

APPENDIX 5-6

Reclamation Bond Estimate

FILE IN:

Confidential

Shelf

Expandable

Refer to Record No. 0016 Date 03072003

In C 00700372003 Improving

For additional information

Confidential!



Canyon Fuel Company, LLC
 Soldier Canyon Mine
 P.O. Box 1029
 Wellington, Utah 84542
 (435) 637-6360 Fax: (435) 637-0108

COPY

C/007/039 Incoming OK
CC: Pam

0016

New Amendment
AM03B

March 7, 2003

Ms. Pamela Grubaugh-Littig
 Department of Natural Resources
 Division of Oil, Gas and Mining
 1594 West North Temple
 Suite 1210
 Salt Lake City, UT 84114-5801

RE: Methane Degassification Amendment, Wells MW-06 and MW-08,
 Canyon Fuel Company, LLC, Dugout Mine, C/007/039

Dear Ms. Grubaugh-Littig:

Enclosed please find five copies of the submittal to address the drilling of two methane degassification wells at the Dugout Canyon Mine. The information provided in the degassification amendment is to be kept in a separate binder and not incorporated into the M&RP binders. However, Plate 1-4 and Appendix 5-6 of the M&RP are part of this amendment and have received revisions and will need to be incorporated into the M&RP binders once this amendment has been approved.

The construction of both wells will increase the disturbed area for Dugout Canyon Mine by a total of 2.27 acres. We have not incorporated the increased disturbed acreage into the M&RP text at this time, but will do so before they are drilled. The drilling of the wells rests on two factors, first how far mining has progressed by the time this amendment is approved and secondly the intensity of the methane in the panels where the wells are proposed. Dugout's plan is to drill at least one of the wells this year.

An additional copy of the submittal has been delivered to the Price Field Office.

Please contact Vicky Miller at (435) 636-2869 or Gary Taylor (435) 636-2893, if there are any questions concerning this submittal.

Sincerely yours,

Vicky S. Miller

Vicky S. Miller

Cc: Chris Hansen (no enclosures)
 Dave Spillman (enclosures)
 Pete Hess (enclosures)

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MAR 07 2003

DIV. OF OIL, GAS & MINING

File in: *C/007/039, 2003, Incoming*

Refer to:
 Confidential
 Shelf
 Expandable

03072003

APPLICATION FOR COAL PERMIT PROCESSING

COPY

Permit Change New Permit Renewal Exploration Bond Release Transfer

Permittee: Canyon Fuel Company, LLC

Mine: Dugout Canyon Mine Permit Number: C/007/039

Title: Degassification Wells MW-06 and MW-08 Amendment

Description, Include reason for application and timing required to implement:

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

- Yes No 1. Change in the size of the Permit Area? Acres: _____ Disturbed Area: 2.27 increase decrease.
- Yes No 2. Is the application submitted as a result of a Division Order? DO# _____
- Yes No 3. Does the application include operations outside a previously identified Cumulative Hydrologic Impact Area?
- Yes No 4. Does the application include operations in hydrologic basins other than as currently approved?
- Yes No 5. Does the application result from cancellation, reduction or increase of insurance or reclamation bond?
- Yes No 6. Does the application require or include public notice publication?
- Yes No 7. Does the application require or include ownership, control, right-of-entry, or compliance information?
- Yes No 8. Is proposed activity within 100 feet of a public road or cemetery or 300 feet of an occupied dwelling?
- Yes No 9. Is the application submitted as a result of a Violation? NOV # _____
- Yes No 10. Is the application submitted as a result of other laws or regulations or policies?
Explain: _____
- Yes No 11. Does the application affect the surface landowner or change the post mining land use?
- Yes No 12. Does the application require or include underground design or mine sequence and timing? (Modification of R2P2)
- Yes No 13. Does the application require or include collection and reporting of any baseline information?
- Yes No 14. Could the application have any effect on wildlife or vegetation outside the current disturbed area?
- Yes No 15. Does the application require or include soil removal, storage or placement?
- Yes No 16. Does the application require or include vegetation monitoring, removal or revegetation activities?
- Yes No 17. Does the application require or include construction, modification, or removal of surface facilities?
- Yes No 18. Does the application require or include water monitoring, sediment or drainage control measures?
- Yes No 19. Does the application require or include certified designs, maps or calculation?
- Yes No 20. Does the application require or include subsidence control or monitoring?
- Yes No 21. Have reclamation costs for bonding been provided?
- Yes No 22. Does the application involve a perennial stream, a stream buffer zone or discharges to a stream?
- Yes No 23. Does the application affect permits issued by other agencies or permits issued to other entities?

Please attach four (4) review copies of the application. If the mine is on or adjacent to Forest Service land please submit five (5) copies, thank you. (These numbers include a copy for the Price Field Office)

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

David G. Spillman
Print Name

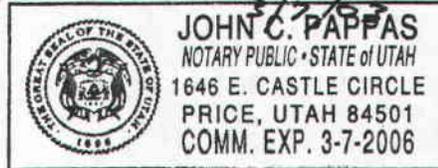
David G. Spillman, Engineering Manager
Sign Name, Position, Date

Subscribed and sworn to before me this 7 day of MARCH, 2003

Notary Public

My commission Expires:

Attest: State of UTAH } ss:
County of CARBON



For Office Use Only:

Assigned Tracking Number:

Received by Oil, Gas & Mining

RECEIVED

MAR 07 2003

DIV. OF OIL, GAS & MINING

Direct Costs

Subtotal Demolition and Removal	\$638,882
Subtotal Backfilling and Grading	\$672,496
Subtotal Revegetation	<u>\$224,039</u>
Subtotal Direct Costs	\$1,535,417

Indirect Costs

Mobilization/Demobilization	\$153,542	10.00%
Contingencies	\$76,771	5.00%
Engineering Redesign	\$38,385	2.50%
Main Office Expense	\$104,408	6.80%
Project Management Fee	<u>\$38,385</u>	2.50%
Subtotal Indirect Costs	<u>\$411,492</u>	
Total Costs	\$1,946,909	

Inflation Factor		0.025226
Years		5
Inflation	<u>\$245,568</u>	
Reclamation Cost Inflated	\$2,192,477	
Bond Amount (rounded to nearest \$1,000)	\$2,192,000	

Inflation Factor = $\frac{\text{ENR Construction Cost Index (CCI) for Current Year}}{\text{ENR CCI for mo/yr 5 years prior to Current Year}}$

Current Year Sept. 2002	<u>6589</u>	=	1.126132
Prior Sept. 1997	5851		12.61%

Materials	Reference Number	Cost	Unit
Excavate Broken Concrete 3 CY (325BL)	02315 400 0300	2.01	/CY
Front-End Loader 5 CY (966G)	02315 400 1650	1.30	/CY
12 CY Truck, 1/2 mile Round Trip	02320 200 0320	3.09	/CY
On Site Disposal	02220 375 5550	6.80	/CY
Asphalt	02220 375 1750	6.20	/SY
Distance Disposal >5 miles	0220 375 5600	9.38	/CY
Steel Building	02220 100 0012	0.24	/CF
City Service	City Service Price	4.00	/CY
Haul, per mile over 8 CY Truck	02225 730 5100	17.20	/CY
16 Ton Truck	01590 200 5300	517.66	/Day
Truck Driver		38.10	/HR
Masonry Building	02220 100 0080	0.20	/CF
1 CY Skid Loader	02315 440 3020	10.92	/CY
Excavator, Diesel Hydraulic, 3-1/2 CY Operating Rate	Blue Book	53.15	/HR
Excavator, Diesel Hydraulic, 3-1/2 CY Rental Rate	Blue Book	15,130.00	/Month
Concrete Pump	03310 700 5350	19.75	/CY
Excavator, Diesel Hydraulic, 2 CY (325B)	02315 400 260	1.71	/CY
Backfill trench, 2-1/4 CY Bucket	02315 900 3080	1.55	/CY
Machine Placed for Slope Protection	02370 300 0100	27.45	/CY
Polypropylene Mesh, Stapled, 6.5 oz./SY	02370 300 0200	1.45	/SY
Drill and Blast Open Face >1500 Cy	02315 340 0010	8.29	/CY
D9R U-Blade ROPS Operating Rate	Blue Book	70.00	/HR
D9R U-Blade ROPS Rental Rate	Blue Book	17,590.00	/Month
815 F Compactor Operating Rate	Blue Book	31.85	/HR
815 F Compactor Rental Rate	Blue Book	9,064.00	/Month
613C Water Wagon Operating Rate	Blue Book	25.70	/HR
613 C Water Wagon Rental Rate	Blue Book	5,010.00	/Month
Truck Pickup 3/4 ton, 4 Wheel drive Operating Rate	Blue Book	7.40	/HR
Truck Pickup 3/4 ton, 4 Wheel drive Rental Rate	Blue Book	785.00	/Month
Foreman		39.60	/HR
Labor		36.50	/HR
Heavy Equipment Operator		47.15	/HR
Front-End Loader 5 CY (966G) Operating Rate	Blue Book	29.05	/HR
Front-End Loader 5 CY (966G) Rental Rate	Blue Book	7,095.00	/Month
12 CY Truck	01590 200 5250	19.90	/HR
Excavator, Diesel Hydraulic, 2 CY (325B)	01590 200 0300	33.90	/HR
Hydro seeding, seed, fertilizer, wood mulch	02920 500 1100	0.47	/SY
State Nursery		1.00	/Plant
Shrubs	02930 410 0200	6.05	/Plant
Storm Drainage	02630 100 2240	31.50	/FT
Water Line	02220 875 3200	4.96	/FT
Sewer Line	02220 875 3200	9.88	/FT
Backhoe-Loader	01590 200 0460	9.20	/HR
12-18 CY Truck Operating Rate	Blue Book	25.05	/HR
12-18 CY Truck Rental Rate	Blue Book	3,580.00	
Silt Fence	02370 550 1100	0.93	/LF
Chicken Wire	02820 500 0010	6.56	/LF
Crew B 13	Means Crew B 13	374.41	/HR
6000 gal to 8000 gal tank	02115 200 0310	225.00	/EA
Mixed Material Building, Large	02220 100 0100	0.26	/CF
Pipe Removal 12 Inch	02220 875 2900	6.50	/LF
Excavating 2-1/2 CY hydraulic backhoe	02315 900 0620	2.58	/CY
ECDC	ECDC	35.00	/TON
Seal Portals	AML1	5,200.00	/EA
Fencing, barbed wire, 3 strand	0200 875 0600	1.36	/LF

Note:

Resources used were:

R. S. Means Building Construction Cost Data 60th Edition

Concrete Breakage

Concrete Demolition 13.56 per cu. yd.

