

REFUSE PILE AMENDMENT

DUGOUT CANYON MINE

Task ID # 2156

January 2006

Canyon Fuel Company, LLC
P.O. Box 1029
Wellington, UT 84542

C/007/039

Mine #	C/007/0039
File	Amending
Record #	0001
Doc. Date	1-24-06
Recd. Date	1-24-06

Canyon Fuel Company, LLC
SCM/Dugout Canyon Mine

Mining and Reclamation Plan
January 24, 2006

APPENDIX 5-6

Reclamation Bond Estimate

Bonding Calculations

Direct Costs

Subtotal Demolition and Removal	\$748,307.00
Subtotal Backfilling and Grading	\$749,326.00
Subtotal Revegetation	\$342,700.00
Direct Costs	\$1,840,333.00

Indirect Costs

Mob/Demob	\$184,033.00	10.0%
Contingency	\$92,017.00	5.0%
Engineering Redesign	\$46,008.00	2.5%
Main Office Expense	\$125,143.00	6.8%
Project Management Fee	\$46,008.00	2.5%
Subtotal Indirect Costs	\$493,209.00	26.8%

Total Cost	\$2,333,542.00
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Escalation factor	0.0259
Number of years	5
Escalation	\$318,258.00

Reclamation Cost Escalated	\$2,651,800.00
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Bond Amount (rounded to nearest \$1,000) 2010 Dollars	\$2,652,000.00
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Ref.	Description	Materials	Mears Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost	
	Mine Belt BC-1 No. 1																				15493
	Transfer Building No 2																				27939
	Fired Belt BC 2 No3																				10946
	Stack Tubes 2 No4																				3175
	Head House 1 No 5																				5248
	Transfer Belt BC 2 No 6																				9687
	Head House 2 No 7																				1359
	Reclaim Tunnel No 8																				20096
	Reclaim Belt BC 4 No 9																				9755
	Escape Tunnel 60 inch No 10																				780
	Crusher Building No 11																				25336
	Truck Loadout Belt BC 5 No 12																				7656
	Truck Loadout and Scales No 13																				20600
	Bathhouse No 14																				111344
	Substation No 15																				1488
	Power Lines and Poles No 16																				1858
	Retaining Wall No 17																				603
	Gabion Wall No 18																				57513
	Pump House No 19																				2315
	Paved Road No 20																				50547
	Stream Culvert 72 inch No 21																				45027
	Water Tanks No 22																				2898
	Rock Dust Bin No 23																				815
	Fuel Tank and Fuel Station No 24																				1338
	Holding Tank No 25																				318
	Ventilation Fan No 26																				1842
	Manway 27																				434
	Water System 28																				71041
	Swamp System 29																				23808
	Item 30 removed																				7590
	Storage Containers 31																				1294
	Gabion Wall No 32																				4014
	Shop Building No 33																				26000
	Switch House No 34																				899
	Porails No 35																				1531
	Storage Building No 36																				1280
	Sampling System No 37																				711
	Stoker Storage Bin No 41																				2194
	Substation No 2 No 42																				970
	Gabion Baskets No 43																				5168
	Refuge Site No 44																				1988
	Peace Fan Culvert																				48785
	Peace Fan Generator																				5200
	Peace Fan Portal																				12297
	Degas Well G2																				7670
	Degas Well G3																				7990
	Degas Well G4																				7670
	Degas Well G-5																				11056
	Degas Well G-6																				8324
	Degas WellG7																				12314
	Degas WellG9																				12088
	Degas WellG10																				12796
	Degas WellG11																				9287
	Degas WellG12																				9081

	Equipment Cost	Hourly Operating Costs	Equipment Overhead	Operator's Hourly Wage Rate	Hourly Cost	Number of Men or Eq.	Total Eq. & Lab. Costs	Units	Quantity	Units	Production Rate	Units	Equip. + Labor Time/Dls.	Units	Cost
Facilities Area 01															308109
Facilities Area 02															119177
Stream Channel 03															32869
Gabion Basin 04															
Refuse Pile 05															277486
Pace Canyon Fan Portal															11685
Subtotal															748328

Refuse Pile 05	Equipment Cost	Hourly Operating Costs	Equipment Overhead	Operator's Hourly Wage Rate	Hourly Cost	Number of Men or Eq.	Total Eq. & Lab. Costs	Units	Quantity	Units	Production Rate	Units	Equip. + Labor Time/Dis.	Units	Cost
Cut and Fill Refuse Site															
D9R Semi-U EROPS (9-43) (3Q02)	18485	80.3	0.1	55.4	259.26	1	259.26 \$/HR		27556 CY	102 CY/HR		270.2 HR			70052
5,000 gal H2O truck Diesel (20-6) (2Q03)	4990	31.95	0.1	43.3	109.63	1	109.63 \$/HR					150 HR			16445
Pickup Truck Crew 4x4 1 ton (20-7) (2Q03)	900	5.4	0.1	0	11.57	1	11.57 \$/HR					270.2 HR			3126
Foreman Average, Outside					59.9	1	59.9 \$/HR					270.2 HR			16185
Doze On-site Subsoil/Topsoil															
D8R Series II Semi-U EROPS (9-55) (2nd04)	13720	53.4	0.1	52	196.49	1	196.49 \$/HR		31156 CY	480 CY/HR		64.9 HR			12752
Borrow Area Soils															
Trucking Topsoil															
CAT 325BL (10-21)(2nd04)	9170	35.55	0.1	52	148.42	1	148.42 \$/HR		51820 CY	150 CY/HR		345.5 HR			51279
6X4 70,000lbs 12-18 CY (20-11) (1Q04)	3600	25.75	0.1	42	92.83	1.5	139.25					345.5 HR			48111
Doze Trucked Subsoil/Topsoil															
D8R Series II Semi-U EROPS (9-55) (2nd04)	13720	53.4	0.1	52	196.49	1	196.49 \$/HR		51820 CY	171 CY/HR		303 HR			59536
Subtotal															277488

Ref.	Description	Materials	Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter/Area	Volume	Weight	Density	Time	Number	Unit	Swall Factor	Quantity	Unit	Cost	
	Dugout Mine Refuse Pile																			
	Soil Preparation	Excavation Bulk Bank 2 CY (322BL)	02315 400 0260	1.74 /CY	/CY					17					AC		27427	CY	47723	
	Seed Mix No. 1																			
	Hydroseeded Equipment and Labor	Hydro Spreader (equip. & labor) 8-81 80MSF/day	Revep002	19.8 /MSF	MSF					17					AC		741	MSF	14872	
	Hydroseeded Material	Dugout Seed Mix No. 1	Dugout 07391S	364.75 /AC	/AC					17					AC		17	AC	6711	
	Hay Mulch	Hay material only 02370 700 1200	Revep001R	66.85 /ton	/ton					17					AC		17	ton/AC	1187	
	Transplant Area No. 1																			
	Area																			
	Transplant Materials	Dugout Transplant Mix No. 1	Dugout 07391T	348 /AC	/AC					15.6					AC		15.6	AC	5444	
	Transplant Labor	Bare root seedlings, 6" to 10"	02312 350 0711	1.31 /Ea	/Ea									400	#/AC		6240	Ea	8174	
	Subtotal																			34188
	Direct Vegetation																			83911
	Reseeding																			
	Assume 25% reveget rate																			18092
	Subtotal																			18092
	Total																			102003

The additional acreage is to account for the increase in surface of the refuse pile. The actual increase in only an acre but the area has been increased by 1.4 acres as a precaution. The number of seedling was not increased because of the slope configuration. 1/08 YSM

CHAPTER 1

LEGAL, FINANCIAL, COMPLIANCE AND RELATED INFORMATION

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CHAPTER 1

LEGAL, FINANCIAL, COMPLIANCE AND RELATED INFORMATION

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

111 Introduction

The refuse pile will be located on property owned by Canyon Fuel Company, LLC. The property is located in the N 1/2 of the NE 1/4 of Section 18, T14S, R12E. The site is located approximately 6.5 miles southwest of the Dugout Canyon Mine adjacent to the Carbon County road accessing the mine (see Figures 1-1A and 1-1B).

112 Identification of Interests

For information pertaining to this section(s) refer to the General Chapter 1 binder for Canyon Fuel Company, LLC, Dugout Canyon Mine, Soldier Canyon Mine and Banning Loadout operations.

112.100 Business Entity

For information pertaining to this section (s) refer to the General Chapter 1 binder for Canyon Fuel Company, LLC, Dugout Canyon Mine, Soldier Canyon Mine and Banning Loadout operations.

112.200 Applicant and Operator

For information pertaining to this section (s) refer to the General Chapter 1 binder for Canyon Fuel Company, LLC, Dugout Canyon Mine, Soldier Canyon Mine and Banning Loadout operations.

112.300 Officers of the Applicant

For information pertaining to this section (s) refer to the General Chapter 1 binder for Canyon Fuel Company, LLC, Dugout Canyon Mine, Soldier Canyon Mine and Banning Loadout operations.

112.400 Coal Mining and Reclamation Operation Owned or Controlled

. For information pertaining to this section (s) refer to the General Chapter 1 binder for Canyon Fuel Company, LLC, Dugout Canyon Mine, Soldier Canyon Mine and Banning Loadout operations.

112.500 Legal or Equitable Owner of the Surface and Mineral Properties

The legal and equitable owner of the surface property to be affected by this mining operation during the duration of the permit period is Canyon Fuel Company, LLC.

Canyon Fuel Company, LLC
225 North 5th Street, 9th Floor
Grand Junction, CO 81501

The legal and equitable owner of the mineral property to be affected by this mining operation during the duration of the permit period is United States of America.

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

Reference Plates 1-2 and 1-3 in the M&RP and RA Figure 1-1B of this amendment for ownership information.

112.600 Owners of Record of Property Contiguous to Proposed Permit Area

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

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

In addition, Canyon Fuel owns properties contiguous to the refuse pile permit area. Surface ownership along the county road is shown on Plates 1-2, 1-3 in the M&RP and RA Figure 1-1B of this amendment.

112.700 MSHA Numbers

MSHA No. 1211-UT-09-01890-01 Dugout Canyon Mine Refuse Pile.
For other MSHA numbers refer to the approved M&RP.

112.800 Interest in Contiguous Lands

Canyon Fuel Company has no interest in contiguous lands other than those currently owned as shown on Plate 1-3 of the approved M&RP.

112.900 Certification of Submitted Information

Refer to the approved M&RP.

113 Violation Information

For information pertaining to this section (s) refer to the General Chapter 1 binder for Canyon Fuel Company, LLC, Dugout Canyon Mine, Soldier Canyon Mine and Banning Loadout operations.

114 Right-of-Entry Information

The Applicant, Canyon Fuel Company, LLC, owns the property on which the refuse pile and borrow area will be placed. The applicant bases their legal right to enter and begin coal mining and reclamation operations on the Warranty Deed, Contract # SC-023, Exhibit C (No. 801673), Page 270, dated 9/1/91. This deed includes both the refuse pile site and the borrow area (T14S R12 E, Section 17: NW1/4SW1/4; NW1/4; E1/2SW1/4;SE1/4, Section 18: E1/2NE1/4).

Refer to the approved M&RP for additional information.

115 Status of Unsuitability Claims

Refer to the approved M&RP.

116 Permit Term

Refer to the approved M&RP.

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

The certificate of insurance(s) and the newspaper advertisement and the verification of the advertisement appearing in the appropriate newspapers will be included in Appendix 1-2 of the

approved M&RP and refer to the General Chapter 1 binder for Canyon Fuel Company, LLC prepared for the Dugout Canyon Mine, Soldier Canyon Mine and Banning Loadout operations for additional information.

The refuse pile site will have no facilities or structures.

118 Filing Fee

Refer to the approved M&RP.

120 PERMIT APPLICATION FORMAT AND CONTENTS

Refer to the approved M&RP.

130 REPORTING OF TECHNICAL DATA

Refer to the approved M&RP.

140 MAPS AND PLANS

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

150 COMPLETENESS

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

Canyon Fuel Company, LLC
Dugout Canyon Mine

Refuse Pile Amendment
February ~~January 2006~~ 2005

CHAPTER 2

SOILS

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CHAPTER 2 SOILS

210 INTRODUCTION

This chapter and associated appendices address the pertinent data required for the refuse pile site for the Dugout Canyon Mine. The M&RP and this document contain pertinent information relating to identification, management, and reclamation activities associated with the soil resources present in the disturbed area of the Dugout Canyon Mine. The soil studies were conducted in accordance with the Utah Division of Oil, Gas, and Mining guidelines that were in effect at the time each study was conducted. The site specific soil survey conducted for this permit application was conducted in accordance with the standards set by the National Cooperative Soil Survey and analyzed according to Table 1 of the Division's "Guidelines for the Management of Topsoil and Overburden for Underground and Surface Coal Mining" (Leatherwood and Duce, 1988).

220 ENVIRONMENTAL DESCRIPTION

The site is located at an elevation of about 5,900 feet on a well-drained bench (pediment) composed of gravelly to stony alluvial deposits, which overlie the Mancos Shale formation. Pinyon-Juniper, sagebrush, and various grasses are the dominant vegetation in the area. Climatological information is provided in RA Attachment 7-5.

221 Prime Farmland Investigation

Refer to a letter included in RA Attachment 3-1, which states that the area of the Dugout Canyon Road cannot be considered as prime farmland and the refuse pile area is immediately adjacent to the road.

222 Soil Survey

222.100 Soils Map

A description of the soils within the refuse pile area on an Order III soil survey level can be found in the SCS "Soil Survey of the Carbon County Area" (Jensen, 1988). A copy of the soil descriptions from the Order III survey has been included in Appendix S-5 of RA Attachment 2-1. Information pertaining to the soils associated with the construction of the sediment pond emergency spillway is included in RA Attachment 2-1 once the data was collected and reported by soil scientist Dan Larsen. No disturbance to the spillway area soils will occur until the information has been collected for incorporated into the attachment, including soil descriptions and estimated salvage quantities.

An Order I soil survey was conducted of the refuse pile site in September 1999. Descriptions of the site soils are derived from ten pit locations and twenty-two soil samples. Based on the soil descriptions and other site observations, thirteen soil map units have been identified. The map units are shown on RA Plate 2-1 and in RA Attachment 2-1. The locations of the soil test pits excavated during the survey are shown on Map SM-1, RA Attachment 2-1.

222.200 Soil Identification

Following is a list of the soils found in the general area of the storage area as mapped by the SCS (Jensen, 1988).

Map	
<u>Unit</u>	<u>Soil Identification</u>
33	Gerst-Badland-Rubbleland complex, 15 to 50 percent slopes,
48	Haverdad loam, 1 to 8 percent slopes,
49	Haverdad loam, alkali, 0 to 3 percent slopes,
50	Haverdad loam, moist, 1 to 5 percent slopes,
66	Mivida gravelly fine sandy loam, 3 to 8 percent slopes

113 Strych stony loam, 3 to 15 percent slopes.

The SCS descriptions for the soils are included in Appendix S-5 of Attachment 2-1.

222.300 Soil Description

The description of the soils is based on the following information: taxonomic classification, horizon name and depth, color, texture (percent sand, silt, and clay), consistence, structure, percent rock fragments and organic matter, saturation, pH, EC, SAR, and solubility of calcium, magnesium, and sodium. This information is included in the soil test pit logs in Attachment 2-1, Appendix S1 and the lab data sheets included in Attachment 2-1, Appendix S3 of this submittal. RA Table 2-1 presents a summary of the soil unit features. The description of soils outside the disturbed area boundary has been taken from the SCS (Jensen, 1988).

The site has gravelly and cobbly soils of the Strych series over much of the area (Jensen, 1988). The project area is primarily disturbed with little evidence of natural soils in place. Original surface soils were stripped by previous site activities. Therefore, the natural soils are basically lacking except at the edges of the site and outside the disturbed area boundary. The remaining soil materials generally consist of coarse alluvium of varying thickness covering the Mancos Shale. In some places the shale is at or near the surface.

222.400 Soil Productivity

The data obtained from soil testing are provided in Appendix S3 of Attachment 2-1. A table showing depth and the number of samples taken from each backhoe pit location (Soil Pits DCW1 through DCW10) can be found in Appendix S3.

A summary of the soil testing results and ratings are provided below:

PH - All samples rated good, with a range of 6.9 to 7.8.

% Saturation - 17 samples rates good (25.1 to 45.3) and 5 samples rated fair (21.6 to 24.9).
Electrical Conductivity - 17 samples rates good (0.038 to 1.93 umhos/cm) and 5 samples rated fair (2.12 to 4.68 umhos/cm).
Sodium Adsorption Ratio - 20 sampled rated good (0.56 to 3.71) and 2 samples rated fair (4.64 and 6.03).
Texture - 12 samples rated good (loam and sandy clay loam) and 10 samples rated fair (clay loam and silty clay loam)
Available Water Capacity - 6 samples rated good (0.11 to 0.14 inches per inch) and 16 samples rated fair (0.05 to 0.10 inches per inch)
Boron - All samples rated good (0.05 to 0.50 ppm)
Selenium - All samples rated good (0.02 ppm or less)
Acid/Base Potential - All samples rated good (90.0 to 282.0 T/1000 tons)

Tests not used in the UDOGM rating criteria indicated low phosphorus, nitrogen, and sulfur levels. Calcium carbonate content is relatively high, with a range of 9.3 to 26.9 percent. Organic matter is low although there are pockets of woody materials in various sample locations. The soils were determined to be acceptable for use in site reclamation.

A summary of the sediment pond spillway soil testing results and ratings for four samples are:
pH - samples rated good, with a range of 7.5 to 7.6; % Saturation - samples rates good (26 to 35.4); Electrical Conductivity - samples rated good (0.40 to 0.58 umhos/cm); Sodium Adsorption Ratio - samples rated good (0.53 to 1.05); Texture - samples rated good (sandy loam and sandy clay loam); Available Water Capacity - samples rated good; Boron - samples rated good (0.21 to 0.31 ppm); Selenium - samples rated good (less than 0.02 ppm) and Acid/Base Potential - All samples rated good (115 to 150 t/1000 tons).

223 Soil Characterization

Daniel M. Larsen, Professional Soil Scientist, performed the soil survey described in this chapter and included as Attachment 2-1, in accordance with the standards of the National Cooperative Soil Survey.

224 Substitute Topsoil

All soil resources to be removed from the refuse pile site qualify as growth media but not as topsoil. However, CFC may use selected overburden materials as a substitute or supplement to the salvaged soil.

If necessary for reclamation of the refuse pile, substitute topsoil/growth medium will be salvaged from a borrow area approximately 3/4 mile southeast of the refuse pile. The borrow area is located on lands owned by the permittee (Portions of the E1/2 NE1/4 SW1/4, W1/2 SE1/4, Section 17, T14S R12E). The borrow area has sufficient soil, in addition to the soils previously salvaged or available for salvage at the refuse site to cover the refuse pile with 4 feet of material. Only the quantity necessary for reclamation will be removed from the borrow area and sufficient soil will remain intact at the borrow location to reclaim the site. Refer to Section 233 and RA Attachment 2-3 for additional information.

At the time of reclamation placement, the soil resources salvaged from the site may be supplemented with appropriate amendments, if necessary.

230 OPERATION PLAN

231 General Requirements

231.100 Removing and Storing Soil Methods

The refuse pile area has been the site of activities since the early 1900's. At the time of the initial disturbances, topsoil was apparently not salvaged; however during the excavation of gravel in 1998 - 1999 some soil was salvaged. These salvaged soils will be included in the soil stockpiles for the refuse pile (RA Plate 2-2). The methods described for soil salvage herein will be followed when removing and storing soil resources currently in-place.

