- CANYON FUEL COMPANY, LLC
- CONOVER, ET AL (For More Information Reference Plate 1-1)
- KFJ RAND PARTNERSHIP

0' 1000'

REVISION	
DATE	BY
01/26/07	JKS
04/27/07	JLP
07/05/07	SC
10/23/07	JLP
02/21/08	VSM/SWF
04/09/08	VSM/SWF
08/06/10	JKS/SV
08/17/11	JKS/SV
03/12/12	JKS/SV
06/24/16	JKS/JH
06/27/16	DGS

DRAWN BY: SC
APPROVED BY:

DATE: MAY 10, 2006 0459.PCP
FILE NAME: Plate 5-7 dgs.dwg

SCALE: 1"=1000'
DRAWING OR MAP NUMBER: PLATE 5-7

Canyon Fuel Company, LLC
Soldier Canyon & Dugout Canyon Mines

PROPOSED MINE SEQUENCE AND PLANNED SUBSIDENCE BOUNDARY

Dugout Canyon Mine

REGISTERED PROFESSIONAL ENGINEER AND LAND SURVEYOR
No. 151610
DAVID G. SPILLMAN
STATE OF UTAH

Dugout M&RP, Chapter 6, Plates 6-1, 6-4, 6-5, 6-6, 6-7

Dugout Canyon Mine Permit Number C/007/039

Canyon Fuel Company

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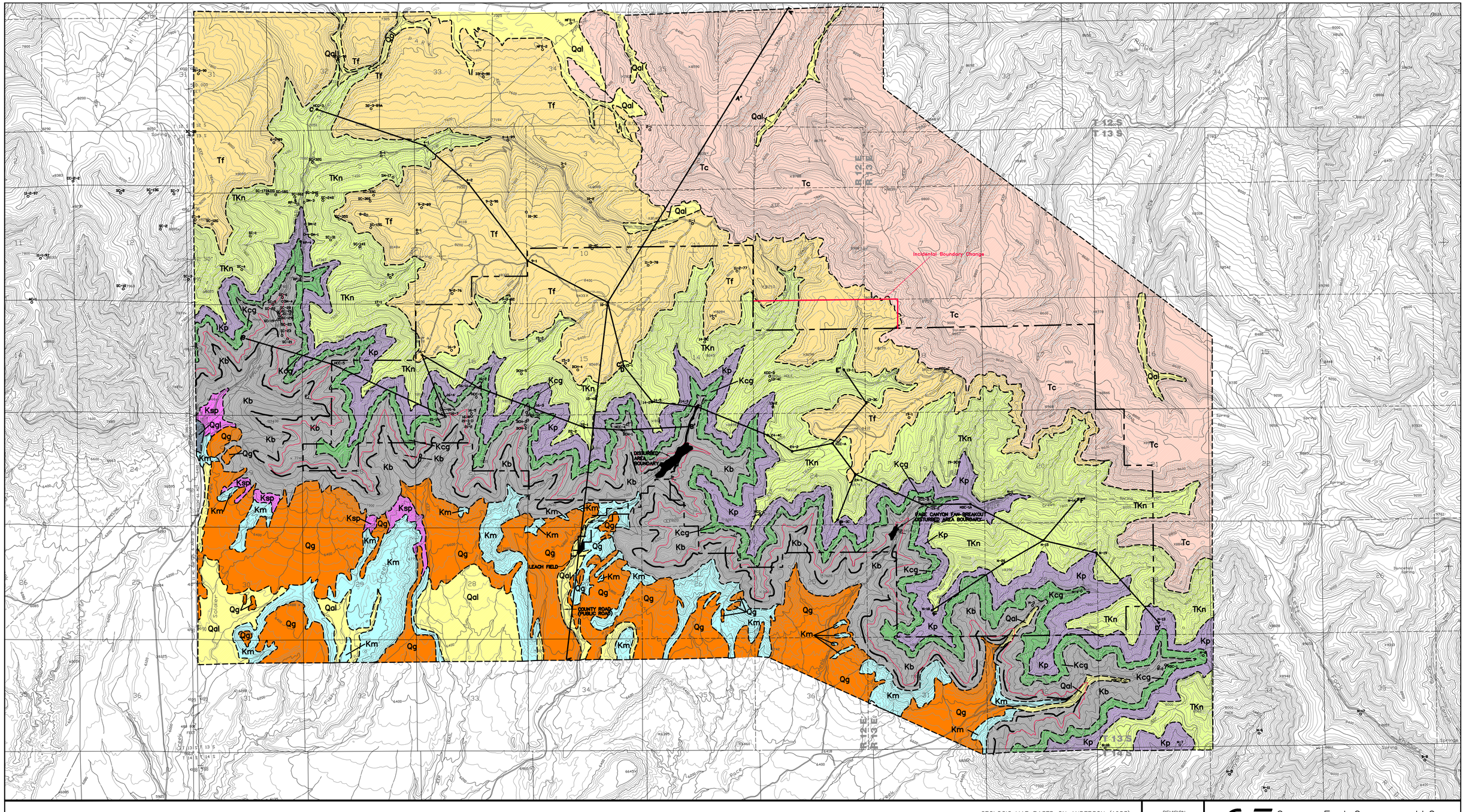


NOTES:

1. REFER TO REFUSE PILE AMENDMENT AND METHANE DEGASSIFICATION AMENDMENT FOR INFORMATION PERTAINING TO THEIR AREAS.
2. SEE FIGURE 6-1 FOR A-A' CROSS SECTION.
3. SEE PLATE 6-3 FOR B-B' AND C-C' CROSS SECTIONS.
4. SEE PLATE 6-3A FOR D-D' CROSS SECTION.
5. SEE PLATE 6-3B FOR E-E' AND F-F' CROSS SECTIONS.

LEGEND

- PERMIT AREA BOUNDARY
- 6° — STRIKE AND DIP
- 9-2 — DRILL HOLE LOCATION
- APPROXIMATE LOCATION OF THE ROCK CANYON COAL SEAM
- U / D — NORMAL FAULT, DASHED WHERE INFERRED, U, UPTHROWN SIDE D, DOWNTHROWN SIDE
- APPROXIMATE LOCATION OF THE TOP OF THE KENILWORTH SANDSTONE MEMBER OF THE BLACKHAWK FORMATION

QUATERNARY
- Qal ALLUVIUM
- Qg PEDIMENT GRAVELS
- Qgl GRAVELS

TERTIARY
- Tc COLTON FORMATION
- Tf FLAGSTAFF FORMATION

CRETACEOUS
- Kp PRICE RIVER FORMATION
- Kcg CASTLEGATE SANDSTONE
- Kb BLACKHAWK FORMATION
- Ksp STAR POINT SANDSTONE
- Km MANCOS SHALE

TERTIARY-CRETACEOUS
- TKn NORTH HORN FORMATION

GEOLOGIC MAP BASED ON ANDERSON (1983) & INTRASEARCH (1998).

REGISTERED PROFESSIONAL ENGINEER
No. 151610
DAVID G. SPILLMAN
STATE OF UTAH

0' 2000'

REVISION	
DATE	BY
12/29/03	RR
01/26/07	JKS
10/07/07	SC
02/21/08	VSM/SWF
03/06/12	JKS
06/06/12	JKS
07/06/16	BK/JKS

Canyon Fuel Company, LLC
Soldier Canyon & Dugout Canyon Mines

GEOLOGY OF DUGOUT CANYON MINE PERMIT AREA

Dugout Canyon Mine

DRAWN BY: JLP	DATE: MAY 7, 1999 D-444.PCP	SCALE: 1" = 2000'	
APPROVED BY: MWS	FILE NAME: X:\DOGM\Working Files\Dugout\Sitla\Plate 6-1.dwg	DRAWING OR MAP NUMBER	PLATE 6-1

Incidental Boundary Change

DISTURBED AREA BOUNDARY

PACE CANYON FAN PORTAL DISTURBED AREA BOUNDARY

LEACH FIELD

LEGEND

- COVER LINES (THICKNESS IN FEET)
- PERMIT AREA BOUNDARY
- COAL SEAM OUTCROP
- BURNED COAL

REGISTERED PROFESSIONAL ENGINEER
No. 151610
DAVID G. SPILLMAN
STATE OF UTAH

0' 1200'

REVISION	
DATE	BY
02/21/08	VSM/SWF
03/05/12	JKS
07/06/18	BK/JKS

Canyon Fuel Company, LLC
Soldier Canyon & Dugout Canyon Mines

ROCK CANYON SEAM OVERBURDEN THICKNESS

Dugout Canyon Mine

DRAWN BY: SC
APPROVED BY: DGS
DATE: Oct 9, 2007
D-446.PCP
SCALE: 1" = 1200'
FILE NAME: K:\DGOM\Working Files\Dugout\Utils\Plate 6-4.dwg
DRAWING OR MAP NUMBER: PLATE 6-4

T 12 S
T 13 S

R 12 E
R 13 E

Incidental Boundary Change

DISTURBED AREA BOUNDARY

PACE CANYON FAN PORTAL DISTURBED AREA BOUNDARY

LEACH FIELD

LEGEND

PERMIT BOUNDARY

EXISTING MINE WORKINGS

COAL SEAM OUTCROP

COAL BURN

INTERBURDEN THICKNESS IN FT

REGISTERED PROFESSIONAL ENGINEER
No. 151610
DAVID G. SPILLMAN
STATE OF UTAH

REVISIONS OR UP-DATES		
NO.	DATE	BY
	03/05/07	SC
	10/10/07	JLP
	02/21/08	VSM/SWF
	03/06/12	JKS
	07/06/16	BK/JKS

DATE: 04/20/98
DESIGNED BY:
DRAWN BY: JLP
CHECKED BY:
SCALE: 1" = 2000'

FILENAME: X:\DOGM\Working Files\Dugout\Sitla\Plate 6-5.dwg

Canyon Fuel Company, LLC
Soldier Canyon Mine / Dugout Canyon Mine

ROCK CANYON SEAM / GILSON SEAM INTERBURDEN MAP

P.O BOX 1029
WELLINGTON, UTAH 84542

DRAWING OR MAP NUMBER PLATE 6-5

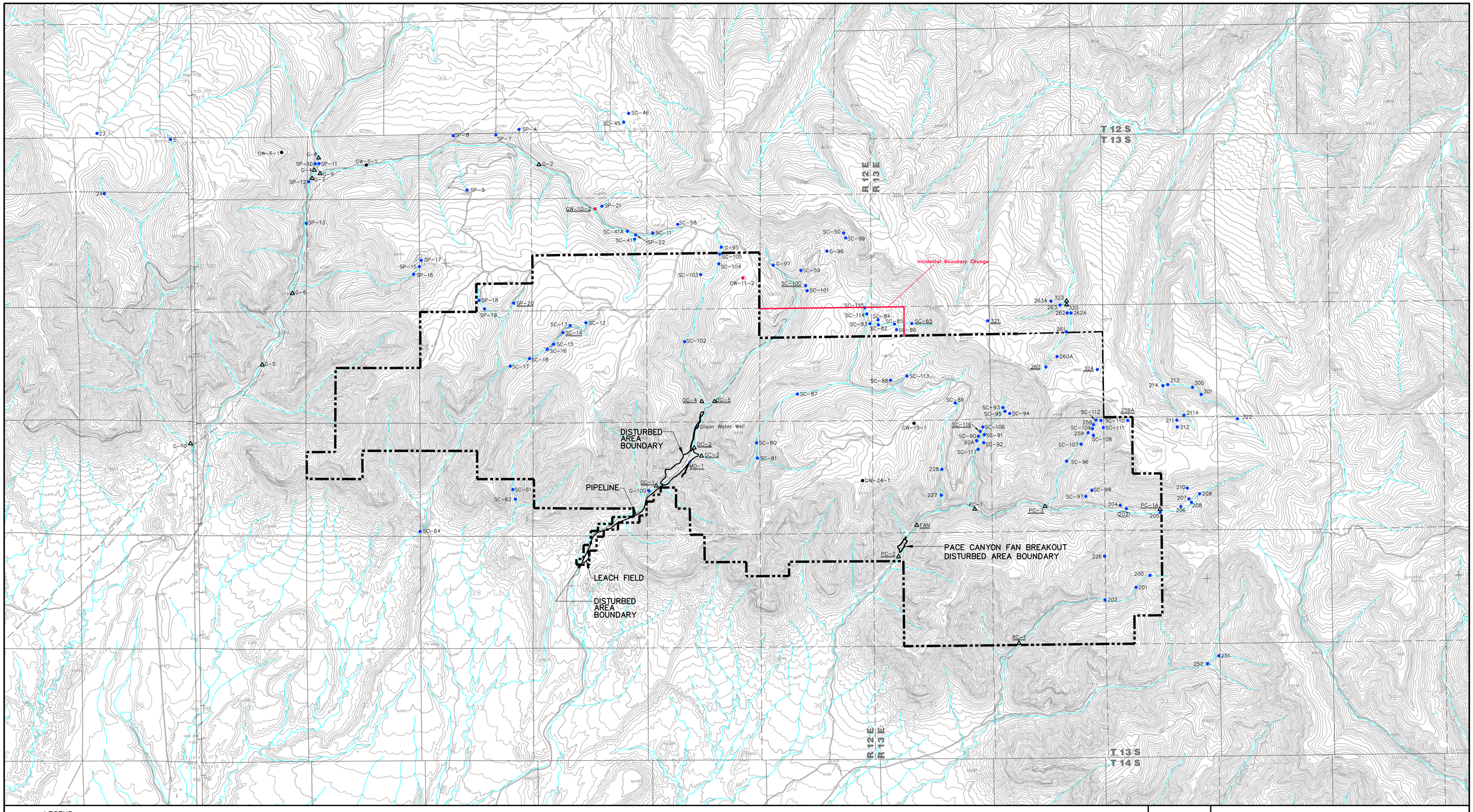
Dugout M&RP, Chapter 7, Plates 7-1, 7-2, 7-3, 7-6

Dugout Canyon Mine Permit Number C/007/039

Canyon Fuel Company

Redline Strikeout Copies

Title page for reference only



LEGEND

- PERMIT AREA BOUNDARY
- MINE DISCHARGE
- SPRING
- MONITORING WELL
- STREAM STATION
- WATER WELL
- EXISTING DRAINAGE

SC-65 — UNDERLINED STATION NUMBERS INDICATE LOCATIONS FOR OPERATIONAL BASELINE AND POST-MINING MONITORING.

270 — CIRCLED STATION NUMBERS INDICATE LOCATIONS FOR BASELINE AND OPERATIONAL MONITORING FOR THE SITLA LEASE AREA.

NOTE:

1. REFER TO REFUSE PILE AMENDMENT AND METHANE DEGASSIFICATION AMENDMENT FOR INFORMATION PERTAINING TO THIER AREAS.

REGISTERED PROFESSIONAL ENGINEER
No. 151610
DAVID G. SPILLMAN
STATE OF UTAH

0' 2000'

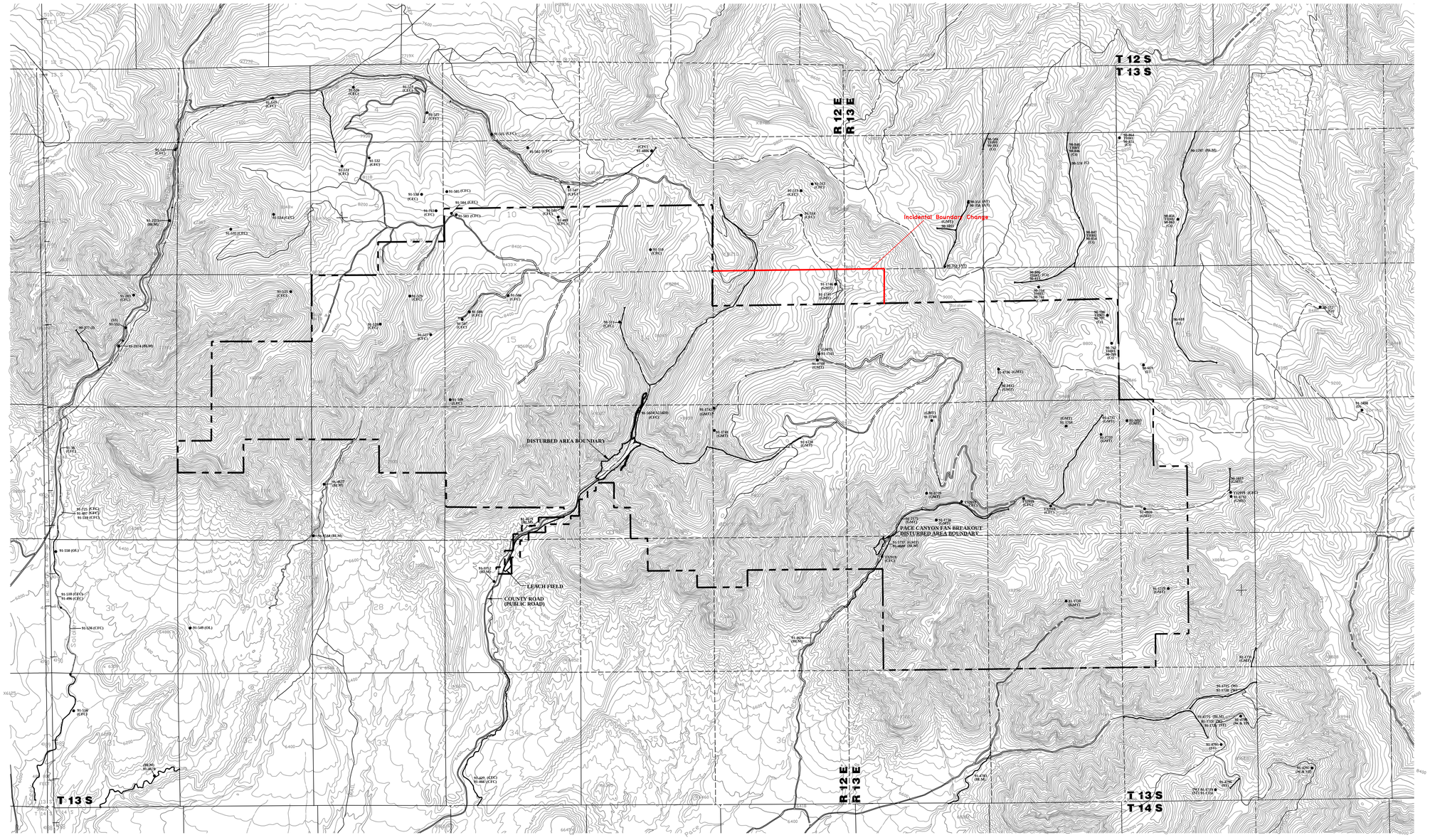
REVISION	
DATE	BY
01/26/07	JKS
03/05/07	JLP
09/18/07	SC
10/10/07	JLP
02/21/08	VSM/SWF
04/09/08	VSM/SWF
07/01/08	VSM/SWF
09/11/08	VSM/SWF
03/06/12	JKS
04/25/12	JKS
02/11/16	BK
07/06/16	BK/JKS

Canyon Fuel Company, LLC
Soldier Canyon & Dugout Canyon Mines

HYDROLOGIC MONITORING STATIONS

Dugout Canyon Mine

DRAWN BY: SWF	DATE: 01/03/05	SCALE: 1" = 2000'
APPROVED BY: LDJ	FILE NAME: PLATE 7-1.DWG	DRAWING OR MAP NUMBER: **PLATE 7-1**



NOTES:

1. REFER TO REFUSE PILE AMENDMENT AND METHANE DEGASSIFICATION AMENDMENT FOR INFORMATION PERTAINING TO THEIR AREAS.
2. THE INFORMATION PRESENTED IS ONLY AS CORRECT AS THE DIVISION OF WATER RIGHTS DATA BASE INFORMATION.
3. REFER TO APPENDIX 7-1 FOR ADDITIONAL WATER RIGHTS INFORMATION.