Powerline

1/3 the cost of a new line \$1,550 plus \$705 for labor and equipment divided by 5,280 feet. Personal communication with Means 0.23 /FT

Powerpoles

1/3 the cost of a new pole \$226 plus \$51 for labor and equipment Personal communication with Means. 126 /Pole

Concrete - Genva Rock R03310-060 69 /CY

Ref.	Description	Cost
1	Mine Belt BC-1	18,333
2	Transfer Building	34,105
3	Feed Belt BC-2	12,941
4	Stack Tube (2)	4,436
5	Head House #1	6,233
6	Transfer Belt BC-3	8,254
7	Head House #2	1,567
8	Reclaim Tunnel	39,378
9	Reclaim Belt BC-4	11,599
10	60" Escape Tunnel	909
11	Crusher Building	30,113
12	Truck Loadout Belt BC-5	9,569
13	Truck Loadout and Scale	25,024
14	Bathhouse	126,051
15	Substation	1,920
16	Power Lines and Poles	2,884
17	Retaining Wall	844
18	Gabion Wall	55,822
19	Pump House	3,074
20	Paved Roads	53,439
21	Stream Culverts	45,702
22	Water Tank (2)	3,430
23	Rock Dust Bin	1,117
24	Fueling Station	1,610
25	Holding Tank (Sewer)	315
26	Ventilation Fan	2,146
27	Magnet	578
28	Water System	65,266
29	Sewage System	21,873
30	Containers	9,160
31	Gilson Well	1,768
32	Shop Building	5,032
33	Switch Houses	1,128
34	Sampling System	1,472
35	Storage Building	1,950
36	Stoker Storage Bin	990
37	Substation No 2	2,849
38	Seal Portals	26,000
	Total	638,882

Ref.	Description	Cost
39	Cut and Fill Mine Site	311,921
40	Topsoil Placement	143,686
41	Stream Channel	108,250
42	Gabion Baskets	447
43	Refuse Site	64,042
44	MW-06	19,357
45	MW-08	24,793
		<hr/>
	Total	672,496

Demolition

Ref	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swail Factor	Quantity	Unit	Cost		
1	Wire Mesh EC-1																					
	Structure Demolition Cost																					
	Structure Vol. Demolished	Steel Building	02220 100 0012	0.24 /CF							62800					CF		62800	CF	16,072		
	Bubble Weight (exclude steel)																0.35	814	CY			
	Truck Capacity																					
	Weight																					
	Transportation Cost Non-Steel Truck																					
	Transportation Cost Non-Steel Drive																					
	Dispose Cost Non-Steel																					
	Steel Weight																					
	Truck Capacity																					
	Weight																					
	Transportation Cost Steel Truck	18 Ton Truck	01560 200 5300	517.66 /Day							62					Ton		3.3	Days	1,708		
	Transportation Cost Steel Drive	Truck Driver		38.10 /HR															26	Hrs.	991	
	Dispose Cost Steel																					
	Equipment Dispose Cost																					
	Structure Cost																					
	Structure Vol. Demolished																					
	Leasing Costs																					
	Transport Costs																					
	Dispose Costs																					
	Concrete Demolition	Concrete Demolition		13.66 /CY							20					CY		20	CY	271		
	Demolition Cost																					
	Concrete Vol. Demolished																	1.3	26	CY		
	Leasing Cost	Front-End Loader 6 CY (6000)	02315 400 1650	1.30 /CY																26	CY	34
	Transportation Cost	12 CY Truck, 1/2 mile Round Trip	02320 200 0320	3.08 /CY																26	CY	80
	Dispose Cost	On Site Dispose	02220 375 6550	6.80 /CY																26	CY	177
	Insulation																					
	Insulation Removal																					
	Concrete																					
	Vol. To Be Demolished																					
	Leasing Cost																					
	Transportation Cost																					
	Dispose Costs																					
	Concrete Demolition																					
	Demolition Cost																					
	Concrete Vol. Demolished																					
	Leasing Cost																					
	Transportation Cost																					
	Dispose Cost																					

Demolition

Ref	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost		
2	Transfer Building																					
	Structure Demolition Cost																					
	Structure Vol. Demolished	Steel Building	02220 100 0012	0.24	/CF						104618					CF		104618	CF	25,108		
	Bubble Weight (exclude steel)																0.35	1358	CY			
	Truck Capacity																					
	Wedges																					
	Transportation Cost Non-Steel Truck																					
	Transportation Cost Non-Steel Drive																					
	Disposal Cost Non-Steel																					
	Steel Weight																					
	Truck Capacity																					
	Wedges																					
	Transportation Cost Steel Truck	18 Ton Truck	01980 200 6300	517.68	/Day						60					Ton		3.1	Days	1,805		
	Transportation Cost Steel Drive	Truck Driver		36.10	/HR														25	Hrs.	963	
	Disposal Cost Steel																					
	Equipment Disposal Cost																					
	Demeriting Cost																					
	Equipment Vol. Demolished																					
	Loading Costs																					
	Transport Costs																					
	Disposal Costs																					
	Concrete Demolition	Concrete Demolition		13.68	/CY						228					CY		229	CY	3,106		
	Demolition Cost																					
	Concrete Vol. Demolished																	1.3	298	CY		
	Loading Cost	Front-End Loader 6 CY (999G)	02318 400 1650	1.30	/CY															298	CY	387
	Transportation Cost	12 CY Truck, 1/2 mile Round Trip	02320 200 0320	3.09	/CY															298	CY	921
	Disposal Cost	On Site Disposal	02220 178 6650	6.80	/CY															298	CY	2,028
	Excavation																					
	Excavation Annual																					
	Concrete																					
	Vol. To Be Disposed																					
	Loading Cost																					
	Transportation Cost																					
	Disposal Costs																					
	Concrete Demolition																					
	Demolition Cost																					
	Concrete Vol. Demolished																					
	Loading Cost																					
	Transportation Cost																					
	Disposal Cost																					

Demolition

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		
3	Feed Bolt EC-3																					
	Structure Demolition Cost																					
	Structure Vol. Demolished	Steel Building	02220 100 0012	0.24	KCF						47436					CF		47436	CF	11,386		
	Subblet Weight (exclude steel)																	0.35	816	CY		
	Truck Capacity																					
	Haulage																					
	Transportation Cost Non-Steel Truck																					
	Transportation Cost Non-Steel Drive																					
	Dispose Cost Non-Steel																					
	Steel Weight																					
	Truck Capacity																					
	Haulage																					
	Transportation Cost Steel Truck	18 Ton Truck	01680 200 6300	\$17.66	/Day						30					Ton			1.9	Days	664	
	Transportation Cost Steel Drive	Truck Driver		\$8.10	/HR															18	Hrs	672
	Dispose Cost Steel																					
	Equipment Dispose Cost																					
	Chemicals Cost																					
	Equipment Vol. Demolished																					
	Leasing Costs																					
	Transport Costs																					
	Dispose Costs																					
	Concrete Demolition																					
	Demolition Cost																					
	Concrete Vol. Demolished																					
	Leasing Cost																					
	Transportation Cost																					
	Dispose Cost																					
	Excavation																					
	Excavation Bitwall																					
	Excavate																					
	Vol. To Be Disposed																					
	Leasing Cost																					
	Transportation Cost																					
	Dispose Costs																					
	Concrete Demolition																					
	Demolition Cost																					
	Concrete Vol. Demolished																					
	Leasing Cost																					
	Transportation Cost																					
	Dispose Cost																					

Demolition

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		
4	Black Tube (2)																					
	Structure Demolition Cost																					
	Structure Vol. Demolished																					
	Subtotal Weight (exclude steel)																					
	Truck Capacity																					
	Headspace																					
	Transportation Cost Non-Steel Truck																					
	Transportation Cost Non-Steel Drive																					
	Disposed Cost Non-Steel																					
	Steel Weight																					
	Truck Capacity																					
	Headspace																					
	Transportation Cost Steel Truck																					
	Transportation Cost Steel Drive																					
	Disposed Cost Steel																					
	Equipment Disposal Cost																					
	Demurrage Cost																					
	Equipment Vol. Demolished																					
	Leading Costs																					
	Transport Costs																					
	Dispose Costs																					
	Concrete Demolition	Concrete Demolition		13.66 /CY							158					CY		158	CY	2,142		
	Demolition Cost																	1.3	206	CY		
	Concrete Vol. Demolished																					
	Leading Cost	Front-End Loader @ CY (6590)	02215 400 1880	1.30 /CY																206	CY	267
	Transportation Cost	12 CY Truck 1/2 mile Round Trip	02220 200 0320	3.09 /CY																206	CY	633
	Dispose Cost	On Site Dispose	02220 378 6550	6.60 /CY																206	CY	1,364
	Separation																					
	Separation Struck																					
	Separate																					
	Vol. To Be Disposed																					
	Leading Cost																					
	Transportation Cost																					
	Dispose Costs																					
	Concrete Demolition																					
	Demolition Cost																					
	Concrete Vol. Demolished																					
	Leading Cost																					
	Transportation Cost																					
	Dispose Cost																					