Soil salvage will take place at the beginning of site use for all areas within the disturbed area boundary to be used immediately. There is no disturbance planned for the areas designated as H and J on RA Plate 2-1 except for the area to be disturbed for the construction of the sediment pond emergency spillway. Topsoil and subsoil will be salvaged and stockpiled from the area disturbed during the construction of the spillway. The removal of salvaged soils will include all horizons, except in soils salvage areas H and J (RA Plate 2-1), where no salvage of soils is currently planned except as state above. These materials will be stored in a graded stockpiles and seeded to promote surface stabilization. The seed mix to be used will be the interim seed mix described in Chapter 3, Section 341.200. At the time of the 1999 Soil and Geotechnical Surveys, the area designated a "L" in the soil survey was described as being a pile of gravel (on top of the soil), the gravel has since been removed from the site (2002). The soils available for salvage in area "L" are assumed to be similar to those in area "M". As recommended by the Division under R645-310-232.500 of the October 24, 2002 Technical Analysis two piles have been created, one stockpile for topsoil and the second for subsoils. Areas D, E, F plus areas K and G designated on RA Plate 2-1 will be salvaged and placed in the topsoil pile. The majority of the salvaged topsoil come from the G and F soil units noted on the soils map. The remainder of the areas to be salvaged will be placed in the subsoil stockpile. Daniel M. Larsen, Professional Soil Scientist was on site during the salvage operations and determined in which pile the salvaged soils were placed.

The operator will endeavor to remove and store as much soil as possible in the designated stockpiles, thereby maximizing the protection of the soil resources of the site. The salvaged soil will be treated in compliance with R614-201-234.300.

231.200 Suitability of Topsoil Substitutes/Supplements

See Section 233.200.

231.300 Testing of Topsoil Handling and Reclamation Procedures Regarding Revegetation

See Sections 232 through 234 and Section 240.

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

See Section 234.

232 Topsoil and Subsoil Removal

232.100 Topsoil Removal and Segregation

Due to the disturbed nature of the site area, all available soil materials will be removed and stockpiled, since the soil resource is limited on the site (refer to Section 231.100). RA Plate 2-1 shows the areas of soils to be stripped and the approximate depth ranges for each soil. RA Table 2-2 presents an estimate of the soil materials that are available for salvage from each of the soil units within the ~~proposed~~ disturbed area. Supporting calculations are presented in Attachment 2-2. The estimate is based on an average of the recommendations of Mr. Larsen's soils report presented in Attachment 2-1. During the actual salvaging activities, efforts will be made to maximize the soil volume to be salvaged.

A professional soil scientist will be on-site during soil salvage operations to monitor and supervise salvage activities for the purpose of maximizing soil salvage volumes, quantities and to determine medium to be left in place (i.e. gravel, boulders). Should a professional soil scientist be unavailable, a professional with knowledge and experience in soil salvage (i.e. UDOGM Soil Reclamation Specialist) will be used. **This commitment also applies to soil salvage from the borrow area.**

232.200 Poor Topsoil

The soils on the site have been classified as fair to good for sustaining vegetation. Therefore, all available soil materials will be removed and stockpiled.

232.300 Thin Topsoil

Soil that is less than 6 inches thick will be removed with the immediately underlying unconsolidated materials and the mixture will be treated as salvageable soil.

232.400 Minor Disturbances Not Requiring Topsoil Removal

Small Structures. Soil will not be removed prior to construction that would result in only minor disturbances. Such construction activity includes work on small structures such as signs, fence lines, and etc.

Vegetation. The operator will not remove soil for minor disturbances where such activity will destroy vegetation or cause erosion.

232.500 Subsoil Segregation

The soil horizons will be removed and stockpiled together during the construction of the site, as described in Section 234.

232.600 Timing

Soil removal will take place after all vegetation that could interfere with soil salvage has been removed.

232.700 Topsoil and Subsoil Removal Under Adverse Conditions

Due to the disturbed nature of the site, soil horizons will be removed together, except where natural conditions render operations hazardous or detrimental to soils outside the disturbed area.

Conventional Machines. In localities where steep grades, adverse terrains, severe rockiness, limited depth of soils, or other adverse conditions exist that render soil removal activities using conventional machines hazardous, soils will not be salvaged and stockpiled.

Substitute Topsoil. Importing of substitute topsoil may be required **depending upon the final height of the refuse pile**, refer to Sections **224**, 233 and 242.

233 Topsoil Substitutes and Supplements

233.100 Overburden Materials Supplementing and/or Replacing Topsoil

Selected overburden materials may be used below the salvaged soils during reclamation operations, if sufficient soil materials are not available for the proposed reclamation activities. Where overburden materials are used, the operator commits to demonstrating to the Division prior to salvaged soil emplacement that the overburden materials are non-toxic, non-acid forming, and non-combustible. Refer to Section 536.200 discussion of waste sampling/testing.

233.200 Suitability of Topsoil Substitutes and Supplements

~~Topsoil substitutes and Supplements may be used for the refuse site area.~~ The description of the substitute topsoil from the borrow area is based on the following information: taxonomic classification, horizon name and depth, color, texture (percent sand, silt, and clay), consistence, structure, percent rock fragments and organic matter, saturation, pH, EC, SAR, and solubility of calcium, magnesium, and sodium. This information in the soil test pit logs and the lab data sheets are included in RA Attachment 2-3 of this submittal.

The material from the borrow area will be available should there be a need for supplemental topsoil/growth medium to reclaim the refuse pile. The analysis of the soil test pit samples indicate that the physical and chemical properties are comparable to the soils salvaged at the refuse pile site. The substitute topsoil/growth medium will be left in place and be utilized only if need for reclamation of the refuse pile site.

The depth and number of samples taken from each backhoe pit location (Soil Pits SB1 through SB9) can be found in RA Attachment 2-3 on the laboratory soil analysis report. The soil pit locations are shown on Figure 2, RA Attachment 2-3. Photographs of the pits and borrow area are located in RA Attachment 2-3.

A summary of the borrow area soil testing results and ratings are provided below:

PH - Samples rated from mildly alkaline to moderately alkaline, with a range of 7.6 to 8.4.

% Saturation - 42 samples rated good (25 to 46.4) and 1 sample in SB8 rated fair (23.8).

Electrical Conductivity - 24 samples rates good (0.22 to 1.90 umhos/cm) and 14 samples rated fair (2.12 to 4.83 umhos/cm) and 5 samples rated poor (5.39 to 12.2 umhos/cm).

Texture - 41 samples rated good (loam, sand loam and sandy clay loam) and 2 samples rated fair (silt loam and silty clay loam)

Boron - 36 samples rated good (0.12 to 0.45 ppm), 7 samples rated fair (0.51 to 1.14 ppm)

Selenium - 34 samples rated good (0.02 ppm or less), 9 samples rated fair (0.04 to 0.28)

Acid/Base Potential - All samples rated good (124 to 197 T/1000 tons).

Refer to Section 224 and RA Table 2-2 for addition information about the borrow area.

233.300 Physical and Chemical Analyses

Topsoil substitutes and supplements may be used for the refuse site area. The laboratory soil analysis report for the borrow area is included in RA Attachment 2-3.

The rate of sampling for the overburden beneath the soil will be sampled as discussed in Section 536.200.

Certification of Reclamation Topsoil Suitability. The borrow area if substitute topsoil should become necessary, the soil will be was certified by an approved laboratory in accordance with at least one of the following: Soil Conservation Service published data and technical guides, state agricultural agency, Tennessee Valley Authority, BLM - USFS published data, physical and chemical analyses results, field-site trials, or greenhouse tests.

233.400 Testing of Substitute Topsoil

Only the substitute topsoil used in lieu of, or in conjunction with, on-site overburden and soil will be tested as described in Section 233.300.

234 Topsoil Storage

Soils salvaged from the site will be stockpiled on the site. Refer to Plates RA 5-1 and 7-1 for the stockpile location. The estimated volumes of soil to be stockpiled are presented in RA Table 2-2.

234.100 Topsoil Stockpiling

Soil removed will be stockpiled for later use in reclamation operations when it is impractical to promptly redistribute the materials on regraded areas. Refer to Plates RA 5-1 and 7-1 for the location of the soil storage area. Because the soil salvage quantities are estimated, the actual contours and corresponding cross-sections are approximate. The final soil stockpiles will be reflected in the as-built drawings for the site. **RA Plate 2-2 will reflect as-built drawings of the stockpiles soils should they be moved to facilitate the expansion of the waste rock site. Once the expansion is completed the as-built drawings of the topsoil stockpiles will be submitted within six months.**

It is anticipated that the piles will be constructed in horizontal lifts of 1.5 to 2.0 feet. Tracked equipment will be used to reduce compaction. The stockpiles will be graded to a maximum slope of 2:1 and seeded to promote surface stabilization. The interim reclamation seed mix described in Chapter 3, Section 341.200 will be used for this purpose.

The stockpiles will be kept isolated from the main area of the refuse site to protect the material from contaminants and unnecessary compaction that would interfere with vegetation. A sign will be installed on the stockpiles to identify one as a topsoil storage area and the second as the subsoil storage area. The stockpiles will be protected from wind and water erosion by being revegetated with a quick growing vegetative cover (interim seed mix) and by installing berms around the stockpiles to help trap sediment coming off the stockpiles. The stockpiled soils will be moved if necessary to facilitate the expansion of the waste rock site and for contemporaneous reclamation. Following the expansion, these stockpiled soils will not be moved or disturbed until

required for redistribution during contemporaneous reclamation. The boulders designated in area "K" (RA Plate 2-1) will be stockpiled separately from the soils salvaged from the refuse site. The boulders will either be placed along the perimeter of the substitute topsoil pile, access road, on top of the subsoil pile or will be transported to the rock stockpile at the Dugout/Soldier Canyon Mine topsoil stockpile adjacent to the Soldier Canyon Road.

234.200 Stockpiled Topsoil

Stable Stockpile Site. Stockpiled materials will be placed on a stable site as described in Section 234.100.

Protection from Contaminants and Compaction. Stockpiled soil will be protected from contaminants and unnecessary compaction. To protect the soil from contaminants and unnecessary compaction that could interfere with vegetation, the stockpiles will be isolated from the main refuse pile area (Section 234.100). A sign designating "topsoil" will be installed on the stockpile.

The stockpile will be constructed in such a manner as to allow equipment access around the base of the stockpiles for repair of the surfaces and diversion structures as needed.

Furthermore, berms will be constructed around the stockpiles to further separate the soils from the materials stored on the site. The berm will be constructed as specified in Chapter 7.

Wind and Water Erosion Protection. The stockpiles will be protected from wind and water erosion by prompt establishment and maintenance of a vegetative cover. Berms will be constructed around the stockpiles to help trap sediment runoff from the stockpiles. Refer to Section 242.100 for additional protection information.

Topsoil Redistribution. A limited quantity of stockpiled soil ~~will~~ **may** be distributed on the refuse pile to determine the quantity of soil cover necessary to meet revegetation reclamation

requirements. The remainder of the stockpiled soil will not be moved until redistributed during reclamation operations unless approved by the Division.

234.300 Topsoil Stockpile Relocation

Stockpiled soil in jeopardy of being detrimentally affected in terms of its quantity and quality by refuse pile operations may be temporarily redistributed upon approval by the Division and modification of this M&RP. The stockpiled soils will be moved to facilitate the expansion of the waste rock site. Following the expansion, these stockpiled soils will not be moved or disturbed until required for redistribution during contemporaneous and final reclamation.

Host Site. Soil relocation may occur provided that such action does not permanently adversely affect soil of the host site.

Topsoil Suitability. Stockpiled soil relocation may occur provided the material is retained in a condition more suitable for redistribution than if stockpiled.

240 RECLAMATION PLAN

241 General Requirements

Reclamation of the site (soil redistribution, amendments, and stabilization) is discussed in Sections 242, 243, and 244, respectively.

242 Soil Redistribution

242.100 Soil Redistribution Practices

The stored soil will be redistributed after recontouring of the site has occurred during reclamation activities. The exact quantity of the salvageable soil available for use is not known at this time, but has been estimated to be approximately 15,511CY of subsoil currently salvaged (includes stockpile berms). ~~The approximate salvaged soils from the refuse pile site are: topsoil stockpile volume 7,298 CY, subsoil stockpile volume 6,508 CY, berm volume 2,686 CY and second subsoil stockpile volume 6,317 CY equaling 22,809 CY available for site reclamation. 7,298 CY of topsoil salvaged.~~ There is the potential for an additional 5,400 CY of subsoil to be salvaged from beneath the current soil stockpiles. This subsoil will be salvage and stockpiled when and if the soil piles are relocated. During reclamation the destruction of the berms and embankments that create the perimeter ditches and sediment pond will generate approximately ~~42,900~~ 2,947 CY of additional cover material. ~~The total available cover material at the refuse site is 31,156 CY (approximate).~~

Soils will be handled when they are in a loose or friable condition. The moisture content will be visually monitored and water will be added as needed to enhance the soil's condition for handling.

Contemporaneous Reclamation: ~~In the future, the applicant may decide is proposing to demonstrate that two feet of cover material over the refuse pile is sufficient to meet reclamation standards for bond release. Additional information and clarification of the project will be provided at that time. An area on the refuse pile will receive reclamation treatments contemporaneously to justify the decrease of required cover soils from four feet to two feet for final reclamation. The area will compare reclamation treatments as shown below. Each treatment area will have a West facing slope, an East facing slope and a level area. All treatments will receive the permanent seed mix (excluding seedlings) and seeding, mulching and gouging procedure as approved for final reclamation.~~

Treatment	Depth of Cover	1 st Layer	2 nd Layer	Top Layer
A	4 feet	12" subsoil and waste mixed	30" subsoil	6" topsoil
B	3 feet	12" subsoil and waste mixed	18" subsoil	6" topsoil
C	2 feet	12" subsoil and waste mixed	6" subsoil	6" topsoil
D	2 feet	18" subsoil		6" topsoil

The treatment areas will be approximately 20 feet by 55 feet with areas delineated by markers such as roof bolt, etc. approximately every five feet surrounding each treatment area.

Treatment areas will be monitored yearly at the end of the growing season for six years, as shown on the table below. Following the sixth year, monitoring results will be evaluated by UDOGM and the permittee to determine if justification has been provided to reduce the cover materials required for reclamation of the refuse pile. Monitoring will be discontinued following this evaluation. The sampling methods to be used according to the currently approved UDOGM guidelines are: sample adequacy, cover (line interception), density (belt transects or plots) and productivity (clipping and/or NRCS estimation). The Jaccard's Community Coefficient will be used to calculate acceptable plant similarity and diversity.

TREATMENT AREAS "A THROUGH D" MONITORING SCHEDULE

	YEAR					
	-1	-2	-3	-4	-5	-6
QUALITATIVE SAMPLING	×	×	×	×	×	×
QUANTITATIVE SAMPLING						
Cover		×	×		×	×

Frequency		✕	✕		✕	✕
Woody Plant Density		✕	✕		✕	✕
Productivity			✕			✕
SOIL SAMPLING			✕			✕

~~A soil sample will be taken in the 3rd and 6th years of monitoring. The sample will be taken 6" above the interface of the waste with the subsoils in accordance with the standards set by the National Cooperative Soil Survey and analyzed according to Table 1 of the Division's "Guidelines for the Management of Topsoil and Overburden for Underground and Surface Coal Mining". Monitoring data for soil and vegetation sampling will be included in the mine's annual reports.~~

Soil Thickness: The topsoil will be distributed to the disturbed areas illustrated on Figure RA 5-1.

Currently, it is planned that the refuse pile portion of the site be covered with approximately 48 inches of soil. Based on the proposed pile configuration this will require about 85,163 ~~82,976~~ CY of soil . The remainder of the site area, not used for refuse storage will be covered with approximately 6 inches of substitute topsoil. Calculations of the soil cover volumes are presented in Attachment 2-2. Soils in the area designated as H and J (approximately 11.2 acres) are not currently planned for salvage, except in the area of the pond spillway (RA Plate 2-1).

~~The quantity of topsoil and subsoil required to cover the proposed refuse pile configuration are shown in the table below. The application rates for Treatments A, B, and C would incorporate waste rock in the bottom foot of growth medium placed over the refuse. The twelve-inch subsoil and waste layer will be approximately a 50/50 mix. Treatment D, the two-foot application rate would incorporate a smaller quantity of waste rock. All applications would roughen the refuse pile surface prior to applying the bottom layer of subsoil or subsoil/waste rock mix. For example, a four-foot cover would include: a bottom foot of growth medium consisting of subsoil mixed with waste rock~~

~~material, a middle layer of 2.5 feet of subsoil and a 0.5 foot layer of substitute topsoil as the top layer.~~

Waste Rock Soil Cover Requirements					
Surface Area of Pile to be Covered (ft ²)	Depth	Quantity Needed	Topsoil/ Subsoil Available*	Quantity of Coal Waste to be Mixed	Additional Soils Required
574,850	4 feet	85,163 CY	38,516 CY	10,645 CY	36,002 CY
574,850	3 feet	63,872 CY	38,516 CY	10,645 CY	14,711 CY
574,850	2 feet	42,581 CY	38,516 CY	4,065 CY	-----
Topsoil					
Quantity Stockpiled	Required to Cover Site with 6" of Topsoil, excluding Refuse Pile		Required to Cover Refuse Pile with 6" of Topsoil		Additional Substitute Soils Required
7,298 CY	2,593 CY		10,645 CY		5,940 CY

* Total includes subsoil stockpiled, estimated additional soils to be salvaged and 4,705 CY of the salvaged topsoil pile. Reference Attachment 2-2 for further explanation of soil materials available to cover the refuse pile.

Compaction. To prevent compaction of topsoil, soil-moving equipment will refrain from unnecessary operation over spread soil. Front-end-loaders and other wheel-mounted equipment may be used to transport and dump soil. However, to minimize compaction, only track-mounted equipment (e.g. bulldozers, trackhoes) will be used to spread the soil. The soil will be loosened prior to seeding as described in Section 341.200.

Erosion. Care will be exercised to ensure the stability of soil on graded slopes to guard against erosion during and after soil application. Erosion control measures will include but not be limited to extreme surface roughening (also known as pocking and gouging).

Since the site has been disturbed by previous activities and will be used to permanently store coal mine waste, the area will not be returned to the original geometric configuration. Prior to soil redistribution, the disturbed area will be graded to meet the proposed final reclamation topography (RA Plate 5-3).

The surface of the refuse pile will be left in a roughened state and in addition will be ripped prior to the application of soil. After the 1st lift of subsoil is placed, the surface of the refuse pile will be ripped again to a depth of approximately 12 inches in an effort to promote root penetration and to mix the top layer of the refuse with the subsoil. Refer to Section 341.200 for further discussion of roughening methods.

The second type of surface consists of roads, perimeter ditches, etc. which may be compacted through their use. The surface will be ripped to a depth of approximately 1.5 to 2 feet with a ripper-equipped tractor or other appropriate equipment where possible to reduce surface compaction, to assure soil adherence, and promote root penetration. Following the ripping of the soils and the application of stockpiled soils, extreme roughening techniques will be applied. A backhoe or trackhoe will be used to create microbasins with a minimum depth of 18" and the width of the bucket. Soil removed to form the microbasins will be dropped approximately 2 to 3 feet above the microbasin onto the soil surface.

242.300 Topsoil Redistribution on Impoundments and Roads

The sedimentation pond and embankment will be breached and reclaimed with the other surface disturbed areas. Similarly, reclamation of abandoned roads will also follow the same technique as for other disturbed areas.

243 Soil Nutrients and Amendments

Soil nutrients and amendments may be applied to the redistributed soil as necessary, to establish the vegetative cover. The type and rate of application will be determined just prior to contemporaneous and final reclamation activities based on analyses of samples collected from the stockpiled soil materials. The soils will, at a minimum, be tested for pH, EC, total carbon, SAR, phosphorus, nitrate-nitrogen, and water holding capacity.