PERMIT AREA BOUNDARY

STREAM RIGHT SOURCE

POINT SOURCE

LEGEND

(AT) = ALBERT THAYN

(BLM) = USA BUREAU OF LAND MANAGEMENT

(C) = J.M. CONOVER

(CFC) = CANYON FUEL COMPANY, LLC

(Ct) = J.M. & IONE, J. GEORGE, WALLACE, HARRY L., CLYDE, REED, ELAINE CONOVER AND EMILY CONOVER SNOW.

(GMT) = GEORGE M. THAYN

(D) = W. LAVON & MARIANNE W. DAY

(I) = BERNIE IRIART

(OL) = HATTIE OLSEN

(SS) = SAM SAMPINOS

(ST) = RALPH STEVENSON

(U) = UTAH SCHOOL AND INSTITUTIONAL TRUST LANDS

(W) = GLEN WELLS

REGISTERED PROFESSIONAL ENGINEER
No. 151610
DAVID G. SPILLMAN
STATE OF UTAH

0' 2000'

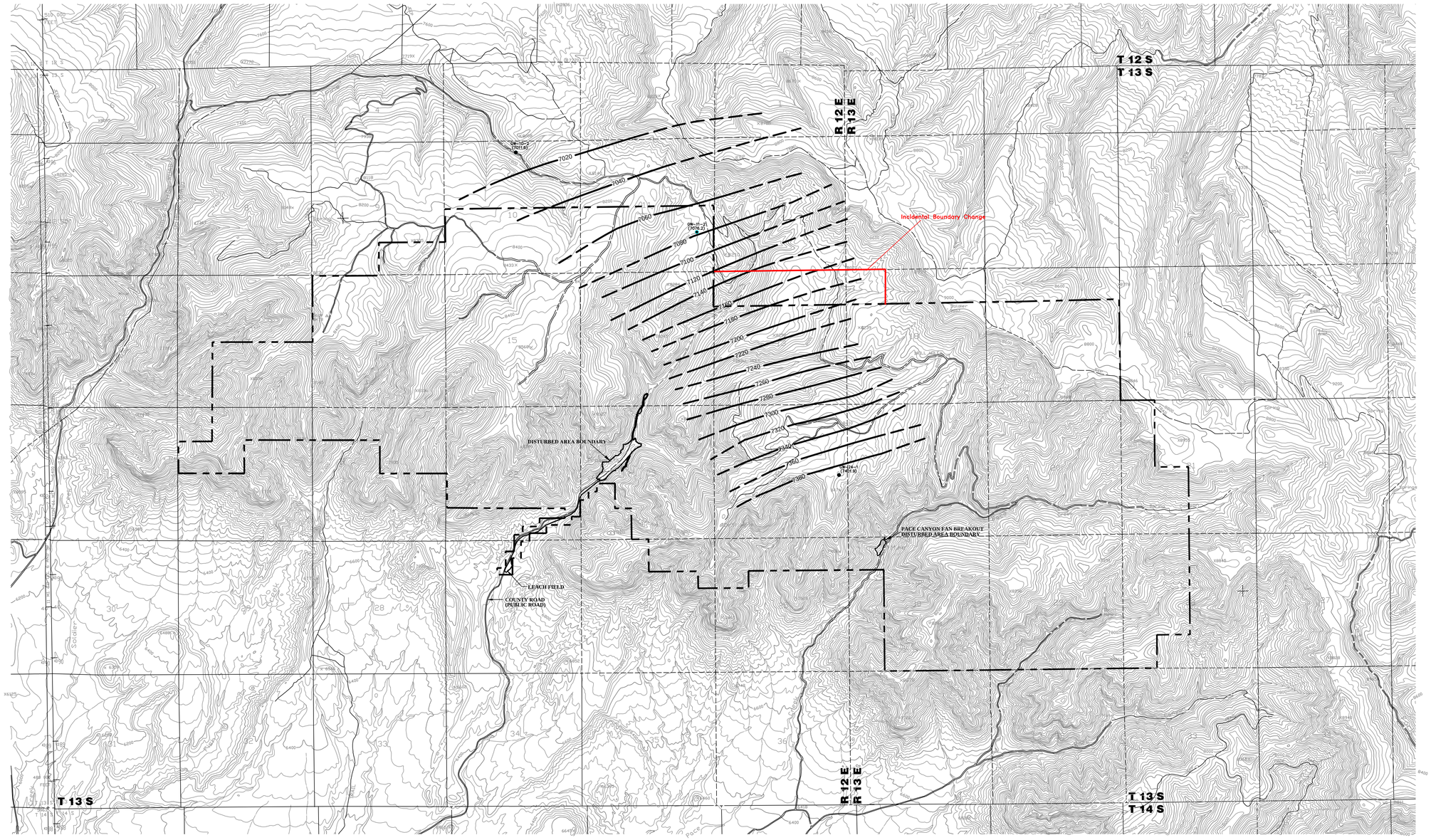
REVISIONS	
DATE	BY
8/20/01	JCB
11/8/01	JCB
12/31/03	RR
01/26/07	JKS
10/10/07	JLP
02/21/08	VSM/SWF
03/06/12	JKS
06/06/12	JKS
07/06/16	BK/JKS

Canyon Fuel Company, LLC
Soldier Canyon & Dugout Canyon Mines

WATER RIGHTS

Dugout Canyon Mine

DRAWN BY: JLP	DATE: MAY 8, 1999	SCALE: 1" = 2000'
APPROVED BY: DGS	FILE NAME: X:\DOGM\Working Files\Dugout\Sitla\Plate 7-2.dwg	DRAWING OR MAP NUMBER PLATE 7-2



NOTE:

REFER TO REFUSE PILE AMENDMENT AND METHANE DEGASSIFICATION AMENDMENT FOR INFORMATION PERTAINING TO THEIR AREAS.

LEGEND:

GW–11–2 (7076.2) — MONITORING WELL (STATIC WATER LEVEL ELEVATION)

7380 — LINE OF EQUAL GROUNDWATER ELEVATION (NOVEMBER 1982)

PERMIT AREA BOUNDARY

REGISTERED PROFESSIONAL ENGINEER
No. 151610
DAVID G. SPILLMAN
STATE OF UTAH

0' 2000'

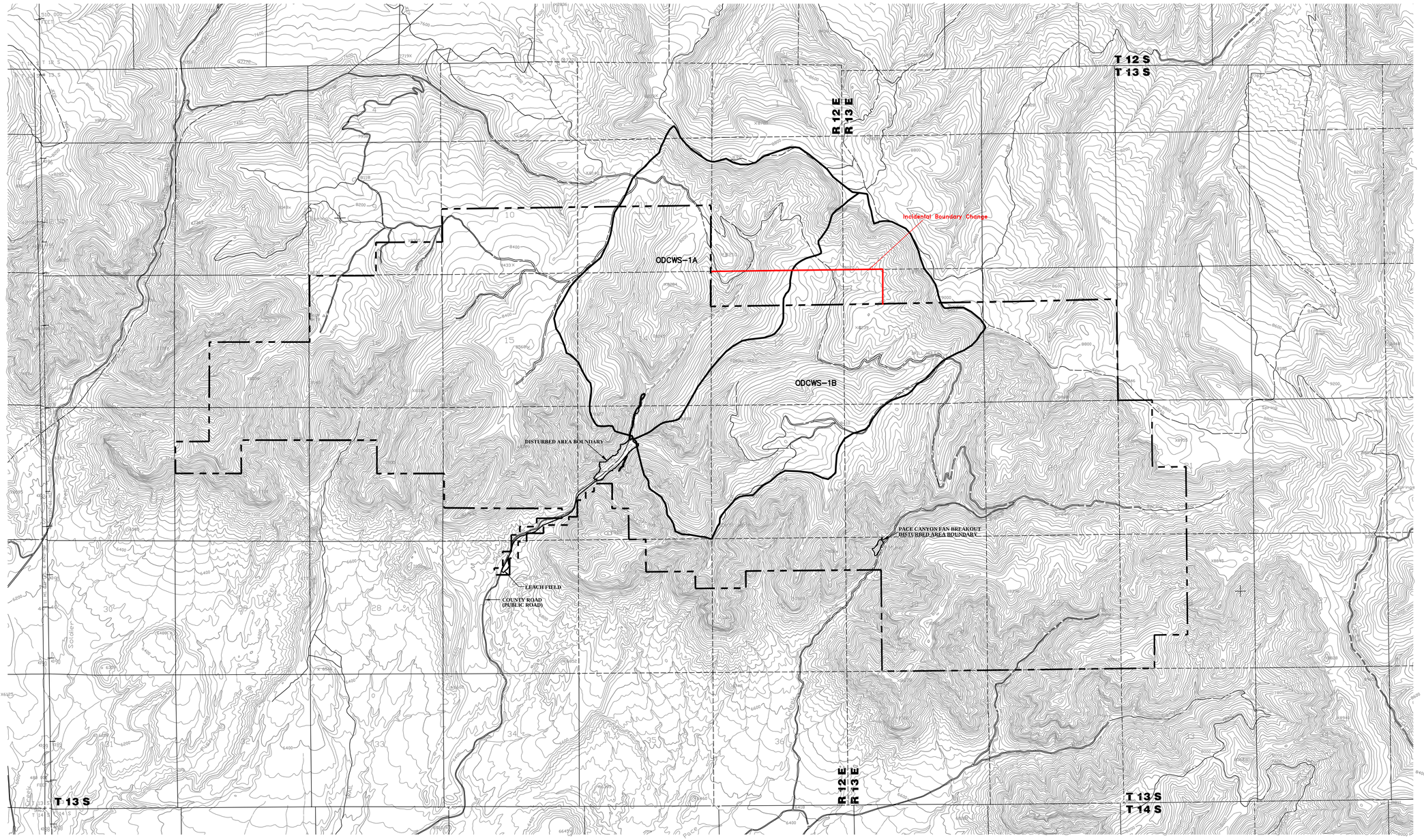
REVISIONS	
DATE	BY
12/18/03	RR
07/01/08	VSM/SWF
03/06/12	JKS
06/06/12	JKS
07/06/16	BK/JKS

Canyon Fuel Company, LLC
Soldier Canyon & Dugout Canyon Mines

CASTLEGATE POTENTIOMETRIC SURFACE

Dugout Canyon Mine

DRAWN BY: JLP	DATE: MAY 5, 1999	SCALE: 1" = 2000'
APPROVED BY: DGS	FILE NAME: X:\DOGM\Working Files\Dugout\Sitla\Plate 7-3.dwg	DRAWING OR MAP NUMBER PLATE 7-3



NOTE:

REFER TO REFUSE PILE AMENDMENT AND METHANE DEGASSIFICATION AMENDMENT FOR INFORMATION PERTAINING TO THEIR AREAS.

LEGEND:

WATERSHED BOUNDARY

ODCWS-1 OPERATIONAL DUGOUT CANYON WATERSHED

PERMIT AREA BOUNDARY

REGISTERED PROFESSIONAL ENGINEER
No. 151610
DAVID G. SPILLMAN
STATE OF UTAH

0' 2000'

REVISIONS	
DATE	BY
12/18/03	RR
07/01/08	VSM/SWF
03/06/12	JKS
06/06/12	JKS
07/06/16	BK

Canyon Fuel Company, LLC
Soldier Canyon & Dugout Canyon Mines

DUGOUT CREEK WATERSHED UPSTREAM FROM SURFACE FACILITIES

Dugout Canyon Mine

DRAWN BY: SWF
APPROVED BY: RBW
DATE: MAY 10, 1999
SCALE: 1" = 2000'
FILE NAME: X:\DOGM\Working Files\Dugout\Sitla\Plate 7-6.dwg
DRAWING OR MAP NUMBER **PLATE 7-6**

Dugout M&RP, Exhibit B Appx. 4-2

Dugout Canyon Mine Permit Number C/007/039

Canyon Fuel Company

Redline Strikeout Copies

Title page for reference only

Dugout M&RP, Refuse Pile Amendment

T 12 S
T 13 S

R 12 E
R 13 E

Incidental Boundary Change

PROPOSED

R12E
R13E

T 13 S
T 14 S

LEGEND:

HARVESTED TIMBER BLOCK

PROPOSED TIMBER BLOCK

H— HELICOPTER LOGGED (NO SOIL DISTURBANCE)

T— TRACTOR LOGGING (EXCAVATED SKID TRAILS)

L— LINE LOGGING (NO EXCAVATED SKID TRAILS)

PERMIT AREA BOUNDARY

AREA OF FUTURE EXPANSION

REGISTERED PROFESSIONAL ENGINEER
No. 151610
DAVID G. SPILLMAN
STATE OF UTAH

0 2000'

REVISION	
DATE	BY
07/06/16	BK/JKS

Canyon Fuel Company, LLC
Soldier Canyon & Dugout Canyon Mines

TIMBER INVENTORY MAP

Dugout Canyon Mine

DRAWN BY: JLP	DATE: MAY 18, 1999	SCALE: 1"=2000'
APPROVED BY: DGS	FILE NAME: D-460.DWG D-460.PCP	DRAWING OR MAP NUMBER EXHIBIT B APPX. 4-2

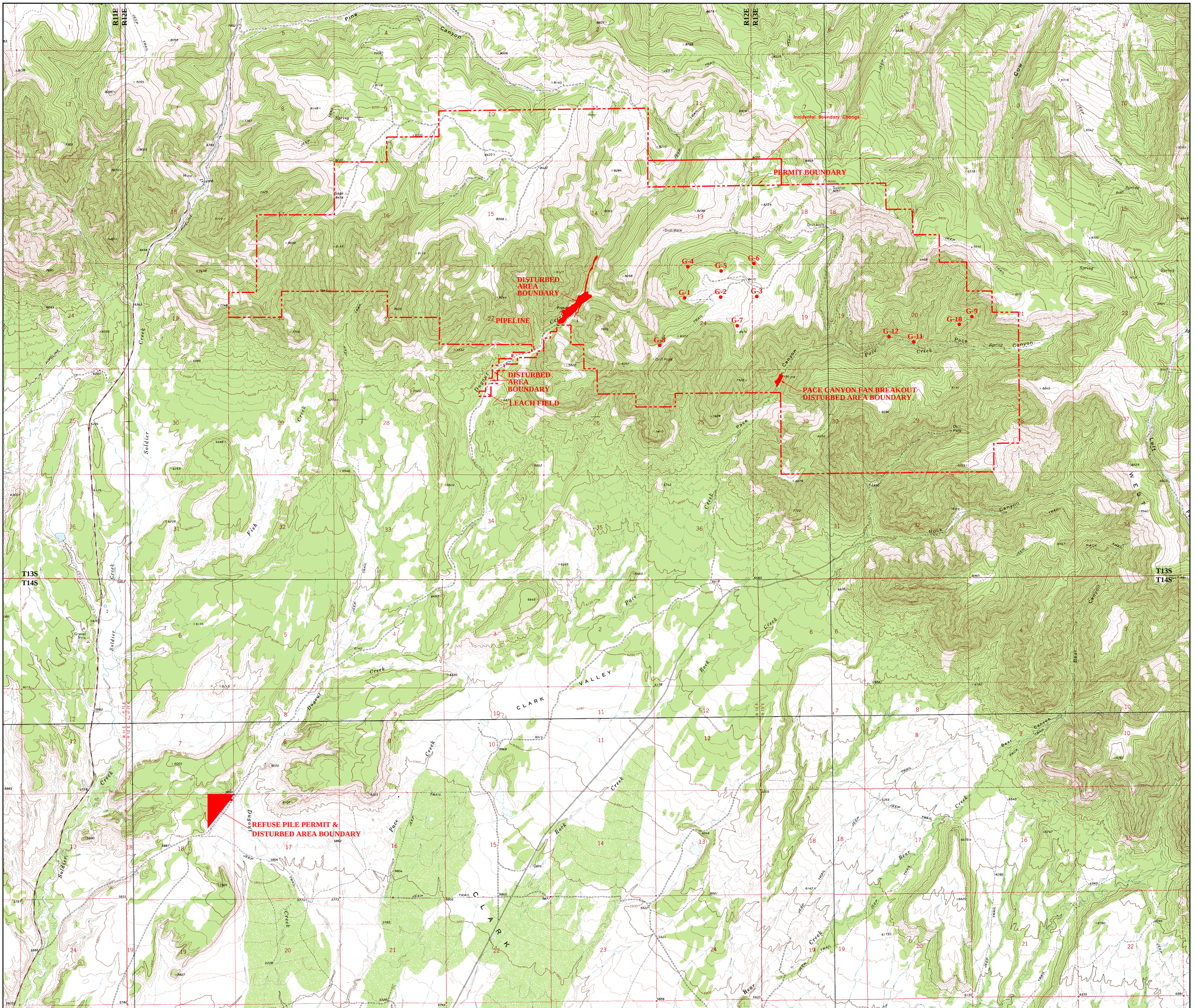
Chapter 1, RA Plate 1-1

Dugout Canyon Mine Permit Number C/007/039

Canyon Fuel Company

Redline Strikeout Copies

Title page for reference only



REGISTERED PROFESSIONAL ENGINEER
No. 151610
DAVID G. SPILLMAN
STATE OF UTAH

REVISIONS	
DATE	BY
01/20/06	VSM
07/06/16	BK/JKS

Canyon Fuel Company, LLC
Soldier Canyon & Dugout Canyon Mines

DUGOUT CANYON MINE PERMIT AREA

Dugout Canyon Mine

DRAWN BY: RR	DATE: JANUARY 07, 2003	SCALE: 1" = 2000'
APPROVED BY: VSM	FILE NAME: G:\UC801\15\DWG\PLATE RA 1-1.DWG	DRAWING OR MAP NUMBER RA PLATE 1-1