Demolition

Ref	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost	
	Steel House #1																				
	Structure Demolition Cost																				
	Structure Vol. Demolished	Steel Building	02220 100 0012	0.24 /CF							23878					CF		23878	CF	5,731	
	Subbase Weight (exclude steel)																0.35	310	CY		
	Truck Capacity																				
	Waste																				
	Transportation Cost Non-Steel Truck																				
	Transportation Cost Non-Steel Drive																				
	Disposal Cost Non-Steel																				
	Steel Weight																				
	Truck Capacity																				
	Waste																				
	Transportation Cost Steel Truck	18 Ton Truck	01660 200 6300	\$17.66 /Day							10					Ton		0.6	Days	311	
	Transportation Cost Steel Drive	Truck Driver		38.10 /HR														5	Hrs.	181	
	Disposal Cost Steel																				
	Equipment Disposal Cost																				
	Demolition Cost																				
	Equipment Vol. Demolished																				
	Leading Costs																				
	Transport Costs																				
	Disposal Costs																				
	Concrete Demolition																				
	Demolition Cost																				
	Concrete Vol. Demolished																				
	Leading Cost																				
	Transportation Cost																				
	Disposal Cost																				
	Excavation																				
	Excavation Bitwall																				
	Concrete																				
	Vol. To Be Processed																				
	Leading Cost																				
	Transportation Cost																				
	Disposal Costs																				
	Concrete Demolition																				
	Demolition Cost																				
	Concrete Vol. Demolished																				
	Leading Cost																				
	Transportation Cost																				
	Disposal Cost																				

Demolition

Ref	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost	
6	Transfer Bolt EC-3																				
	Structure Demolition Cost																				
	Structure Vol. Demolished	Steel Building	02220 100.0012	0.24 /CF							30000					CF		30000	CF	7,200	
	Bubble Weight (exclude steel)																0.35	289	CY		
	Truck Capacity																				
	Haulage																				
	Transportation Cost Non-Steel Truck																				
	Transportation Cost Non-Steel Drive																				
	Disposal Cost Non-Steel																				
	Steel Weight																				
	Truck Capacity																				
	Haulage																				
	Transportation Cost Steel Truck	18 Ton Truck	01560 200.5500	\$17.65 /Cvy							20					Ton		1.3	Days	673	
	Transportation Cost Steel Drive	Truck Driver		\$8.10 /HR														10	Hrs	\$81	
	Disposal Cost Steel																				
	Employment Disposal Cost																				
	Demolition Cost																				
	Employment Vol. Demolished																				
	Leasing Costs																				
	Transport Costs																				
	Disposal Costs																				
	Concrete Demolition																				
	Demolition Cost																				
	Concrete Vol. Demolished																				
	Leasing Cost																				
	Transportation Cost																				
	Disposal Cost																				
	Excavation																				
	Excavation Barrel																				
	Excavate																				
	Vol. To Be Disposed																				
	Leasing Cost																				
	Transportation Cost																				
	Disposal Costs																				
	Concrete Demolition																				
	Demolition Cost																				
	Concrete Vol. Demolished																				
	Leasing Cost																				
	Transportation Cost																				
	Disposal Cost																				

Demolition

Ref	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost	
7	Steel House #2																				
	Structure Demolition Cost																				
	Structure Vol. Demolished	Steel Building	02220 100 0012	0.24	/CF						4436					CF		4436	CF	1,066	
	Substr. Weight (exclude steel)																0.35	56	CY		
	Truck Capacity																				
	Haulage																				
	Transportation Cost Non-Steel Truck																				
	Transportation Cost Non-Steel Drive																				
	Disposal Cost Non-Steel																				
	Steel Weight																				
	Truck Capacity																				
	Haulage																				
	Transportation Cost Steel Truck	18 Ton Truck	01560 200 6300	517.66	/Dev						10					Ton		0.6	Days	311	
	Transportation Cost Steel Drive	Truck Driver		36.10	/HR														5	Hrs.	191
	Disposal Cost Steel																				
	Equipment Disposal Cost																				
	Demolition Cost																				
	Equipment Vol. Demolished																				
	Leading Costs																				
	Transport Costs																				
	Disposal Costs																				
	Concrete Demolition																				
	Demolition Cost																				
	Concrete Vol. Demolished																				
	Leading Cost																				
	Transportation Cost																				
	Disposal Cost																				
	Excavation																				
	Excavation Minrel																				
	Excavate																				
	Vol. To Be Disposed																				
	Leading Cost																				
	Transportation Cost																				
	Disposal Costs																				
	Concrete Demolition																				
	Demolition Cost																				
	Concrete Vol. Demolished																				
	Leading Cost																				
	Transportation Cost																				
	Disposal Cost																				

Demolition

Ref	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swall Factor	Quantity	Unit	Cost	
0	Acclaim Tunnel																				
	Structure Demolition Cost																				
	Structure Vol. Demolished	Steel Building	02220 100 0012	0.24 /CF							18774					CF		18774	CF	4,508	
	Bubble Weight (exclude steel)																0.35	243	CY		
	Truck Capacity																				
	Haulage																				
	Transportation Cost Non-Steel Truck																				
	Transportation Cost Non-Steel Drive																				
	Dispose Cost Non-Steel																				
	Steel Weight																				
	Truck Capacity																				
	Haulage																				
	Transportation Cost Steel Truck	18 Ton Truck	01550 200 5300	\$17.88 /Day							32					Ton		2	Days	1,035	
	Transportation Cost Steel Drive	Truck Driver		38.10 /HR														18	Hrs.	610	
	Dispose Cost Steel																				
	Equipment Disposal Cost																				
	Dismantling Cost																				
	Equipment Vol. Demolished																				
	Leasing Costs																				
	Transport Costs																				
	Dispose Costs																				
	Concrete Demolition	Concrete Demolition		13.66 /CY							1182					CY		1182	CY	16,028	
	Demolition Cost																				
	Concrete Vol. Demolished																				
	Leasing Cost	Front-End Loader 6 CY (885G)	02315 400 1680	1.30 /CY																	
	Transportation Cost	12 CY Truck, 1/2 mile Round Trip	02320 200 0320	3.09 /CY																	
	Dispose Cost	On Site Disposal	02220 376 5580	6.60 /CY																	
	Excavation																				
	Excavation Manual																				
	Excavate																				
	Vol. To Be Disposed																				
	Leasing Cost																				
	Transportation Cost																				
	Dispose Costs																				
	Concrete Demolition																				
	Demolition Cost																				
	Concrete Vol. Demolished																				
	Leasing Cost																				
	Transportation Cost																				
	Dispose Cost																				

Demolition

Ref	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost		
0	Reclaim Ball BC-4																					
	Structure Demolition Cost																					
	Structure Vol. Demolished	Steel Building	02220 100 0012	0.24 /CF							35180					CF		35180	CF	8,443		
	Subtotal Weight (exclude steel)																0.35	468	CY			
	Truck Capacity																					
	Hourly																					
	Transportation Cost Non-Steel Truck																					
	Transportation Cost Non-Steel Drive																					
	Disposal Cost Non-Steel																					
	Steel Weight																					
	Truck Capacity																					
	Hourly																					
	Transportation Cost Steel Truck	18 Ton Truck	01890 200 6300	\$17.69 /Day							40					Ton		2.8	Days	1,294		
	Transportation Cost Steel Drive	Truck Driver		38.10 /HR															20	Hrs	782	
	Disposal Cost Steel																					
	Equipment Disposal Cost																					
	Demolition Cost																					
	Equipment Vol. Demolished																					
	Leading Costs																					
	Transport Costs																					
	Disposal Costs																					
	Concrete Demolition	Concrete Demolition		13.68 /CY							30					CY		39	CY	520		
	Demolition Cost																					
	Concrete Vol. Demolished																					
	Leading Cost	Front-End Loader & CY (6580)	02215 400 1850	1.30 /CY																51	CY	66
	Transportation Cost	12 CY Truck 1/2 mile Round Trip	02320 200 0320	3.09 /CY																51	CY	156
	Disposal Cost	On Site Disposal	02220 375 6550	6.60 /CY																51	CY	337
	Expansive																					
	Expansive Material																					
	Expansive																					
	Vol. To Be Disposed																					
	Leading Cost																					
	Transportation Cost																					
	Disposal Costs																					
	Concrete Demolition																					
	Demolition Cost																					
	Concrete Vol. Demolished																					
	Leading Cost																					
	Transportation Cost																					
	Disposal Cost																					

Demolition

Ref	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost	
10.60	Escape Tunnel																				
	Structure Demolition Cost																				
	Structure Vol. Demolished	Steel Building	02220 100 0012	0.24 /CF							2827					CF		2827	CF	676	
	Bubble Weight (exclude steel)																0.35	37	CY		
	Truck Capacity																				
	Heads																				
	Transportation Cost Non-Steel Truck																				
	Transportation Cost Non-Steel Drive																				
	Disposal Cost Non-Steel																				
	Steel Weight																				
	Truck Capacity																				
	Heads																				
	Transportation Cost Steel Truck	16 Ton Truck	01690 200 6300	617.66 /Day							4					Ton		0.3	Days	155	
	Transportation Cost Steel Drive	Truck Driver		36.10 /HR														2	Hrs.	76	
	Disposal Cost Steel																				
	Equipment Disposal Cost																				
	Demolition Cost																				
	Equipment Vol. Demolished																				
	Leading Cost																				
	Transport Cost																				
	Disposal Cost																				
	Concrete Demolition																				
	Demolition Cost																				
	Concrete Vol. Demolished																				
	Leading Cost																				
	Transportation Cost																				
	Disposal Cost																				
	Excavation																				
	Excavation Bitwall																				
	Excavate																				
	Vol. To Be Disposed																				
	Leading Cost																				
	Transportation Cost																				
	Disposal Cost																				
	Concrete Demolition																				
	Demolition Cost																				
	Concrete Vol. Demolished																				
	Leading Cost																				
	Transportation Cost																				
	Disposal Cost																				