In the event that the topsoil/subsoil piles are moved adjacent to the Dugout Canyon Road in conjunction with the pile expansion, organic matter will be incorporated into topsoil/subsoil piles when the soils are relocated. The type and rate of application will be determined by the applicant and UDOGM reclamation specialists prior to moving the soils.

244 Soil Stabilization

244.100 Protection and Stabilization of Surface Areas

Reclaimed areas will be stabilized to control erosion by application of one or combinations of a mulch, extreme surface roughening, or other appropriate methods. Rills and gullies will be regraded (Refer to Section 244.300). Seeding will be accomplished using BTCA methods suitable for reclamation. These methods may include, but not necessarily limited to: application of seeds, and mulch with a long fiber tackifier. Refer to Section 341.200 for a discussion of the seeding and the incorporation of straw/hay into the soil. Additional and more detailed discussions regarding soil protection during and after final reclamation can be found in Chapter 5 of this submittal. Methods of revegetation to be employed at final reclamation at this site are discussed in more detail in Chapter 3.

244.200 Mulch Application

Mulch will be applied as discussed previously in this chapter and for a further discussion of revegetation practices to be utilized, see Chapter 3 of the approved M&RP.

244.300 Rills and Gullies

Postmining Land Use and Revegetation. Rills and gullies that disrupt the postmining land use or reestablishment of vegetative cover will be regraded and seeded. CFC will fill, regrade, or otherwise stabilize any rills or gullies deeper than nine (9) inches that form in areas that have been regraded and soiled. The areas adjacent to any rills or gullies, which have been filled, regraded or otherwise stabilized, will be reseeded or stabilized accordingly.

Water Quality. Rills and gullies that contribute to the degradation of stream quality will be regraded and be seeded.

250 PERFORMANCE STANDARDS

251 Topsoil, Subsoil, and Topsoil Supplements Management

Topsoil, subsoil, and topsoil supplements shall be managed as outlined in Sections 230 and 240.

252 Stockpiled Topsoil and Subsoil

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

REFERENCES:

Jensen, E. H., and Borchert, J. W., 1988. Soil Survey of Carbon Area, Utah. Soil Conservation Service, United States Department of Agriculture, Washington D.C.

Leatherwood, J., and Duce, D., 1988. Guidelines for Management of Topsoil and Overburden for Underground and Surface Coal Mining. State of Utah Department of Natural Resources, Division of Oil, Gas and Mining.

RA TABLE 2-2
SOIL SALVAGE VOLUMES

AREA	VOLUME ANTICIPATED (CY)	VOLUME SALVAGED	
		APPROXIMATE (CY)	
		Topsoil	Subsoil
A	4719		1787
B	14300		5323
C	5467		2778
D	2957	832	
E	4616	1313	1066
F	3393	2423	
G	2603	2595	
I	2356		
K	206		407
M	3700		3857
H & J (Spillway)		135	293
TOTAL	44317 CY	7298 CY	15511 CY

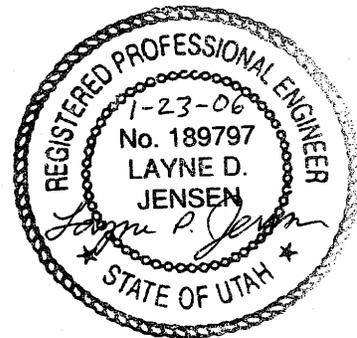
Soil Borrow Area (approximate available soil)

106,000 CY

Canyon Fuel Company, LLC
Dugout Canyon Mine

Refuse Pile Amendment
January 2006

RA ATTACHMENT 2-2
SOIL VOLUME CALCULATIONS



Reclamation Soil Thickness Dugout Refuse Pile Site

Area covered by the refuse pile = 516,552 ft²

To obtain the surface area to be covered by soil the above area must be adjusted to account for the 2:1 slopes of the refuse pile. A 2:1 slope increases the surface area by 11.8%.

Slope area = 368,950 ft²

Area of flatter space on top of the pile = 147,602 ft²

Adjusted slope area = 1.118 x 368,950 ft² = 412,486 ft²

Adjusted surface area of the pile to be covered = 560,088 ft²

The refuse pile will be covered with 4 feet of cover material. The cover material will consist of topsoil, subsoil, and a blend of coal waste and subsoil.

The volume of material needed to cover the refuse pile = 82,976 CY

Available Cover Material

There are currently topsoil and subsoil stockpiles located in the northwestern portion of the site. These stockpiles have been surrounded by a full containment berm. Olympus Aerial Surveys estimated the volume in each stockpile as well as the volume of soil in the containment berms.

Topsoil Stockpile volume = 7,298 CY

Subsoil Stockpile volume = 6,508 CY

Berm volume = 2,686 CY

An additional 6,317 CY of subsoil has been stripped from the site since construction of the stockpiles.

Total cover material currently available to be placed in the new stockpiles = 22,809 CY

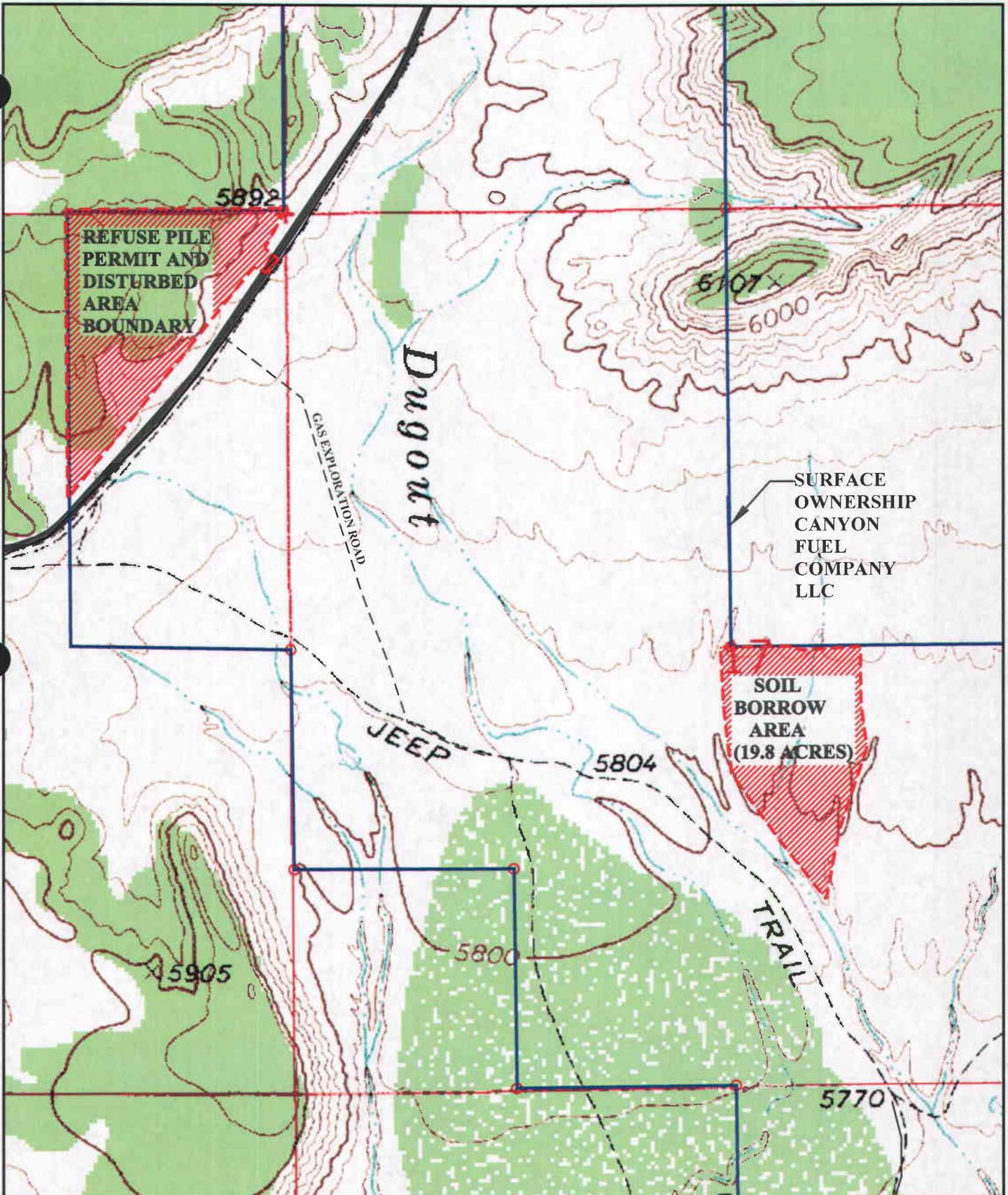
When the topsoil and subsoil stockpiles are moved additional subsoil may be excavated from the northwest portion of the site. The volume of material available to be stripped has been estimated to be 5,400 CY.

During reclamation the berms and embankments that create the perimeter ditches and sediment pond will be pulled back to blend the undisturbed areas into the reclaimed refuse pile. This process will generate approximately 2,947 CY of additional cover material.

Total available cover material = 31,156 CY

To reduce the volume of imported cover material the bottom foot of cover material will be a blend of coal waste and subsoil. Equal portions of coal waste and subsoil will be used to create this blended cover material. Thus, the volume of available cover material may be increased by 10,372 CY ($560,088 \text{ ft}^2 \times 0.5 \text{ ft} / 27 \text{ ft}^3/\text{CY}$) to a total of 41,528 CY.

Volume of cover material to be imported = $82,976 - 41,528 = 41,448 \text{ CY}$



SURFACE OWNERSHIP
CANYON FUEL COMPANY LLC

SOIL BORROW AREA IS LOCATED IN SECTION 17, T14S R12E



REVISIONS OR UP-DATES			DATE
NO.	DATE	BY	1-19-06
		DESIGNED BY:	
		DRAWN BY:	SC
		CHECKED BY:	
		SCALE:	1"=800'
FILENAME: \\SMA\GAS\SURFACE\SOIL BORROW AREA\BASTEROCKAREA			

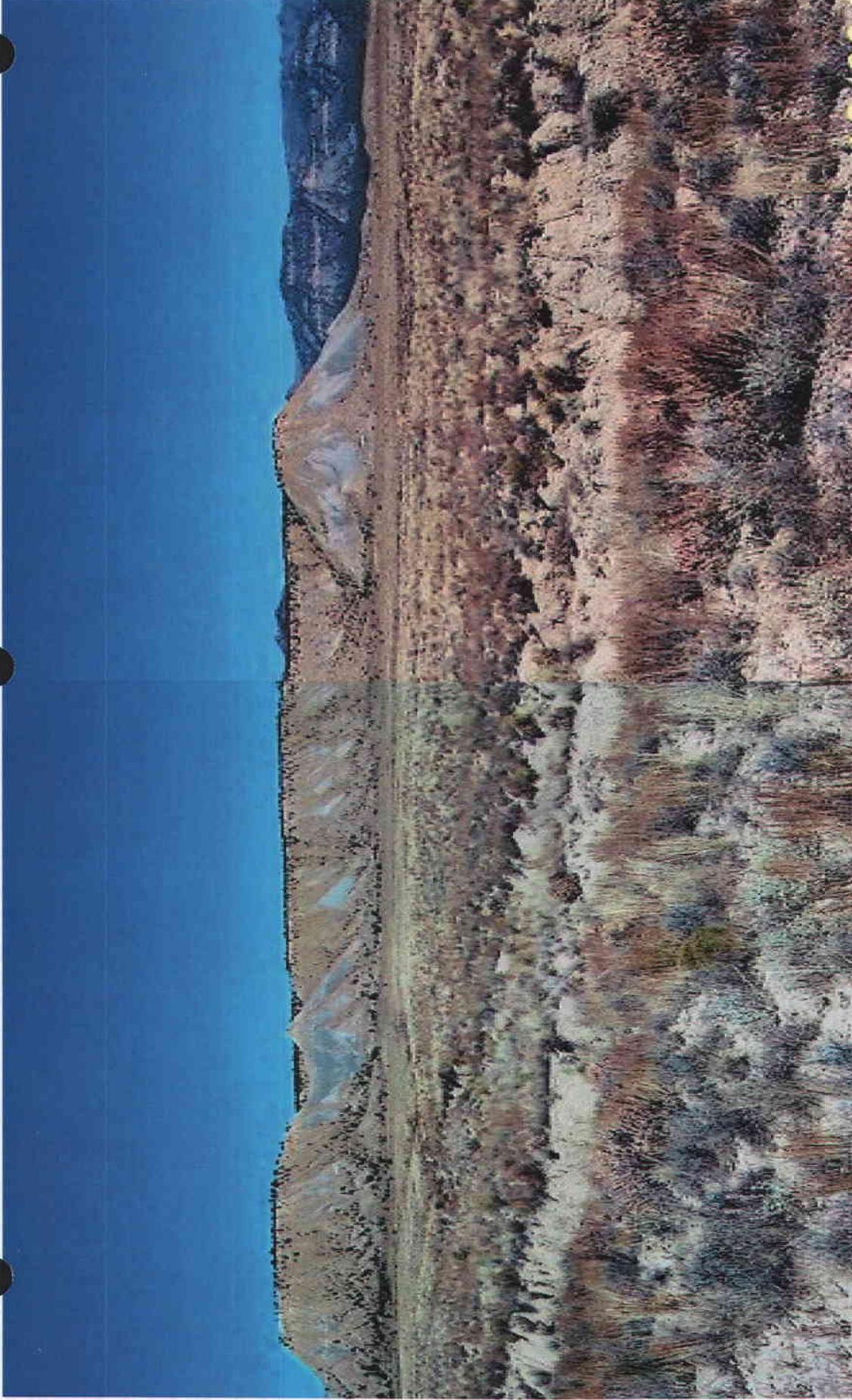


Canyon Fuel Company, LLC
Dugout Canyon Mine

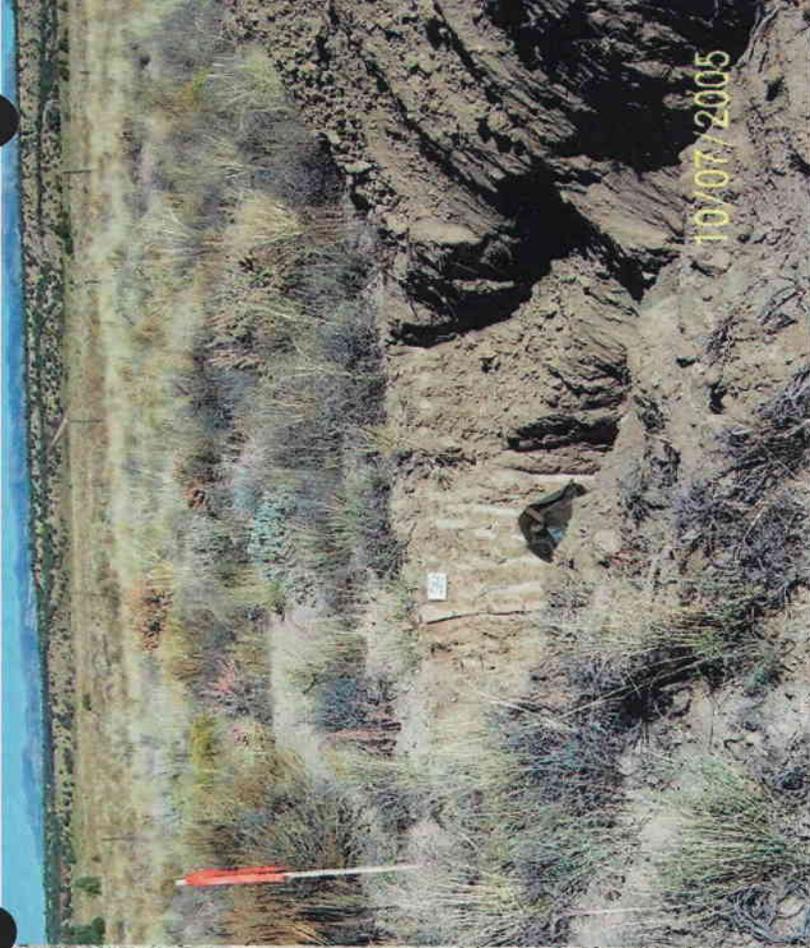
SOIL BORROW AREA
FIGURE 1
RA ATTACHMENT 2-3