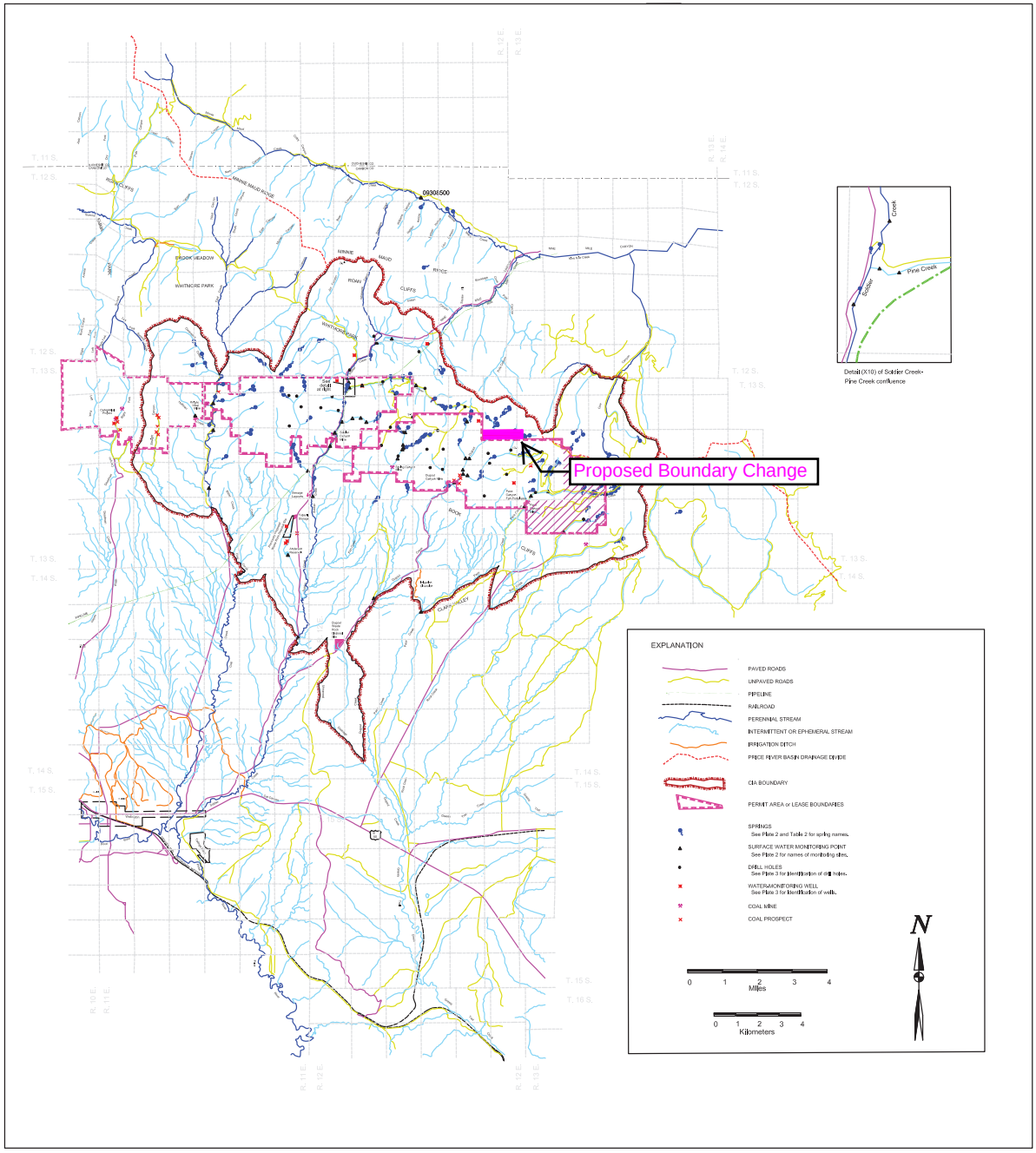
Supportive Documents

IBC, Canyon Fuel Company, Task ID # 5212

Plate 1 Cumulative Impact Area (CIA) Boundary Map

Title page for reference only

The expanded area lies within the Cumulative Hydrologic Impact Assessment (CHIA), Book Cliffs Area II. Plate 1-Cumulative Impact Area (CIA) Book Cliff Area II of the CHIA shows the CIA boundary with relationship to Dugout's permit boundary. See supportive documents Plate 1-CIA for the highlighted proposed expansion area. According to the CHIA, page 63 "The Division has found no evidence of material damage from the actual mining operations, nor a probability of material damage from actual or anticipated mining operations in the Book Cliffs Area II CHIA".



State of Utah
Department of Natural Resources
Division of Oil, Gas & Mining
3 Triad, Suite 350
Salt Lake City, Utah 84180-1203
(801) 538-5340

Rev.	Date	By	Revision
	3/2/98	JDSmith	Final corrections for March 1998 CHIA
JDS	7/30/99	JDSmith	Revision for Fed. Lease UE7054-027621
SRSSD	3/28/00	JDSmith	Significant Revision SRSSD
SITLA	6/24/05	DDean	SITLA Lease ML-42649 and Pace Canyon Fan Portal

PLATE 1 - CUMULATIVE IMPACT AREA (CIA)
BOOK CLIFFS AREA II CHIA

Drawn By	J.D. SMITH
Date	AUGUST 31, 1997
Approved By	
Date	
Scale	SEE BAR SCALES
Dwg. No.	C:\CHIA\CHIA\BookCliffs_II\DUGOUT\ACAD\Plates\Plate-1\mxd\05.dwg

Supportive Documents

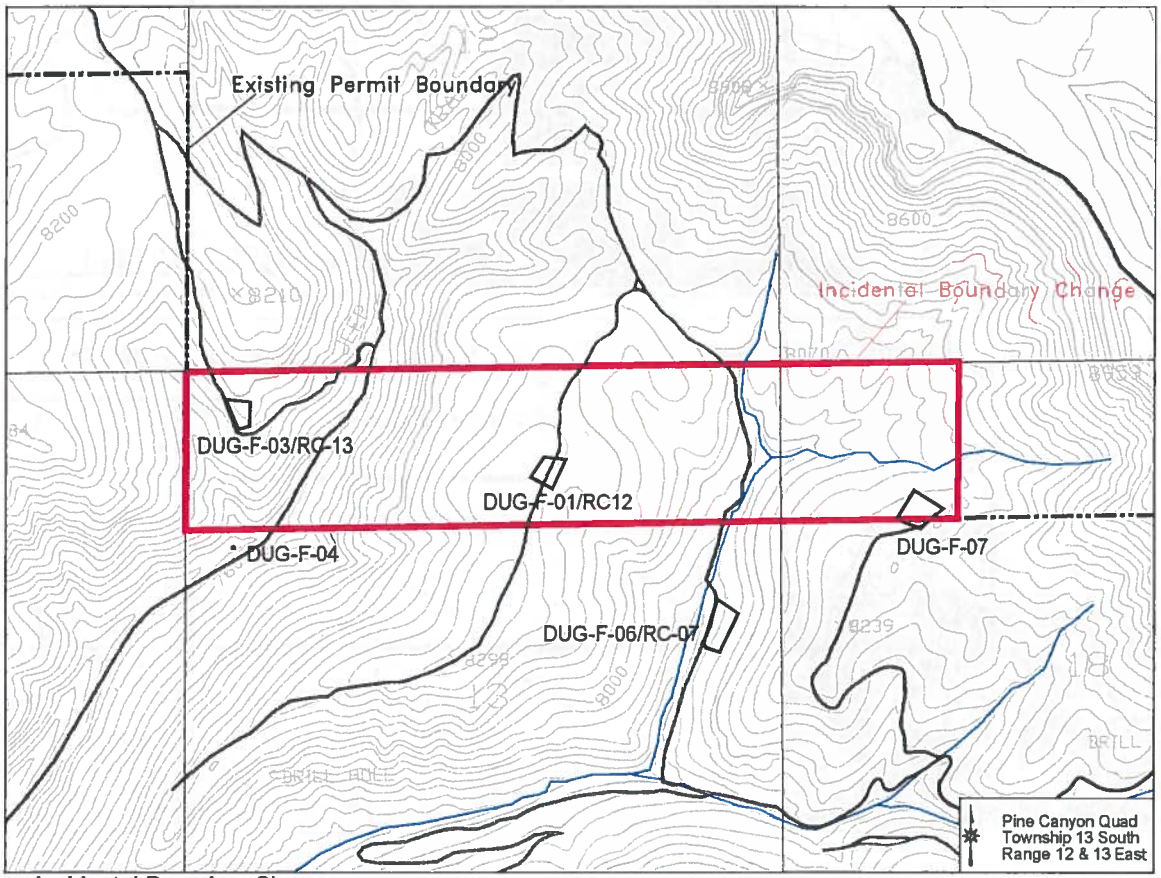
IBC, Canyon Fuel Company, Task ID # 5212

Exploration Plan 2010

Title page for reference only

Dugout Canyon Mine performed an Exploration Plan in 2010 within the Federal Coal Lease UTU-07064-027821. The Exploration Plan coverd 5 drill sites where 3 of these drill sites were within the proposed expansion area, see below. There are no proposed surface disturbance activities (drilling/surface disturbance of any kind) within the proposed boundary expansion. The Exploration Plan is formatted to address the specific requirements of 30 CFR Chapter VII subchapters G and K and 43 CFR 3482 and the applicable regulations under R 645-201 and 202 of the Utah Department of Oil, Gas and Mining (UDOGM). The Exploration plan was submitted and accepted by the BLM in 2010.

The Exploration Plan of 2010 covers drill sites DUG-F-01, DUG-F-03, DUG-F-04, DUG-F-06 & DUG-F-07. Sites actually drilled are DUG-F-01, DUG-F-03, DUG-F-04 & DUG-F-06. See map below.



Incidental Boundary Change:

Township 13 South, Range 12 East, SLBM, Utah
Section 13: N1/2N1/2, containing approximately 160 acres
Township 13 South, Range 13 East, SLBM, Utah
Section 18: Lot 1, containing approximately 47 acres

United States Department of the Interior

BUREAU OF LAND MANAGEMENT

Utah State Office
P.O. Box 45155
Salt Lake City, UT 84145-0155
http://www.blm.gov

Sandrus
9-3-10
WBeck
9/3/10
9/3/10

SEP 03 2010

In Reply Refer to:
3482 (UT9223)
U-07064

Mr. Wade Robinson
Ark Land Company
c/o Canyon Fuel Company, LLC
PO Box 1029
Wellington, Utah 84542

Re: Approval of Minor Coal Exploration Plan, Federal Coal Lease U-07064, Carbon County, Utah

Dear Mr. Robinson:

On July 22, 2010, BLM received a plan to conduct coal exploration on the Federal Coal Lease U-07064. Ark Land Company, a subsidiary of Arch Coal, Inc., proposed to drill five exploration holes which are on a federal lease, to further evaluate the coal reserves in this area. Primary access to the exploration site will be by existing roads.

NEPA analysis found no issues that could not be mitigated.

The BLM approves the requested exploration plan for U-07064 subject to the terms and conditions of the lease and the special stipulations attached.

This decision may be appealed to the Interior Board of Lands Appeals (IBLA), Office of the Secretary, in accordance with the regulations contained in 43 CFR Part 4, and the enclosed Form 1842-1. If an appeal is taken, your notice of appeal must be filed in this office (at the above address) within 30 days from the receipt of this decision. The appellant has the burden of showing that the decision is in error.

If you have any questions regarding this matter, please contact Sue Wiler of our staff at 435-636-3651.

Sincerely,

s/ Roger L. Bankert

Roger Bankert
Chief, Branch of Minerals

Enclosures
1. BLM Stipulations (4 pp)
2. Form 1842-1

cc: UTG023, Steve Rigby, Price Field Office (w/enclosures)
UT924, Bill Buge, Utah State Office (w/enclosures)
Dana Dean (UDOGM) (w/Enclosures)
Division of Oil, Gas and Mining
1594 West North Temple
P. O. Box 145801
Salt Lake City, Utah 84114-5801

DugoutExplorationapprovalletter9-3-2010-RB-SA

Special Stipulations for Exploration For Arch Coal / Dugout

EXPLORATION PLAN
2010

TO ACCOMPANY AN
APPLICATION FOR A FEDERAL MINOR COAL
EXPLORATION PLAN
UTU-07064-027821

Dugout Canyon Mine
Carbon County, Utah

Exploration Plan
July 19, 2010

Ark Land Company
A Subsidiary of Arch Coal, Inc.

Introduction

Ark Land Company (a subsidiary of Arch Coal Inc.) is submitting this Exploration Plan on behalf of Canyon Fuel Company, Dugout Canyon Mine to the United States Bureau of Land Management (BLM) as required in 43 CFR 3482 in order to obtain approval to conduct coal exploration and reclamation activities. As many as five (5) exploration drill holes are proposed for core drilling. Exploration activities will occur on private surface owned by either Canyon Fuel Company, or the Milton and Ardith Thayn Trust and will involve coal resources administered by the U. S. Bureau of Land Management. The plan is formatted to address the specific requirements of 30 CFR Chapter VII Subchapters G and K and 43 CFR 3482, and the applicable regulations under R645-201 and 202 of the Utah Department of Oil, Gas and Mining (UDOGM). Requirements of the Utah Department of Oil, Gas and Mining relative to the on-lease exploration plan are addressed on pages 8-9.

43 CFR 3482

3482.1(a)(1) This exploration plan is submitted to the authorized officer to obtain approval to conduct exploration and reclamation activities. The exploration activities proposed are not considered casual use because some heavy equipment will be employed and minor surface disturbance will occur.

3482.1(a)(2) Five copies of this exploration plan are delivered to the authorized officer. This exploration plan honors the BLM conditions of the federal coal leases involved including protection of the coal resources and reclamation of the disturbed surface. Reclamation is an integral part of the exploration activities and will progress as contemporaneously as practical with the other exploration activities.

3482.1(a)(3)(i) The name, address and telephone number of the applicant is :

Ark Land Company
C/o Dugout Canyon Mine
PO Box 1029
Wellington, Utah 84542
435 613-2830

The applicant is the same as the operator of the proposed exploration plan. Correspondence regarding this exploration plan should be addressed to:

Wade Robinson
Ark Land Company
C/o Dugout Canyon Mine
PO Box 1029
Wellington, Utah 84542
435 613-2830

The lessee of record is:

Canyon Fuel Company
225 N. 5th Str., Suite 900
Grand Junction, CO 81501
(970) 263-5130

3482.1(a)(3)(iii) The name, address and telephone number of the representative of the applicant who will be present during and be responsible for conducting the exploration is:

Wade Robinson
Ark Land Company
C/o Dugout Canyon Mine
PO Box 1029
Wellington, Utah 84542
435 613-2830

At times a consulting geologist may act as representative of the applicant. The BLM and UDOGM will be notified of the consulting geologist's name and address if one is used.

3482.1(a)(3)(iii) The exploration area is located approximately 20 miles northeast of the town of Wellington, Carbon County, Utah (Figure 1). The legal description of the exploration area is as follows:

T13S R12E, Carbon County, Utah:
Section 13 – N1/2

T13S R13E, Carbon County, Utah:
Section 18 – NW1/4 of the NW1/4
Total: 367.44 acres

The proposed exploration holes are located north of Dugout Canyon Mine facility. Figure 2 provides the location of exploration drill sites (DUG F 01, DUG F 03, DUG F 04, DUG F 06, and DUG F 07) and access routes. Heavy Equipment access is via a county road through Clark Valley east of Wellington, herein called the Clark Valley Road. A well-maintained dirt road referred to as the Pace Canyon Road connects the Clark Valley Road to the exploration area. A second access will be the Pine Canyon Road from the Soldier Creek Mine. Existing drilling access routes will receive minor grading and localized repairs as needed. Vehicles associated with a degasification drilling program may share the roads with exploration drilling vehicles.

The elevation in the area ranges from 7,200 feet in the south along the base of the Book Cliffs to 8,700 feet in the north atop the high mesas. The terrain is rugged with relatively gently sloping mesas bounded by the steep slopes of the Book Cliffs. Relatively deep and narrow valleys bisect the highlands and drain southward away from the Book Cliffs. The major drainages in the area are Pace Creek, Rock Creek and Dugout Creek.

Rocks exposed in the exploration area belong to the Cretaceous age Blackhawk and Price River formations, and the Cretaceous-Tertiary age North Horn Formation. The rock types are predominantly sandstone, siltstone, shale, and coal. Quaternary alluvium and colluvium deposits of sand, silt, clay and boulders exist within the confines of the canyons. The major geologic features in the exploration area are the escarpments created by the various sandstone outcrops including the 150 ft thick Castlegate Sandstone, a member of the Price River formation. Some faults are present within the area of the exploration program.

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 the exploration drill hole.

There is no known groundwater or surface water flows to the Colorado or Green Rivers with potential for impact by the drilling of the exploration hole. Potential adverse affects to the four Colorado River endangered fish species would not be likely since there is no direct route to the Colorado River or Green River from the proposed drill hole locations. Per meetings with Division of Water Quality personnel during application for a UPDES permit in 2004, "there is no data supporting the premise that surface waters associated with the area of the mine operations reached the Price River or Colorado River prior to or since mining disturbance".

Vegetation – A vegetation report prepared by Mt. Nebo Scientific has been provided in Appendix C. The report covers species and cover for the area of the drill hole. The Mt. Nebo Scientific report also discusses the existence of Threatened and Endangered species.

Wildlife - Drilling of the exploration holes will be post-July 15, eliminating the sites from the wildlife exclusionary period.

Raptors - Aerial raptor nest surveys done of the area by the Utah Division of Wildlife Resource are available for review in the confidential folder of the Dugout Canyon Mine's M&RP. The surveys have identified no raptor within or immediately adjacent to the drill sites.

Goshawks - A Northern Goshawk calling survey was performed for four weeks. According to the survey there was no response from a northern goshawk. A copy of this survey is located in the confidential binder.

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 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 – A calling point survey was conducted in the 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". Additional studies by DW Wiley and F. Howe indicate that the habitat for the owls is in the southern parts of Utah, not in the Bookcliff area proposed for exploration drilling.

Cultural Resources - There are no known districts, sites, buildings, structures, or objects listed on, or eligible for listing on, the National Register of Historic Places within the proposed exploration area. There are no known archeological resources located in the proposed exploration area, refer to the Confidential Folder of the Dugout Canyon M&RP. Appendix D (Confidential File) is a site-specific cultural resource evaluation (SPUT-593) for the drilling location.

Ark Land Company will notify the Division should the unlikely event of a cultural or paleontologist resource is discovered during operations. If discovered, the operation will cease and the Division will be notified as soon as possible of the discovery.

3482.1(a)(3)(iv)(A) The general method to be followed during drilling exploration, reclamation, and abandonment is: 1) repair the existing roads as needed, repair of roads may include hauling gravel to fill rough areas on bedrock ledges and grading rutted areas 2) set temporary water tank, pump, and water line as needed, 3) drill and log hole, 3) reclaim the drill site and remove the tank and pump. Water lines may remain to facilitate future exploration drill and degasification drilling. Access to the drill site will be accomplished along an existing road and on foot. No blasting is planned.

Water will be pumped and/or hauled from Dugout Creek or Pace Canyon to the drill sites (Figure 2). When necessary, water will be stored in water/frac tanks. Water use agreement is located in Appendix E.

Core drilling typically involves one truck-mounted 2,000 ft rated core drill, one 3,000 gallon water truck, one drill pipe truck, one auxiliary air compressor, one supply trailer, four pick-up trucks, a geophysical logging truck and one covered trailer. The drilling procedure for the exploration hole will likely be rotary drilling and spot coring of selected zones. It is anticipated that casing will be set into the top of the Castlegate Sandstone.

A supply trailer will carry drill steels, coring equipment, drilling additives, cutting and welding equipment, a dog house and other supplies. Two pick-up trucks will be used by the drillers to carry personnel, fuel, and supplies and two pickup trucks will be used by the dirt contractor. A water truck will be used to supply water to the drilling equipment and/or the removal of water from the pit for disposal. The company representative and geological consultant will also use pick-up trucks for transportation. Support vehicles such as pickup trucks and geophysical logging truck will be parked at the drill sites or on adjacent existing roads.