Demolition

Ref	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost	
11	Crusher Building																				
	Structure Demolition Cost																				
	Structure Vol. Demolished	Steel Building	02220 100 0012	0.24 /CF							93305					CF		93305	CF	22,393	
	Substrate Weight (exclude steel)																				
	Truck Capacity																				
	Height																				
	Transportation Cost Non-Steel Truck																				
	Transportation Cost Non-Steel Drive																				
	Dispose Cost Non-Steel																				
	Steel Weight																				
	Truck Capacity																				
	Height																				
	Transportation Cost Steel Truck	16 Ton Truck	01690 200 6300	617.66 /Day							100					Ton		6.3	Days	3,261	
	Transportation Cost Steel Drive	Truck Driver		38.10 /HR														60	Hrs.	1,805	
	Dispose Cost Steel																				
	Equipment Dispose Cost																				
	Demolition Cost																				
	Equipment Vol. Demolished																				
	Leading Costs																				
	Transport Costs																				
	Dispose Costs																				
	Concrete Demolition	Concrete Demolition		13.66 /CY							91					CY		91	CY	1,234	
	Demolition Cost																	1.3			
	Concrete Vol. Demolished																				
	Leading Cost	Front-End Loader 6 CY (8990)	02316 400 1850	1.30 /CY																118	CY
	Transportation Cost	12 CY Truck, 1/2 mile Round Trip	02320 200 0320	3.09 /CY																118	CY
	Dispose Cost	On Site Dispose	02220 375 5550	6.60 /CY																118	CY
	Excavation																				
	Excavation Bitwall																				
	Concrete																				
	Vol. To Be Disposed																				
	Leading Cost																				
	Transportation Cost																				
	Dispose Costs																				
	Concrete Demolition																				
	Demolition Cost																				
	Concrete Vol. Demolished																				
	Leading Cost																				
	Transportation Cost																				
	Dispose Cost																				

Demolition

Ref	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost		
12	Truck Loadout Bolt BC-5																					
	Structure Demolition Cost																					
	Structure Vol. Demolished	Steel Building	02220 100 0012	0.24	/CF						30699					CF		30699	CF	7,416		
	Subble Weight (exclude steel)																0.35	401	CY			
	Truck Capacity																					
	Heads																					
	Transportation Cost Non-Steel Truck																					
	Transportation Cost Non-Steel Drive																					
	Disposal Cost Non-Steel																					
	Steel Weight																					
	Truck Capacity																					
	Heads																					
	Transportation Cost Steel Truck	16 Ton Truck	01690 200 6300	\$17.66	/Day						20					Ton		1.3	Days	673		
	Transportation Cost Steel Drive	Truck Driver		39.10	/HR														10	Hrs.	381	
	Disposal Cost Steel																					
	Equipment Disposal Cost																					
	Demolition Cost																					
	Equipment Vol. Demolished																					
	Leading Costs																					
	Transport Costs																					
	Disposal Costs																					
	Concrete Demolition	Concrete Demolition		13.66	/CY						39					CY		39	CY	529		
	Demolition Cost																					
	Concrete Vol. Demolished																					
	Leading Cost	Front-End Loader 8 CY (8990)	02316 400 1850	1.30	/CY															61	CY	80
	Transportation Cost	12 CY Truck, 1/2 mile Round Trip	02320 200 0320	3.09	/CY															61	CY	186
	Disposal Cost	On Site Disposal	02220 375 6560	6.80	/CY															61	CY	347
	Excavation																					
	Excavation Manual																					
	Excavate																					
	Vol. To Be Disposed																					
	Leading Cost																					
	Transportation Cost																					
	Disposal Costs																					
	Concrete Demolition																					
	Demolition Cost																					
	Concrete Vol. Demolished																					
	Leading Cost																					
	Transportation Cost																					
	Disposal Cost																					

Demolition

Ref	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost	
13	Truck Loadout and Route																				
	Structure Demolition Cost																				
	Structure Vol. Demolished	Steel Bulbline	02220 100 0012	0.24	/CF						74978					CF		74978	CF	17,994	
	Bulbline Weight (exclude steel)																0.35	972	CY		
	Truck Capacity																				
	Haulage																				
	Transportation Cost Non-Steel Truck																				
	Transportation Cost Non-Steel Drive																				
	Dispose Cost Non-Steel																				
	Steel Weight																				
	Truck Capacity																				
	Haulage																				
	Transportation Cost Steel Truck	18 Ton Truck	01690 200 6300	\$17.68	/Day						50					Ton		3.1	Days	1,605	
	Transportation Cost Steel Drive	Truck Driver		38.10	/HR														25	Hrs.	953
	Dispose Cost Steel																				
	Endowment Dispose Cost																				
	Endowment Cost																				
	Endowment Vol. Demolished																				
	Leading Costs																				
	Transport Costs																				
	Dispose Costs																				
	Concrete Demolition	Concrete Demolition		13.66	/CY						189					CY		189	CY	2,188	
	Demolition Cost																1.3	207	CY		
	Concrete Vol. Demolished																				
	Leading Cost	Front-End Loader 5 CY (9860)	02315 400 1850	1.30	/CY														207	CY	269
	Transportation Cost	12 CY Truck - 1/2 mile Round Trip	02220 200 0320	3.08	/CY														207	CY	640
	Dispose Cost	On Site Disposal	02220 376 6580	6.60	/CY														207	CY	1,408
	Excavation																				
	Excavation Bitwall																				
	Excavate																				
	Vol. To Be Disposed																				
	Leading Cost																				
	Transportation Cost																				
	Dispose Costs																				
	Concrete Demolition																				
	Demolition Cost																				
	Concrete Vol. Demolished																				
	Leading Cost																				
	Transportation Cost																				
	Dispose Cost																				

Demolition

Ref	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost		
14	Shed/Structure																					
	Structure Demolition Cost																					
	Structure Vol. Demolished	Steel Building	02220 100 0012	0.24	/CF						416365					CF		416365	CF	99,928		
	Substrate Weight (exclude steel)																	0.2	3084	CY		
	Truck Capacity																					
	Wastage																					
	Transportation Cost Non-Steel Truck	City Service	City Service Price	4.00	/CY														3084	CY	12,336	
	Transportation Cost Non-Steel Drive																					
	Disposal Cost Non-Steel																					
	Steel Weight																					
	Truck Capacity																					
	Wastage																					
	Transportation Cost Steel Truck	18 Ton Truck	01880 200 6500	617.88	/Dev						107					Ton		6.7	Drive	3,468		
	Transportation Cost Steel Drive	Truck Driver		38.10	/HR														64	Hrs.	2,057	
	Disposal Cost Steel																					
	Equipment Disposal Cost																					
	Wastage Cost																					
	Equipment Vol. Demolished																					
	Leading Costs																					
	Transport Costs																					
	Disposal Costs																					
	Concrete Demolition	Concrete Demolition		13.88	/CY						294					CY		294	CY	3,987		
	Demolition Cost																	1.3	382	CY		
	Concrete Vol. Demolished																					
	Leading Cost	Front-End Loader 6 CY (886G)	02315 400 1850	1.30	/CY															382	CY	497
	Transportation Cost	12 CY Truck, 1/2 mile Round Trip	02320 200 0520	3.09	/CY															382	CY	1,180
	Disposal Cost	On Site Disposal	02220 375 6550	8.50	/CY															382	CY	2,560
	Excavation																					
	Excavation Material																					
	Excavate																					
	Vol. To Be Disposed																					
	Leading Cost																					
	Transportation Cost																					
	Disposal Costs																					
	Concrete Demolition																					
	Demolition Cost																					
	Concrete Vol. Demolished																					
	Leading Cost																					
	Transportation Cost																					
	Disposal Cost																					

Demolition

Item	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost	
16	Substation																				
	Structure Demolition Cost	Mixed Material Building, Large	02220 100 0100	0.28	/CF						4000					CF		4000	CF	1040	
	Structure Vol. Demolished																0.35	62	CY		
	Subsides Weight (exclude steel)																				
	Truck Capacity																				
	Haulage																				
	Transportation Cost Non-Steel Truck																				
	Transportation Cost Non-Steel Drive																				
	Disposal Cost Non-Steel	City Service	City Service Price	4.00	/CY													62	CY	208	
	Steel Weight																				
	Truck Capacity																				
	Haulage																				
	Transportation Cost Steel Truck																				
	Transportation Cost Steel Drive																				
	Disposal Cost Steel																				
	Equipment Disposal Cost																				
	Demolition Cost																				
	Equipment Vol. Demolished																				
	Leading Costs																				
	Transport Costs																				
	Disposal Costs																				
	Concrete Demolition	Concrete Demolition		13.88	/CY						24					CY		24	CY	325	
	Demolition Cost																				
	Concrete Vol. Demolished																	1.3	31	CY	
	Leading Cost	Front-End Loader 6 CY (0950)	02218 400 1080	1.30	/CY														31	CY	40
	Transportation Cost	12 CY Truck, 1/2 mile Round Trip	02220 200 0320	3.08	/CY														31	CY	98
	Disposal Cost	On Site Disposal	02220 375 6560	6.80	/CY														31	CY	211
	Excavation																				
	Excavation Binwall																				
	Excavate																				
	Vol. To Be Disposed																				
	Leading Cost																				
	Transportation Cost																				
	Disposal Costs																				
	Concrete Demolition																				
	Demolition Cost																				
	Concrete Vol. Demolished																				
	Leading Cost																				
	Transportation Cost																				
	Disposal Cost																				

Demolition

Ref	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost	
16	Power Lines and Poles																				
	Structure Demolition Cost	Wire Removal		0.23	/FT						3773					FT		3773	FT	888	
	Structure Vnl. Demolished																				
	Subbie Weight (exclude steel)																				
	Truck Capacity																				
	Haulage																				
	Transportation Cost Non-Steel Truck																				
	Transportation Cost Non-Steel Drive																				
	Dispose Cost Non-Steel																				
	Steel Weight																				
	Truck Capacity																				
	Haulage																				
	Transportation Cost Steel Truck																				
	Transportation Cost Steel Drive																				
	Dispose Cost Steel																				
	Equipment Dispose Cost																				
	Demolition Cost	Pole Removal		128	/Pole						16					Poles		16	Poles	2,016	
	Equipment Vnl. Demolished																				
	Leads Cost																				
	Transport Costs																				
	Dispose Costs																				
	Concrete Demolition																				
	Demolition Cost																				
	Concrete Vnl. Demolished																				
	Leads Cost																				
	Transportation Cost																				
	Dispose Cost																				
	Excavation																				
	Excavation Bitwall																				
	Excavate																				
	Vnl. To Be Disposed																				
	Leads Cost																				
	Transportation Cost																				
	Dispose Costs																				
	Concrete Demolition																				
	Demolition Cost																				
	Concrete Vnl. Demolished																				
	Leads Cost																				
	Transportation Cost																				
	Dispose Cost																				