P.O. BOX 1029
WELLINGTON, UTAH 84542

DRAWING OR
MAP NUMBER



Refuse Pile soil borrow area, Dugout Canyon Mine, October 2005



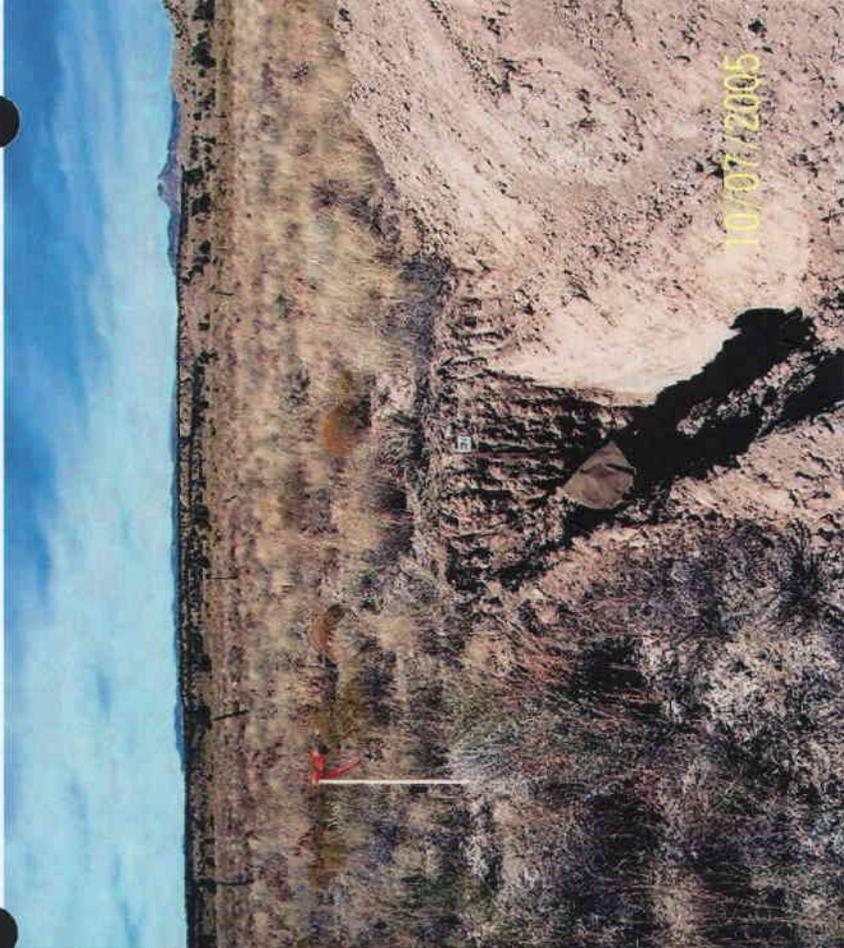
Soil Borrow Area – Sample Pit SB 1



Soil Borrow Area – Sample Pit SB 2



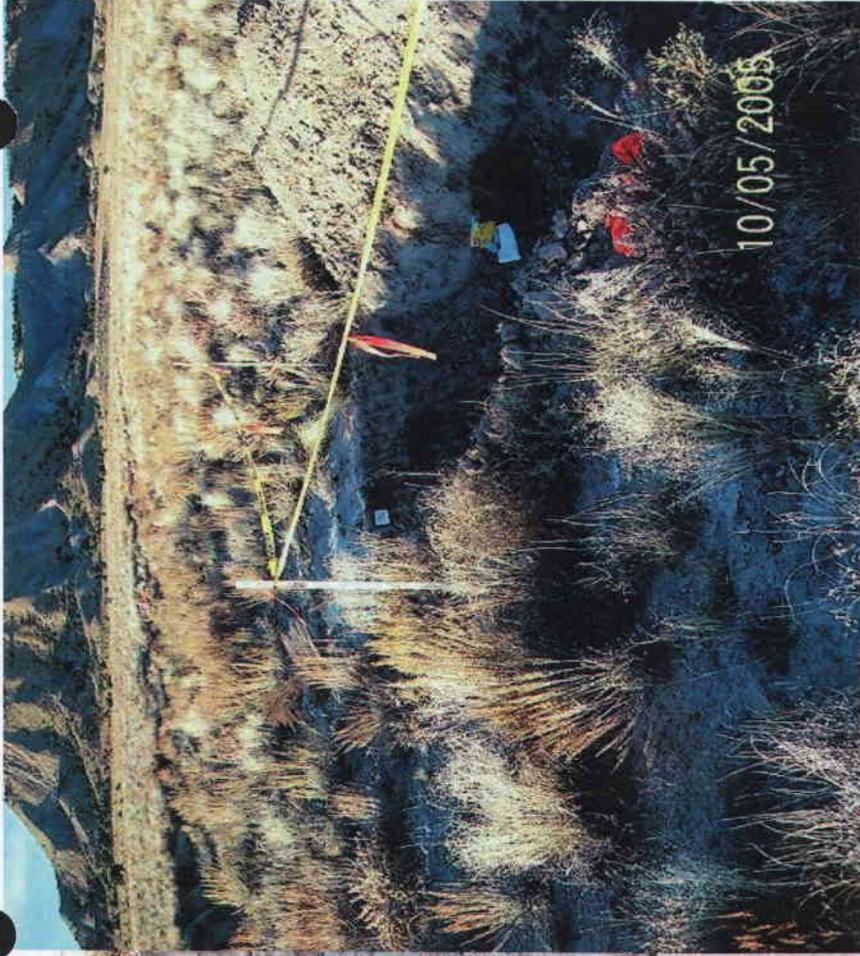
Soil Borrow Area – Sample Pit SB 3



Soil Borrow Area – Sample Pit SB 4



Soil Borrow Area – Sample Pit SB 5



Soil Borrow Area – Sample Pit SB 6



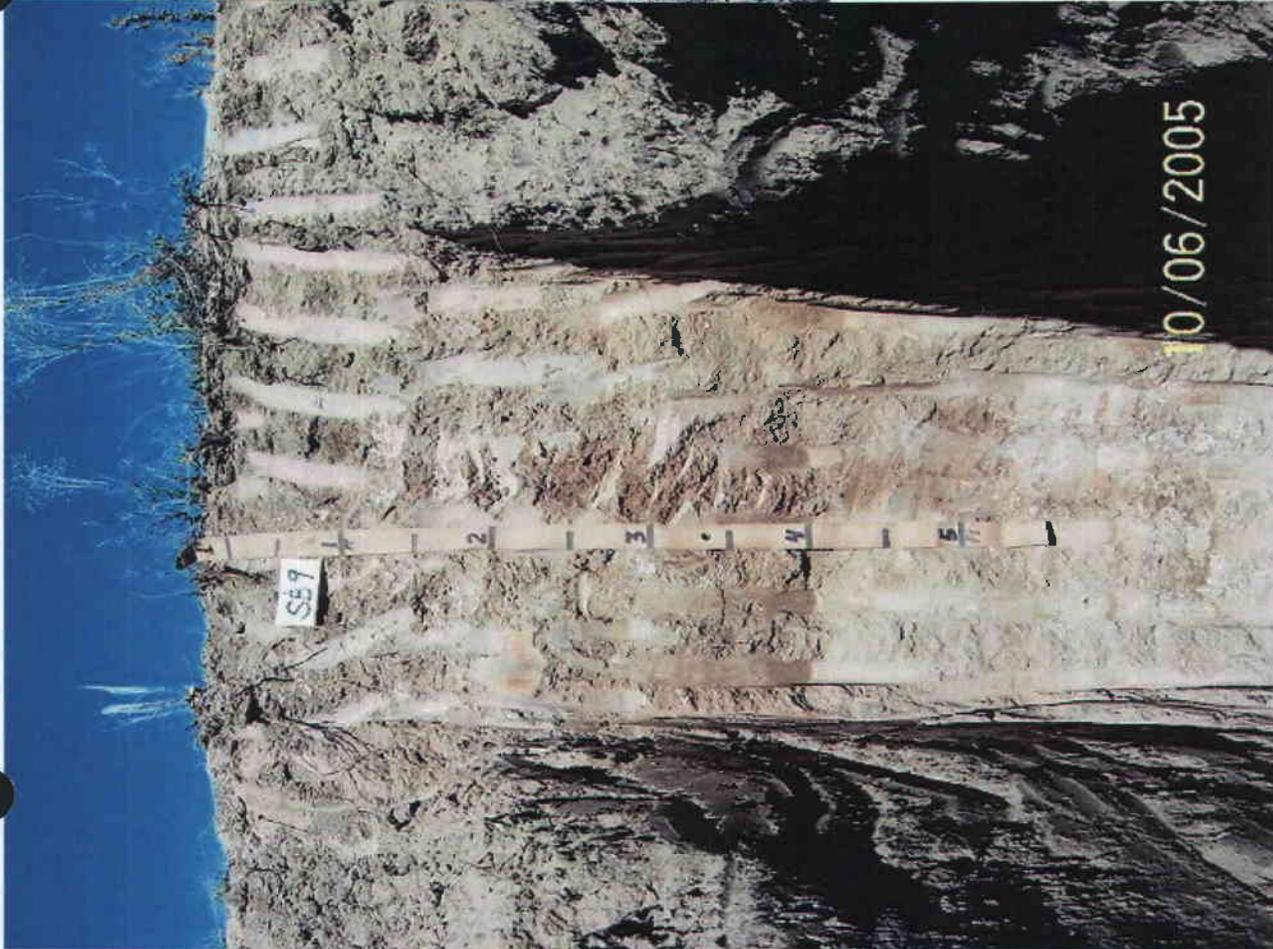
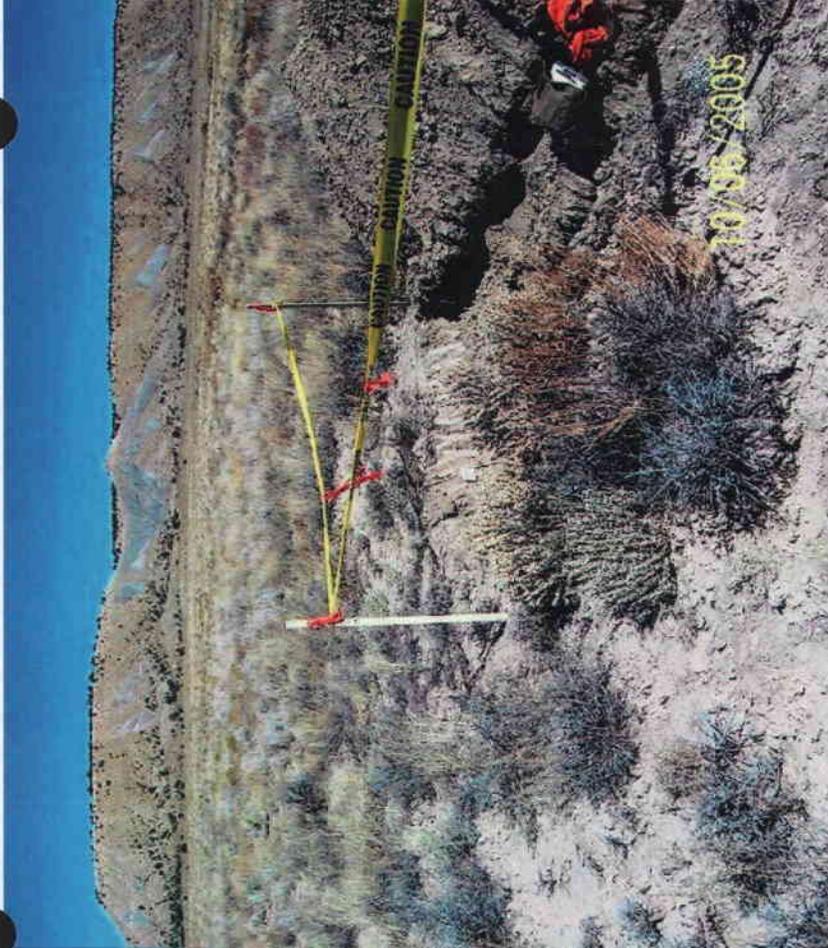


Soil Borrow Area – Sample Pit SB 7





Soil Borrow Area – Sample Pit SB 8



Soil Borrow Area – Sample Pit SB 9

Report ID: 010509502

Soil Analysis Report
 Canyon Fuel Co
 Dugout Mine -Canyon Fuel
 P.O. Box 1029
 Wellington, UT 84542

1633 Terra Avenue
 Sheridan, WY 82801

Page 1 of 9

REC'D DEC - 5 2005

Client Project ID: Dugout Canyon
 Date Received: 10/12/05

Set #0105509502
 Report Date: 11/28/05

Lab Id	Sample Id	Depths (Inches)	pH s.u.	Saturation %	EC @ 25°C dS/m	Calcium meq/L	Magnesium meq/L	Sodium meq/L	SAR	Sand %	Silt %	Clay %	Texture
0105S09502	SB-1	0-5	7.6	33.1	0.38	2.64	0.93	0.24	0.18	33.0	45.0	22.0	LOAM
0105S09503	SB-1	5-13	7.8	37.3	0.33	1.34	0.71	1.19	1.17	26.0	48.0	26.0	LOAM
0105S09504	SB-1	13-32	7.9	40.4	2.12	7.85	5.07	10.7	4.20	37.0	41.0	22.0	LOAM
0105S09505	SB-1	32-54	7.6	37.9	4.83	25.8	16.9	17.5	3.78	36.0	38.0	26.0	LOAM
0105S09506	SB-1	54-78	7.7	35.5	4.00	20.6	24.0	9.25	1.96	42.0	42.0	16.0	LOAM
0105S09507	SB-2	0-8	7.7	31.4	0.39	3.15	0.67	0.33	0.24	47.0	37.0	16.0	LOAM
0105S09508	SB-2	8-15	7.7	29.7	0.30	2.89	0.73	0.26	0.20	50.0	30.0	20.0	LOAM
0105S09509	SB-2	15-26	7.8	30.2	0.22	1.57	0.42	0.46	0.46	43.0	37.0	20.0	LOAM
0105S09510	SB-2	26-48	7.7	46.4	0.83	6.30	1.51	1.01	0.51	14.0	58.0	28.0	SILTY CLAY LOA
0105S09511	SB-2	48-70	7.7	43.6	3.43	21.5	21.3	5.68	1.23	19.0	55.0	26.0	SILT LOAM
0105S09512	SB-3	0-6	7.8	30.6	0.46	3.03	1.20	0.27	0.19	40.0	42.0	18.0	LOAM
0105S09513	SB-3	6-18	7.9	35.9	0.33	1.54	0.91	1.00	0.91	35.0	39.0	26.0	LOAM
0105S09514	SB-3	18-38	8.2	38.0	1.05	1.81	0.92	7.90	6.42	36.0	42.0	22.0	LOAM
0105S09515	SB-3	38-45	7.8	25.0	4.19	19.5	10.7	24.7	6.36	72.0	15.0	13.0	SANDY LOAM
0105S09516	SB-3	45-72	7.6	33.4	2.46	12.5	7.17	5.25	1.67	40.0	41.0	19.0	LOAM
0105S09517	SB-4	0-5	7.8	36.6	0.42	2.14	0.82	0.71	0.58	30.0	44.0	26.0	LOAM
0105S09518	SB-4	5-18	8.2	32.5	0.35	1.00	0.47	1.87	2.18	43.0	37.0	20.0	LOAM
0105S09519	SB-4	18-31	8.4	36.0	0.63	0.96	0.54	4.36	5.04	38.0	41.0	21.0	LOAM
0105S09520	SB-4	31-44	7.9	26.3	4.52	19.1	22.5	17.0	3.72	70.0	14.0	16.0	SANDY LOAM
0105S09521	SB-4	44-64	7.7	33.4	4.57	21.7	18.3	16.1	3.59	42.0	38.0	20.0	LOAM
0105S09522	SB-5	0-12	7.9	28.0	0.30	1.98	0.68	0.47	0.41	50.0	32.0	18.0	LOAM
0105S09523	SB-5	12-30	8.3	35.3	0.59	1.04	0.65	4.06	4.42	31.0	47.0	22.0	LOAM
0105S09524	SB-5	30-56	7.8	36.2	5.65	21.9	19.3	24.3	5.35	39.0	37.0	24.0	LOAM
0105S09525	SB-5	56-68	7.9	32.8	5.39	21.4	29.3	18.9	3.75	44.0	38.0	18.0	LOAM
0105S09526	SB-6	0-8	8.0	32.0	0.67	2.12	1.03	2.51	2.00	48.0	36.0	16.0	LOAM
0105S09527	SB-6	8-17	8.3	31.5	0.53	1.23	0.50	3.74	4.02	52.0	30.0	18.0	SANDY LOAM
0105S09528	SB-6	17-29	8.2	31.3	0.42	0.96	0.37	2.96	3.63	38.0	38.0	24.0	LOAM

These results only apply to the samples tested.

Abbreviations for extractants: PE= Saturated Paste Extract, H2OSol= 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, Pys= Pyritic Sulfur, Pyr+Org= Pyritic Sulfur + Organic Sulfur, Neut. Pot.= Neutralization Potential
 Miscellaneous Abbreviations: SAR= Sodium Adsorption Ratio, CEC= Cation Exchange Capacity, ESP= Exchangeable Sodium Percentage

Reviewed By: Joy Shulley
 Inter-Mountain Laboratories

Inter-Mountain Laboratories, Inc.

Report ID: 010509502

1633 Terra Avenue
Sheridan, WY 82801

Soil Analysis Report

Canyon Fuel Co
Dugout Mine -Canyon Fuel

Page 2 of 9

Client Project ID: Dugout Canyon

Date Received: 10/12/05

P.O. Box 1029
Wellington, UT 84542

Set #0105S09502

Report Date: 11/28/05

Lab Id	Sample Id	Depths (Inches)	Very Fine Sand		Field Capacity %	Wilt Point %	TOC %	Total Sulfur %	T.S. AB		Neutral. Pot.		T.S. ABP	
			%	%					1/1000t	1/1000t	1/1000t	1/1000t	1/1000t	1/1000t
0105S09502	SB-1	0 - 5	20.9	23.1	9.5	0.3	<0.01	0.00	0.00	157	157	157	157	
0105S09503	SB-1	5 - 13	23.2	25.4	12.8	0.3	0.01	0.31	0.31	167	167	166	166	
0105S09504	SB-1	13 - 32	28.6	23.9	12.7	<0.1	<0.01	0.00	0.00	148	148	148	148	
0105S09505	SB-1	32 - 54	27.6	24.8	12.4	0.2	0.44	13.7	13.7	141	141	127	127	
0105S09506	SB-1	54 - 78	33.2	26.1	6.3	<0.1	0.01	0.31	0.31	154	154	153	153	
0105S09507	SB-2	0 - 8	28.2	21.6	6.5	0.3	<0.01	0.00	0.00	136	136	136	136	
0105S09508	SB-2	8 - 15	23.6	17.2	7.6	<0.1	0.01	0.31	0.31	146	146	145	145	
0105S09509	SB-2	15 - 26	29.4	21.8	7.5	0.6	0.01	0.31	0.31	146	146	145	145	
0105S09510	SB-2	26 - 48	13.4	29.4	16.1	0.9	0.01	0.31	0.31	180	180	180	180	
0105S09511	SB-2	48 - 70	15.6	26.9	13.4	<0.1	0.30	9.37	9.37	163	163	154	154	
0105S09512	SB-3	0 - 6	23.0	23.2	8.7	1.4	0.01	0.31	0.31	148	148	148	148	
0105S09513	SB-3	6 - 18	24.3	22.8	10.6	0.2	<0.01	0.00	0.00	164	164	164	164	
0105S09514	SB-3	18 - 38	24.8	21.0	11.3	0.3	0.01	0.31	0.31	146	146	146	146	
0105S09515	SB-3	38 - 45	15.5	13.1	5.2	<0.1	<0.01	0.00	0.00	181	181	181	181	
0105S09516	SB-3	45 - 72	24.5	24.5	7.5	0.2	0.01	0.31	0.31	159	159	158	158	
0105S09517	SB-4	0 - 5	21.9	24.8	11.4	0.3	0.01	0.31	0.31	164	164	164	164	
0105S09518	SB-4	5 - 18	22.7	23.0	9.4	0.3	<0.01	0.00	0.00	165	165	165	165	
0105S09519	SB-4	18 - 31	26.7	22.2	11.5	0.2	<0.01	0.00	0.00	155	155	155	155	
0105S09520	SB-4	31 - 44	13.5	17.3	5.9	<0.1	<0.01	0.00	0.00	184	184	184	184	
0105S09521	SB-4	44 - 64	28.2	25.0	8.6	0.2	<0.01	0.00	0.00	154	154	154	154	
0105S09522	SB-5	0 - 12	24.1	19.0	7.3	0.3	0.01	0.31	0.31	165	165	165	165	
0105S09523	SB-5	12 - 30	21.5	22.9	10.0	0.3	0.01	0.31	0.31	144	144	144	144	
0105S09524	SB-5	30 - 56	25.4	24.3	11.0	0.2	0.36	11.2	11.2	155	155	144	144	
0105S09525	SB-5	56 - 68	28.8	23.3	8.7	0.1	0.32	10.0	10.0	139	139	129	129	
0105S09526	SB-6	0 - 8	31.3	20.0	8.8	0.4	0.01	0.31	0.31	166	166	165	165	
0105S09527	SB-6	8 - 17	28.7	17.4	9.0	0.4	<0.01	0.00	0.00	158	158	158	158	
0105S09528	SB-6	17 - 29	21.1	19.1	11.3	0.2	0.02	0.62	0.62	155	155	154	154	

These results only apply to the samples tested.