All gasoline and diesel powered equipment will be equipped with mufflers and spark arresters. Fire suppression equipment will be available to personnel on the project site.

There are no occupied dwellings and no pipelines located in the exploration area. No trenches will be dug and no structures constructed.

The potential for water pollution will be minimized by keeping pollutants away from the drill hole and in their containers. All spills of polluting materials will be removed from the area and disposed of in a proper manner.

The drill pads will be constructed approximately100 ft. X 100 ft., including a mud pit. Approximately 12" of topsoil/growth medium will be salvaged. The sites are immediately adjacent to an existing road. A qualified individual will be present at the site during construction to identify topsoil, should any be located and to direct topsoil/growth medium salvage. A one to three foot berm of subsoil will be constructed around the perimeter of the pad to ensure no runoff from the pad. The pad will be constructed such that fluids will drain toward the mud pit, which will be lined. When the pad is immediately adjacent to an ephemeral or perennial drainage the pit and pad slope will be opposite the drainage. Figure 3 shows a typical drill pad layout. Drill cuttings, excess drill core and used drill foam/mud will be placed in the mud pit and buried at a depth greater than 3.5 feet prior to distribution of soils during reclamation. The pit liner not buried beneath the cuttings will be cut off and removed from the site for proper disposal. The liquids in the mud pit will be allowed to evaporate or will be pumped and hauled for disposal before the site is reclaimed. Mud pits will be fenced when unattended to prevent wildlife from possible entry. The site will be kept free of trash and debris.

As an integral part of the exploration activities reclamation will progress as contemporaneously as practical following the exploration activities. The site will be retuned to approximate original contour, pocked and gouged. An approved seed mix will be applied following gouging.

3482.1(a)(3)(iv)(B) Earth excavation for the drill sites will be completed by a dozer and. A tract mounted backhoe and or a rubber-tired backhoe may be used at times for construction of mud pits. Excavation will include grubbing, removal and storage of the topsoil. Mud pit(s) will be excavated in the material below the topsoil if there is sufficient soil depth. The only material disposed of at the drill sites will be cuttings and drilling fluids which will be placed in the mud pits.

3482.1(a)(3)(iv)(C) The exploration drill holes will be plugged with a cement or cement/bentonite slurry to their full depth. The completion method includes pulling surface casing when possible; but when not possible, cutting it below ground level; pumping the cement/bentonite slurry through the drill pipe starting at the bottom of the hole. Plugging will then be done in stages by tripping-out of the hole 3-4 joints (60-80 ft) and pumping again. This process will be repeated to the surface. A monument marker will be placed in the top of the cement surface plug with the hole number and year.

3482.1(a)(3)(iv)(D) The drill hole may range from 4 inches to 12 1/4 inches in diameter, depending on the drilling method. The larger diameter will be associated with the installation of surface casing. The estimated depths of the proposed drill hole and disturbance area are as follows:

Drill Site	Location	Total Depth (ft)	Pad Area Disturbance (ft)	Disturbed Area (acres)
DUG-F-01	NW1/4, NE1/4, Sec. 13, T13S, R12E	2200	100 X 100	0.5
DUG-F-03	NW1/4, NW1/4, Sec. 13, T13S, R12E	1820	100 X 100	0.5
DUG-F-04	SW1/4, NW1/4, Sec 13, T13S, R12E	1365	100 X 100	0.5
DUG-F-06	SE1/4, NE1/4, Sec. 13, T13S, R12E	1780	100 X 100	0.5
DUG-F-07	Center of NW1/4, Sec. 18, T13S, R13E	2320	100 X 100	0.5

3482.1(a)(3)(iv)(E) None of the holes are planned to be completed as water monitor wells due to small hole diameter and limited rig capacity.

3482.1(a)(3)(v) A time table for all exploration related activities is given below. It is anticipated that exploration activities will start as early as mid-July. The only coal removed during exploration activities will be cores. Cores will be a nominal three inches in diameter. Assuming an average thickness of 7 ft for the Rock Canyon Coal Seam and 8 ft for the Gilson Coal Seam, an estimated 60 pounds of coal will be removed. The drilling procedure will be to rotary drill and spot core to total depth utilizing water, foam, polymer and/or mud as the drilling medium.

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
Prepare Roads, run water lines, set water tanks												
Prepare Sites												
Drilling												
Reclamation												

3482.1(a)(3)(vii) The measures to be used during exploration activities to comply with the performance standards of 43 CFR 3484.1(a) and those of the approved state program (UDOGM) are given on pages 8-9.

3482.1(a)(3)(viii) Figure 2 shows existing roads, proposed access routes and drill hole locations, federal coal lease boundaries, existing bodies of surface water and topographic and drainage features. There are no occupied dwellings or pipelines located in the exploration area. No trenches will be dug, no structures constructed, and no debris disposed of in the exploration area.

3482.1(a)(3)(ix) The owner of record of the surface land is either Canyon Fuel Company or the Milton and Ardith Thayn Trust.

3482.1(a)(3)(x) At this time the authorized officer has not asked for additional data.

43 CFR 3484

3484.1(a)(1) The standards of the rules of this part are given in the following sections of this Appendix A.

3484.1(a)(2) The lands on which exploration activities will occur are not valuable nor prospectively valuable for oil, gas, or geothermal resources. The drill holes proposed will not be drilled to depths or formations where oil, gas, or geothermal resources have been encountered in this area or could be encountered.

3484.1(a)(3) All drill holes will be plugged as previously described in the reply to section **3482.1(a)(3)(iv)(C)**. The BLM will be notified of when plugging will begin. Water pollution potential will be minimized by keeping pollutants in their containers and away from the drill hole. Materials used during drilling operations will be selected to be as non-polluting as possible. Berms will be constructed around the drill holes to contain any potential spills. All spills of polluting materials will be removed from the area and properly disposed of.

Berms, straw bales, and or silt fences will be used to limit the mixing of surface and ground waters. No mixing of surface and ground waters will occur due to abandonment by plugging.

Mud pits, when used, will be constructed to hold all drilling mud and foam. When mud pits cannot be constructed, portable containers will be used or the drilling mud, foam, and or cuttings will be hauled off and disposed of properly.

3484.1(a)(4) Canyon Fuel Company, Dugout Mine will retain all drill and geophysical logs for at least one year and will make them available for inspection and analysis by the authorized officer. All drill cores through critical coal zones will be retained for at least one year.

3484.1(a)(5) None of the holes are planned to be completed as water monitor wells due to small hole diameter and limited rig capacity.

The proposed exploration plan qualifies as minor exploration as described in State of Utah Coal Mining Rules R645 section R645-200-122.

R645-201-221 to 225 Applicable parts of these stipulations were addressed in previous portions of this exploration plan.

R645-201-310 to 323.300 Requirements of these sections were addressed in previous portions of this exploration plan.

R645-201-323.400 The requirements of R645-202 will be met as follows:

R645-202-100 This was addressed in a previous portion of this exploration plan.

R645-202-231 This was addressed in a previous portion of this exploration plan.

R645-202-232 No roads or other transportation facilities will be constructed.

R645-202-233 This was addressed in a previous portion of this exploration plan. During reclamation, any hand grubbed vegetative material will be distributed over the areas from which it was removed to enhance germination. Salvaged topsoil may be contained within berms.

R645-202-234 There will be no diversion of overland flows.

R645-202-235 The drill holes will be plugged to preclude cross-connection. Impoundments will not be constructed.

R645-202-236 Based on historical drilling results, it is not anticipated that acid- or toxic- forming materials will be encountered during exploration. However, an in-mine floor sample taken in 2008 exhibited some acid potential. In the unlikely event unsuitable material is encountered the excess cores will either be buried under four feet of cover on site or taken to the waste rock site and buried beneath four feet of cover.

R645-202-241 This was addressed in a previous portion of this exploration plan.

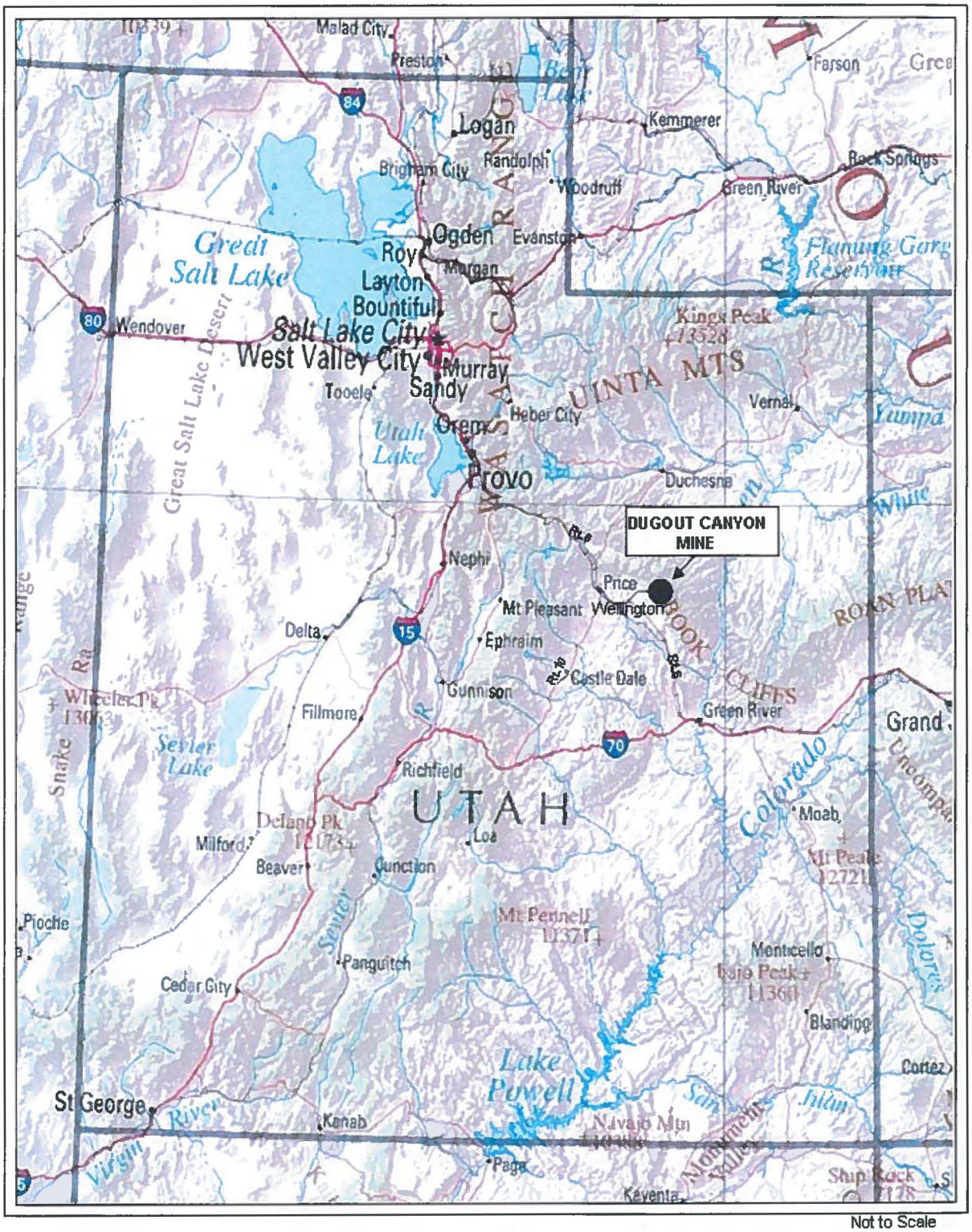
R645-202-242 The method of revegetation is intended to encourage prompt re-vegetation and recovery of a diverse, effective, and permanent vegetative cover. The seed mix is of the same seasonal variety native to the area to be disturbed. The following seed mixture will be used:

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
Wyoming Big Sage (2,500,000 seeds/lb)*	0.5	29
TOTAL	10.0	100

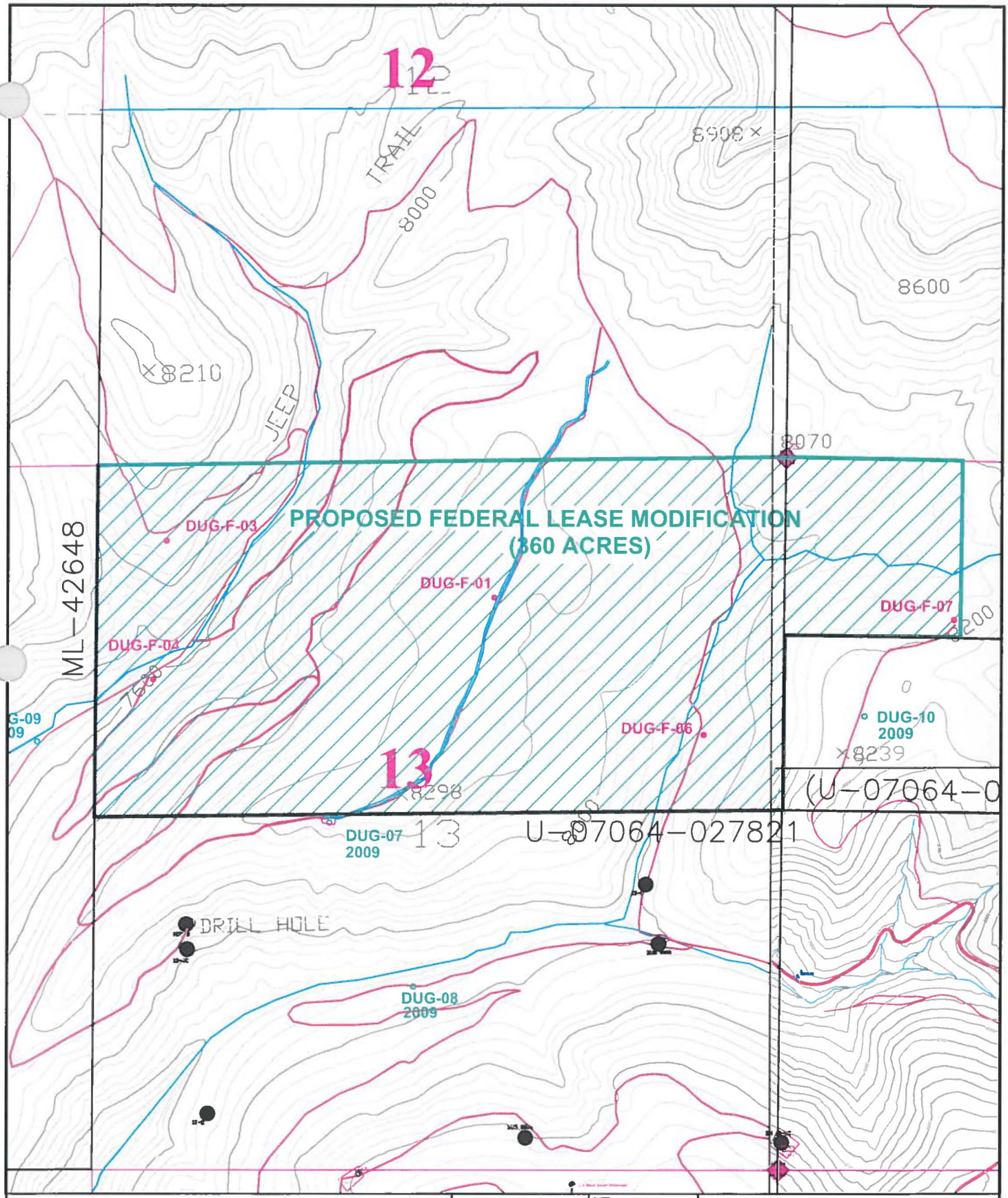
* Native Plants
** Rounded nearest whole seed

When necessary a seed substitute may be made, the substitute will be native and of a similar genus. The seed mixture will be broadcasted over the pocked and gouged reclaimed drill site. The seed mixture and cultivation methods will assure growth capable of stabilizing the soil surface from erosion.



Not to Scale

Figure 1: Location Map of Dugout Canyon Mine



Existing Road

Proposed
2010 Exploration Site

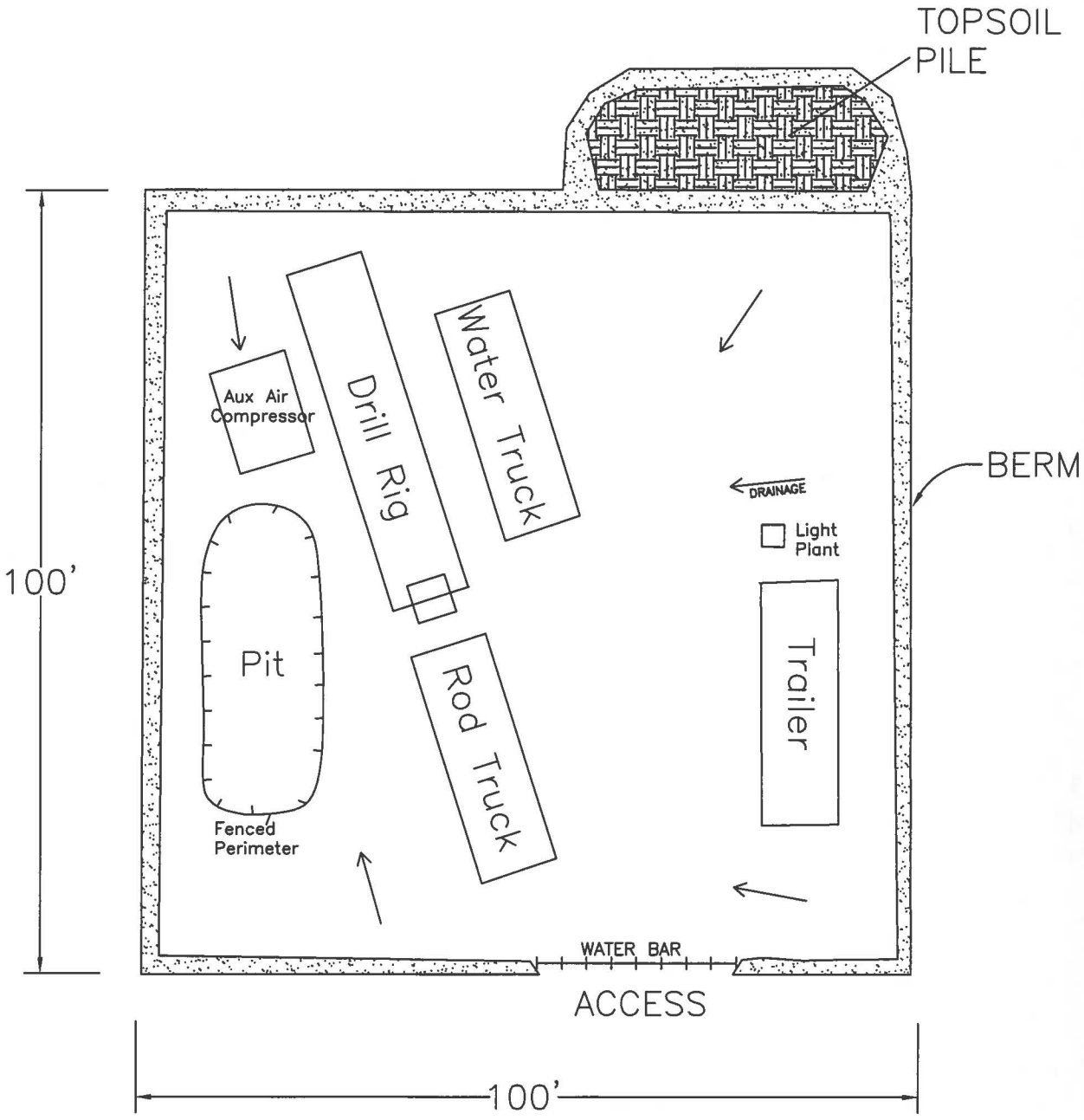
REVISIONS OR UP-DATES			DATE: 1/11/2010	
NO.	DATE	BY	DESIGNED BY:	
			DRAWN BY:	WR
			CHECKED BY:	
			SCALE: 1" = 1000'	
FILENAME:				

Canyon Fuel Company, LLC
Dugout Canyon Mine

2010 Drill Site Locations
Figure 2

P.O BOX 1029
WELLINGTON, UTAH 84542

DRAWING OR MAP NUMBER



Note: Location of equipment, soil piles, and mudpit may vary depending on local terrain and conditions.