Demolition

Ref	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost		
17	Retaining Wall																					
	Structure Demolition Cost																					
	Structure Vol. Demolished																					
	Subblee Weight (exclude steel)																					
	Truck Capacity																					
	Haulage																					
	Transportation Cost Non-Steel Truck																					
	Transportation Cost Non-Steel Drive																					
	Dispose Cost Non-Steel																					
	Steel Weight																					
	Truck Capacity																					
	Haulage																					
	Transportation Cost Steel Truck																					
	Transportation Cost Steel Drive																					
	Dispose Cost Steel																					
	Equipment Dispose Cost																					
	Dismantling Cost																					
	Equipment Vol. Demolished																					
	Leading Costs																					
	Transport Costs																					
	Dispose Costs																					
	Concrete Demolition	Concrete Demolition		13.66	/CY						30					CY		30	CY	407		
	Demolition Cost																	1.3	39	CY		
	Concrete Vol. Demolished																					
	Leading Cost	Front-End Loader 6 CY (889G)	02318 400 1680	1.30	/CY															39	CY	51
	Transportation Cost	12 CY Truck, 1/2 mile Round Trip	02320 200 0320	3.09	/CY															39	CY	121
	Dispose Cost	On Site Dispose	02220 375 8560	6.80	/CY															39	CY	265
	Excavation																					
	Excavation Bimwall																					
	Excavate																					
	Vol. To Be Disposed																					
	Leading Cost																					
	Transportation Cost																					
	Dispose Costs																					
	Concrete Demolition																					
	Demolition Cost																					
	Concrete Vol. Demolished																					
	Leading Cost																					
	Transportation Cost																					
	Dispose Cost																					

Demolition

Ref	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost		
18	Gabion Wall																					
	Structure Volume										880					CY						
	Demolition Time 60 CY/DAY															117	HR					
	Structure Demolition Cost																					
	Structure Vol. Demolished	Crew B 13	Means Crew B 13	374.41	/HR														117	HR	43,606	
	Subbing Weight (exclude steel)													2		TONS/CY			1780	TONS		
	Truck Capacity																					
	Haulage																					
	Transportation Cost Non-Steel Truck																					
	Transportation Cost Non-Steel Drive																					
	Disposal Cost Non-Steel																					
	Steel Weight																					
	Truck Capacity																					
	Haulage																					
	Transportation Cost Steel Truck	18 Ton Truck	01860 200 6300	617.66	/Day															14.6	Days	7,556
	Transportation Cost Steel Drive	Truck Driver		38.10	/HR															117	Hrs.	4,456
	Disposal Cost Steel																					
	Equipment Disposal Cost																					
	Dismantling Cost																					
	Equipment Vol. Demolished																					
	Leasing Costs																					
	Transport Costs																					
	Disposal Costs																					
	Concrete Demolition																					
	Demolition Cost																					
	Concrete Vol. Demolished																					
	Leasing Cost																					
	Transportation Cost																					
	Disposal Cost																					
	Excavation																					
	Excavation Removal																					
	Concrete																					
	Vol. To Be Disposed																					
	Leasing Cost																					
	Transportation Cost																					
	Disposal Costs																					
	Concrete Demolition																					
	Demolition Cost																					
	Concrete Vol. Demolished																					
	Leasing Cost																					
	Transportation Cost																					
	Disposal Cost																					

Demolition

Ref	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost	
19	Frame House																				
	Structure Demolition Cost																				
	Structure Vol. Demolished	Steel Building	02220 100 0012	0.24	/CY						2219					CY		2219	CY	633	
	Substruc Weight (exclude steel)																				
	Truck Capacity																				
	Hauling																				
	Transportation Cost Non-Steel Truck																				
	Transportation Cost Non-Steel Drive																				
	Disposal Cost Non-Steel																				
	Steel Weight																				
	Truck Capacity																				
	Hauling																				
	Transportation Cost Steel Truck	18 Ton Truck	01960 200 8300	817.66	/Day						8					Ton		0.3	Days	158	
	Transportation Cost Steel Drive	Truck Driver		36.10	/HR														2	Hrs.	70
	Disposal Cost Steel																				
	Equipment Disposal Cost																				
	Demolition Cost																				
	Structure Vol. Demolished																				
	Leading Costs																				
	Transport Costs																				
	Disposal Costs																				
	Concrete Demolition	Concrete Demolition		13.96	/CY						62					CY		62	CY	1,112	
	Demolition Cost																				
	Concrete Vol. Demolished																		1.3	107	CY
	Leading Cost	Front-End Loader 8 CY (6000)	02118 400 1660	1.20	/CY																
	Transportation Cost	12 CY Truck 1/2 mile Round Trip	02320 200 0320	3.08	/CY																
	Disposal Cost	On Site Disposal	02220 378 6660	6.80	/CY																
	Structure Vol. Demolished																				
	Leading Costs																				
	Transportation Cost																				
	Disposal Costs																				
	Concrete Demolition																				
	Demolition Cost																				
	Concrete Vol. Demolished																				
	Leading Cost																				
	Transportation Cost																				
	Disposal Cost																				

Demolition

Ref	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
20	Paved Roads																			
	Structure Demolition Cost																			
	Structure Vol. Demolished																			
	Rubble Weight (exclude steel)																			
	Truck Capacity																			
	Haulage																			
	Transportation Cost Non-Steel Truck																			
	Transportation Cost Non-Steel Drive																			
	Dispose Cost Non-Steel																			
	Steel Weight																			
	Truck Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Drive																			
	Dispose Cost Steel																			
	Equipment Dispose Cost																			
	Demolition Cost	Asphalt	02220 375 1750	6.20	SY						8448					SY		8448	SY	52,378
	Equipment Vol. Demolished																			
	Leading Costs																			
	Transport Costs	On Site Dispose	02220 375 1750	6.80	CY						156					CY		156	CY	1,061
	Dispose Costs																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete Vol. Demolished																			
	Leading Cost																			
	Transportation Cost																			
	Dispose Cost																			
	Excavation																			
	Excavation Material																			
	Excavate																			
	Vol. To Be Disposed																			
	Leading Cost																			
	Transportation Cost																			
	Dispose Costs																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete Vol. Demolished																			
	Leading Cost																			
	Transportation Cost																			
	Dispose Cost																			

Demolition

Ref	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost	
Z1	Stream Culverts																				
	Excavate Culvert	Excavator, Diesel Hydraulic, 2 CY (3268)	02316 400 260	1.71	ACY	2360	12	12			12533					CT		12533	CY	21431	
	Backfill Culvert	Backfill Trench, 2-1/4 CY Bucket	02316 900 3080	1.65	ACY	2360	12	12			12533					CT		12533	CY	19426	
	Structure Vol, Demolished																				
	Sublime Weight (exclude steel)																				
	Truck Capacity																				
	Haulage																				
	Transportation Cost Non-Steel Truck																				
	Transportation Cost Non-Steel Drive																				
	Disposed Cost Non-Steel																				
	Steel Weight																				
	Truck Capacity																				
	Haulage																				
	Transportation Cost Steel Truck	18 Ton Truck	01660 200 6300	\$17.66	/Day							94				Ton		6.9	Days	3,064	
	Transportation Cost Steel Drive	Truck Driver		36.10	/HR													47	Hrs	1,791	
	Disposed Cost Steel																				
	Equipment Disposal Cost																				
	Dismantling Cost																				
	Equipment Vol, Demolished																				
	Loading Costs																				
	Transport Costs																				
	Disposal Costs																				
	Concrete Demolition																				
	Demolition Cost																				
	Concrete Vol, Demolished																				
	Loading Cost																				
	Transportation Cost																				
	Disposal Cost																				
	Excavation																				
	Excavation Shovel																				
	Excavate																				
	Vol. To Be Disposed																				
	Loading Cost																				
	Transportation Cost																				
	Disposal Costs																				
	Concrete Demolition																				
	Demolition Cost																				
	Concrete Vol, Demolished																				
	Loading Cost																				
	Transportation Cost																				
	Disposal Cost																				

Demolition

Ref	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost	
22	Water Tank (2)																				
	Structure Demolition Cost																				
	Structure Vol. Demolished	Steel Building	02220 100 0012	0.24 /CF							241					CF		241 CF		58	
	Bubble Weight (exclude steel)																0.35	3 CY			
	Truck Capacity																				
	Headline																				
	Transportation Cost Non-Steel Truck																				
	Transportation Cost Non-Steel Drive																				
	Disposal Cost Non-Steel																				
	Steel Weight																				
	Truck Capacity																				
	Headline																				
	Transportation Cost Steel Truck	18 Ton Truck	01890 200 8300	\$17.98 /Day							39					Ton		2.4 Days		1,242	
	Transportation Cost Steel Drive	Truck Driver		38.10 /HR														19 Hrs.		724	
	Disposal Cost Steel																				
	Equipment Disposal Cost																				
	Demeritina Cost																				
	Equipment Vol. Demolished																				
	Leadsin Costs																				
	Transport Costs																				
	Disposal Costs																				
	Concrete Demolition	Concrete Demolition		13.86 /CY							60					CY		60 CY		678	
	Demolition Cost																	1.3	65 CY		
	Concrete Vol. Demolished																				
	Leadsin Cost	Front-End Loader & CY (6046)	02318 400 1880	1.30 /CY																65 CY	85
	Transportation Cost	12 CY Truck, 1/2 mile Round Trip	02320 200 0320	3.08 /CY																65 CY	201
	Disposal Cost	On Site Disposal	02220 375 6550	6.80 /CY																65 CY	442
	Excavation																				
	Excavation Removal																				
	Extricate																				
	Vol. To Be Disposed																				
	Leadsin Cost																				
	Transportation Cost																				
	Disposal Costs																				
	Concrete Demolition																				
	Demolition Cost																				
	Concrete Vol. Demolished																				
	Leadsin Cost																				
	Transportation Cost																				
	Disposal Cost																				