Abbreviations for extractants: PE= Saturated Paste Extract, H2SO4= water soluble, AB-DTPA= Ammonium Bicarbonate-DTPA, AAC= 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, Neut. Pot.= Neutralization Potential
 Miscellaneous Abbreviations: SAR= Sodium Adsorption Ratio, CEC= Cation Exchange Capacity, ESP= Exchangeable Sodium Percentage

Reviewed By: Joy Shulley
 Inter-Mountain Soils Lab Supervisor

Report ID: 010509502

1633 Terra Avenue
Sheridan, WY 82801

Soil Analysis Report

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

Page 3 of 9

Client Project ID: Dugout Canyon
Date Received: 10/12/05

Set #0105S09502
Report Date: 11/28/05

Lab Id	Sample Id	Depths (Inches)	Boron ppm	Nitrogen		TKN %	Selenium ppm	Available Sodium		Exchangeable Sodium meq/100g
				Nitrate ppm	ppm			meq/100g	meq/100g	
0105S09502	SB-1	0 - 5	0.24	1.22	<0.02	0.10	0.10	0.09	0.09	
0105S09503	SB-1	5 - 13	0.45	0.26	<0.02	0.26	0.26	0.22	0.22	
0105S09504	SB-1	13 - 32	0.67	0.02	<0.02	1.24	1.24	0.81	0.81	
0105S09505	SB-1	32 - 54	0.55	0.36	0.14	1.51	1.51	0.85	0.85	
0105S09506	SB-1	54 - 78	0.41	1.70	0.16	0.73	0.73	0.40	0.40	
0105S09507	SB-2	0 - 8	0.12	0.90	<0.02	0.09	0.09	0.08	0.08	
0105S09508	SB-2	8 - 15	0.17	0.40	<0.02	0.08	0.08	0.07	0.07	
0105S09509	SB-2	15 - 26	0.12	0.24	<0.02	0.13	0.13	0.12	0.12	
0105S09510	SB-2	26 - 48	0.26	0.16	<0.02	0.22	0.22	0.17	0.17	
0105S09511	SB-2	48 - 70	1.14	0.26	0.10	0.60	0.60	0.35	0.35	
0105S09512	SB-3	0 - 6	0.19	3.34	<0.02	0.08	0.08	0.07	0.07	
0105S09513	SB-3	6 - 18	0.29	0.18	<0.02	0.39	0.39	0.35	0.35	
0105S09514	SB-3	18 - 38	0.31	0.78	<0.02	1.61	1.61	1.33	1.33	
0105S09515	SB-3	38 - 45	0.22	3.02	0.02	1.34	1.34	0.72	0.72	
0105S09516	SB-3	45 - 72	0.23	0.94	0.02	0.50	0.50	0.32	0.32	
0105S09517	SB-4	0 - 5	0.18	2.46	<0.02	0.16	0.16	0.13	0.13	
0105S09518	SB-4	5 - 18	0.32	0.32	<0.02	0.52	0.52	0.46	0.46	
0105S09519	SB-4	18 - 31	0.33	0.18	<0.02	1.27	1.27	1.11	1.11	
0105S09520	SB-4	31 - 44	0.43	0.40	0.04	1.05	1.05	0.60	0.60	
0105S09521	SB-4	44 - 64	0.25	0.32	0.02	1.26	1.26	0.72	0.72	
0105S09522	SB-5	0 - 12	0.24	0.42	<0.02	0.10	0.10	0.09	0.09	
0105S09523	SB-5	12 - 30	0.32	<0.02	<0.02	1.10	1.10	0.96	0.96	
0105S09524	SB-5	30 - 56	0.60	0.18	0.04	2.02	2.02	1.14	1.14	
0105S09525	SB-5	56 - 68	0.51	0.24	0.28	1.34	1.34	0.72	0.72	
0105S09526	SB-6	0 - 8	0.25	0.76	<0.02	0.38	0.38	0.30	0.30	
0105S09527	SB-6	8 - 17	0.31	0.28	<0.02	0.80	0.80	0.68	0.68	
0105S09528	SB-6	17 - 29	0.25	0.10	<0.02	0.95	0.95	0.86	0.86	

These results only apply to the samples tested.

Abbreviations for extractants: PE= Saturated Paste Extract, H2SO4= 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, Neut. Pot.= Neutralization Potential
 Miscellaneous Abbreviations: SAR= Sodium Adsorption Ratio, CEC= Cation Exchange Capacity, ESP= Exchangeable Sodium Percentage

Reviewed By: Joy Shulley
Lead Chemist, Soil Lab Supervisor

Report ID: 010509502

Soil Analysis Report

Canyon Fuel Co

Dugout Mine -Canyon Fuel

P.O. Box 1029

Wellington, UT 84542

1633 Terra Avenue
Sheridan, WY 82801

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Client Project ID: Dugout Canyon

Date Received: 10/12/05

Set #010509502

Report Date: 11/28/05

Lab Id	Sample Id	Depths (Inches)	pH s.u.	Saturation %	EC @ 25°C dS/m	Calcium meq/L	Magnesium meq/L	Sodium meq/L	SAR	Sand %	Silt %	Clay %	Texture
010509529	SB-6	29 - 48	7.9	36.8	4.51	19.6	13.3	23.7	5.86	39.0	39.0	22.0	LOAM
010509530	SB-6	48 - 68	7.9	33.9	8.38	20.9	48.8	42.4	7.19	39.0	37.0	24.0	LOAM
010509531	SB-7	0 - 3	7.9	29.6	0.80	4.46	1.41	1.44	0.84	49.0	38.0	13.0	LOAM
010509532	SB-7	3 - 8	8.0	31.1	0.30	1.56	0.64	0.54	0.52	40.0	40.0	20.0	LOAM
010509533	SB-7	8 - 23	8.2	29.7	0.41	1.15	0.59	2.13	2.28	39.0	43.0	18.0	LOAM
010509534	SB-7	23 - 50	8.0	25.6	4.76	15.8	12.1	29.6	7.93	63.0	19.0	18.0	SANDY LOAM
010509535	SB-7	50 - 72	7.8	33.5	5.85	18.8	24.0	30.7	6.64	40.0	36.0	24.0	LOAM
010509536	SB-8	0 - 8	7.8	29.0	0.36	2.49	1.01	0.54	0.41	48.0	32.0	20.0	LOAM
010509537	SB-8	8 - 16	8.0	31.3	0.28	1.73	0.76	0.44	0.39	43.0	38.0	19.0	LOAM
010509538	SB-8	16 - 39	7.8	37.5	2.24	18.9	9.22	3.04	0.81	35.0	41.0	24.0	LOAM
010509539	SB-8	39 - 47	7.7	23.8	2.75	21.0	10.7	5.66	1.42	69.0	19.0	12.0	SANDY LOAM
010509540	SB-8	47 - 72	7.6	36.9	3.06	22.4	10.9	6.64	1.63	34.0	40.0	26.0	LOAM
010509541	SB-9	0 - 7	7.9	38.5	0.37	2.37	0.91	0.43	0.34	30.0	44.0	26.0	LOAM
010509542	SB-9	7 - 20	8.3	39.0	0.33	0.90	0.49	2.05	2.46	31.0	47.0	22.0	LOAM
010509543	SB-9	20 - 36	8.3	36.3	1.90	2.12	2.91	11.3	7.12	32.0	48.0	20.0	LOAM
010509544	SB-9	36 - 72	8.3	34.0	12.2	16.9	63.2	75.5	11.9	42.0	37.0	21.0	LOAM

These results only apply 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, Neut. Pot.= Neutralization Potential
 Miscellaneous Abbreviations: SAR= Sodium Adsorption Ratio, CEC= Cation Exchange Capacity, ESP= Exchangeable Sodium Percentage

Reviewed By: Joy Shuley
 Invi. Chemist: Soils Lab. Supervisor

Report ID: 010509502

1633 Terra Avenue
Sheridan, WY 82801

Soil Analysis Report

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

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Client Project ID: Dugout Canyon
Date Received: 10/12/05

Set #0105S09502
Report Date: 11/28/05

Lab Id	Sample Id	Depths (inches)	Very Fine Sand %	Field Capacity %	Wilting Point %	TOC %	Total Sulfur %	T.S. AB /1000t	Neutral. Pot. /1000t	T.S. ABP /1000t
0105S09529	SB-6	29 - 48	24.9	23.6	12.6	0.2	0.12	3.75	127	124
0105S09530	SB-6	48 - 68	23.9	24.2	11.1	0.2	0.28	8.75	143	134
0105S09531	SB-7	0 - 3	30.8	20.8	6.9	0.5	0.01	0.31	153	153
0105S09532	SB-7	3 - 8	26.2	21.9	10.3	0.3	0.01	0.31	163	162
0105S09533	SB-7	8 - 23	24.6	21.2	9.4	0.3	0.01	0.31	168	168
0105S09534	SB-7	23 - 50	12.4	15.1	7.5	<0.1	<0.01	0.00	197	197
0105S09535	SB-7	50 - 72	21.0	21.6	11.1	0.2	0.02	0.62	141	140
0105S09536	SB-8	0 - 8	27.8	21.1	8.9	1.2	<0.01	0.00	168	168
0105S09537	SB-8	8 - 16	28.1	23.2	9.9	0.3	0.01	0.31	155	155
0105S09538	SB-8	16 - 39	26.9	25.3	12.3	0.3	0.01	0.31	139	139
0105S09539	SB-8	39 - 47	16.1	14.5	5.8	<0.1	0.03	0.94	195	194
0105S09540	SB-8	47 - 72	24.3	26.3	11.8	0.3	0.02	0.62	146	145
0105S09541	SB-9	0 - 7	21.0	24.3	12.2	0.4	<0.01	0.00	153	153
0105S09542	SB-9	7 - 20	21.4	23.4	13.1	0.3	0.01	0.31	163	162
0105S09543	SB-9	20 - 36	21.3	22.9	12.1	<0.1	<0.01	0.00	162	162
0105S09544	SB-9	36 - 72	23.1	22.5	11.2	0.1	0.33	10.3	150	139

These results only apply to the samples tested.

Abbreviations for extractants: PE= Saturated Paste Extract, H2Osol= 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= Pyritic Sulfur, Pyr+Org= Pyritic Sulfur + Organic Sulfur, Neut. Pot.= Neutralization Potential
 Miscellaneous Abbreviations: SAR= Sodium Adsorption Ratio, CEC= Cation Exchange Capacity, ESP= Exchangeable Sodium Percentage

Reviewed By: Joy Shulley

Innov. Chemicals, Salt Lake City, Utah

Report ID: 010509502

1633 Terra Avenue
Sheridan, WY 82801

Soil Analysis Report

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

Client Project ID: Dugout Canyon
Date Received: 10/12/05

Set #010509502
Report Date: 11/28/05

Lab Id	Sample Id	Depths (Inches)	Boron ppm	Nitrogen Nitrate ppm	TKN %	Selenium ppm	Available Sodium meq/100g	Exchangeable Sodium meq/100g
010509529	SB-6	29 - 48	0.65	0.18	0.07	<0.02	2.08	1.21
010509530	SB-6	48 - 68	0.59	0.48	0.05	0.04	2.86	1.42
010509531	SB-7	0 - 3	0.24	8.10	0.08	<0.02	0.15	0.11
010509532	SB-7	3 - 8	0.23	2.04	0.06	<0.02	0.12	0.10
010509533	SB-7	8 - 23	0.30	0.40	0.08	<0.02	0.40	0.34
010509534	SB-7	23 - 50	0.30	1.12	0.04	0.02	1.71	0.95
010509535	SB-7	50 - 72	0.16	2.24	0.01	<0.02	2.45	1.42
010509536	SB-8	0 - 8	0.13	0.74	0.05	<0.02	0.07	0.05
010509537	SB-8	8 - 16	0.23	0.22	0.06	<0.02	0.12	0.11
010509538	SB-8	16 - 39	0.38	<0.02	0.06	<0.02	0.35	0.24
010509539	SB-8	39 - 47	0.13	1.04	0.06	0.02	0.36	0.23
010509540	SB-8	47 - 72	0.27	0.50	0.04	0.14	0.64	0.39
010509541	SB-9	0 - 7	0.29	1.32	0.09	<0.02	0.11	0.09
010509542	SB-9	7 - 20	0.35	<0.02	0.07	<0.02	0.54	0.46
010509543	SB-9	20 - 36	0.24	0.08	0.10	0.02	1.79	1.38
010509544	SB-9	36 - 72	0.31	0.34	0.05	0.10	5.61	3.04

These results only apply to the samples tested.

Abbreviations for extractants: PE= Saturated Paste Extract, H2Osol= 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, Neut. Pot.= Neutralization Potential
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Reviewed By: Joy Shuley
 Inter-Mountain Laboratories

Inter-Mountain Laboratories, Inc.

Report ID: 010509502

1633 Terra Avenue
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Soil Analysis Report

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

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Client Project ID: Dugout Canyon
Date Received: 10/12/05

Set #0105S09502
Report Date: 11/28/05

Lab Id	Sample Id	Depths (Inches)	pH s.u.	Saturation %	EC @ 25°C dS/m	Calcium meq/L	Magnesium meq/L	Sodium meq/L	SAR	Sand %	Silt %	Clay %	Texture
0105S09524	SB-5	30 - 56	7.8	36.2	5.65	21.9	19.3	24.3	5.35	39.0	37.0	24.0	LOAM
0105S09524D	SB-5	30 - 56	7.8	37.0	5.75	22.6	19.8	24.8	5.37	38.0	38.0	24.0	LOAM
0105S09536	SB-8	0 - 8	7.8	29.0	0.36	2.49	1.01	0.54	0.41	48.0	32.0	20.0	LOAM
0105S09536D	SB-8	0 - 8	7.8	30.1	0.35	2.73	0.69	0.22	0.17	47.0	33.0	20.0	LOAM
0105S09538	SB-8	16 - 39	7.8	37.5	2.24	18.9	9.22	3.04	0.81	35.0	41.0	24.0	LOAM
0105S09538D	SB-8	16 - 39	7.7	42.0	2.22	17.0	8.51	3.01	0.84	34.0	42.0	24.0	LOAM
0105S09541	SB-9	0 - 7	7.9	38.5	0.37	2.37	0.91	0.43	0.34	30.0	44.0	26.0	LOAM
0105S09541D	SB-9	0 - 7	7.9	36.4	0.35	2.12	0.81	0.39	0.32	31.0	47.0	22.0	LOAM

These results only apply to the samples tested.

Abbreviations for extractants: PE= Saturated Paste Extract, H2O Sol= 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, Neut. Pot.= Neutralization Potential
Miscellaneous Abbreviations: SAR= Sodium Adsorption Ratio, CEC= Cation Exchange Capacity, ESP= Exchangeable Sodium Percentage

Reviewed By: Joy Shulley
Inter-Mountain Laboratories, Inc. Supervisor

Inter-Mountain Laboratories, Inc.

Report ID: 010509502

1633 Terra Avenue
Sheridan, WY 82801

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Soil Analysis Report

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

Client Project ID: Dugout Canyon
Date Received: 10/12/05

Set #0105S09502
Report Date: 11/28/05

Lab Id	Sample Id	Depths (Inches)	Very Fine Sand %	Field Capacity %	Wilt Point %	TOC %	Total Sulfur %	T.S. AB v/1000t	Neutral. Pot. v/1000t	T.S. ABP v/1000t
0105S09524	SB-5	30 - 56	25.4	24.3	11.0	0.2	0.36	11.2	155	144
0105S09524D	SB-5	30 - 56	25.9	24.4	10.6	0.2	0.36	11.2	156	145
0105S09536	SB-8	0 - 8	27.8	21.1	8.9	1.2	<0.01	0.00	168	168
0105S09536D	SB-8	0 - 8	26.7	21.3	9.3	0.3	<0.01	0.00	165	165
0105S09538	SB-8	16 - 39	26.9	25.3	12.3	0.3	0.01	0.31	139	139
0105S09538D	SB-8	16 - 39	25.1	25.2	12.2	0.3	0.01	0.31	140	140
0105S09541	SB-9	0 - 7	21.0	24.3	12.2	0.4	<0.01	0.00	153	153
0105S09541D	SB-9	0 - 7	21.2	23.7	12.1	0.4	<0.01	0.00	154	154

These results only apply to the samples tested.

Abbreviations for extractants: PE= Saturated Paste Extract, H2SO4= water soluble, AB-DTPA= Ammonium Bicarbonate-DTPA, AAC= Acid Ammonium Oxalate
 Abbreviations used in acid base accounting: T.S.= Total Sulfur, AB= Acid Base, ABP= Pyritic Sulfur, Pyr+Org= Pyritic Sulfur + Organic Sulfur, Neut. Pot.= Neutralization Potential
 Miscellaneous Abbreviations: SAR= Sodium Adsorption Ratio, CEC= Cation Exchange Capacity, ESP= Exchangeable Sodium Percentage

Reviewed By: Joy Shuley
 Inter-Mountain Labs, Inc.

Inter-Mountain Laboratories, Inc.

Report ID: 010509502

1633 Terra Avenue
Sheridan, WY 82801

Soil Analysis Report

Page 9 of 9

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

Client Project ID: Dugout Canyon
Date Received: 10/12/05

Set #0105S09502
Report Date: 11/28/05

Lab Id	Sample Id	Depth (Inches)	Boron ppm	Nitrogen Nitrate ppm	TKN %	Selenium ppm	Available Sodium		Exchangeable Sodium meq/100g
							meq/100g	meq/100g	
0105S09524	SB-5	30 - 56	0.60	0.18	0.05	0.04	2.02	2.02	1.14
0105S09524D	SB-5	30 - 56	0.57	0.18	0.05	0.04	2.00	2.00	1.08
0105S09536	SB-8	0 - 8	0.13	0.74	0.05	<0.02	0.07	0.07	0.05
0105S09536D	SB-8	0 - 8	0.14	0.74	0.05	<0.02	0.07	0.07	0.06
0105S09538	SB-8	16 - 39	0.38	<0.02	0.06	<0.02	0.35	0.35	0.24
0105S09538D	SB-8	16 - 39	0.39	<0.02	0.06	<0.02	0.35	0.35	0.22
0105S09541	SB-9	0 - 7	0.29	1.32	0.09	<0.02	0.11	0.11	0.09
0105S09541D	SB-9	0 - 7	0.28	1.34	<0.01	<0.02	0.11	0.11	0.10

These results only apply to the samples tested.

Abbreviations for extractants: PE= Saturated Paste Extract, H2Osol= 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, Neut. Pot.= Neutralization Potential
 Miscellaneous Abbreviations: SAR= Sodium Adsorption Ratio, CEC= Cation Exchange Capacity, ESP= Exchangeable Sodium Percentage

Reviewed By: Joy Shuley
 Inter-Mountain Laboratories, Inc.

Canyon Fuel Company, LLC
Dugout Canyon Mine

Refuse Pile Amendment
~~July 2005~~
January 2006

CHAPTER 5
ENGINEERING

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CHAPTER 5 ENGINEERING

510 INTRODUCTION

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

511 General Requirements

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

512 Certification

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

512.100 Cross Sections and Maps

The configuration of the refuse pile and cross sections through the pile are provided on RA Plates 5-1 and ~~5-1A~~ 5-2 of this submittal. An as-built map of the refuse pile topography (Olympus Aerial Survey, May 2003) is included in Attachment 5-5.

512.200 Plans and Engineering Designs

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

Excess Spoil. No excess spoil will be generated from the refuse pile area.

Durable Rock Fills. No durable rock fills will exist in the refuse pile area.

Coal Mine Waste. If coal mine waste is generated by the Dugout Canyon Mine, it will be placed in the refuse pile site.

Impoundments. A sedimentation pond impoundment was built in the refuse pile area (see Section 732).

Primary Roads. The access road to the refuse pile and the temporary road to construct the refuse pile are classified as primary roads.

Variance From Approximate Original Contour. CFC requests a variance from the approximate original contour requirements of the regulations for this site. The main reason for the variance is that placement of refuse will raise the site topography by approximately 60 feet. The justification for the request is that the site was previously disturbed by the removal of in-place topsoil and gravel. This site functioned as a gravel pit and was used for the construction of the road from Soldier Canyon Road to the Dugout Canyon Mine. After completion of the refuse pile construction, the site will be reclaimed. Additional justification is included in the remainder of this submittal.

513 Compliance with MSHA Regulations and MSHA Approvals

513.100 Coal Processing Waste Dams and Embankments

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

513.200 Impoundments and Sedimentation Ponds

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

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

If underground development waste is generated by the Dugout Canyon Mine, it will be stored at the refuse pile site. Coal processing waste will be stored at the refuse pile site. No excess spoil will be generated or stored within this area.

513.400 Refuse Piles

Coal mine waste or underground development waste generated by the Dugout Canyon Mine, will be stored at the refuse pile site. The design of the pile will meet the requirements of MSHA, 30 CFR 77.124 and 30 CFR 77.215 in accordance with Section 536.900.

513.500 Underground Openings to the Surface

No underground openings will be present in this area.

513.600 Discharges to Underground Mines

No discharges to underground mines will occur in this area.

513.700 Surface Coal Mining and Reclamation Activities

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

513.800 Coal Mine Waste Fires

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

CFC will utilize a program of prevention and suppression to minimize the potential for coal mine waste fires. An ongoing educational program will emphasize the need for attention to fire prevention. Suppression will occur by separating smoldering material and compacting the adjacent material (to minimize oxygen content in the adjacent material). The burning material will then be extinguished using appropriate methods (see Section 528.300 of the approved M&RP and Section 536.200 of this amendment). No burning mine waste will be removed from the refuse pile area without a removal plan approved by the Division.