REVISIONS OR UP-DATES			DATE: 8/13/08	
NO.	DATE	BY	DESIGNED BY:	
1	8/13/08	AP	DRAWN BY:	JKS
			CHECKED BY:	AP
			SCALE:	NTS

FILENAME: Typical Drillpad Construction.Dwg

Canyon Fuel Company, LLC
Dugout Canyon Mine

FIGURE 3
Typical Drill Pad Construction And Setup

P.O BOX 1029
WELLINGTON, UTAH 84542

DRAWING OR MAP NUMBER

Appendix A

Surface Use Agreement

SURFACE USE AGREEMENT

THIS SURFACE USE AGREEMENT (this "Agreement"), dated as of November ___, 1999 ("Effective Date"), is by and between **Canyon Fuel Company, L.L.C.**, ("CFC"), whose mailing address is 6955 Union Park Center, Suite 540, Midvale, Utah 84047, and **Milton and Ardith Thayn Trust** ("Thayn"), whose mailing address is 7730 East Hwy 6, Price, Utah 84501.

Recitals

Thayn is the surface owner of lands located in Carbon County, Utah, which are described on **Exhibit "A"** attached hereto (the "Thayn Lands"). CFC is a coal mining company and owns and operates the Soldier Canyon Mine and Dugout Canyon Mine (the "Mines"). CFC holds rights under Federal coal leases and pursuant to mine permits granted or to be granted by the Utah Division of Oil, Gas and Mining (the "Mine Permits") to develop and mine underground coal. Thayn has agreed to grant to CFC the nonexclusive use by CFC of the surface of the Thayn Lands to facilitate its coal mining operations in exchange for rights and services from CFC.

Agreement

IN CONSIDERATION of the mutual covenants contained in this Agreement and other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the parties agree as follows:

1. Grants and Services to Thayn.

   (a) CFC shall lease to Thayn for farming and grazing the following lands and grazing and water rights described in **Exhibit "B"** attached hereto : (1) lands owned by CFC located in the Clark Valley (the "Clark Valley Lease Lands"); (2) water rights owned by CFC appurtenant to the Clark Valley Lease Lands (the "Clark Valley Water Rights"); (3) state and federal grazing rights held by CFC related to the Clark Valley Lease Lands (the "Grazing Rights"); and (4) water rights represented by 50 shares of water stock in the Wellington Canal Company owned by CFC (the "Water Shares"). The Clark Valley Lease Lands, the Clark Valley Water Rights, the Grazing Rights and the Water Shares shall all be leased to Thayn under the "Lease Agreement" attached hereto as **Exhibit "C."**

(b) CFC hereby grants to Thayn, for the term of this Agreement and for so long thereafter as agreed in writing by the parties, the non-exclusive, limited use of the Dugout Canyon unimproved road lying north of the Dugout Canyon Mine as may be reasonable and necessary for Thayn's cattle ranching activities, provided that such use shall (i) not interfere with the regular activities of the Mines; (ii) comply with all CFC and applicable federal, state and local rules and regulations imposed on the use of the road; and (iii) not include use of the road by any third party including hunters, tourists or sight-seers.

(c) Upon written notice to CFC, Thayn may request that CFC monitor the flow of springs, streams and seeps located on the Thayn Lands that Thayn reasonably believes may be impacted by CFC's underground mining operations. Upon receiving the written request, CFC shall meet with Thayn to discuss the monitoring sites and to reach a mutually acceptable schedule for such monitoring, provided that CFC shall only be required to monitor such sites for flow. Nothing in this Agreement shall modify CFC's water monitoring program as required by the Mine Permits.

(d) Thayn shall have the non-exclusive right to submit bids as an independent contractor for earth-moving projects conducted on the Thayn Lands that CFC elects, in its sole discretion, to contract to a third party. Thayn shall have a preference for selection as the contractor for the project provided that Thayn can demonstrate to the reasonable satisfaction of CFC that (i) Thayn owns or has right to use the necessary equipment for the project, (ii) Thayn carries insurance coverage required by CFC's risk management procedures for the project, (iii) Thayn has the necessary licenses and permits to conduct the project, and (iv) Thayn's proposed bid is competitive with other bids solicited by CFC for the project. Notwithstanding the foregoing, nothing in this Agreement shall be construed to require CFC to use a third party contractor for any project on the Thayn Lands or to conduct a bid process to select a third party contractor for work conducted on the Thayn Lands or on behalf of Thayn.

2. Surface Use Grants to CFC. CFC shall have and is hereby granted an easement on, over, and through, and a right to use, the surface of the Thayn

Lands as may be necessary and appropriate for the following purposes in connection with mining coal by underground mining methods: (a) conduct subsidence and soil and water sampling, and carry out raptor, wildlife and other environmental studies; (b) conduct exploration drilling and analyses of subsurface conditions by all reasonable means; (c) place or install minor mechanical instruments such as geophones, geo-seismic lines and the like to monitor underground, mine-related activities and results; (d) drill production holes, place and relocate pipelines, and place surface facilities to develop, vent or remove coalbed methane gas, provided such use shall not interfere with regular activities of Thayn's ranching and hunting, and further provided, CFC shall coordinate such activities with Thayn to minimize disruption to Thayn's ranching and hunting activities; and (e) exclusively subside the surface of the Thayn Lands. Except as provided in Sections 3 and 5, CFC shall have no obligation to pay to Thayn any compensation for use of the Thayn Lands.

3. Compensation for Surface Facilities.

(a) In the event CFC is required to place temporary or semi-permanent structures on the Thayn Lands (such as methane venting, exhausting equipment, methane drainage pump stations, pipelines and utilities) in connection with exercising its rights hereunder, CFC shall reasonably compensate Thayn for the use of the Thayn Lands for such structures at rates comparable to other operations in the area. (By way of example, coalbed methane venting and degasification wells are currently compensated at rates in the range of $2,000 to $3,500 per year until the well is plugged and reclaimed.) The parties shall use their best good faith efforts to negotiate compensation for any permanent structure placed on the Thayn Lands.

(b) CFC shall pay Thayn $2,000 for each exploration drill hole placed on the Thayn Lands. Thayn acknowledges that $2,000 represents fair and reasonable compensation for each such drill hole, provided, however, if any such exploration drill hole is subsequently used for coalbed methane venting, Thayn shall be entitled to additional compensation in accordance with the provisions of Section 3(a).

4. Care of Thayn Lands.

(a) CFC shall use and maintain the Thayn Lands in a careful, safe, and lawful manner and shall conduct its operations in compliance with all applicable federal, state and local laws, rules and regulations. CFC shall only use the Thayn Lands for the purposes set forth herein and shall not permit the use or occupancy of the Thayn Lands by any person other than CFC, its employees, agents and contractors.

(b) CFC shall provide Thayn with written notice prior to undertaking any activities on the Thayn Lands. Thayn's concurrence shall be obtained regarding the location of any proposed material surface disturbance, including but not limited to drilling exploration boreholes. Thayn's permission shall not be unreasonably withheld.

(c) CFC shall give special siting consideration to potential borehole locations near springs and seeps on the Thayn Lands.

(d) CFC shall repair or replace any improvements upon the Thayn Lands damaged by CFC's operations. CFC shall reclaim all surface areas disturbed as a result of CFC's operations and shall implement a noxious weed control program for all such disturbed areas for a period of not less than four years from the date of reclamation reseeding.

(e) All drilling or other similar activities and all CFC-related facilities, such as "mud pits,"that could result in injury or death to livestock shall be fenced or otherwise isolated to protect livestock. CFC shall repair or reclaim to the extent techonogically and economically feasible subsidence damage to the Thayn Lands that could be harmful to livestock.

(f) CFC shall maintain insurance coverage for its activities conducted on the Thayn Lands consistent with coverages customary for the coal industry and in compliance with all applicable regulatory requirements and shall provide Thayn with a copy of all insurance certificates naming Thayn as an additional insured against CFC's operations conducted pursuant to this Agreement.

(g) As required by and in conformance with applicable law, CFC shall replace any water supply owned and beneficially used by Thayn for

domestic, agricultural, or other legitimate use from an underground or surface source where the water supply has been adversely impacted by contamination, diminution, or interruption proximately resulting from CFC's mining operations.

5. Term.

(a) This Agreement shall be for a term of years beginning on the Effective Date and continuing for a period for the life of the Mines plus two (2) years, but in no event longer than twenty (20) years. For purposes of this Agreement, the life of the Mines shall end upon permanent closure of the Mines and cessation of all operations for the production and sale of coal from the Mines.

(b) CFC shall have no obligation to make any rental or other payment to maintain this Agreement in full force and effect. The parties acknowledge and agree that the Lease Agreement shall constitute full and fair consideration for this Agreement. In the event the Lease Agreement terminates or expires as provided therein prior to a date twenty (20) years from the Effective Date, CFC shall pay to Thayn the sum of $5,000 annually on the anniversary date for the remaining term of this Agreement in lieu of the rights granted under the Lease Agreement ("Rental Payment").

(c) The monetary payment terms set forth in Sections 3 and 5(b) of this Agreement ("Payment Terms") shall be adjusted for inflation on the seventh (7th) and fourteenth (14th) annual anniversaries after the Effective Date based on the cumulative changes in the Consumer Price Index (CPI), or other generally-recognized economic pricing index, for the preceding seven-year period. The proposed adjustments shall be calculated by CFC and communicated to Thayn in writing within thirty (30) days after the seventh and fourteenth anniversaries. All adjustments to Payment Terms shall be effective as of the seventh and fourteenth anniversary dates and shall otherwise apply prospectively and shall not apply to payments previously made under this Agreement. All other claims for adjustment of non-monetary terms of this Agreement, including allegations of non-compliance with any express term, shall be subject to the provisions of Section 7.

(d) Nothing in this Section 5 shall, nor shall it be interpreted to, amend, modify or waive any term or provision of Section 2 that grants rights to CFC to the Thayn Lands. Thayn shall have no right to claim a default of or to terminate this Agreement based on the Payment Terms readjustment provisions of this Section 5.

6. Title. Thayn warrants generally the title to the surface of the Thayn Lands and represents that Thayn has all necessary right and authority to grant to CFC the property rights and privileges conveyed hereunder.

7. Breach of Obligations. If either party believes that the other party has not complied with any express term, obligation or covenant of this Agreement, then in such event such party shall notify the other party in writing setting out specifically the details regarding the alleged breach or default. The party in default shall have thirty (30) days after receipt of the notice within which to cure or commence to cure all or any part of the breach or default alleged by the other party. If the defaulting party fails to cure or commence to cure the alleged default or breach as required, then the non-defaulting party shall have the option, but not the obligation, to submit the matter to binding arbitration as provided in this Agreement.

8. Arbitration. Disputes arising under this Agreement between the parties based upon any alleged breach of any of the obligations hereunder, which the parties are unable to resolve, shall be finally settled in accordance with the provisions of the Utah Arbitration Act by a single arbitrator. The arbitrator shall have broad power to grant relief for any dispute submitted pursuant to this Section 8, including without limitation termination of this Agreement. The arbitration proceedings shall be conducted in Price, Utah. CFC shall be responsible for all costs incurred in arbitration, including all fees and expenses of the arbitrator. Either party may enforce any arbitration award by instituting an action in the appropriate state or federal district court.

9. Indemnification. CFC shall indemnify, defend and hold harmless Thayn from and against all claims, costs, losses and expenses of any and every kind or character (including without limitation, mechanic liens and additional taxes) that are caused by or arise out of CFC's operations conducted on the Thayn Lands pursuant to this Agreement, provided that Thayn shall not be indemnified for matters expressly covered by this

Agreement, including without limitation the grant to CFC to subside the surface as a result of its underground mining operations.

10. Assignment. CFC's rights under this Agreement may not be assigned or sublet without the prior written consent of Thayn, which consent shall not be unreasonably withheld, provided that CFC may assign or sublease its interest hereunder without consent if such assignment or sublease is to an affiliate, parent or subsidiary of CFC, or to a party which acquires all or substantially all of the assets of CFC or the Mines.

11. Notices. All notices shall be in writing and addressed as follows:

If to Canyon Fuel Company:

President
Ark Land Company
CityPlace One
Suite 300
St. Louis, MO 63141-7056
(314) 994-2700

With a copy to:

Canyon Fuel Company, L.L.C.
Soldier Canyon Mine
P.O. Box 1029
Wellington, UT 84542
Attn: David G. Spillman
(435) 636-2872

If to Thayn:

Milton and Ardith Thayn Trust
7730 East Hwy 6
Price, UT 84501
Attn: David Thayn
(435) 472-4251

Notices are sufficient if delivered by hand, sent by facsimile transmission or deposited in the United States mail, postage prepaid and addressed to the appropriate addresses.

12. CFC Permits. Thayn expressly agrees to not oppose CFC's application for or issuance of the Mine Permits or for such other permits or approvals necessary or required to conduct coal mining operations at the Mines that may relate to or involve the Thayn Lands. In the event that CFC's Mine Permits are materially revised to require access or use of the Thayn Lands not granted by this Agreement, the parties shall use their respective best good faith efforts to negotiate such required access or use.

IN WITNESS WHEREOF, the parties have executed this Agreement as of the Effective Date.

CANYON FUEL COMPANY L.L.C.

By James E Hoyle

Its VP + Treasurer

Milton and Ardith Thayn Trust

By Milton Thayn

Its Trustee

Missouri

STATE OF ~~UTAH~~)

City)ss:

~~COUNTY~~ OF St Louis)

The foregoing instrument was acknowledged before me this 2nd day of November, by James E Hoyle who being by me duly sworn did say that he is the VP + Treasurer of Canyon Fuel Company, L.L.C.,

and that the foregoing Surface Use Agreement was signed on behalf of said limited liability company.

NOTARY PUBLIC

Mary C. Hamilton

Residing at: City of St. Louis

My Commission Expires:
9-14-2003

MARY C HAMILTON
Notary Public - Notary Seal
STATE OF MISSOURI
ST. LOUIS CITY
MY COMMISSION EXP. SEPT 14,2003

STATE OF UTAH)
)ss:
COUNTY OF CARBON)

DIONNE M. OMAN
NOTARY PUBLIC • STATE of UTAH
53 E. SMITH CIRCLE
PRICE UTAH 84501
COMM. EXP. 12-15-2002

The foregoing instrument was acknowledged before me this 15 day of November, by Milton Thayn, the signer of the foregoing Surface Use Agreement, who duly acknowledged to me that he executed the same as Trustee of and for the benefit of the Milton and Ardith Thayn Trust.

NOTARY PUBLIC

Dionne M Oman

Residing at: Price, UT

My Commission Expires:
12-15-2002

EXHIBIT "A"
to
Surface Use Agreement

Thayn Lands

T13S, R12 E, Salt Lake Meridian, Utah
Sec. 12: E/2 SE/4;
Sec. 13: E/2; SE/4 NW/4; E2 SW/4; NW/4 SW/4;
Sec. 24: All;
Sec. 25: NW/4.

T13S, R13 E, Salt Lake Meridian, Utah
Sec. 7: S/2SW/4, NW/4SW/4;
Sec. 18: S/2, NW/4, S/2NE/4, NW/4NE/4;
Sec. 17: SW/4, S/2SE/4, NW/4SE/4;
Sec. 19: All Except Lot 4;
Sec. 20: All;
Sec. 21: S/2, S/2N/2, NW/4NW/4;
Sec. 22: SW/4, S/2NW/4;
Sec. 27: W/2;
Sec. 28: All;
Sec. 29: All;
Sec. 30: All Except Lots 1 and 2;
Sec. 33: N/2N/2.

EXHIBIT "B"
to
Surface Use Agreement

CLARK VALLEY LEASE LANDS

(approximately 4,461 acres):

Township	Range	Section	Description
14 South	12 East	3	S½SE¼; S½SW¼
"	"	5	S½SE¼
"	"	8	NE¼NE¼;W½NE¼;SW¼;E½NW¼
"	"	9	SE¼
"	"	10	E½;SW¼;E½NW¼;SW¼NW¼
"	"	11	SE¼;NE¼;E½SE¼;SW¼SE¼;W½
"	"	13	W½;SW¼;S½NW¼;NE¼SW¼
"	"	14	All
"	"	15	E½;SW¼;E½NW¼
"	"	17	NW¼;SE¼;E½SW¼;NW¼SW¼
"	"	18	E½NE¼
"	"	20	N½NE¼
"	"	21	NE¼NW¼;W½NW¼;SE¼NE¼
"	"	22	NW¼

CLARK VALLEY WATER RIGHTS

Water Right No. (Irrigation & Stockwatering)	Water Right No. (Stockwatering)	
91-23	91-410	91-447
91-85	91-411	91-448
91-86	91-412	91-449
91-409	91-413	91-450

Exhibit B
to Surface Use Agreement

Water Right No. (Irrigation & Stockwatering)	Water Right No. (Stockwatering)	
91-457	91-414	91-451
91-491	91-415	91-452
91-492	91-416	91-453
91-493	91-417	91-456
91-494	91-418	91-458
91-495	91-419	91-459
91-604	91-420	91-460
91-605	91-421	91-461
91-606	91-422	91-465
91-607	91-426	91-466
	91-427	91-467
	91-428	91-468
	91-429	91-469
	91-430	91-470
	91-443	91-591
	91-444	91-3729
	91-445	91-3730
	91-446	

GRAZING RIGHTS

BLM Grazing Allotment #4079 (North Clark Valley) Approx. (Acreage 9,480)
Period of Use - March 20th-June 5th

State Grazing Permit #21722 (Approx. Acreage 680)

WATER SHARES

50 Shares of water stock in The Wellington Canal Company from Certificate No. 881

EXHIBIT "C"
to
Surface Use Agreement

LEASE AGREEMENT

THIS LEASE AGREEMENT (this "Lease") is made and entered into as of November ___, 1999 ("Effective Date"), by and between **CANYON FUEL COMPANY, L.L.C.** ("Lessor"), and **MILTON AND ARDITH THAYN TRUST** ("Lessee").