Demolition

Ref	Description	Materials	Mearns Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost	
23	Rock Dust Bin																				
	Structure Demolition Cost																				
	Structure Vol. Demolished	Steel Building	02220 100 0012	0.24 /CF							2205					CF		2205	CF	544	
	Subbase Weight (exclude steel)																				
	Truck Capacity																				
	Haulage																				
	Transportation Cost Non-Steel Truck																				
	Transportation Cost Non-Steel Drive																				
	Disposal Cost Non-Steel																				
	Steel Weight																				
	Truck Capacity																				
	Haulage																				
	Transportation Cost Steel Truck	16 Ton Truck	01590 200 5300	517.66 /Day							6					Ton		0.3	Days	165	
	Transportation Cost Steel Drive	Truck Driver		38.10 /HR														2.0	Hrs.	76	
	Disposal Cost Steel																				
	Equipment Disposal Cost																				
	Dismantling Cost																				
	Equipment Vol. Demolished																				
	Leading Costs																				
	Transportation Costs																				
	Disposal Costs																				
	Concrete Demolition	Concrete Demolition		13.88 /CY							12					CY		12	CY	163	
	Demolition Cost																	1.3		18	CY
	Concrete Vol. Demolished																				
	Leading Cost	Front-End Loader & CY (600G)	02316 400 1960	1.30 /CY																18	CY
	Transportation Cost	12 CY Truck, 1/2 mile Round Trip	02320 200 0320	3.09 /CY																18	CY
	Disposal Cost	On Site Disposal	02220 376 6550	6.80 /CY																18	CY
																					106
	Excavation																				
	Excavation Strwell																				
	Excavate																				
	Vol. To Be Disposed																				
	Leading Cost																				
	Transportation Cost																				
	Disposal Costs																				
	Concrete Demolition																				
	Demolition Cost																				
	Concrete Vol. Demolished																				
	Leading Cost																				
	Transportation Cost																				
	Disposal Cost																				

Demolition

Item	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost	
20	Building Station																				
	Structure Demolition Cost																				
	Structure Vol. Demolished	Steel Building	02220 100 0012	0.24 /CF							3945					CF	0.35	3945	CF	947	
	Sublime Weight (exclude steel)																	81	CY		
	Truck Capacity																				
	Weights																				
	Transportation Cost Non-Steel Truck																				
	Transportation Cost Non-Steel Drive																				
	Disposal Cost Non-Steel																				
	Steel Weight																				
	Truck Capacity																				
	Weights																				
	Transportation Cost Steel Truck	18 Ton Truck	01590 200 5300	\$17.88 /Day							7					Ton		0.4	Days	207	
	Transportation Cost Steel Drive	Truck Driver		36.10 /HR														3	Hrs.	114	
	Disposal Cost Steel																				
	Equipment Disposal Cost																				
	Demeriting Cost																				
	Equipment Vol. Demolished																				
	Leasing Costs																				
	Transport Costs																				
	Disposal Costs																				
	Concrete Demolition	Concrete Demolition		13.88 /CY							12					CY		12	CY	163	
	Demolition Cost																				
	Concrete Vol. Demolished																	1.3		16	CY
	Leasing Cost	Front-End Loader 8 CY (8880)	02315 400 1650	1.30 /CY																16	CY
	Transportation Cost	12 CY Truck, 1/2 mile Round Trip	02320 200 0320	3.09 /CY																16	CY
	Disposal Cost	On Site Disposal	02220 375 8550	6.80 /CY																16	CY
	Excavation																				
	Excavation Bitwell																				
	Excavate																				
	Vol. To Be Disposed																				
	Leasing Cost																				
	Transportation Cost																				
	Disposal Costs																				
	Concrete Demolition																				
	Demolition Cost																				
	Concrete Vol. Demolished																				
	Leasing Cost																				
	Transportation Cost																				
	Disposal Cost																				

Demolition

Ref	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost	
28	Holdings Tank (Basew)																				
	Structure Demolition Cost																				
	Structure Vol. Demolished																				
	Building Weight (exclude steel)																				
	Truck Capacity																				
	Hardware																				
	Transportation Cost Non-Steel Truck	6000 gal to 8000 gal tank		225.00 /GAL							1					EA		1	Gal	225	
	Transportation Cost Non-Steel Drive											2				TON		2	TON		
	Disposal Cost Non-Steel																				
	Steel Weight																				
	Truck Capacity																				
	Hardware																				
	Transportation Cost Steel Truck	16 Ton Truck	01840 200 6300	\$17.98 /Day															0.10	Days	62
	Transportation Cost Steel Drive	Truck Driver		38.10 /HR															1	Hrs.	38
	Disposal Cost Steel																				
	Structure Demolition Cost																				
	Structure Vol. Demolished																				
	Building Weight (exclude steel)																				
	Truck Capacity																				
	Hardware																				
	Transportation Cost Steel Truck	16 Ton Truck	01840 200 6300	\$17.98 /Day															0.10	Days	62
	Transportation Cost Steel Drive	Truck Driver		38.10 /HR															1	Hrs.	38
	Disposal Cost Steel																				
	Structure Demolition Cost																				
	Structure Vol. Demolished																				
	Building Weight (exclude steel)																				
	Truck Capacity																				
	Hardware																				
	Transportation Cost Steel Truck	16 Ton Truck	01840 200 6300	\$17.98 /Day															0.10	Days	62
	Transportation Cost Steel Drive	Truck Driver		38.10 /HR															1	Hrs.	38
	Disposal Cost Steel																				
	Structure Demolition Cost																				
	Structure Vol. Demolished																				
	Building Weight (exclude steel)																				
	Truck Capacity																				
	Hardware																				
	Transportation Cost Steel Truck	16 Ton Truck	01840 200 6300	\$17.98 /Day															0.10	Days	62
	Transportation Cost Steel Drive	Truck Driver		38.10 /HR															1	Hrs.	38
	Disposal Cost Steel																				
	Structure Demolition Cost																				
	Structure Vol. Demolished																				
	Building Weight (exclude steel)																				
	Truck Capacity																				
	Hardware																				
	Transportation Cost Steel Truck	16 Ton Truck	01840 200 6300	\$17.98 /Day															0.10	Days	62
	Transportation Cost Steel Drive	Truck Driver		38.10 /HR															1	Hrs.	38
	Disposal Cost Steel																				
	Structure Demolition Cost																				
	Structure Vol. Demolished																				
	Building Weight (exclude steel)																				
	Truck Capacity																				
	Hardware																				
	Transportation Cost Steel Truck	16 Ton Truck	01840 200 6300	\$17.98 /Day															0.10	Days	62
	Transportation Cost Steel Drive	Truck Driver		38.10 /HR															1	Hrs.	38
	Disposal Cost Steel																				

Ref	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swel Factor	Quantity	Unit	Cost	
20	Ventilation Fan																				
	Structure Demolition Cost																				
	Structure Vol. Demolished	Steel Building	02220 100 0012	0.24	/CF						6650					CF		6650	CF	1,644	
	Subtotal Weight (exclude steel)																	89	CY		
	Truck Capacity																				
	Haulage																				
	Transportation Cost Non-Steel Truck																				
	Transportation Cost Non-Steel Drive																				
	Disposal Cost Non-Steel																				
	Steel Weight																				
	Truck Capacity																				
	Haulage																				
	Transportation Cost Steel Truck	16 Ton Truck	01590 200 5300	617.99	/Day						10					Ton		0.6	Days	311	
	Transportation Cost Steel Drive	Truck Driver		38.10	/HR													5	Hrs	191	
	Disposal Cost Steel																				
	Equipment Disposal Cost																				
	Dismantling Cost																				
	Equipment Vol. Demolished																				
	Leasing Costs																				
	Transport Costs																				
	Disposal Costs																				
	Concrete Demolition																				
	Demolition Cost																				
	Concrete Vol. Demolished																				
	Leasing Cost																				
	Transportation Cost																				
	Disposal Cost																				
	Asphalt																				
	Vol. To Be Disposed																				
	Leasing Cost																				
	Transportation Cost																				
	Disposal Costs																				
	Concrete Demolition																				
	Demolition Cost																				
	Concrete Vol. Demolished																				
	Leasing Cost																				
	Transportation Cost																				
	Disposal Cost																				

Demolition

Ref	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost		
27	Mainnet																					
	Structure Demolition Cost																					
	Structure Vol. Demolished	Steel Building	02220 100 0012	0.24 /CF							35					CF		35	CF	8		
	Building Weight (exclude steel)																0.38	0	CY			
	Truck Capacity																					
	Haulage																					
	Transportation Cost Non-Steel Truck																					
	Transportation Cost Non-Steel Drive																					
	Disposal Cost Non-Steel																					
	Steel Weight																					
	Truck Capacity																					
	Haulage																					
	Transportation Cost Steel Truck	18 Ton Truck	01660 200 6300	\$17.88 /Day							2					Ton		0.1	Days	82		
	Transportation Cost Steel Drive	Truck Driver		38.10 /HR															1	Hrs.	38	
	Disposal Cost Steel																					
	Equipment Disposal Cost																					
	Permitting Cost																					
	Equipment Vol. Demolished																					
	Leaving Costs																					
	Transport Costs																					
	Disposal Costs																					
	Concrete Demolition	Concrete Demolition		13.88 /CY							17					CY		17	CY	231		
	Demolition Cost																					
	Concrete Vol. Demolished																	1.3	22	CY		
	Leaving Cost	Front-End Loader 8 CY (885G)	02318 400 1880	1.23 /CY																22	CY	27
	Transportation Cost	12 CY Truck, 1/2 mile Round Trip	02320 200 0320	3.29 /CY																22	CY	72
	Disposal Cost	On Site Disposal	02220 376 6560	6.80 /CY																22	CY	150
	Excavation																					
	Excavation Binwall																					
	Excavate																					
	Vol. To Be Disposed																					
	Leaving Cost																					
	Transportation Cost																					
	Disposal Costs																					
	Concrete Demolition																					
	Demolition Cost																					
	Concrete Vol. Demolished																					
	Leaving Cost																					
	Transportation Cost																					
	Disposal Cost																					