514 Inspections

514.100 Excess Spoil

Excess spoil will not be stored in this area.

514.200 Refuse Piles

Quarterly inspections will be made of the refuse pile area (see RA Plate 5-1). These inspections will be performed by a professional engineer or a specialist experienced in the construction of similar earth and waste structures. CFC will provide copies of the certified reports to the Division in the annual report. The report will discuss any appearances of instability, structural weakness, or other hazardous conditions. A copy of this report will be maintained at the mine site.

An MSHA permit was obtained before any refuse was placed in the pile area. All activities performed at this site will be in accordance with the applicable MSHA permit.

514.300 Impoundments

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

Quarterly inspections of the sedimentation pond will continue until removal of the structure or release of the performance bond. An annual certified report of inspection will be prepared by a qualified registered professional engineer and submitted to the Division in the annual report. The report will discuss any appearances of instability, structural weakness or other hazardous conditions, depth and elevation of any impounded waters, existing storage capacity, and existing or required monitoring procedures and instrumentation, and any other aspects of the structure affecting stability. A copy of this report will be maintained at the mine site.

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

515 Reporting and Emergency Procedures

515.100 Slides

If a slide occurs within the refuse pile area that may have a potential adverse effect on the public, property, health, safety, or the environment, CFC will notify the Division following discovery of the

slide and will comply with any remedial measures required by the Division.

515.200 Impoundment Hazards

If any examination or inspection of an impoundment discloses that a potential hazard is associated with that impoundment that may have an adverse effect on the public, property, health, safety, or the environment, the person who examined the impoundment will promptly inform the Division of the finding and of the emergency procedures formulated for public protection and remedial action. If adequate procedures cannot be formulated or implemented, the Division will be notified.

515.300 Temporary Cessation of Operations

Prior to a temporary cessation of operations within the permit area that will last for a period of 30 days or more or as soon as it is known that a temporary cessation will extend beyond 30 days, CFC will submit to the Division a notice of intention to cease or abandon operations. This notice will include the following:

A statement of the number of surface acres affected by mining operations in the permit area prior to cessation of operations,

A discussion of the extent and kind of reclamation activities which will have been accomplished prior to cessation of operations, and

An identification of the backfilling, regrading, revegetation, environmental monitoring, and water treatment activities that will continue during the temporary cessation.

During the temporary cessation, CFC will secure surface facilities in areas in which there are no current operations but where future operations are to be resumed under an approved permit.

520 OPERATION PLAN

521 General

521.100 Cross Sections and Maps

Existing Surface and Subsurface Facilities and Features. No buildings are located in and within 1000 feet of the refuse pile area. No surface or subsurface features are within, passing through or passing over the refuse pile area. An existing county road bypasses the area. The county road lies on land either owned by the State of Utah, the United States of America, or Canyon Fuel Company, LLC (see Plate 1-3 of the approved M&RP).

Landowner, Right-of-Entry, and Public Interest. CFC is the current land owner of the property where the refuse pile is built. It is located adjacent to the county road to Dugout Canyon. Public access will be limited to the site by construction of a suitable fence and gate. The contiguous surface owners are the United States of America and Canyon Fuel Company, LLC (See Figure RA 1-1B of this submittal). The contiguous subsurface owner is the United States of America (See Figure RA 1-1B of this submittal).

Mining Sequence and Planned . This does not apply to this site (see Section 525).

Land Surface Configuration. Surface contours of undisturbed areas within the storage area are provided on RA Plate 5-1 of this submittal. The initial segment of the refuse pile was constructed in a gravel pit. The first four (4) feet of refuse material was used to fill a pit and bring it to grade. The remainder of the refuse material will be placed above grade and reach a total pile height of sixty (60) feet above portions of the immediate surrounding area as provided on RA Plate 5-1 of this submittal. As shown on RA Plate 1-1, the hills surrounding the site range in elevation from 5887 to 6283, therefore the reclaimed elevation of the refuse pile of 5980 to 6000 will blend with the surrounding area.

Surface Facilities. The surface facilities associated with the refuse pile site include: the refuse pile, temporary material/snow storage areas, soil stockpiles, access road, sedimentation pond, and drainage control structures. Facilities are shown or mentioned on RA Plate 5-1. Detailed

information on sedimentation pond and drainage facilities is presented in Chapter 7 of this submittal. Cross sections of the refuse storage pile(s) are provided on RA Plate 5-1.

Transportation Facilities. A permanent road is not anticipated to be constructed, used, or maintained by CFC in the storage area. During construction of the pile, temporary access roads will be constructed and maintained. The temporary roads will be reclaimed and seeded with the permanent reclamation seed mix (Section 341.200 of this amendment).

521.200 Signs and Markers

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

- Mine name,
- Company name,
- Company address and telephone number,
- MSHA identification number, and
- Permanent program permit identification number as obtained from the Division.

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

Buffer Zone Markers. Stream buffer zone markers are not required for this area.

Topsoil Markers. Markers will be placed on all soil stockpiles. These markers will be a design that can be easily seen and read, will be made of durable material, will conform to local regulations, and will be maintained until after the release of all bonds for the permit area.

522 Coal Recovery

No coal recovery will be performed at this site.

523 Mining Methods

No mining will be performed at this site.

524 Blasting and Explosives

No explosives are to be used at this site.

525 Subsidence

No subsidence will occur in this area, because no underground coal mining will occur beneath the refuse pile site. Therefore, there will be no effects on the site from coal mining related subsidence.

526 Mine Facilities

526.100 Mine Structures and Facilities

No buildings exist or are proposed at the refuse pile site; therefore, no existing buildings will be used in connection with or to facilitate this proposed coal mining and reclamation operation.

526.200 Utility Installation and Support Facilities

No utilities are to be installed at this site.

527 Transportation Facilities

527.100 Road Classification

No permanent roads are to be built in association with the construction of the refuse pile. A temporary road will be used to access the site. The access road to the refuse pile and the temporary road to construct the refuse pile are classified as primary roads. The existing road will be upgraded to provide all weather access to the site. Refer to Section 521.100 of this amendment for additional detail.

527.200 Description of Transportation Facilities

The access road to the refuse pile site follows the alignment of an existing road shown on RA Plate 7-1. The access road is approximately 530 feet long and will have graveled surface 20 feet wide. The access road will have a maximum grade of 16% and an average grade of 10%. The road will gently slope towards UD-1c which drains to culvert UC-1 (See cross-section RA Figure 5-1 2). The road does not cross any natural drainage. Culvert, UC-1, was installed at the intersection of the access road and the county road, to allow free flow of the runoff in the county road borrow ditch. Specific design information for the culvert is provided in RA Attachment 7-4.

The ~~site~~ temporary access road is shown on RA Plate 5-1. The road is approximately 20 feet wide and is constructed on compacted subsoil. The road will have an uniform grade of 2% within the site (See cross-section RA Figure 5-2). The runoff from the road will flow into drainage ditches and then into the sediment pond.

During operations, the access road and ~~site~~ temporary access road will be maintained using a road grader and any other equipment which may be necessary to ensure compliance. Drainage ditches will be maintained to ensure proper functioning. Additional gravel will be selectively placed as required to ensure approximately four to six inches of road base gravel on the access road.

Accidental spillage of coal mine waste during haulage from the mine site to the refuse pile will be minimized by not overloading the haulage trucks. Accidental spills, if they occur, will be cleaned up and transported to the refuse site within 24 hours after the accidental spill occurs.

If a catastrophic events causes damage to ~~either the access or site~~ roads, the rapid repair of the road/roads will begin as soon as practical following the catastrophic damage.

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

Coal mine waste and/or underground development waste materials generated at the Dugout Mine, will be transported to the refuse site and disposed of in a controlled manner in accordance with Section 536. Construction of the refuse pile will meet MSHA and DOGM requirements in accordance with the approved plan.

Non-coal and hazardous wastes will not be disposed of in the refuse pile. They will be handled in accordance with the approved M&RP.

529 Management of Mine Openings

No mine openings will be built in the area.

530 OPERATIONAL DESIGN CRITERIA AND PLANS

531 General

This section contains the general plans for the construction of the sediment control measures and general construction and maintenance of the refuse pile area. This site will be used by CFC to handle coal mine waste or underground development waste that may be generated by the Dugout Mine. Also, a portion of the site will be used as a temporary storage yard for mine materials and a place for disposal of excess snow from the Dugout Mine site.

During operations, the runoff from the site area will be treated through the use of sediment controls such as diversion ditches and berms, a sediment pond, and silt fences and/or straw bales. These structures will be constructed, to handle the site runoff, before the initial refuse is placed.

532 Sediment Control

Sediment-control measures for the site area are described in detail in Sections 732 and 742 of this submittal. Runoff-control structures at the refuse pile area have been designed to convey runoff in a non-erosive manner. Sediment yields in the permit area are minimized by, disturbing the smallest practicable area during the construction or modification of surface facilities and contemporaneously reclaiming areas suitable for such reclamation.

533 Impoundments

533.100 Slope Stability

The only impoundment with an embankment that will be constructed, used, or maintained by CFC will be the sedimentation pond at the refuse pile site. This pond is an incised pond with an embankment consisting of native materials. A slope-stability analysis was performed on this pond embankment material and is provided in RA Attachment 5-1. According to this analysis, the minimum safety factor for the sedimentation pond embankment is 1.9 under static moist conditions. Furthermore, the analysis presented in RA Attachment 5-1 indicates that a minimum safety factor of 2.2 will exist for the embankment under conditions of rapid drawdown. All analyses were performed assuming that the pond was full to its maximum design depth. These safety factors exceed the minimum requirements of R645-301-533.100.

533.200 Foundation Considerations

Soils investigations have been conducted at the site of the refuse pile area. Results of these investigations are presented in Chapter 2 and RA Attachment 5-1 of this submittal. During these investigations, foundation conditions in the area of the proposed sedimentation pond were evaluated. Based on these investigations, no conditions were encountered which suggested that the materials in which the pond would be constructed would be unstable. The slope-stability analyses presented in RA Attachment 5-1 indicate that the pond embankments will also be stable under operating conditions. Detailed cross sections of the sedimentation pond are presented on

RA Plate 7-2 of this submittal.

533.300 Slope Protection

The inslopes of the sedimentation pond and portions of the outslope disturbed by the spillway construction were revegetated following construction to minimize surface erosion and protect the embankments against sudden drawdown. The interim seed mix was used for this revegetation effort (see Section 341.200 of this submittal).

Rapid drawdown in the sedimentation pond would be restricted to pumping the vertical distance between the spillway and the pond bottom, a distance of 11 feet (see RA Plate 7-2). Drawdown of this magnitude and rate is not considered significant and, therefore, not a stability or erosion concern. The analysis presented in RA Attachment 5-1 indicates that the slope of the embankment will be stable under conditions of rapid drawdown (minimum safety factor of 2.2). During pumping of the sedimentation pond, flow rates (and drawdown) will be controlled. Hence, it is unlikely that this drawdown will cause surface erosion of the embankment face.

533.400 Embankment Faces

Embankment inslopes and portions of the outslopes were revegetated following construction of the sedimentation pond, as outlined in Section 533.300. Riprap will also be placed on the upstream face of the embankment near the emergency spillway structure.

533.500 Highwalls

No highwalls will be located below the discharge lines of the sedimentation pond.

533.600 MSHA Criteria

The sedimentation pond does not meet the size criteria of 30 CFR 216(a).

533.700 Pond Operation and Maintenance Plans

The sedimentation pond has been designed as a total containment pond to contain the 100-year, 24-hour storm event, plus an adequate freeboard. Details of the design and the requirements for operation and maintenance of the pond are presented in Chapter 7 of this submittal.

534 Roads

534.100 Location, Design, Construction, Reconstruction, Use, Maintenance, and Reclamation

No permanent roads will be constructed in the storage area. The refuse will be transported from the mine to the refuse pile area using the existing county road. A temporary access road between the refuse pile area and county road will be constructed to allow equipment access to the pile. The temporary road will be reclaimed. The temporary road will be maintained in accordance with the approved M&RP. Refer to Section 527.200 for additional description of the transportation facilities.

Control of Damage to Public or Private Property. Roads will be designed in accordance with applicable county and State standards. By designing according to these standards, damage to public or private property will be minimized.

Road Surfacing. The county road surface, which accesses the mine site, consists of asphalt. The temporary access road surface material will be surfaced with an all weather surface of rock. No acid- or toxic-forming materials will be used in the road surfaces. *The characteristics of the substances used for road surfaces will be nonacid-and nontoxic-forming. The roads are not established on constructed lands and road slopes are less than 2:1.*

534.200 Environmental Protection and Safety

The design and construction of the temporary road will be in accordance with Section 534.200 of the approved M&RP.

534.300 Primary Roads

The access road to the refuse pile will be constructed in accordance with the requirements of Section 534.300 of the M&RP.

535 Spoil

No spoil will be generated in the refuse pile permit area.

536 Coal Mine Waste

Coal mine and underground development waste resulting from mining activities at the Dugout Canyon Mine will be disposed of at the refuse pile.

536.100 Design

The designs and their associated evaluations were based on the results of detailed foundation and laboratory analyses of soils at the site of the refuse pile. These results are presented in RA Attachment 5-2 of this submittal.

Based on the materials encountered in the refuse pile site area, the refuse pile can be constructed to an approximate height of 60 feet with 2H:1V outsoles on the native alluvial soils and have a static safety factor of 1.59 for failure surfaces starting in the refuse and terminating in the underlying soils. If the weathered Mancos Shale, which is present over the majority of the site, is used in the evaluation, the static safety factor rises to 2.38 for the 60-foot height pile configuration. For failure surfaces originating and terminating in the refuse materials, the pile has a static safety factor of 2.27. Therefore, the proposed pile configuration meets the minimum regulatory requirements. Because the effects of bedrock were not included in the analyses, the results are considered to be conservative. RA Plate 5-1 presents the proposed configuration of the refuse pile. **RA Plate 5-2 shows the reclamation topography and treatment for the refuse pile. Reclamation cross sections are shown on RA Plate 5-2A.** ~~It will consist of 2H:1V outsoles, with a mesa type~~

~~crest. The crest shall consist of a gently sloping (4%), crowned surface to aid in shedding precipitation.~~ The reclaimed refuse pile will have concave slopes with 2:1 slopes near the top of the pile and 3:1 slopes or less at the toe of the reclaimed slope. The top of the reclaimed pile will be regraded to have an irregular plateau surface that drains towards all pile outslopes instead of draining only towards one side of the pile. The top of the reclaimed refuse pile will have slopes of 6:1 or less. Where possible the reclaimed slopes will be varied to blend into the shape of undisturbed areas. Outslopes of the reclaimed pile will be varied as much as possible to prevent long straight surfaces with uniform slopes.

Storage capacity of the pile is estimated to be approximately ~~686,055~~ 1,018,792 tons of refuse. Calculations are presented in RA Attachment 5-3.

536.200 Waste Emplacement

Construction. Prior to the start of refuse pile construction, the appropriate sediment control facilities (sediment pond, undisturbed diversion ditch/berm, and disturbed area diversions) described in Chapter 7 were in place. Since initial waste rock storage will occur in an area 4 feet below natural grade, it is anticipated that ditches DD-1 and DD-2 will be constructed to their full extent only after waste reaches a level equal to the currently existing ground surface. An interim berm will be constructed to direct surface runoff away from the storage area below grade and toward ditch DD-3 and the sediment pond. RA Plate 5-1 presents the layout of the refuse pile areas.

Vegetative cover will be removed from the refuse site area, prior to placement of any coal mine or underground development waste. Soil materials shall be removed, stockpiled, and properly protected for future use in reclaiming the site. As the site has previously been disturbed there is no topsoil present. CFC commits to reasonable mechanized efforts to collect the maximum amount of soil materials still present on the site. It is anticipated that all suitable soil materials down to the Mancos Shale will be stripped. The soil materials salvaged from the strip area will be stored in the soil stockpile. The details of the soil salvage operations and estimates of the volume of soil to be stripped are presented in Chapter 2.

Once the soils have been stripped from the area, the refuse material will be placed. Based on prior experience, the refuse materials anticipated to be generated by the mine will generally consist of shale with some sandstone, bone coal, and in limited quantities, sandstone from paleochannels.

Sediment pond wastes from either the mine site or refuse area sediment pond will be stored in the refuse pile.

~~There is a potential for~~ coal processing waste to **will** be stored at the refuse site, should economics justify the washing of coal. Waste stored at the refuse site will be hauled to a wash facility for processing and the waste material not shipped to customers will be returned to the Dugout refuse site for disposal. The waste material returned to the Dugout refuse site **could will potentially** be from any of the Canyon Fuel mines. **Waste material from other than Dugout Mine will be approved by the Division prior to placement at the Dugout refuse site.** The returned waste materials will be sampled as described below under the subheading "Testing".

Operation. Refuse materials will be hauled to the site using either belly dump trailers or end dump trucks. At the refuse site, the trucks will deposit the refuse on a fill bench, where it will be spread and compacted **by truck and equipment traffic.** ~~in thin lifts using compaction equipment. Lifts shall be limited to 2 feet or less in thickness and each~~ Successive lift will be allowed to drain (when necessary) before it is capped with the next lift in the construction sequence.

The gradation of the refuse material will most likely be coarse and poorly graded with a small percentage of fine materials. Therefore, it is necessary to rework and level the lifts to assist in achieving the desired densities and prevent the formation of large voids. Additional compaction of each lift can be accomplished by routing the loaded haul trucks over the lift surface in such a manner as to cover the surface uniformly.

Waste rock loads containing non-cemented, soft shale, clay, or fine-grained materials shall be mixed with coarser graded loads in a controlled manner to limit concentrations of fine materials within the fill. This will be especially true for sediment pond wastes from either the mine site or refuse area sediment pond.

All lifts will be emplaced in a controlled manner to ensure the mass stability of the refuse pile and prevent mass movement during and after construction. Additionally, the lifts shall be graded to promote drainage off the pile surface. No intentional impoundments will be created by the placement of the refuse materials.

~~Each successive lift shall be benched to allow convenient access to the developing pile. As the limits of the site area are reached laterally, the outer slope shall conform to the slope indicated in RA Plate 5-1.~~

~~As the ultimate limits, both horizontally and vertically, of the southern end of the refuse area are reached, a portion of the soils stockpiled in the storage area shall be used to cap the southern outslope of the refuse pile. The surface of the pile will be prepared and the soils distributed and revegetated in accordance with the plans presented in Chapter 2 and 3 of this submittal.~~

Maintenance. Coal mine and underground development waste may have high moisture content. Controlled placement and compaction of the refuse materials will minimize the potential for spontaneous combustion or ignition of these materials. In the unlikely event that any burning waste is found during the regular inspections of the refuse pile area, it will be separated and extinguished either by burying the burning materials or by using water sprays. Once extinguished, the material will be placed, compacted, and buried on the active refuse pile bench.

Testing. Due to the anticipated coarse, open graded nature of the refuse materials, most quality control work for the fill will have to be on a visual basis. Conventional in-place density tests will not give reliable results under these circumstances.

Based on analyses of the materials that have been encountered in the Dugout Canyon Mine and other CFC mines to date, no acid-forming problems are anticipated. When the site is receiving materials, a representative sample will be collected of the material at a rate of one sample per 2,000 cubic yards of material through the ~~third~~ **fourth** quarter of 2005 and one sample per 5,000 cubic yards of material, thereafter. These samples will be analyzed for the parameters listed in Table 6 of the Division's topsoil and overburden guidelines (Leatherwood and Duce, 1988).