Recitals

A. Lessor is the owner of certain lands and water and grazing rights located in Carbon County, Utah, and more particularly described in **Exhibit "A"** attached hereto: (1) lands located in Clark Valley ("Clark Valley Lease Lands"); (2) water rights appurtenant to the Clark Valley Lease Lands ("Clark Valley Water Rights"); (3) state and federal grazing rights related to the Clark Valley Lease Lands ("Grazing Rights"); and (4) water rights represented by 50 shares of water stock in the Wellington Canal Company ("Water Shares"). The Clark Valley Lease Lands, the Clark Valley Water Rights, the Grazing Rights and the Water Shares are collectively referred to as the "Lease Interests."

B. The parties have entered into that certain Surface Use Agreement dated _____ ("Surface Use Agreement") whereby Lessee grants to Lessor rights to use the surface of Lessee's lands to facilitate Lessor's coal mining operations in exchange for this Lease, Lessee desires to lease from Lessor and Lessor and other consideration.

Agreement

NOW, THEREFORE, in consideration of the mutual promises and obligations herein contained, and for other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, Lessor hereby leases to Lessee the Lease Interests subject to and conditioned upon the following agreement between the parties:

ARTICLE I
AGREEMENT FOR WATER RIGHTS

1.1 Lessor's Right to Use Clark Valley Water Rights and Water Shares. Lessee shall have the right to use part or all of the Clark Valley Water Rights and the water represented by the Water Shares (collectively, the "Leased Water Rights") for the sole purposes of irrigation or stock watering on or for the benefit of the Clark Valley Lease Lands, or such additional uses

expressly allocated to the Leased Water Rights, upon the condition that Lessee notifies Lessor of its intention to use the Leased Water Rights at least one (1) month prior to the date of use by Lessee. Notwithstanding Lessee's exercise of its right granted hereunder, Lessee shall make beneficial use of the Leased Water Rights during the term of this Lease and shall take all necessary and reasonable actions so as to preserve the validity of the Leased Water Rights and prevent any reversion back to the State of Utah. Lessee's promise to make beneficial use of the Leased Water Rights provides an essential portion of the consideration given by Lessee to cause Lessor to enter into this Lease.

1.2 Interest in Clark Valley Water Rights. Lessor and Lessee expressly acknowledge that the interest of Lessee in the Leased Water Rights is that of a tenant, that Lessee shall acquire no ownership interest in the Leased Water Rights, and that Lessee shall have no right, title, or interest in the Leased Water Rights from and after the termination of this Lease. Lessee shall not in any way, intentionally or otherwise, directly or indirectly, take or encourage others to take any action which is inconsistent with or which will or may jeopardize the interests of Lessor in the Leased Water Rights.

1.3 Change of Diversion or Use. Without the prior written consent of Lessor, Lessee shall not file any change application or exchange application with the Utah State Engineer for purposes of changing the nature, point of diversion or use of the Leased Water Rights.

1.4 Voting Rights. Lessee shall have no right to vote the Water Shares and nothing contained in this Lease shall, nor shall it be interpreted to, grant to Lessee any rights to participate in meeting of the Wellington Canal Company or to act for or on behalf of Lessor as the record title owner of the Shares.

ARTICLE II
AGREEMENT FOR GRAZING RIGHTS

2.1 Conditions. Lessor shall have the right to use the Grazing Rights shall be subject to the following conditions:

(a) Lessee shall comply with all applicable statutes and regulations and the terms and conditions of the Grazing Rights and shall perform all other duties or tasks necessary to preserve the Grazing Rights in good standing and prevent any cancellation or other loss of the Grazing Rights. Lessee shall preserve and protect the interest of the Lessor therein and shall not take any action which is inconsistent with or will jeopardize the interest of Lessor in the Grazing Rights. Lessee shall promptly provide Lessor with a copy of any notice of violation, cancellation, inquiry or rental requirement received by Lessee relating to the Grazing Rights and shall undertake all necessary and reasonable actions to

remedy, cure or otherwise remove the basis for the notice. Lessee shall fully cooperate with Lessor to perform such actions as are necessary and advisable to preserve in full force and effect the Grazing Rights.

(b) Lessor shall remain responsible for and shall pay directly to the BLM and/or State, as appropriate, all fees, rents, costs, or other charges required by statute, regulation, or agreement to keep the Grazing Rights in good standing.

(c) Lessee hereby expressly waives any right or claim that it may have pursuant to 43 C.F.R. Part 4100 as now enacted or as hereinafter amended to receive compensation for any interests lessee may have in authorized range improvements on the Grazing Rights; and Lessee expressly acknowledges that the mutual promises and obligations of Lessor as specified in this Lease shall be deemed to be adequate compensation for any interests that Lessee may have in authorized range improvements on the Grazing Rights.

(d) The general terms and conditions of this Lease shall apply to Lessee's right to use the Grazing Rights and the lands governed thereby as though included within the Clark Valley Lease Lands. Any breach or failure by Lessee to satisfy the covenants or conditions relative to the Grazing Rights shall constitute a breach of this Lease.

2.2 Lessee's Cattle. At all times during the term of this Lease, Lessee shall own a minimum of forty percent (40%) of the cattle actively grazing on or using the Clark Valley Lease Lands. Lessee shall not permit grazing of third party livestock on the Clark Valley Lease Lands that would result in a breach of this provision.

ARTICLE III
GENERAL TERMS AND CONDITIONS

3.1 Term. The term of this Lease shall commence upon the Effective Date and continue for a primary term five (5) years or the equivalent of sixty (60) calendar months. Lessee at its option shall have the right to renew this Lease for three (3) additional extended terms of five (5) years each by giving Lessor written notice of Lessee's election to renew 60-days prior to the termination of the then effective term. Unless otherwise terminated, this Lease shall terminate at the end of the last extended term which termination in no event shall occur later than 20 years after the Effective Date.

3.2 Consideration.

(a) Lessee shall have no obligation to pay any rental to maintain this Lease in full force and effect for the term hereof, the consideration for this Lease being represented by the covenants and obligations set forth in the Surface Use Agreement.

(b) In the event that this Lease is terminated or expires prior to a date twenty (20) years from the Effective Date, Lessor shall pay to Lessee as continuing consideration for the Surface Use Agreement the sum of $5,000 annually ("Rental Payment") in lieu of this Agreement, payable on the anniversary date of the Effective Date each year for twenty (20) years from the Effective Date, or until the Surface Use Agreement terminates as provided therein.

3.3 Use and Occupancy by Lessee. Lessee shall use the Clark Valley Lease Lands, Leased Water Rights the Grazing Rights and the water attributable to the Water Shares exclusively for the grazing of cattle and for the raising of forage for the feeding of livestock. Lessee shall not authorize or conduct mining, drilling operations or hunting on the Clark Valley Lease Lands or remove sand, gravel, dirt, minerals, water, or associated substances from the Clark Valley Lease Lands; shall not commit any waste upon the Clark Valley Lease Lands; and shall not conduct or allow any business, activity, or thing on the Clark Valley Lease Lands which is or becomes unlawful, prohibited, or a nuisance, or which may cause damage to lessor, to occupants of the vicinity, or to other third parties. Lessee shall comply with and abide by all laws, ordinances, and regulations of all municipal, county, state and Federal authorities which are now in force or which may hereinafter become effective with respect to the use and occupancy of the Clark Valley Lease Lands, the Leased Water Rights and the Grazing Rights. Lessee shall conduct operations of the Clark Valley Lease Lands in accordance with good grazing and range or husbandry practices with reference to practices of others in the geographic vicinity of the Clark Valley Lease Lands and in compliance with applicable law. Lessee shall not overgraze the Clark Valley Lease Lands. Lessee shall ensure that all main entrance gates are kept locked with locks provided by Lessor.

3.4 Use by Lessor. Use of the Clark Valley Lease Lands by Lessee shall be nonexclusive. Lessor shall be entitled, without compensation to Lessee, to use the Clark Valley Lease Lands or grant other parties the right to use the Clark Valley Lease Lands, including but not limited to rights for easements, licenses, and leases, but Lessor shall not grant rights for grazing or agricultural use of the Clark Valley Lease Lands to third parties or make use of the Clark Valley Lease Lands itself for such purposes. However, Lessor shall reimburse Lessee for any damages done to Lessee's crops as a result of the use of the Clark Valley Lease Lands by Lessor.

3.5 Improvements. Lessee shall not construct any permanent building on the Clark Valley Lease Lands and shall not construct any temporary building or advertising sign on the Clark Valley Lease Lands without the prior written consent of Lessor. Lessee shall provide

and/or pay for the labor, material, and equipment for any fences, gates, cattle guards, ditches, ponds, reservoirs, or other improvements for Lessee to make use of the Clark Valley Lease Lands, the Grazing Rights, or to make beneficial use of the Leased Water Rights. Unless otherwise agreed in writing, any improvements which Lessee shall make to the Clark Valley Lease Lands shall be made at no expense to Lessor and shall not be removed and shall remain on the Clark Valley Lease Lands upon the termination of this Lease unless otherwise directed by Lessor. Lessee may use whatever fences, gates, cattle guards, ditches, ponds, reservoirs, and other improvements which now exist on the Clark Valley Lease Lands.

3.6 Representation of Lessee. Lessee represents as follows:

(a) Lessee is experienced in farming methods, farm equipment, and irrigation methods generally used in Carbon County Lessee shall cultivate grazing pastures and make beneficial use of the Clark Valley Water Rights and otherwise exercise Lessee's rights and privileges under this Lease.

(b) Lessee has sufficient farming and construction equipment available for its use and shall continue to have such equipment available for its use during the term of this Lease for the construction and maintenance of ditches, roads, ponds, fences, and the performance of other tasks which may be needed to satisfy Lessee's obligations under this Lease.

(c) Lessee has knowledge of the requirements necessary to preserve the Leased Water Rights in good standing and prevent any loss of nonuse or other reversion back to the State of Utah.

3.7 Right of Entry. At any time throughout the term of the Lease, Lessor shall have the right to enter upon the Clark Valley Lease Lands or any portion thereof for purposes of inspecting the same, determining whether Lessee is performing its obligations under the Lease, including but not limited to the obligation to make beneficial use of the Leased Water Rights, taking any action necessary or desirable to remedy any default by lessee in any of Lessee's obligations hereunder, showing or exhibiting the Clark Valley Lease Lands to existing or prospective mortgage lenders, purchasers, or lessees, placing "for sale" or "for lease" signs on the Clark Valley Lease Lands, performing environmental or analytical studies, or for any other purpose whatsoever.

3.8 Insurance. At all times during the term hereof, Lessee shall secure and maintain public liability insurance providing coverage against damage to persons or property resulting from acts or omissions of Lessor or Lessee respecting the Clark Valley Lease Lands, with limits of liability in such amounts as lessor may determine. All insurance required or permitted hereunder shall be written by reputable, responsible companies licensed in the State of Utah and shall name Lessor as insured. Lessor shall be furnished with copies of the insurance policies then

in force pursuant to this section, together with evidence that the premiums therefor have been paid.

3.9 Taxes. Throughout the term hereof Lessor shall pay all real property taxes, assessments, and special assessments, (all of which are hereinafter collectively referred to as "Taxes"), which are levied against or which apply with respect to the Clark Valley Lease Lands, the Grazing Rights or the Water Rights. Lessee shall pay all taxes, assessments, charges and fees which during the term hereof may be imposed, assessed, or levied by any governmental or public authority against or upon Lessee's use of the Clark Valley Lease Lands or any personal property, equipment, or fixtures kept or installed therein by Lessee.

3.10 Assignment and Subletting.

(a) Lessee shall have the right to assign or sublet a portion of this Lease with the prior written consent of Lessor, which consent shall not be unreasonably withheld, provided, however, that such assignment or sublease shall expressly provide and require that Lessee own and maintain a minimum of forty percent (40%) of the cattle actively grazing on or using the Clark Valley Lease Lands (as required under Section 2.2 of this Agreement) and that such assignment or sublease shall automatically terminate if at any time Lessee breaches the covenant under Section 2.2. In the event of any such assignment or sublease with the consent of the Lessor, Lessee shall remain liable on all of its covenants and obligations hereunder unless the instrument whereby Lessor consents to the assignment or subletting contains a provision in which Lessor specifically releases Lessee from such further liability. Any purported assignment without the written consent of the Lessor shall constitute a default hereunder and shall be void and of no effect.

(b) Lessor shall have the right to assign its interests under this Lease without the consent of Lessee. In the event Lessor assigns such interests, Lessor shall, from and after the Effective Date (irrespective of when the assignment occurs), be relieved of any and all liability or obligation to Lessee hereunder, and all such liability and obligation shall, as of the time of such assignment or on the Effective Date, whichever is later, automatically pass to Lessor's assignee, whether or not specifically assumed by it.

3.11. Default and Remedies. In the event Lessee breaches or fails to perform any of its obligations hereunder and Lessee does not within sixty (60) days, unless a lesser time is required by applicable law for the Grazing Rights, after the giving of written notice by Lessor cure the default or begin action to cure the default and thereafter diligently prosecute such action to completion if the default cannot be reasonably cured withing sixty (60) days, or as required by applicable law, Lessor shall have the right, at its option, to exercise any of the following rights and remedies:

(a) Lessor may itself perform or cause to be performed the obligation with respect to which Lessee is in default. In the event Lessor does so, its cost of such performance, including reasonable attorneys' fees and all expenses incurred by Lessor, plus interest thereon at the rate of eighteen percent (18%) per annum from the date of expenditure, shall be deemed to be additional rent and shall be immediately paid by Lessee.

(b) Lessor may terminate this Lease, immediately enter the Clark Valley Lease Lands, and take possession of the Clark Valley Lease Lands, the Leased Valley Water Rights and the Grazing Rights with or without process of law, and remove all persons and property from the Clark Valley Lease Lands. No such action by Lessor shall be considered or construed to be a forcible entry. By taking such action, Lessor shall incur no liability to Lessee or to any other persons occupying or using the Clark Valley Lease Lands or using the Leased Water Rights or the Grazing Rights for any damage caused or sustained by reason of such entry and removal of persons and property, and Lessee hereby covenants and agrees to indemnify and save harmless Lessor from all costs, loss, or damage arising from or occasioned by such action. In the event Lessor terminates this Lease pursuant to this Subsection (b), it shall also have the right to recover from lessee all other amounts necessary to compensate Lessor for all damages caused by Lessee's default or which would be likely to result from such default.

(c) Lessor may continue this Lease in effect and enforce all of its rights hereunder. If Lessor does so, it shall have the right to relet or sublet the Clark Valley Lease Lands, the Leased Water Rights, and the Grazing Rights or portions thereof, and any such reletting or subletting may be for a term which extends beyond the term of this Lease. Notwithstanding any election by Lessor to proceed under Subsections (a) or (b) above, so long as Lessee remains in default under this Lease, Lessor shall have the right at any time to terminate this Lease pursuant to Subsection (b) above and to exercise the rights therin provided. The remedies specified in this Section 3.11 are cumulative and are not intended to exclude any other remedy or means of redress to which Lessor may be entited in the even of any defalut or threatened default by Lessee with respect to any of its obligations under this Lease.

3.12 Indemnification and Waiver. Lessee shall indemnify and shall hold harmless Lessor and all of Lessor's directors, partners, members, officers, agents, and employees, and each of them, from and against any and all obligations, debts, loss, damage, claims, demands, suits, controversies, costs, fees, liens, encumbrances, and liabilities whatsoever, including attorneys' fees, in any way resulting from or arising out of any failure by Lessee to abide by all of the terms of this Lease or any negligent or intentional act or omission by Lessee or any of its agents, employees, invitees, licensees, or contractors arising out of or in connection and occupancy of the

Clark Valley Lease Lands or use of the Leased Water Rights, or the Grazing Rights. Lessor shall not be responsible or liable for any loss or damage to Lessee or to Lessee's property or business that may be occasioned by or through the acts or omissions of persons occupying, using, or trespassing upon the Clark Valley Lease Lands. Lessee shall use the Clark Valley Lease Lands, the Leased Water Rights and the Grazing Rights at its own risk, and hereby releases Lessor, to the full extent permitted by law, from all claims of every kind or nature, including claims for loss of life, personal or bodily injury, or property damage.

3.13 Enforcement. If any action is brought to recover any rent under this Lease, or because of any breach of or to enforce or interpret any of the provisions of this Lease, or for recovery of possession of the Clark Valley Lease Lands, the party prevailing in such action shall be entitled to recover from the other party reasonable attorney's fees (including those incurred in connection with any appeal), the amount of which shall be fixed by the court and made a part of any judgment rendered.

3.14 Notices. Any notice required or permitted hereunder to be given or transmitted between the parties shall be either personally delivered or mailed, postage prepaid by certified or registered mail, addressed as follows:

TO LESSOR:
President
Ark Land Company
CityPlace One
Suite 300
St. Louis, MO 63141-7056

With a copy to:
Canyon Fuel Company, L.L.C.
Soldier Canyon Mine
P. O. Box 1029
Wellington, UT 84542
Attn: David G. Spillman
(435) 636-2872

TO LESSEE:
Milton and Ardith Thayn Trust
7730 East Highway 6
Price, Utah 84501
Attn: David Thayn
(435) 472-4751

Any notice which is mailed shall be effective on receipt as evidenced by the registration certificate. Either party may, by notice to the other given as prescribed in this Section 3.14, change the above address for any future notices which are mailed under this Lease.

3.15 Liens and Encumbrances. Lessor shall keep the Clark Valley Lease Lands, Leased Water Rights, and Grazing Rights, free of all liens and encumbrances of every nature and kind arising after the Effective Date and shall proceed with all diligence to contest or discharge any lien or encumbrance that is filed or claimed.

3.16 Miscellaneous.

(a) Neither this instrument nor any memorandum or notice concerning the same shall be recorded without the prior written consent of Lessor. Lessor may, at its option and at any time, file this Lease or a notice or short form concerning the same (which said notice or short form Lessee hereby agrees to execute upon Lessor's request) for record in Carbon County, Utah.

(b) The captions which precede the sections of this Lease are for convenience only and shall in no way affect the manner in which any provision hereof is construed.

(c) There are no representations or agreements between the parties except as set forth in this Lease, and this Lease supersedes any and all prior negotiations, agreements, or understandings between Lessor and Lessee in any way related to the subject matter hereof. None of the provisions of this Lease may be altered or modified except through an instrument in writing signed by both parties.

(d) The liability of each person executing and delivering this Lease shall be joint and several. Each provision of this Lease to be performed by Lessee shall be construed to be both a covenant and a condition. To the extent permitted by the provisions hereof, all reservations, terms, conditions, and covenants herein contained shall be binding upon and shall inure to the benefit of the respective heirs, personal representatives, successors, and assigns of the parties hereto.

(e) Time is of the essence to the provisions of this Lease. Any waiver, either express or implied, by Lessor or any breach by Lessee of any promise, condition or term hereof shall not be construed or claimed to be a waiver of any other breach of any condition, promise, or term of this Lease.

(f) Nothing in this Lease shall, nor shall it be interpreted to, amend, modify or waive any provision of the Surface Use Agreement. Except for the express provision to make the Rental Payments under Section 3.2(b), any default under or termination of this Lease shall not affect in any manner the terms, conditions or validity of the Surface Use Agreement, it being the intent and understanding of the parties that the Surface Use Agreement and this Lease shall constitute separate and independent legal agreements, enforceable in accordance with their respective terms.

IN WITNESS WHEREOF the parties hereto have executed this Lease as of the Effective Date.