Demolition

Ref	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost	
28	Water System																				
	Excavate Pipe	Excavating 2-1/2 CY Hydraulic backhoe	02316 900 0820	2.58	/CY	8450	2	4			67800					CF		2504	CY	6480	
	Pipe Removal	Pipe Removal 12 inch	02220 875 2800	8.50	L.F	8450										LF		8450	LF	64825	
	Backfill Trench	Backfill trench 2-1/4 CY Bucket	02316 900 3080	1.55	/CY	8450	2	4			67800					CF		2504	CY	3581	
	Structure Demolition Cost																				
	Structure Vol. Demolished																				
	Bulbless Weight (exclude steel)																				
	Truck Capacity																				
	Haulage																				
	Transportation Cost Non-Steel Truck																				
	Transportation Cost Non-Steel Drive																				
	Disposal Cost Non-Steel																				
	Steel Weight																				
	Truck Capacity																				
	Haulage																				
	Transportation Cost Steel Truck																				
	Transportation Cost Steel Drive																				
	Disposal Cost Steel																				
	Equipment Disposal Cost																				
	Dismantling Cost																				
	Equipment Vol. Demolished																				
	Leading Costs																				
	Transport Costs																				
	Disposal Costs																				
	Concrete Demolition																				
	Demolition Cost																				
	Concrete Vol. Demolished																				
	Leading Cost																				
	Transportation Cost																				
	Disposal Cost																				
	Excavation																				
	Excavation Bitwall																				
	Excavate																				
	Vol. To Be Disposed																				
	Leading Cost																				
	Transportation Cost																				
	Disposal Costs																				
	Concrete Demolition																				
	Demolition Cost																				
	Concrete Vol. Demolished																				
	Leading Cost																				
	Transportation Cost																				
	Disposal Cost																				

Ref	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
29	Excavate System																			
	Excavate Pipe	Excavating 2-1/2 CY Hydraulic backhoe	02315 800 0820	2.68	ACY	2832	2	4			22056					CF		539	CY	2186
	Pipe Removal	Pipe Removal 12 inch	02220 876 2900	8.50	LF	2832												2632	LF	18406
	Backfill Trench	Backfill trench, 2-1/4 CY Bucket	02315 900 3090	1.66	ACY	2832	2	4			22056					CF		539	CY	1300
	Structure Demolition Cost																			
	Structure Vol. Demolished																			
	Sublime Weight (exclude steel)																			
	Truck Capacity																			
	Hourage																			
	Transportation Cost Non-Steel Truck																			
	Transportation Cost Non-Steel Drive																			
	Disposal Cost Non-Steel																			
	Steel Weight																			
	Truck Capacity																			
	Hourage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Drive																			
	Disposal Cost Steel																			
	Equipment Disposal Cost																			
	Dismantling Cost																			
	Equipment Vol. Demolished																			
	Leading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete Vol. Demolished																			
	Leading Cost																			
	Transportation Cost																			
	Disposal Cost																			
	Excavation																			
	Excavation Shovel																			
	Excavate																			
	Vol. To Be Disposed																			
	Leading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete Vol. Demolished																			
	Leading Cost																			
	Transportation Cost																			
	Disposal Cost																			

Ref	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost	
30	Containers																				
	Structure Demolition Cost																				
	Structure Vol. Demolished	Mixed Material Building, Large	02220 100 0100	0.28 /CF		40	10	10			4000					8 CF		32000 CF		8,320	
	Subbase Weight (exclude steel)																0.35		CF		
	Truck Capacity																				
	Material																				
	Transportation Cost Non-Steel Truck																				
	Transportation Cost Non-Steel Drive																				
	Disposal Cost Non-Steel	EGDC	EGDC	35.00 /TON							24					TON		24 TON		840	
	Steel Weight																				
	Truck Capacity																				
	Material																				
	Transportation Cost Steel Truck																				
	Transportation Cost Steel Drive																				
	Disposal Cost Steel																				
	Embayment Disposal Cost																				
	Demolition Cost																				
	Embayment Vol. Demolished																				
	Leading Costs																				
	Transport Costs																				
	Disposal Costs																				
	Concrete Demolition																				
	Demolition Cost																				
	Concrete Vol. Demolished																				
	Leading Cost																				
	Transportation Cost																				
	Disposal Cost																				
	Excavation																				
	Excavation General																				
	Excavate																				
	Vol. To Be Disposed																				
	Leading Cost																				
	Transportation Cost																				
	Disposal Costs																				
	Concrete Demolition																				
	Demolition Cost																				
	Concrete Vol. Demolished																				
	Leading Cost																				
	Transportation Cost																				
	Disposal Cost																				

Demolition

Ref	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost	
31	Open Well																				
	Structure Demolition Cost																				
	Structure Vol. Demolished	Steel Building	02220 100 0012	0.24	/CF						800								800 CF	182	
	Bulking Weight (exclude steel)																	0.35	10 CY		
	Truck Capacity																				
	Wastage																				
	Transportation Cost Non-Steel Truck																				
	Transportation Cost Non-Steel Drive																				
	Disposal Cost Non-Steel																				
	Steel Weight																				
	Truck Capacity																				
	Wastage																				
	Transportation Cost Steel Truck	18 Ton Truck	01880 200 6300	617.68	/Day						0.6								0.03 Days	18	
	Transportation Cost Steel Drive	Truck Driver		36.10	/HR														0.2 Hrs.	8	
	Disposal Cost Steel																				
	Equipment Disposal Cost																				
	Operational Cost																				
	Equipment Vol. Demolished																				
	Leading Costs																				
	Transport Costs																				
	Disposal Costs																				
	Concrete Demolition	Concrete Demolition		13.68	/CY						66								66 CY	746	
	Demolition Cost																				
	Concrete Vol. Demolished																	1.3	72 CY		
	Leading Cost	Front-End Loader 6 CY (9993)	02315 400 1650	1.30	/CY															72 CY	94
	Transportation Cost	12 CY Truck, 1/2 mile Round Trip	02320 200 9320	3.09	/CY															72 CY	222
	Disposal Cost	On Site Disposal	02220 375 6650	6.80	/CY															72 CY	490
	Excavation																				
	Excavation Binwall																				
	Excavate																				
	Vol. To Be Disposed																				
	Leading Cost																				
	Transportation Cost																				
	Disposal Costs																				
	Concrete Demolition																				
	Demolition Cost																				
	Concrete Vol. Demolished																				
	Leading Cost																				
	Transportation Cost																				
	Disposal Cost																				

Demolition

Ref	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost	
32	Shear Building																				
	Structure Demolition Cost																				
	Structure Vol. Demolished	Steel Building	02220 100 0012	0.24	CF						14400					CF		14400	CF	3,458	
	Subsidiary Weight (exclude steel)																0.35	187	CY		
	Truck Capacity																				
	Haulage																				
	Transportation Cost Non-Steel Truck																				
	Transportation Cost Non-Steel Drive																				
	Disposal Cost Non-Steel																				
	Steel Weight																				
	Truck Capacity																				
	Haulage																				
	Transportation Cost Steel Truck	18 Ton Truck	01890 200 8300	517.66	/Day						0.6					Ton		0.03	Days	16	
	Transportation Cost Steel Drive	Truck Driver		36.10	/HR													0.2	Hrs.	8	
	Disposal Cost Steel																				
	Equipment Disposal Cost																				
	Demolition Cost																				
	Equipment Vol. Demolished																				
	Leading Costs																				
	Transport Costs																				
	Disposal Costs																				
	Concrete Demolition	Concrete Demolition		13.66	/CY						65					CY		65	CY	748	
	Demolition Cost																				
	Concrete Vol. Demolished																	1.3	72	CY	
	Leading Cost	Front-End Loader 6 CY (596G)	02318 400 1660	1.30	/CY														72	CY	94
	Transportation Cost	12 CY Truck, 1/2 mile Round Trip	02320 200 0320	3.08	/CY														72	CY	222
	Disposal Cost	On Site Disposal	02220 375 5560	6.80	/CY														72	CY	480
	Excavation																				
	Excavation Bitwall																				
	Excavate																				
	Vol. To Be Disposed																				
	Leading Cost																				
	Transportation Cost																				
	Disposal Costs																				
	Concrete Demolition																				
	Demolition Cost																				
	Concrete Vol. Demolished																				
	Leading Cost																				
	Transportation Cost																				
	Disposal Cost																				

Demolition

Ref	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost	
33	Switch Houses																				
	Structure Demolition Cost																				
	Structure Vol. Demolished																				
	Sublime Weight (exclude steel)																				
	Truck Capacity																				
	Haulage																				
	Transportation Cost Non-Steel Truck																				
	Transportation Cost Non-Steel Drive																				
	Disposal Cost Non-Steel																				
	Steel Weight																				
	Truck Capacity																				
	Haulage																				
	Transportation Cost Steel Truck	18 Ton Truck	01860 200 8300	\$17.98/Day							18					Ton		1.00 Days	618		
	Transportation Cost Steel Drive	Truck Driver		\$8.10/HR														8 Hrs.	306		
	Disposal Cost Steel																				
	Equipment Disposal Cost																				
	Demolition Cost																				
	Equipment Vol. Demolished																				
	Leading Costs																				
	Transport Costs																				
	Disposal Costs																				
	Concrete Demolition	Concrete Demolition		13.66	/CY						11					CY		11	CY	149	
	Demolition Cost																				
	Concrete Vol. Demolished																	1.3	14	CY	
	Leading Cost	Front-End Loader 6 CY (8980)	02316 400 1660	1.30	/CY														14	CY	18
	Transportation Cost	12 CY Truck, 1/2 mile Round Trip	02320 200 0320	3.08	/CY														14	CY	43
	Disposal Cost	On Site Disposal	02220 376 6560	6.80	/CY														14	CY	96
	Excavation																				
	Excavation Renewal																				
	Excavate																				
	Vol. To Be Disposed																				
	Leading Cost																				
	Transportation Cost																				
	Disposal Costs																				
	Concrete Demolition																				
	Demolition Cost																				
	Concrete Vol. Demolished																				
	Leading Cost																				
	Transportation Cost																				
	Disposal Cost																				