Analyses reports of the sampled waste rock will be submitted with the annual report.

Should a problem be identified, a mitigation plan will be prepared and submitted to the Division for approval. All identified potential acid or toxic-forming materials will be buried after the material handling plan is approved by the Division.

Copies of the toxicity/acid-base results from the samples collected at the Dugout Canyon Mine are presented in RA Attachment 5-4 and Appendix 5-7 of the approved M&RP.

537 Regraded Slopes

537.100 Division Approval

No mining or reclamation activities will be conducted in the refuse pile permit area that require approval of the Division for alternative specifications or for steep cut slope.

537.200 Regrading of Settled and Revegetated Fills

Upon completion of the filling of the refuse pile, the site will be reclaimed. The refuse fill will be constructed in a prudent manner to ensure that the pile will be stable. Geotechnical analysis of the proposed configuration is presented in RA Attachment 5-2.

Based on the proposed construction plans, the pile will be constructed to achieve the final configuration. Following completion of the construction, the pile surface will be prepared for soil distribution and revegetation according to plans presented in Chapter 2 and 3 of this submittal.

540 RECLAMATION PLAN

541 General

541.100 Commitment

Upon the permanent cessation of coal mining and reclamation operations at the Dugout Canyon Mine, CFC will close, backfill, or otherwise permanently reclaim all affected areas in accordance with the R645 regulations and this reclamation plan.

541.200 Surface Coal Mining and Reclamation Activities

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

541.300 Underground Coal Mining and Reclamation Activities

No underground activities are planned for this site.

**541.400 Environmental Protection Performance Standards
Performance Standards**

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

542 Narratives, Maps, and Plans

542.100 Reclamation Timetable

A timetable for the completion of each major step in the reclamation plan is presented in RA Figure 5-1. The first phase consists of regrading the site, placing soil, surface roughening, and seeding (vegetating) the site. This phase will take approximately six (6) months to complete based on the number and anticipated types of construction equipment to be used, the number of operators and laborers necessary to complete the work, and the number of weather days (when work cannot take place) anticipated to occur. Work will be completed sooner if bad weather is not encountered. The second phase will be an approximate 10 month period where the success of the surface reclamation will be evaluated in relation to the surface roughening and the initial seeding success. If the surface roughening and/or initial reseeding (vegetation) does not appear successful,

additional seeding or reworking of portions of the reclaimed surface may be necessary.

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

Based on the proposed construction plans, the pile will be constructed so that the pile will be at final configuration when the disposal of waste is completed. Therefore, it is anticipated that little regrading will need to be conducted. The construction plans for the refuse pile area were designed to meet the objectives of maximizing refuse storage quantities and maintaining a geotechnically stable base. The primary features of this plan are:

Constructing a 2H to 1V outslope for the refuse pile;

Placement of soil;

Revegetation and mulching of the soiled site; and

Breaching and filling of the sedimentation pond with embankment materials.

Following completion of the construction, the pile surface will be prepared for soil distribution from the soils in the stage storage area. The quantity of soil cover required for the refuse pile facility is discussed in Section 242 of this amendment.

Grading activities during operations will develop a pile with a final surface configuration approximating that defined by RA Plates 5-1. Once this final surface is achieved, the top two feet of the surface not be compacted or the surface will be ripped to prepare it for soil spreading. Details regarding soil placement and revegetation following regrading are provided in Chapters 2 and 3, respectively.

Sedimentation Pond Removal and Interim Sediment Control. The sedimentation pond will be retained for as long as practical during reclamation. Because the pond is constructed as an incised structure, the pond reclamation will consist primarily of breaching the pond and pushing the embankment into the pond to create a gentle slope. The emergency spillway outlet channel will

be removed and the rock from the spillway will be used in the construction of reclaimed channel RD-1c. During reclamation the berm materials of the diversion ditches around the refuse pile will be pushed into the ditch and a free draining slope will be constructed to allow runoff from the pile site to enter the natural drainages. Once the sediment pond and ditch areas are adequately graded, the soil materials will be redistributed and revegetated in accordance with Chapters 2 and 3.

542.300 Final Surface Configuration Maps and Cross Sections

Final surface configuration maps and cross sections for the Dugout Canyon refuse pile site are provided on RA Plates 5-2 and 5-2A. The topography illustrated on RA Plate 5-2 shows the proposed pile configuration and the proposed final configuration of the ground surface. RA Plate 5-2A presents final pile conditions and final configuration cross-sections of the refuse pile site.

542.400 Removal of Temporary Structures

No surface structures are planned to be associated with the refuse pile operation.

542.500 Removal of Sedimentation Pond

Refer to Section 542.200 of this amendment.

542.600 Roads

All temporary access roads constructed during refuse pile construction activities will be reclaimed when no longer needed for access to the site. Any surfacing material will be removed, the area will be regraded, ripped, and the final reclamation seed mix will be applied as specified in Chapter 3.

542.700 Final Abandonment of Mine Openings and Disposal Areas

No mine openings or disposal areas will exist in this area.

542.800 Estimated Cost of Reclamation

Refer to the existing M&RP. It is anticipated that the cost of reclamation of the refuse pile is adequately covered within the existing Dugout Canyon Mine reclamation bond.

550 RECLAMATION DESIGN CRITERIA AND PLANS

551 Casing and Sealing of Underground Openings

No underground openings will exist in the area.

552 Permanent Features

552.100 Small Depressions

No small depressions will be created as part of the refuse pile construction and reclamation. Additionally, the original topographic divide that existed on the site pre-disturbance will be enhanced as part of the refuse pile construction plan.

552.200 Permanent Impoundments

No permanent impoundments will be left following reclamation.

553 Backfilling and Grading

553.100 Disturbed Area Backfilling and Grading

Approximate Original Contour. As indicated earlier, the site of the refuse pile is a previously disturbed site. ~~Therefore, CFC request a variance to the approximate original contour requirements.~~ The proposed configuration of the site will comply with the post-mining land use and

blend into the surrounding area. ~~proposed reclamation of the pile will be better than the unreclaimed site.~~

Based on the proposed plan, a portion of the existing ground surface will be raised by the construction of the refuse pile. Prior to placing refuse, the soils present on the site will be stripped and temporarily stored on site. At final reclamation, the stored soil will be redistributed and revegetated as described in Chapters 2 and 3 of this submittal.

The reclaimed slopes of the refuse pile will have a similar shape to the slopes in the surrounding area, including concave slopes and slope breaks. The top of the reclaimed pile will be regraded to have an irregular plateau surface that drains towards all pile outslopes instead of draining only towards one side of the pile (refer to RA Plates 5-2 and 5-2A).

Erosion and Water Pollution. Sediment-control measures will be implemented during and following reclamation activities.

Prior to seeding, all areas with a slope steepness of 3H:1V or steeper will be roughened using a trackhoe. The final surface will consist of mounds and depressions capable of holding runoff. Refer to Sections 355 and 341 regarding erosion-control and revegetation.

During these activities temporary sediment controls will consist of installation of silt fences, berms, and/or straw bales, surface roughening, and re-establishment of the vegetative cover for the limited areas. As vegetation becomes established on the reclaimed surfaces, erosion potentials will be further minimized. By minimizing erosion, water pollution will also be precluded.

Post-Mining Land Use. The disturbed area will be reclaimed in a manner that supports the approved post-mining land use.

553.200 Spoil and Waste

Spoil. No spoil will be generated within the permit area.

Coal Processing Waste. No coal processing waste will be generated within the permit area. However, should coal from the CFC mines be processed at a washing facility, there is potential for the processing waste to be returned to the refuse pile site for disposal.

553.250 Refuse Piles

The refuse pile site is a previously disturbed area. The site is to be located in a played out gravel pit. Therefore, little soil materials remain available on the site. The refuse pile surface will be prepared and the soil will be distributed and revegetated in accordance with the plans proposed in Chapters 2 and 3.

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

No coal seams are present in the area.

553.400 Cut-and-Fill Terraces

No cut-and-fill terraces will be built at the site.

553.500 Highwalls From Previously Mined Areas

No highwalls exist or will be built at the refuse pile site.

553.600 Previously Mined Areas

The area has not been previously mined.

553.700 Backfilling and Grading - Thin Overburden

Backfilling and grading will occur during reclamation, as described in Sections 534.100 and

542.600.

553.800 Backfilling and Grading - Thick Overburden

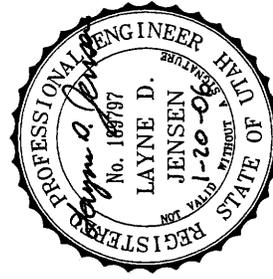
Backfilling and grading will occur during reclamation, as described in Sections 534.100 and 542.600.

553.900 Regrading of Settled and Revegetated Fills

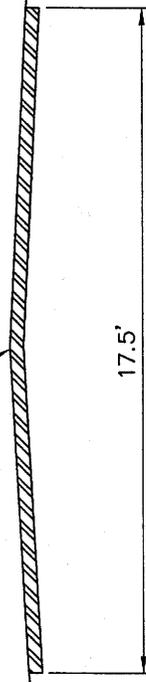
No settled or revegetated fills currently or will exist at the storage site.

560 PERFORMANCE STANDARDS

Coal mining and reclamation operations at the Dugout Canyon Mine will be conducted in accordance with the approved permit and the requirements of R645-301-510 through R645-301-553.



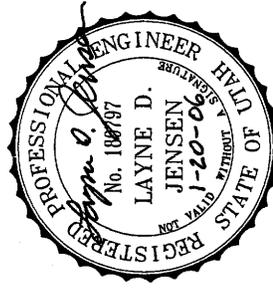
CROWNED PAVED ROAD



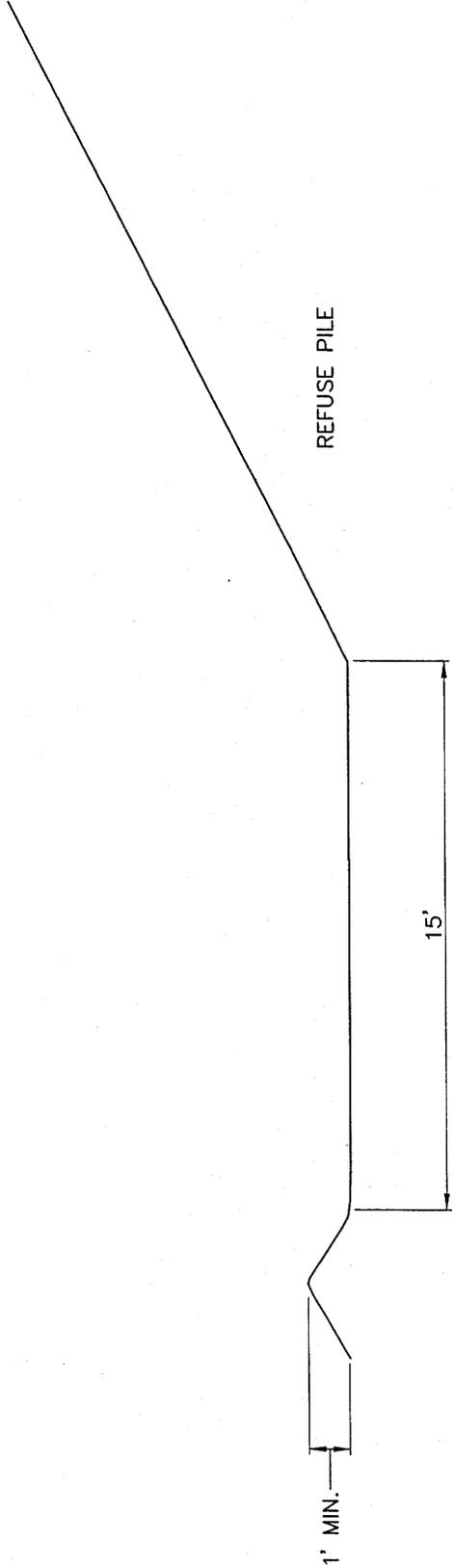
17.5'



RA FIGURE 5-2. TYPICAL ACCESS ROAD CROSS-SECTION



REFUSE PILE

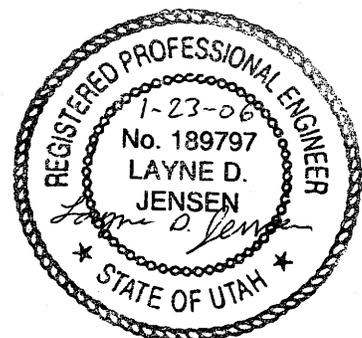


RA FIGURE 5-3. TYPICAL TEMPORARY ACCESS ROAD CROSS-SECTION

Canyon Fuel Company, LLC
Dugout Canyon Mine

Refuse Pile Amendment
January 2006

RA ATTACHMENT 5-3
REFUSE PILE VOLUME CALCULATIONS



Determination of Refuse Tonnage for Final Pile Configuration

The existing topography shown on the maps is representative of the site when the last aerial survey was conducted on August 12, 2004. At that time Olympus Aerial Surveys had estimated that 46,217 CY of coal refuse had already been placed at the site.

At the final pile configuration an additional 639,838 CY of coal waste will have been added to the refuse pile.

Total coal refuse in the pile = 46,217 CY + 639,838 CY = 686,055 CY

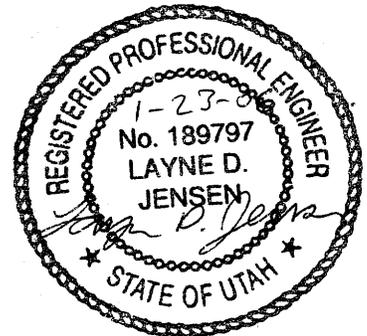
Unit weight of coal refuse = 110 lbs/ft³

Tonnage = (686,055 CY * 27 ft³/CY * 110 lbs/ft³) / 2000 lbs/ft³ = 1,018,792 tons

Canyon Fuel Company, LLC
Dugout Canyon Mine

Refuse Pile Amendment
January 2006

RA ATTACHMENT 7-4
HYDROLOGY CALCULATIONS



RECLAMATION CHANNELSRD-1a

Contributing Watershed is Approximately 15% of RWS-1

Peak Flow = $6.55 \times 0.15 = 0.98$ cfs

Minimum Slope = 4.86%

Maximum Slope = 13.59%

Trapizoidal Ditch

Side slopes = 2:1

Depth = 1 ft

Bottom Width = 1 ft

Riprap = none

Maximum Velocity = 4.46 fps

Maximum Depth = 0.27 ft

Freeboard = 0.73 ft

See pages 41 and 42 for calculation sheets and page 65 for a typical cross-section of the ditch

RD-1b

Contributing Watershed is 85% of RWS-1

Peak Flow = $6.55 \times 0.85 = 5.57$ cfs

Minimum Slope = 0.68%

Maximum Slope = 3.24%

Trapizoidal Ditch

Side slopes = 2:1

Depth = 1.25 ft

Bottom Width = 3 ft

Riprap = none

Maximum Velocity = 4.28 fps

Maximum Depth = 0.66 ft

Freeboard = 0.59 ft

See pages 43 and 44 for calculation sheets and page 66 for a typical cross-section of the ditch

RD-1c

Contributing Watershed is RWS-1

Peak Flow = 6.55 cfs

Minimum Slope = 4.4%

Maximum Slope = 23.3%

Trapizoidal Ditch

Side slopes = 2:1

Depth = 1.25 ft

Bottom Width = 2.0 ft

Riprap = 6 inch

Maximum Velocity = 6.97 fps

Maximum Depth = 0.61 ft

Freeboard = 0.64 ft

See pages 45 and 46 for calculation sheets and page 67 for a typical cross-section of the ditch

RD-2

Contributing Watershed is RWS-2

Peak Flow = 0.59 cfs

Minimum Slope = 1.77%

Maximum Slope = 17.24%

Trapizoidal Ditch

Side slopes = 2:1

Depth = 1.0 ft

Bottom Width = 1 ft

Riprap = none

Maximum Velocity = 4.07 fps

Maximum Depth = 0.27 ft

Freeboard = 0.73 ft

See pages 47 and 48 for calculation sheets and page 68 for a typical cross-section of the ditch

RD-3

Contributing Watershed is RWS-3

Peak Flow = 1.47 cfs

Minimum Slope = 15.38%

Maximum Slope = 31.80%

Trapizoidal Ditch

Side slopes = 2:1

Depth = 1.0 ft

Bottom Width = 2.0 ft

Riprap = 3"

Maximum Velocity = 4.79 fps

Maximum Depth = 0.17 ft

Freeboard = 0.83 ft

See pages 49 and 50 for calculation sheets and page 69 for a typical cross-section of the ditch

RD-4

Contributing Watershed is RWS-4

Peak Flow = 0.50 cfs

Minimum Slope = 3.25%

Maximum Slope = 11.44%

Trapizoidal Ditch

Side slopes = 2:1

Depth = 1.0 ft

Bottom Width = 1.0 ft

Riprap = none

Maximum Velocity = 3.36 fps

Maximum Depth = 0.21 ft

Freeboard = 0.79 ft

See pages 51 and 52 for calculation sheets and page 70 for a typical cross-section of the ditch

Summary of Watershed Data

Watershed Area	Drainage Area (ac)	Curve Number	S (in)	Y (%)	I (ft)	L (hr)	Time of Conc. (hr)	Peak Flow (cfs)
Operational Watersheds								
DWS-1	14.8	90	1.111	25.5	700	0.033	0.055	16.03
UWS-1	18	75	3.333	11	1500	0.154	0.257	4.74
UWS-2	25.5	75	3.333	18.4	1975	0.148	0.248	6.78
Reclamation Watersheds								
RWS-1	21.2	76	3.158	13.2	1500	0.136	0.228	6.55
RWS-2	1	80	2.500	20.3	260	0.024	0.040	0.59
RWS-3	2.6	80	2.500	21	510	0.040	0.068	1.47
RWS-4	0.87	80	2.500	19.9	330	0.029	0.049	0.5
RWS-5	26.1	75	3.333	18.4	2060	0.153	0.256	6.87

Notes

Watershed locations can be found on Plates RA7-1 and RA7-3

S = 1000/CN - 10

Y = average watershed slope = (length of contour lines)(contour interval)/(watershed area)

I = hydraulic length

L = watershed lag = $(1.48(S+1)^{0.7}) / (1900(Y)^{0.5})$

Time of Concentration + 1.67L

Peak Flow is based on a 100-yr 6-hr storm event

Triangular Hydrograph Calculations using
SCSHYDRO Program

Watershed I.D.:
RWS-1 100-YEAR 6-HOUR

INPUT SUMMARY

STORM :	WATERSHED :
Dist. = SCS Type 'b'	Area = 21.20 acres
Depth = 2.05 inches	CN = 76.00
Duration = 6.0 hrs	Time conc. = 0.23 hrs

OUTPUT SUMMARY

Runoff depth: 0.440 inches
Initial abstr: 0.632 inches
Peak flow: 6.55 cfs (0.306 iph)
at time: 2.614 hrs

Triangular Hydrograph Calculations using
SCSHYDRO Program

Watershed I.D.:
RWS-2 100-YEAR 6-HOUR

INPUT SUMMARY

STORM :	WATERSHED :
Dist. = SCS Type 'b'	Area = 1.00 acres
Depth = 2.05 inches	CN = 80.00
Duration = 6.0 hrs	Time conc. = 0.04 hrs

OUTPUT SUMMARY

Runoff depth: 0.593 inches
Initial abstr: 0.500 inches
Peak flow: 0.59 cfs (0.581 iph)
at time: 2.507 hrs

Triangular Hydrograph Calculations using
SCSHYDRO Program

Watershed I.D.:
RWS-3 100-YEAR 6-HOUR

INPUT SUMMARY

STORM :	WATERSHED :
Dist.= SCS Type 'b'	Area = 2.60 acres
Depth = 2.05 inches	CN = 80.00
Duration = 6.0 hrs	Time conc.= 0.07 hrs