LESSOR:	LESSEE:
CANYON FUEL COMPANY, L.L.C.	MILTON AND ARDITH THAYN TRUST
By_____	By_____
Its_____	Its Trustee

STATE OF UTAH)
)ss:
COUNTY OF _____)

The foregoing instrument was acknowledged before me this ___ day of _____, by _____, who being by me duly sworn did say that he is the _____ of Canyon Fuel Company, L.L.C., and that the foregoing Lease was signed on behalf of said limited liability company.

NOTARY PUBLIC

_____
Residing at:_____

My Commission Expires:

_____

STATE OF UTAH)
)ss:
COUNTY OF CARBON)

The foregoing instrument was acknowledged before me this ___ day of _____, by

_____, the signer of the foregoing Lease, who duly acknowledged to me that he executed the same as Trustee of and for the benefit of the Milton and Ardith Thayn Trust.

NOTARY PUBLIC

_____

Residing at:_____

My Commission Expires:

_____

EXHIBIT "A"
to
Lease Agreement

CLARK VALLEY LEASE LANDS

(approximately 4,461 acres):

Township	Range	Section	Description
14 South	12 East	3	S½SE¼; S½SW¼
"	"	5	S½SE¼
"	"	8	NE¼NE¼;W½NE¼;SW¼;E½NW¼
"	"	9	SE¼
"	"	10	E½;SW¼;E½NW¼;SW¼NW¼
"	"	11	SE¼;NE¼;E½SE¼;SW¼SE¼;W½
"	"	13	W½;SW¼;S½NW¼;NE¼SW¼
"	"	14	All
"	"	15	E½;SW¼;E½NW¼
"	"	17	NW¼;SE¼;E½SW¼;NW¼SW¼
"	"	18	E½NE¼
"	"	20	N½NE¼
"	"	21	NE¼NW¼;W½NW¼;SE¼NE¼
"	"	22	NW¼

CLARK VALLEY WATER RIGHTS

Water Right No. (Irrigation & Stockwatering)	Water Right No. (Stockwatering)	
91-23	91-410	91-447
91-85	91-411	91-448
91-86	91-412	91-449
91-409	91-413	91-450
91-457	91-414	91-451

Exhibit A
to Lease Agreement

Water Right No. (Irrigation & Stockwatering)	Water Right No. (Stockwatering)	
91-491	91-415	91-452
91-492	91-416	91-453
91-493	91-417	91-456
91-494	91-418	91-458
91-495	91-419	91-459
91-604	91-420	91-460
91-605	91-421	91-461
91-606	91-422	91-465
91-607	91-426	91-466
	91-427	91-467
	91-428	91-468
	91-429	91-469
	91-430	91-470
	91-443	91-591
	91-444	91-3729
	91-445	91-3730
	91-446	

GRAZING RIGHTS

BLM Grazing Allotment #4079 (North Clark Valley) Approx. (Acreage 9,480)
Period of Use - March 20th-June 5th

State Grazing Permit #22966 (Replacing Permit #21722) (Approx. Acreage 680)

WATER SHARES

50 Shares of water stock in The Wellington Canal Company from Certificate No. 881

Canyon Fuel Company LLC
6955 Union Park Center, Suite 540
Midvale, Utah 84047

RE: Soldier Canyon Mine
Dugout Canyon Mine

Gentlemen:

The Milton and Ardith Thayn Trust ("Trust") is the record title owner of the surface to the lands described below that cover or otherwise relate to coal leases Canyon Fuel Company now or in the future intends to develop ("Lands"):

T13S, R12 E, Salt Lake Meridian, Utah
Sec. 12: E/2 SE/4;
Sec. 13: E/2; SE/4 NW/4; E2 SW/4; NW/4 SW/4;
Sec. 24: All;
Sec. 25: NW/4.

T13S, R13 E, Salt Lake Meridian, Utah
Sec. 7: S/2SW/4, NW/4SW/4;
Sec. 18: S/2, NW/4, S/2NE/4, NW/4NE/4;
Sec. 17: SW/4, S/2SE/4, NW/4SE/4;
Sec. 19: All Except Lot 4;
Sec. 20: All;
Sec. 21: S/2, S/2N/2, NW/4NW/4;
Sec. 22: SW/4, S/2NW/4;
Sec. 27: W/2;
Sec. 28: All;
Sec. 29: All;
Sec. 30: All Except Lots 1 and 2;
Sec. 33: N/2N/2.

Subject to the Surface Use Agreement dated effective November 22nd 1999, between the parties, the Trust hereby consents to Canyon Fuel's underground mining activities below the Lands and access to the surface to repair subsidence.

Very truly yours,

Milton and Ardith Thayn Trust

By: Milton Thayn

FIRST AMENDMENT TO SURFACE USE AGREEMENT

THIS FIRST AMENDMENT TO SURFACE USE AGREEMENT ("Amendment"), dated effective as of _13_ August, 2001, is by and between **Canyon Fuel Company, L.L.C.** ("CFC") and **Milton and Ardith Thayn Trust** ("Thayn").

Recitals

A. The parties have entered into that certain Surface Use Agreement dated as of November 22, 1999, between CFC and Thayn ("Surface Use Agreement"). All capitalized terms used in this Amendment, unless otherwise defined herein, shall have the meanings assigned to them in the Surface Use Agreement

B. The parties now desire to amend the Surface Use Agreement consistent with the terms of this Amendment.

Amendment

NOW, THEREFORE, for good and valuable consideration, the parties agree as follows:

1. The Surface Use Agreement is amended by addition of the following provisions:

a. Water Purchases. CFC may, at its option any time during the term of the Surface Use Agreement, purchase water from Thayn, for which Thayn holds beneficial use rights or otherwise controls, to conduct any of the activities permitted by the Surface Use Agreement on the Thayn Lands. CFC and Thayn will cooperate to make necessary filings with the Utah State Engineer to facilitate such water uses. The purchase price for the water is $ .0125/ gallon and will be adjusted as provided in subparagraph (d) below. Thayn may determine at its discretion when water is available for purchase by CFC and CFC will be responsible for all costs and expenses to deliver the water to the location of usage. The purchase price for the water shall have no bearing on future determinations of the value of the Thayn water rights or water used on the Thayn Lands.

b. Interference with Hunting Activities.

(i) CFC will reimburse Thayn in an amount not to exceed $10,000 annually for the loss of any revenue incurred by Thayn as a result of interference with, or the inability to conduct, deer and elk hunting and guide services on the Thayn Lands by Thayns' outfitters due to exploration or production drilling conducted by or on behalf of CFC on the Thayn Lands. For purposes of this provision, the deer hunting season includes the muzzle load, archery and rifle hunts. Thayn will provide CFC with a written claim for lost revenue describing the basis for the claim no later than 30 days after the end of a hunting season. The parties agree that the actual presence and ongoing operation of a drilling rig on the Thayn Lands during the elk or the deer hunting seasons will automatically constitute interference with hunting activities. In such event, upon written notice from Thayn, Arch will pay to Thayn $3750 for the deer hunt season and $3750 for the elk hunt season respectively impacted by the presence and operation of a drilling rig. Arch's maximum liability under this provision for each hunting season shall not

exceed $5,000 for the elk hunt and $5,000 for the deer hunt. The reimbursement payment will be readjusted as provided in subparagraph (d) below. Thayn acknowledges that the payment provided represents fair and reasonable compensation and Thayn waives any and all other claims against CFC for alleged damages arising out of interference with deer and elk hunting and guide services on the Thayn Lands.

(ii) CFC and Thayn have jointly established a 100-yard non-hunting buffer zone surrounding any drilling rig or active drilling operations. Thayn will inform hunters on the Thayn Lands of actual drilling locations and operations in an effort to create a safe operations buffer zone. CFC will prohibit its employees and employees of its contractors from carrying firearms, including muzzle loaders, archery equipment and rifles during the hunting seasons. Only road use necessary to conduct Arch's operations and activities under the Surface Use Agreement will be allowed during the elk and deer hunting seasons on the Thayn Lands in an effort to maintain a quality hunting environment.

c. Rezoning. Thayn will support and not oppose any rezoning of the Thayn Lands that is required by or results from mining or oil and gas operations conducted on the Thayn Lands, provided, however, that CFC will reimburse Thayn for all additional taxes, or other costs and expenses, incurred by Thayn as a result of such rezoning.

d. Adjustments to Payments.

(i) The purchase price for the water described in subparagraph (a) will be adjusted for inflation on the fifth annual anniversary date after the Effective Date, and every five years thereafter on the anniversary of the Effective Date based on the cumulative changes in the Consumer Price Index (CPI), or other generally-recognized economic pricing index, for the preceding five-year period.

(ii) The reimbursement payment described in subparagraph (b) will be adjusted for inflation on the fourth annual anniversary date after the Effective Date, and every four years thereafter on the anniversary of the Effective Date based on the then current fee arrangement with Thayn or on a written bona fide offer from a hunting outfitter who, if required by state law, is licensed. Allocation of the reimbursement payment between the deer and elk hunts shall be based on the terms of the offer.

(iii) The proposed adjustment shall be calculated by CFC and communicated to Thayn in writing within thirty (30) days after the applicable anniversary date. All adjustments shall be effective as of the then applicable anniversary date and shall otherwise apply prospectively and shall not apply to payments previously made under this Amendment.

2. Except as expressly provided in this Amendment, nothing herein shall, nor be interpreted to, amend, modify or waive any provision of the Surface Use Agreement. The parties acknowledge that the Surface Use Agreement is in full force and effect and currently in good standing. This Amendment may be executed in counterparts by the parties.

Executed and dated as of the Effective Date.

Canyon Fuel Company, L.L.C.

By:_____
Its:_____

Milton and Ardith Thayn Trust

By: George M Thayn

Appendix B

Lease Document

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Utah State Office
P.O. Box 45155
Salt Lake City, UT 84145-0155

In Reply Refer To:
3487
Soldier Creek LMU
SL-051279-063188 et al
(UT-932)

JUL 15 1997

DECISION

Canyon Fuel Company L.L.C.	:	Coal Leases
6955 Union Park Center, Suite 540	:	SL-051279-063188, U-50722,
Midvale, Utah 84047	:	U-07064-027821, UTU-69635

Logical Mining Unit Approved

The Soldier Creek Logical Mining Unit (LMU) filed October 27, 1989, is hereby approved effective March 1, 1996, with Canyon Fuel Company L.L.C. as unit operator.

The Soldier Creek LMU contains 12,142.49 acres and is composed of Federal coal leases SL-051279-063188, U-07064-027821, U-50722, and UTU-69635; a Bureau of Land Management Authorization to Mine; a State of Utah coal lease ML-42648; and private lands owned by the operator.

Deputy State Director,
Natural Resources

Enclosure
LMU Document

INCORPORATED
EFFECTIVE:
MAR 31 2000
UTAH DIVISION OIL, GAS AND MINING

Soldier Creek Logical Mining Unit

The Mineral Leasing Act (MLA) of February 25, 1920, as amended by the Federal Coal Leasing Amendments Act (FCLAA) of 1976, authorizes the consolidation of coal leases into a logical mining unit (LMU). An LMU is an area of land which the coal resources can be developed in an efficient, economical and orderly manner as a unit with due regard to conservation of coal resources and other resources.

As a result of a modification to an application for an LMU designation filed by Coastal States Energy Company, the Soldier Creek LMU is approved effective March 1, 1996, and provides as follows:

1. Unit Area: The area specified on the map attached hereto marked Exhibit A being hereby designated the LMU area, containing 12,142.5 acres as described as follows:

Federal Coal Lease SL-051279-063188

T. 13 S., R. 11 E., SLM, Utah
Sec. 12, E½E½;
Sec. 13, NE¼NE¼

T. 13 S., R. 12 E., SLM, Utah
Sec. 7, lots 1 through 4, E½W½, E½;
Sec. 8, W½;
Sec. 17, W½;
Sec. 18, lot 1, N½NE¼, SE¼NE¼, NE¼NW¼.

Contains 1548.31 acres

Federal Coal Lease U-07064-027821

T. 13 S., R. 12 E., SLM, Utah
Sec. 13, S½;
Sec. 23, E½E½, W½SE¼, NE¼SW¼;
Sec. 24, all;
Sec. 25, N½N½;
Sec. 26, N½NE¼.

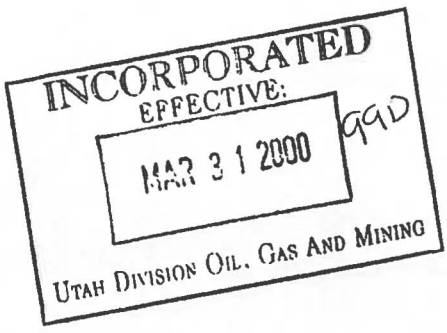
T. 13 S., R. 13 E., SLM, Utah
Sec. 18, lots 3,4, E½SW¼, SE¼;
Sec. 19, lots 1-4, E½W½, NE¼, NW¼SE¼;
Sec. 30, lot 1.

Contains 2416.14 acres more or less

Federal Coal Lease U-50722

T. 13 S., R. 11 E., SLM, Utah
Sec. 1, lot 8;
Sec. 12, E½W½, W½E½;
Sec. 13, NW¼NE¼, NE¼NW¼.

Contains 440 acres more or less.



Federal Coal Lease UTU-69635

T. 13 S., R. 11 E., SLM, Utah
Sec. 1, lots 1-7 and 8 (for all coal except the Rock Cyn. Bed);
Sec. 10, E½E½;
Sec. 11, all;
Sec. 12, W½W½;
Sec. 13, W½NW¼, SE¼NW¼, SW¼;
Sec. 14, N½, N½S½, SE¼SE¼;
Sec. 15, NE¼NE¼;
Sec. 23, N½NE¼NE¼;
Sec. 24, N½N½NW¼.

Containing 2177.52 acres more or less

BLM Authorization to Mine

T. 13 S., R. 11 E., SLM, Utah
Sec. 13, SE¼NE¼, NE¼SE¼.

T. 13 S., R. 12 E., SLM, Utah
Sec. 18, S½NW¼.

Containing 120 acres more or less

State Lease

T. 13 S., R. 12 E., SLM, Utah
Sec. 8, E½;
Sec. 10, S½;
Sec. 11, S½;
Sec. 14, all;
Sec. 15, all;
Sec. 17, NE¼, E½SW¼, SE¼;
Sec. 20, E½NW¼, SW¼NW¼, N½NE¼;
Sec. 21, N½NW¼, NE¼;
Sec. 22, N½, N½S½;
Sec. 23, W½NW¼

Containing 3640 acres more or less

Private Lands:

T. 13 S., R. 12 E., SLM, Utah
Sec. 23, W½NE¼, E½NW¼;
Sec. 16, all.

T. 13 S., R. 11 E., SLM, Utah
Sec. 2;
Sec. 3, lots 5,6,7;

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Sec. 9, E½NE¼, SW¼NE¼, N½SE¼;
Sec. 10, NW¼, W½NE¼, NW¼SW¼, NW¼SE¼.
Containing 1752.2 acres more or less.

The LMU includes the following Federal coal leases described in Exhibit B attached: SL-051279-063188, U-074064-027821, U-05722, UTU-69635.

2. **Unit Operator:**

Canyon Fuel Company, L.L.C.
P.O. Box 1029
Wellington, UT 84542

3. **Stipulations:** As a consideration to the approval of the LMU, the operator/lessee consents to the following stipulations which make all Federal leases within the LMU subject to uniform requirements of this Resource Recovery and Protection Plan (R2P2), LMU recoverable reserves exhaustion, diligent development, continued operation, maximum economic recovery, advance royalty and royalty reporting periods. As of March 1, 1996, the diligence terms and conditions of the Federal lease are subject to or are superseded by the diligence requirements imposed on the LMU.

a. Supervision: Bureau of Land Management
Price Field Office
125 South 600 West
P.O. Box 7004
Price, Utah 84501

The Price Field Office Manager located at the above location is responsible for the review and approval of exploration plans and operations, and modifications thereto, prior to the commencement of mining operations within a permit area approved pursuant to the Surface Mining Control and Reclamation Act (SMCRA) of 1977. The Manager is also responsible for review and approval of resource recovery and protection plans and modifications thereto, and is also responsible for inspection and enforcement, including production verification, of such operations and all lands and all coal within the LMU, and for implementing all other applicable provisions of the 43 CFR 3400 rules for the LMU.

b. Diligent Development and Continued Operation requirements: Pursuant to 43 CFR 3480.0-5 (a)(13)(B), the diligent development period for the LMU began on October 1,1995. Therefore, the LMU must have production of commercial quantities (1% of the total recoverable reserves) by October 1, 2005. Canyon Fuel Company L.L.C. must mine 664,000 tons from anywhere within the Solider Creek LMU to achieve diligent development. This requirement was met on January 1997. The LMU must maintain continued operation requirements (mining commercial quantities) or a request to be allowed to pay advance royalty in lieu of continued operation. This request must be submitted to BLM 30 days prior to the start of the continued operation year. Since the LMU has met the requirement for diligent development in January 1997, the LMU will be required to maintain production of commercial quantities on an annual basis. The continued operation period for this LMU began on February 1, 1997.

c. Advance Royalty: The number of years for which advanced royalty may be paid in lieu of continued operation is ten (10). Advance royalty may be paid in lieu of continued operation only until October 1, 2015. No advanced royalty paid prior to that date may be credited against production royalty after that date.

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d. Reporting Period: The rental amount for Federal coal leases is to be prorated to the effective date of the LMU. Thereafter, rental for Federal coal leases contained in the LMU will be due, in a lump sum, annually on the anniversary date of the LMU approval, March 1, 1997. Upon approval and for the duration of this LMU, no Federal rentals may be credited against production royalties for any Federal coal lease contained in the LMU, even though the Federal coal lease terms may have allowed for such credits prior to the effective date of the LMU. Royalties for Federal recoverable reserves produced within the LMU will be paid on the appropriate Minerals Management Service (MMS) Production and Operations reports every royalty reporting period. The LMU royalty reporting period will be on a monthly basis beginning with the royalty period after the date that coal is first produced following the effective date of the LMU. If coal is being produced on the effective date of the LMU approval, the first royalty reporting period will begin on the first day of the month following the effective date of the LMU. Since all production within an LMU is credited to the entire LMU, a certified record of all non-Federal LMU coal production must be provided to the Price Office Manager on an annual basis. Progress maps and reports required by 43 CFR 3483.2 will show all Federal and non-Federal production from anywhere within the LMU.

e. Recoverable Coal reserves Exhaustion: The 40-year LMU recoverable coal reserves exhaustion period commences the date the coal is first produced from the LMU, following the effective date of LMU approval. If there is production occurring within the LMU on the effective date of LMU approval, the 40-year clock begins on the effective date of LMU approval.

f. Other: If the LMU of which Federal coal leases SL-051279-063188, U-074004-027821, U-05722, UTU-69635 is a part, fails for whatever reason, the above-mentioned leases will automatically be applied had they not been included in an LMU.

Canyon Fuel Company, L.L.C.

By [signature]

Title President and CEO

Date May 13, 1997

Bureau of Land Management

By [signature]

Title Acting, Deputy State Director, Natural Resources

Date JUL 15 1997

INCORPORATED
EFFECTIVE:
MAR 31 2000
UTAH DIVISION OIL, GAS AND MINING

Appendix C

Vegetation Information
Threatened and Endangered Information

The Vegetation Information, Vegetation and Sensitive Species has been moved to the official incorporated application and can be found under Dugout M&RP, Chapter 3, Appendix 3-1.