OUTPUT SUMMARY

Runoff depth: 0.593 inches
Initial abstr: 0.500 inches
Peak flow: 1.47 cfs (0.562 iph)
at time: 2.511 hrs

Triangular Hydrograph Calculations using
SCSHYDRO Program

Watershed I.D.:
RWS-4 100-YEAR 6-HOUR

INPUT SUMMARY

STORM :	WATERSHED :
Dist. = SCS Type 'b'	Area = 0.87 acres
Depth = 2.05 inches	CN = 80.00
Duration = 6.0 hrs	Time conc. = 0.05 hrs

OUTPUT SUMMARY

Runoff depth: 0.593 inches
Initial abstr: 0.500 inches
Peak flow: 0.50 cfs (0.574 iph)
at time: 2.509 hrs

RD-1a Minimum Slope
Worksheet for Trapezoidal Channel

41
mod 1-06

Project Description	
Worksheet	Refuse Pile Rec
Flow Element	Trapezoidal Cha
Method	Manning's Form
Solve For	Channel Depth

Input Data	
Mannings Coeffic	0.035 <i>Rocky Earth</i>
Slope	048600 ft/ft
Left Side Slope	2.00 V : H
Right Side Slope	2.00 V : H
Bottom Width	1.00 ft
Discharge	0.98 cfs

Results	
Depth	0.27 ft <i><1.0' ok</i>
Flow Area	0.3 ft ²
Wetted Perim	1.61 ft
Top Width	1.27 ft
Critical Depth	0.29 ft
Critical Slope	0.038867 ft/ft
Velocity	3.13 ft/s
Velocity Head	0.15 ft
Specific Energ	0.43 ft
Froude Numb	1.12
Flow Type	supercritical

RD-1a Maximum Slope
Worksheet for Trapezoidal Channel

42
mod 1-06

Project Description

Worksheet	Refuse Pile Rec
Flow Element	Trapezoidal Cha
Method	Manning's Form
Solve For	Channel Depth

Input Data

Mannings Coeffic	0.035	<i>Rocky Earth</i>
Slope	135900	ft/ft
Left Side Slope	2.00	V : H
Right Side Slope	2.00	V : H
Bottom Width	1.00	ft
Discharge	0.98	cfs

Results

Depth	0.20	ft
Flow Area	0.2	ft ²
Wetted Perim	1.45	ft
Top Width	1.20	ft
Critical Depth	0.29	ft
Critical Slope	0.038866	ft/ft
Velocity	4.46	ft/s <i>< 5.0 fps ∴ OK</i>
Velocity Head	0.31	ft
Specific Energ	0.51	
Froude Numb	1.84	
Flow Type	Supercritical	

RD-1b Minimum Slope
Worksheet for Trapezoidal Channel

43
mod 1-06

Project Description

Worksheet	Refuse Pile Rec
Flow Element	Trapezoidal Cha
Method	Manning's Form
Solve For	Channel Depth

Input Data

Mannings Coeffic	0.030	<i>bare ground</i>
Slope	006800	ft/ft
Left Side Slope	2.00	V : H
Right Side Slope	2.00	V : H
Bottom Width	3.00	ft
Discharge	5.57	cfs

Results

Depth	0.66 ft	<i>< 1.25' ok</i>
Flow Area	2.2	ft ²
Wetted Perim	4.47	ft
Top Width	3.66	ft
Critical Depth	0.46	ft
Critical Slope	0.021275	ft/ft
Velocity	2.54	ft/s
Velocity Head	0.10	ft
Specific Energ	0.76	ft
Froude Numb	0.58	
Flow Type	Subcritical	

RD-1b Maximum Slope
Worksheet for Trapezoidal Channel

44
mod 1-06

Project Description

Worksheet	Refuse Pile Rec
Flow Element	Trapezoidal Cha
Method	Manning's Form
Solve For	Channel Depth

Input Data

Mannings Coeffic	0.030	<i>bare ground</i>
Slope	0.32400	ft/ft
Left Side Slope	2.00	V : H
Right Side Slope	2.00	V : H
Bottom Width	3.00	ft
Discharge	5.57	cfs

Results

Depth	0.41	ft
Flow Area	1.3	ft ²
Wetted Perim	3.91	ft
Top Width	3.41	ft
Critical Depth	0.46	ft
Critical Slope	0.021275	ft/ft
Velocity	4.28	ft/s <i>< 5.0 fps</i>
Velocity Head	0.28	ft
Specific Energ	0.69	ft
Froude Numb	1.22	
Flow Type	Supercritical	

RD-1c Minimum Slope
Worksheet for Trapezoidal Channel

45
mod 1-06

Project Description

Worksheet	Refuse Pile Rec
Flow Element	Trapezoidal Cha
Method	Manning's Form
Solve For	Channel Depth

Input Data

Mannings Coeffic	0.037	$D_{50} = 6''$	slope = 4.4%
Slope	0.044000	ft/ft	
Left Side Slope	2.00	V : H	
Right Side Slope	2.00	V : H	
Bottom Width	2.00	ft	
Discharge	6.55	cfs	

Results

Depth	0.61 ft	< 1.25
Flow Area	1.4	ft ²
Wetted Perim	3.35	ft
Top Width	2.61	ft
Critical Depth	0.65	ft
Critical Slope	0.034226	ft/ft
Velocity	4.69	ft/s
Velocity Head	0.34	ft
Specific Energ	0.95	ft
Froude Numb	1.13	
Flow Type	Supercritical	

RD-1c Maximum Slope
Worksheet for Trapezoidal Channel

46
mod 1-06

Project Description	
Worksheet	Refuse Pile Rec
Flow Element	Trapezoidal Cha
Method	Manning's Formi
Solve For	Channel Depth

Input Data	
Mannings Coeffic	0.048 <i>0.50 = 6" slope = 23.3 %</i>
Slope	0.233000 ft/ft
Left Side Slope	2.00 V : H
Right Side Slope	2.00 V : H
Bottom Width	2.00 ft
Discharge	6.55 cfs

Results	
Depth	0.42 ft
Flow Area	0.9 ft ²
Wetted Perim	2.95 ft
Top Width	2.42 ft
Critical Depth	0.65 ft
Critical Slope	0.057602 ft/ft
Velocity	6.97 ft/s <i>< 7.5 fps ∴ ok</i>
Velocity Head	0.75 ft
Specific Energ	1.18 ft
Froude Numb	1.97
Flow Type	Supercritical

RD-2 Minimum Slope
Worksheet for Trapezoidal Channel

47
mod 1-06

Project Description

Worksheet	Refuse Pile Rec
Flow Element	Trapezoidal Cha
Method	Manning's Form
Solve For	Channel Depth

Input Data

Mannings Coeffic	0.035	<i>Rocky ground</i>
Slope	017700	ft/ft
Left Side Slope	2.00	V : H
Right Side Slope	2.00	V : H
Bottom Width	1.00	ft
Discharge	0.59	cfs

Results

Depth	0.27 ft	<i>< 1.0' ∴ ok</i>
Flow Area	0.3	ft ²
Wetted Perim	1.61	ft
Top Width	1.27	ft
Critical Depth	0.21	ft
Critical Slope	0.040045	ft/ft
Velocity	1.89	ft/s
Velocity Head	0.06	ft
Specific Energ	0.33	ft
Froude Numb	0.67	
Flow Type	Subcritical	

RD-2 Maximum Slope
Worksheet for Trapezoidal Channel

48
mal 1-06

Project Description

Worksheet	Refuse Pile Rec
Flow Element	Trapezoidal Cha
Method	Manning's Form
Solve For	Channel Depth

Input Data

Mannings Coeffic	0.035	<i>Rocky ground</i>
Slope	172400	ft/ft
Left Side Slope	2.00	V : H
Right Side Slope	2.00	V : H
Bottom Width	1.00	ft
Discharge	0.59	cfs

Results

Depth	0.14	ft
Flow Area	0.1	ft ²
Wetted Perim	1.30	ft
Top Width	1.14	ft
Critical Depth	0.21	ft
Critical Slope	0.040044	ft/ft
Velocity	4.07	ft/s <i>< 5.0 fps ∴ OK</i>
Velocity Head	0.26	ft
Specific Energ	0.39	ft
Froude Numb	2.01	
Flow Type	supercritical	

RD-3 Minimum Slope
Worksheet for Trapezoidal Channel

49
mal 1-06

Project Description

Worksheet	Refuse Pile Rec
Flow Element	Trapezoidal Cha
Method	Manning's Form
Solve For	Channel Depth

Input Data

Mannings Coeffic	0.040	$D_{50} = 3''$	$slope = 15.38$
Slope	153800	ft/ft	
Left Side Slope	2.00	V : H	
Right Side Slope	2.00	V : H	
Bottom Width	2.00	ft	
Discharge	1.47	cfs	

Results

Depth	0.17 ft	$< 1.0' \therefore ok$
Flow Area	0.4	ft ²
Wetted Perim	2.38	ft
Top Width	2.17	ft
Critical Depth	0.25	ft
Critical Slope	0.045437	ft/ft
Velocity	4.09	ft/s
Velocity Head	0.26	ft
Specific Energ	0.43	ft
Froude Numb	1.77	
Flow Type	Supercritical	

RD-3 Maximum Slope Worksheet for Trapezoidal Channel

50
mal 1-06

Project Description

Worksheet	Refuse Pile Rec
Flow Element	Trapezoidal Cha
Method	Manning's Form
Solve For	Channel Depth

Input Data

Mannings Coeffic	0.045	<i>D₅₀ = 3"</i>	<i>slope = 31.8%</i>
Slope	318000	ft/ft	
Left Side Slope	2.00	V : H	
Right Side Slope	2.00	V : H	
Bottom Width	2.00	ft	
Discharge	1.47	cfs	

Results

Depth	0.15	ft	
Flow Area	0.3	ft ²	
Wetted Perim	2.33	ft	
Top Width	2.15	ft	
Critical Depth	0.25	ft	
Critical Slope	0.057411	ft/ft	
Velocity	4.79	ft/s	<i>< 5.0 fps ∴ ok</i>
Velocity Head	0.36	ft	
Specific Energ	0.50	ft	
Froude Numb	2.23		
Flow Type	supercritical		

RD-4 Minimum Slope
Worksheet for Trapezoidal Channel

51
mad 1-06

Project Description

Worksheet	Refuse Pile Rec
Flow Element	Trapezoidal Cha
Method	Manning's Form
Solve For	Channel Depth

Input Data

Mannings Coeffic	0.035	<i>Rocky Ground</i>
Slope	0.32500	ft/ft
Left Side Slope	2.00	V : H
Right Side Slope	2.00	V : H
Bottom Width	1.00	ft
Discharge	0.50	cfs

Results

Depth	<u>0.21 ft</u>	<i>< 1.0' ∴ ok</i>
Flow Area	0.2	ft ²
Wetted Perim	1.46	ft
Top Width	1.21	ft
Critical Depth	0.19	ft
Critical Slope	0.040547	ft/ft
Velocity	2.21	ft/s
Velocity Head	0.08	ft
Specific Energ	0.28	ft
Froude Numb.	0.90	
Flow Type	Subcritical	

RD-4 Maximum Slope
Worksheet for Trapezoidal Channel

52
mod 1-06

Project Description

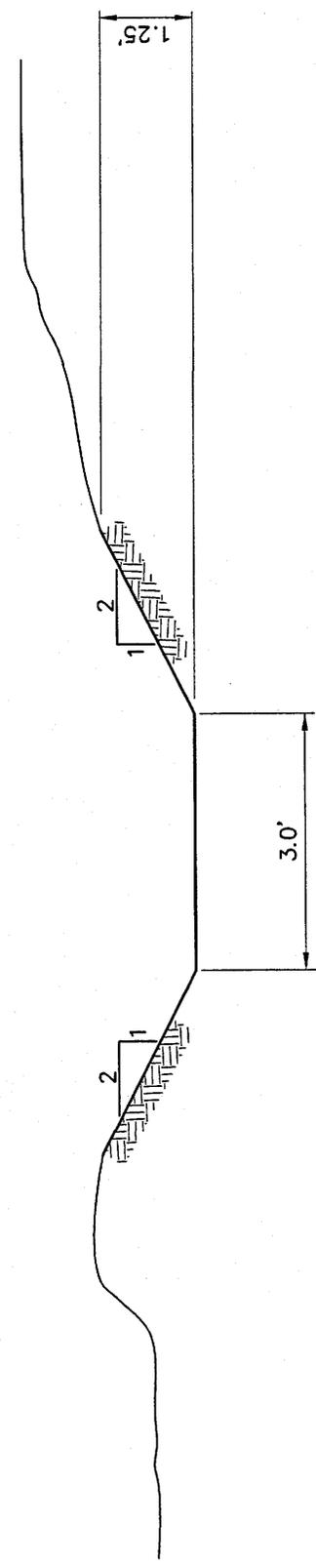
Worksheet	Refuse Pile Rec
Flow Element	Trapezoidal Cha
Method	Manning's Form
Solve For	Channel Depth

Input Data

Mannings Coeffic	0.035 <i>Rocky Ground</i>
Slope	114400 ft/ft
Left Side Slope	2.00 V : H
Right Side Slope	2.00 V : H
Bottom Width	1.00 ft
Discharge	0.50 cfs

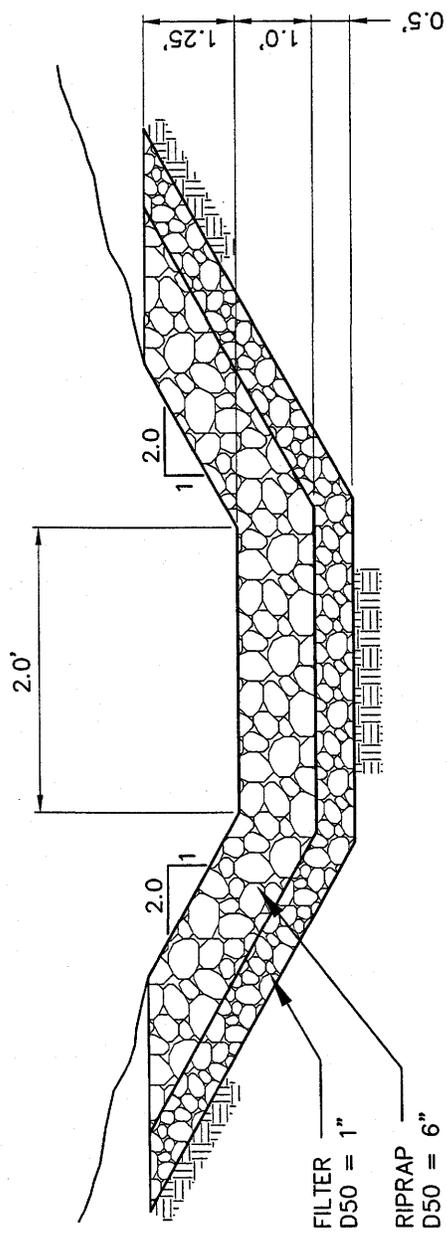
Results

Depth	0.14 ft
Flow Area	0.1 ft ²
Wetted Perim	1.31 ft
Top Width	1.14 ft
Critical Depth	0.19 ft
Critical Slope	0.040546 ft/ft
Velocity	<u>3.36 ft/s</u> <i>< 5.0 fps ∴ OK</i>
Velocity Head	0.18 ft
Specific Energ	0.31 ft
Froude Numb	1.64
Flow Type	supercritical



NO SCALE

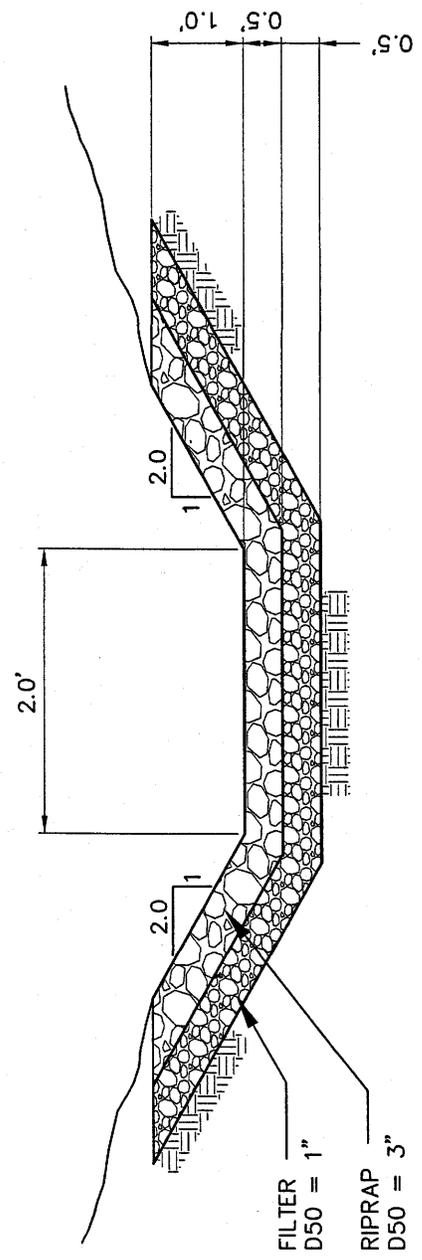
RD-1b



NO SCALE

RD-1c

mod 1-06



NO SCALE

RD-3

CHAPTER 8
BONDING AND INSURANCE

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~~LIST OF ATTACHMENTS~~

~~RA Attachment 8-1 — Refuse Pile Bond Calculations~~

CHAPTER 8 BONDING AND INSURANCE

810 BONDING DEFINITIONS AND DIVISION RESPONSIBILITIES

This chapter provides information regarding the bonding for coal mining and reclamation operations at the Dugout Canyon Mine Refuse Pile. CFC will have on file with the Division a bond or bonds made payable to the Division for performance of all the requirements of the State Program.

820 REQUIREMENT TO FILE A BOND

The disturbed area (15.60 acres) covered by the bond is outlined on RA Plate 5-1 of this amendment. The disturbed area and specific acres to be reclaimed are discussed in Section 340. The performance bond period is for the duration of the coal mining and reclamation operations including the extended period designated by the Division. The bond is in the form of a surety bond and is described in Section 860 of the M&RP.

830 DETERMINATION OF BOND AMOUNT

The reclamation bond (direct and indirect costs) for the Dugout Canyon Mine refuse pile site is found in Appendix 5-6 of the M&RP. \$117,732 (2008 dollars). The most current formulas from the Office of Surface Mining, *Handbook for Calculation of Reclamation Bond Amounts*, April 2000 were used to determine the coverage necessary for reclamation (Means, 2006). Additional details concerning the estimate can be found in Sections 540, and 550, and RA Attachment 8-1 of this amendment. The bonding information pertaining to the refuse pile site will be incorporated into Appendix 5-6 of the approved M&RP upon approval of this bond. The bond coverage will be adjusted per the Division's determination of required bond coverage.

840 GENERAL TERMS AND CONDITIONS OF THE BOND

Refer to Chapter 8 of the approved M&RP.

850 BONDING REQUIREMENTS FOR UNDERGROUND COAL MINING AND RECLAMATION ACTIVITIES

Refer to Chapter 8 of the approved M&RP.

860 FORMS OF BONDS

Refer to Chapter 8 of the approved M&RP.

870 REPLACEMENT OF BONDS

Refer to Chapter 8 of the approved M&RP.

880 REQUIREMENTS TO RELEASE PERFORMANCE BONDS

The applicant will comply with the requirements described in Section R645-301-880 of the Division regulations when applying for the release of performance bonds.

890 TERMS AND CONDITIONS FOR LIABILITY INSURANCE

Certificates of Insurance issued for the Dugout Mine are included as Appendix 1-2 of the M&RP. For additional information refer to Chapter 8 of the approved M&RP.