The Threatened and Endangered Information, Threatened, Endangered, Candidate & Sensitive Vertebrate Species Report has been moved to the official incorporated application and can be found under Dugout M&RP, Chapter 3, Appendix 3-3.

Appendix D

Confidential Information
Archeological Report
Lab Analyses

The Archeoolgical Report, SENCO-PHENIX SPUT-593 has been moved to the supportive documents and can be found under Archeology, SENCO-PHENIX, SPUT-593 report "Confidential".

The Soil Resource Assessment, Exploration and Degas Locations has been moved to the official incorporated application and can be found under Dugout M&RP, Chapter 2, Appendix 2-2.

Appendix E

Water Use Agreement

GARY R. HERBERT
Governor
GREG BELL
Lieutenant Governor

State of Utah

DEPARTMENT OF NATURAL RESOURCES
Division of Water Rights

MICHAEL R. STYLER
Executive Director

KENT L. JONES
State Engineer/Division Director

ORDER OF THE STATE ENGINEER

For Temporary Change Application Number 91-409 (t36451)

Temporary Change Application Number 91-409 (t36451) in the name of Canyon Fuel Company LLC, was filed on April 13, 2010, to add additional points of diversion, add additional places of use, and change the nature of use of 20.00 acre-feet (af) of water as evidenced by Water Right Number 91-409. Heretofore, the water has been diverted from a surface source located North 1280 feet and West 1200 feet from the SE Corner of Section 3, T14S, R12E, SLB&M. The water has been used for the irrigation of 196.84 acres from April 1 to September 30, and the stockwatering requirements of 810 head of livestock (in cattle or horses or equivalent species) from January 1 to December 31. The water was used in all or portion(s) of Sections 9, 10, 15, and 22, T14S, R12E, SLB&M.

Hereafter, it is proposed to divert 20.00 acre-feet of water from the same point as heretofore and from additional points located: (1) Surface - North 1280 feet and West 1200 feet from the SE Corner of Section 3, T14S, R12E, SLB&M; (2) Surface - North 1070 feet and West 1100 feet from the SE Corner of Section 19, T13S, R13E, SLB&M; (3) Surface - South 780 feet and East 25 feet from the NW Corner of Section 18, T13S, R13E, SLB&M; (4) Surface - North 1060 feet and East 2590 feet from the SW Corner of Section 20, T13S, R13E, SLB&M; (5) Surface - North 3500 feet and West 850 feet from the SE Corner of Section 19, T13S, R13E, SLB&M; (6) Surface - North 1070 feet and West 900 feet from the SE Corner of Section 20, T13S, R13E, SLB&M; (7) Surface - North 790 feet and East 1485 feet from the SW Corner of Section 21, T13S, R13E, SLB&M; (8) Surface - South 1900 feet and East 100 feet from the NW Corner of Section 13, T13S, R12E, SLB&M; (9) Surface - North 1400 feet and West 960 feet from the SE Corner of Section 21, T13S, R13E, SLB&M; (10) Surface - South 1011 feet and East 1322 feet from the NW Corner of Section 30, T13S, R13E, SLB&M. The nature of use of the water is being changed to mining purposes, and other purposes (dust suppression, fire protection, coal processing, and drilling). The place of use of the water is to remain the same as heretofore, but adding all or portion(s) of Sections 11, 12, 13, 14, T13S, R12E, SLB&M; and Sections 16, 17, 18, 19, 20, 21, 28, 29, and 30, T13S, R13E, SLB&M.

Notice of this temporary change application was not published in a newspaper. It is the opinion of the State Engineer that it meets the criteria of Section 73-3-3 of the Utah Code for the approval of temporary change applications.

In evaluating the various elements of the underlying rights, it is not the intention of the State Engineer to adjudicate the extent of these rights, but rather to provide sufficient definition of the rights to assure that other vested rights are not impaired by the change and/or no enlargement occurs. If, in a subsequent action, the court adjudicates that this right is entitled to either more or less water, the State Engineer will adjust the figures accordingly.

It is, therefore, **ORDERED** and Temporary Change Application Number 91-409 (t36451) is hereby **APPROVED** subject to prior rights.

To accommodate the approval of this temporary change application, the use of 20.00 acre-feet of water for the irrigation of 196.84 acres, and the stockwatering requirements of 810 head of livestock (in cattle or horses or equivalent species) at the historic point of diversion and place of use must cease.

This application shall automatically expire one year from the date hereof.

It is the applicant's responsibility to maintain a current address with this office and to update ownership of their water right. Please notify this office immediately of any change of address or for assistance in updating ownership.

Your contact with this office, should you need it, is with the Southeastern Regional Office. The telephone number is 435-613-3750.

This Order is subject to the provisions of Administrative Rule R655-6-17 of the Division of Water Rights and to Sections 63G-4-302, 63G-4-402, and 73-3-14 of the Utah Code which provide for filing either a Request for Reconsideration with the State Engineer or an appeal with the appropriate District Court. A Request for Reconsideration must be filed with the State Engineer within 20 days of the date of this Order. However, a Request for Reconsideration is not a prerequisite to filing a court appeal. A court appeal must be filed within 30 days after the date of this Order, or if a Request for Reconsideration has been filed, within 30 days after the date the Request for Reconsideration is denied. A Request for Reconsideration is considered denied when no action is taken 20 days after the Request is filed.

Dated this 3 day of May, 2010.

Marc K. Stilson, P.E., Regional Engineer

Mailed a copy of the foregoing Order this 3 day of May, 2010 to:

Canyon Fuel Company LLC
Attn: Property Administration
CityPlace One Suite 300
St. Louis MO 63141

BY: _____
Michele Gabb, Regional Secretary

GARY R. HERBERT
Governor
GREG BELL
Lieutenant Governor

State of Utah
DEPARTMENT OF NATURAL RESOURCES
Division of Water Rights

MICHAEL R. STYLER
Executive Director

KENT L. JONES
State Engineer/Division Director

ORDER OF THE STATE ENGINEER
For Temporary Change Application Number 91-5024 (t36452)

Temporary Change Application Number 91-5024 (t36452) in the name of Canyon Fuel Company LLC, was filed on April 13, 2010, to change the point of diversion, add additional places of use, and change the nature of use of 12.00 acre-feet (af) of water as evidenced by Water Right Number 91-5024. Heretofore, the water has been diverted from a surface source located North 1260 feet and East 120 feet from the SW Corner of Section 3, T14S, R12E, SLB&M. The water was stored in the following reservoir: Clarks Valley Reservoir - from March 31 to July 31, having a capacity of 460.5 acre-feet in all or portion(s) of Sections 10, and 15, T14S, R12E, SLB&M. The water has been used for the irrigation of 124.97 acres from April 1 to October 1. The water was used in all or portion(s) of Sections 9, 10, 15, and 22, T14S, R12E, SLB&M.

Hereafter, it is proposed to divert 12.00 acre-feet of water from surface source located South 125 feet and East 2307 feet from the NW Corner of Section 23, T13S, R12E, SLB&M. The nature of use of the water is being changed to mining purposes, and other purposes (dust suppression, fire protection, coal processing, and drilling). The place of use of the water is to remain the same as heretofore, but adding all or portion(s) of Sections 9, 10, 11, 12, 13, 14, 15, 16, 17, 20, 21, 22, and 23, T13S, R12E, SLB&M; and Sections 16, 17, 18, 19, 20, 21, 24, 27, 28, 29, and 30, T13S, R13E, SLB&M.

Notice of this temporary change application was not published in a newspaper. It is the opinion of the State Engineer that it meets the criteria of Section 73-3-3 of the Utah Code for the approval of temporary change applications.

In evaluating the various elements of the underlying rights, it is not the intention of the State Engineer to adjudicate the extent of these rights, but rather to provide sufficient definition of the rights to assure that other vested rights are not impaired by the change and/or no enlargement occurs. If, in a subsequent action, the court adjudicates that this right is entitled to either more or less water, the State Engineer will adjust the figures accordingly.

It is, therefore, **ORDERED** and Temporary Change Application Number 91-5024 (t36452) is hereby **APPROVED** subject to prior rights.

To accommodate the approval of this temporary change application, the use of 12.00 acre-feet of water for the irrigation of 124.97 acres at the historic point of diversion must cease

This application shall automatically expire one year from the date hereof.
It is the applicant's responsibility to maintain a current address with this office and to update ownership of their water right. Please notify this office immediately of any change of address or for assistance in updating ownership.

Your contact with this office, should you need it, is with the Southeastern Regional Office. The telephone number is 435-613-3750.

This Order is subject to the provisions of Administrative Rule R655-6-17 of the Division of Water Rights and to Sections 63G-4-302, 63G-4-402, and 73-3-14 of the Utah Code which provide for filing either a Request for Reconsideration with the State Engineer or an appeal with the appropriate District Court. A Request for Reconsideration must be filed with the State Engineer within 20 days of the date of this Order. However, a Request for Reconsideration is not a prerequisite to filing a court appeal. A court appeal must be filed within 30 days after the date of this Order, or if a Request for Reconsideration has been filed, within 30 days after the date the Request for Reconsideration is denied. A Request for Reconsideration is considered denied when no action is taken 20 days after the Request is filed.

Dated this 3 day of May, 2010.

Marc K. Stilson, P.E., Regional Engineer

Mailed a copy of the foregoing Order this 3 day of May, 2010 to:

Canyon Fuel Company LLC
City Place One Suite 300
St. Louis MO 63141

BY: _____
Michele Gabb, Regional Secretary

Supportive Documents

IBC, Canyon Fuel Company, Task ID # 5212

Section: 525 Subsidence

Title page for reference only

Section 525 discusses repair and compensation due to material damage to or diminish to the value or reasonable foreseeable use of structures or renewable resource land occur due to subsidence.

525 Subsidence

525.100 Subsidence Control Plan

Structures and Renewable Resource Lands. As noted in Section 521.100, no major electric transmission lines, pipeline, or agricultural drainage tile fields exist within the area of potential subsidence. As described in Section 527.100, the roads within the area of potential subsidence consist of private roads that are owned and maintained by the parent company of SCM and private citizens, including the Thayn family. These are unimproved dirt roads that may be used for access to the lease area. Localized damage that occurs to roads not owned by the parent company of SCM will be repaired to a condition acceptable to both the private landowner and SCM. No other structures are known to exist within the area of potential subsidence.

Renewable resource lands within the permit and adjacent areas are shown on Plate 4-1 and discussed in Section 411 of this M&RP. The area of potential subsidence is currently used for livestock grazing and wildlife habitat, with limited timber production on adjacent lands to the east of Dugout Canyon (see Section 411.120). Hydrologic resources in the area are discussed in Chapter 7 of this M&RP. Information regarding baseline groundwater conditions is provided in Section 724.100.

Mining Methods. As noted in Section 523, continuous miner and longwall mining methods will be used in the Dugout Canyon Mine. The size, sequence, and timing for the development of the underground workings are shown on Plate 5-7 and in Annual Reports. Subsidence is not anticipated to occur in areas where continuous miner/development mining methods are used.

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

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MAY 2 2 2012
Div. of Oil

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

Appendix 5-11 contains a report entitled "Prediction of Surface Deformation Resulting from Longwall Mining" which discusses subsidence. The specific sections within the report discuss, subsidence mechanism; mining, geologic conditions and subsidence characteristics; predicted ground movements and the monitoring program. This information is provided per deficiencies in the 2005 mid-term review of the M&RP.

In the "Prediction of Surface Deformation Resulting from Longwall Mining" report study "subsidence calculations (consisting of vertical movements and horizontal trains) were completed for four longwall panels of interest to this study, as illustrated in Figure 1." Mining panels GIL-5, GIL-6, GIL-7 and GIL-8 were part of the subsidence study for the Gilson Block 2 in this report located in Appendix 5-11. "The type of subsidence mechanism predicted for the study area is the trough-type subsidence. In the Gilson Block 2, CFC is utilizing panel-barrier designs to control overburden caving, seismicity and surface deformation. Considering panel width to average overburden depth rations for the project area (0.4 to 1.0), these longwall panels are considered to have a subcritical widths (Figure 3), and thus the majority of subsidence is expected during the mining of the individual longwall panels."

Section 3.3 on page 10 of the "Prediction of Surface Deformation Resulting from Longwall Mining" report discusses subsidence engineering parameters and measurements descriptions/calculations. Measured subsidence factor verses panel width to depth ratio for Utah operations is shown on Figure 5, typical subsidence profiles for the GIL- 5 through GIL-7 panels are shown on Figures 6 and 7.

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

- Traverse and Benchmark Monuments - These monuments are constructed with tap-on convex cap with a center punch mark and a center rod. The center rod has been emplaced in a 5.5- to 6-foot deep poured concrete casing. Where rock was encountered before the required depth, the rock was broken with a stone rod and an anchor point was grouted into the rock using a concrete patching material. Alternatively, monuments in rock were emplaced as described below ("Rock Monuments and Stations").

- Survey Stations - These stations consist of rebar rods with a length of 5 feet. Each rebar has been fitted with a aluminum cap. The caps are plain with a center punch mark and a concave label across the top. Where survey stations are installed in boulders or rock which did not allow the use of rebar, they were installed as indicated below ("Rock Monuments and Stations").

- Rock Monuments and Stations - Where survey monuments and stations are established in boulders and rock which do not allow the installation of a rod in a concrete casing, these monuments consist of an aluminum alloy convex marker with a center punch and concave label. They are secured by drilling a hole to a depth of approximately 3 inches and installing the cap in a concrete grout mixture.

Future monuments and stations that are required for proper control will be installed to provide one monitoring point per panel. Since geologic and mining uncertainties often force a change in planned mining sequences, future control points may be installed only after the mine panels are in their development phase.

Re-surveys will concentrate on areas which have been mined in the past or are anticipated to be mined within the upcoming year. Hence, the area of detailed survey may be expanded each progressive year.

INCORPORATED
SEP 2 1 2009

Annual re-surveys of the mine permit area will produce vertical control at the same sites as the previous year. Information on each site will be produced annually while the area underlying the site is being actively mined or is still potentially subsiding. The subsiding areas which show no change for two consecutive years will be considered stable and will be omitted from further annual surveys. If additional mining is anticipated within the stable areas, these areas will again be added to the annual surveys.

In addition to the ground surveys, aerial photogrammetric methods will be included in the surveys when the areas become too large to feasiblely handle with ground surveys. This method may be added to enhance the ground surveys and to cover larger areas as the mine expands. Visual checks for subsidence will be made during all surface activities, especially during water monitoring activities. These visual surveys will be used to detect surface irregularities and surface cracks.

Visual ground checks for subsidence will be made of areas surrounding monitored seeps, springs and streams during hydrologic monitoring. In addition, roads used to access hydrologic monitoring stations will be visually checked for evidence of subsidence during monitoring activities. The observations made during hydrologic monitoring will be included in the Mine's Annual Report.

Anticipated Effects of Subsidence. Based on experience in the region and the results of investigations performed by Dunrud (1976), future subsidence in the permit area is anticipated to result in the formation of tension cracks, with these cracks healing to some degree following formation. It is further anticipated that no substantial damage will occur to rangeland conditions as a result of subsidence within the permit area. The only potential effects in that respect will be the exposure of plant roots where tension cracks form.

It is not anticipated that material damage will occur to streams as a result of subsidence. Gentry and Abel (1978) demonstrated that topographic lows (e.g., stream channels) tend to be protected by upwarping of adjacent slopes during subsidence. Therefore, mining-induced surface fracturing should be very limited (or nonexistent) within stream channel areas. Any fracturing that does occur in stream channels is likely to fill rapidly as a result of sedimentation.

It is also not anticipated that subsidence will significantly affect springs within the permit and adjacent areas. Von Schonfeldt et al. (1980) found that uniform subsidence "rarely causes problems to renewable resources such as aquifers, streams, and ranch lands." Since second mining will occur uniformly across the permit area, the resulting subsidence should also be uniform, minimizing the potential impacts to overlying springs.

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525.200 Subsidence Control

Adopted Control Measures. SCM has adopted a mining technology which provides for planned subsidence in a predictable and controlled manner. As planned, this subsidence will be uniform, thus minimizing impacts to surface resources.

Compliance With Control Plan. SCM will comply with all provisions of the approved subsidence control plan.

Correction of Material Damage. No material damage of surface resources is anticipated as a result of subsidence in the permit area. However, should material damage occur, SCM will correct any material damage resulting from subsidence caused to surface lands to the extent technologically and economically feasible by restoring the land to a condition capable of maintaining the value and reasonably foreseeable uses which it was capable of supporting before the subsidence. In addition, SCM will notify the Division of any slide, rock fall, or other disturbance known to be caused by subsidence that will have an adverse effect on the environment.

Protection of Significant Surface Resources. None of the following exist within the area of potential subsidence associated with the Dugout Canyon Mine:

- Public buildings or facilities,
- Churches, schools, and hospitals,
- Impoundments with a storage capacity of 20 acre-feet or more or bodies of water with a volume of 20 acre-feet or more,
- Aquifers or bodies of water that serve as a significant water source for any public water supply system, or
- Urbanized areas, cities, towns, or communities,
- Non-commercial buildings or occupied (human) structures.

Hence, no special control measures are required to preclude subsidence impacts to these resources. Refer to Appendix 5-11 for additional discussion of subsidence.

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Supportive Documents

IBC, Canyon Fuel Company, Task ID # 5212

Section: 728 Probable Hydrologic Consequences

Title page for reference only

Section 728 provides a description of the measures to be taken to replace adversely affected State-appropriated water supplies.

Water Replacement. The water consumed in operating underground equipment, dust suppression, and evaporation is obtained from ground water sources. These underground water sources are not connected to the surface waters in the area. Research has been performed by the mine to verify that water currently entering the mine is not coming from the surface or depleting surface waters. Continued monitoring by the mine of the surface waters and seeps and springs flows in the permit and adjacent areas have shown no discernable impacts due to mining activities. It is the operator's position that the water consumed in operating Dugout Canyon Mine is not depleting surface water sources. In fact, there is an overall net gain to local river systems discharging to the Colorado River as a result of the mine's discharge.

The Permittee will replace the water supply of any land owner if such a water supply proves to be contaminated, diminished or interrupted as a result of the mining operations. First, a determination will be made by the Division in accordance with R645 - 301- 731.800 as to whether or not material damage has occurred. Then, in accordance with Regulation R645-301-525.510, Dugout Canyon Mine will correct any material damage resulting from subsidence caused to surface lands (which includes water rights), to the extent technologically and economically feasible, by restoring the land to a condition capable of maintaining the value and reasonably foreseeable uses that it was capable of supporting before subsidence damage. Negotiations will be held with the water right holders to determine the best plan of action and implementation of water replacement.

729 Cumulative Hydrologic Impact Assessment (CHIA)

A Cumulative Hydrologic Impact Assessment to include the permit and adjacent areas is to be prepared by the Division.

730 OPERATION PLAN

731 General Requirements

This permit application includes an operation plan which addresses the following:

- Groundwater and Surface Water Protection and Monitoring Plan;
- Design Criteria and Plans;
- Performance Standards; and
- Reclamation Plan.

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