Demolition

Ref	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost	
34	Structure System																				
	Structure Demolition Cost																				
	Structure Vol. Demolished																				
	Structure Weight (exclude steel)																				
	Truck Capacity																				
	Hardware																				
	Transportation Cost Non-Steel Truck																				
	Transportation Cost Non-Steel Drive																				
	Dispose Cost Non-Steel																				
	Steel Weight																				
	Truck Capacity																				
	Hardware																				
	Transportation Cost Steel Truck	18 Ton Truck	01860 200 5300	517.86 /Day							18					Ton		1.1 Days		669	
	Transportation Cost Steel Drive	Truck Driver		36.10 /HR														9 Hrs.		343	
	Dispose Cost Steel																				
	Equipment Dispose Cost																				
	Equipment Cost																				
	Equipment Vol. Demolished																				
	Leasing Costs																				
	Transport Costs																				
	Dispose Costs																				
	Concrete Demolition	Concrete Demolition		13.86 /CY							19.84					CY		19.84 CY		269	
	Demolition Cost																	1.3		26	269
	Concrete Vol. Demolished																				
	Leasing Cost	Front-End Loader 6 CY (6000)	02316 400 1650	1.30 /CY																26 CY	34
	Transportation Cost	12 CY Truck 1/2 mile Round Trip	02320 200 0320	3.09 /CY																26 CY	60
	Dispose Cost	On Site Dispose	02220 175 8650	6.80 /CY																26 CY	177
	Excavation																				
	Excavation Binwall																				
	Excavate																				
	Vol. To Be Disposed																				
	Leasing Cost																				
	Transportation Cost																				
	Dispose Costs																				
	Concrete Demolition																				
	Demolition Cost																				
	Concrete Vol. Demolished																				
	Leasing Cost																				
	Transportation Cost																				
	Dispose Cost																				

Demolition

Ref	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost	
35	Storage Building																				
	Structure Demolition Cost	Steel Building	02220 100 0012	0.24	/CF						2284					CF		2284	CF	648	
	Structure Vol. Demolished																0.35	30	CY		
	Building Weight (exclude steel)																				
	Truck Capacity																				
	Weight																				
	Transportation Cost Non-Steel Truck																				
	Transportation Cost Non-Steel Drive																				
	Dispose Cost Non-Steel																				
	Steel Weight																				
	Truck Capacity																				
	Weight																				
	Transportation Cost Steel Truck	18 Ton Truck	01590 200 5300	517.66	/Day						8					Ton		0.4	Days	207	
	Transportation Cost Steel Drive	Truck Driver		38.10	/HR														3	Hrs.	114
	Dispose Cost Steel																				
	Equipment Dispose Cost																				
	Demolition Cost																				
	Equipment Vol. Demolished																				
	Leading Costs																				
	Transport Costs																				
	Dispose Costs																				
	Concrete Demolition	Concrete Demolition		13.66	/CY						38.4					CY		38.4	CY	621	
	Demolition Cost																	1.3	50	CY	
	Concrete Vol. Demolished																				
	Leading Cost	Front-End Loader 6 CY (2593)	02315 400 1650	1.30	/CY															65	
	Transportation Cost	12 CY Truck, 1/2 mile Round Trip	02320 200 0320	3.08	/CY															50	CY
	Dispose Cost	On Site Dispose	02220 375 5550	6.80	/CY															50	CY
																					340
	Excavation																				
	Excavation Binwell																				
	Excavate																				
	Vol. To Be Disposed																				
	Leading Cost																				
	Transportation Cost																				
	Dispose Costs																				
	Concrete Demolition																				
	Demolition Cost																				
	Concrete Vol. Demolished																				
	Leading Cost																				
	Transportation Cost																				
	Dispose Costs																				

Demolition

Ref	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost	
30	Stoker Storage Bin																				
	Structure Demolition Cost																				
	Structure Vol. Demolished																				
	Bubbles Weight (exclude steel)																				
	Truck Capacity																				
	Welding																				
	Transportation Cost Non-Steel Truck																				
	Transportation Cost Non-Steel Drive																				
	Disposal Cost Non-Steel																				
	Steel Weight																				
	Truck Capacity																				
	Welding																				
	Transportation Cost Steel Truck																				
	Transportation Cost Steel Drive																				
	Disposal Cost Steel																				
	Equipment Disposal Cost																				
	Demeritina Cost																				
	Equipment Vol. Demolished																				
	Loading Costs																				
	Transport Costs																				
	Disposal Costs																				
	Concrete Demolition	Concrete Demolition		13.68	/CY						35					CY		35	CY	475	
	Demolition Cost																	1.3	46	CY	
	Concrete Vol. Demolished																				
	Loading Cost	Front-End Loader 5 CY (988G)	02315 400 1850	1.30	/CY														46	CY	60
	Transportation Cost	12 CY Truck, 1/2 mile Round Trip	02320 200 0320	3.09	/CY														46	CY	142
	Disposal Cost	On Site Disposal	02220 375 5550	6.80	/CY														46	CY	313
	Excavation																				
	Excavation Binwall																				
	Excavate																				
	Vol. To Be Disposed																				
	Loading Cost																				
	Transportation Cost																				
	Disposal Costs																				
	Concrete Demolition																				
	Demolition Cost																				
	Concrete Vol. Demolished																				
	Loading Cost																				
	Transportation Cost																				
	Disposal Cost																				

Demolition

Ref	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost		
37	Substation No 2																					
	Structure Demolition Cost	Mixed Material Building, Large	02220 100 0100	0.26	/CF						4000					CF		4000	CF	1040		
	Structure Vol. Demolished																	0.35	62	CY		
	Subbing Weight (exclude steel)																					
	Truck Capacity																					
	Heulage																					
	Transportation Cost Non-Steel Truck																					
	Transportation Cost Non-Steel Drive																					
	Disposal Cost Non-Steel	City Service	City Service Price	4.00	/CY														62	CY	208	
	Steel Weight																					
	Truck Capacity																					
	Heulage																					
	Transportation Cost Steel Truck																					
	Transportation Cost Steel Drive																					
	Disposal Cost Steel																					
	Equipment Disposal Cost																					
	Demolition Cost																					
	Equipment Vol. Demolished																					
	Leading Costs																					
	Transport Costs																					
	Disposal Costs																					
	Concrete Demolition	Concrete Demolition		13.66	/CY						67					CY		67	CY	773		
	Demolition Cost																	1.3	74	CY		
	Concrete Vol. Demolished																					
	Leading Cost	Front-End Loader 8 CY (895G)	02316 400 1860	1.30	/CY															74	CY	96
	Transportation Cost	12 CY Truck, 1/2 mile Round Trip	02320 200 0320	3.08	/CY															74	CY	228
	Disposal Cost	On Site Disposal	02220 376 6660	6.80	/CY															74	CY	503
	Excavation																					
	Excavation Binwall																					
	Excavate																					
	Vol. To Be Disposed																					
	Leading Cost																					
	Transportation Cost																					
	Disposal Costs																					
	Concrete Demolition																					
	Demolition Cost																					
	Concrete Vol. Demolished																					
	Leading Cost																					
	Transportation Cost																					
	Disposal Cost																					

Demolition

Ref	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
30	Steel Portals																			
	Structure Demolition Cost	Steel Portals	AM,1	5,200.00	/EA													5	EA	26000
	Structure Vol. Demolished																			
	Bulkhead Weight (exclude steel)																			
	Truck Capacity																			
	Hardware																			
	Transportation Cost Non-Steel Truck																			
	Transportation Cost Non-Steel Drive																			
	Dispose Cost Non-Steel																			
	Steel Weight																			
	Truck Capacity																			
	Hardware																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Drive																			
	Dispose Cost Steel																			
	Equipment Dispose Cost																			
	Demolition Cost																			
	Equipment Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Dispose Costs																			
	Excavation																			
	Excavation Bitwall																			
	Concrete																			
	Vol. To Be Disposed																			
	Loading Cost																			
	Transportation Cost																			
	Dispose Costs																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Dispose Cost																			

Earth Work

39	Equipment Costs	Hourly Operating Costs	Hourly Equipment Cost	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
Cut and Fill Mine Site															
Equipment															
Rough Grading (1)															
D9R U-Blade ROPS	17,590	70.00	0.10	47.15	234.09	1	234.09	\$/Hr	118,169	CY	186	CY/Hr	635.3	Hrs.	148,721
Finishing Grading (2)															
D9R U-Blade ROPS	17,590	70.00	0.10	47.15	234.09	1	234.09	\$/Hr	19,928	CY	186	CY/Hr	107.1	Hrs.	25,078
815 F Compactor (3)															
815 F Compactor (3)	9,064	31.85	0.10	47.15	138.84	1	138.84	\$/Hr	58,490	CY	878	CY/Hr	66.8	Hrs.	9,270
Excavator, Diesel Hydraulic, 3-1/2 CY															
Excavator, Diesel Hydraulic, 3-1/2 CY	15,130	53.15	0.10	47.15	200.18	1	200.18	\$/Hr	10,000	CY	392	CY/Hr	25.5	Hrs.	5,107
Front-End Loader 5 CY (996G)															
Front-End Loader 5 CY (996G)	7,095	29.05	0.10	47.15	123.45	1	123.45	\$/Hr	8,342	CY	204	CY/Hr	40.9	Hrs.	5,048
Support Personnel and Labor															
Laborer				36.50	36.50	1	36.50	\$/Hr					635.3	Hrs.	23,189
5,000 Gallon Water Wagon	5,010	25.70	0.1	38.10	97.88	1	97.88	\$/Hr					635.3	Hrs.	62,058
Pick-up 3/4 Ton 4x4	785	7.40	0.10		13.05	1	13.05	\$/Hr					635.3	Hrs.	8,291
Foreman Outside				39.80	39.80	1	39.80	\$/Hr					635.3	Hrs.	25,159

NOTES:

- (1) Assumes all cut material handled by a dozer with 20% double handling.
- (2) Finish grading production is based on a 150' haul and 70% efficiency.
- (3) Assumes that the top 18" are not compacted to promote establishment of vegetation.
- (4) Channel excavation is accounted for in the stream channel restoration section.

Earth Work

40	Equipment Costs	Hourly Operating Costs	Hourly Equipment Cost	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
Topsoil Placement															
Move Topsoil															
	17,590	70.00	0.1	47.15	234.09	1	234.09	\$/Hr	21,460	CY	186	CY/Hr	115.4	Hrs.	27,008
Pocking Handled in Vegetation Section															
	7,095	29.05	0.1	47.15	123.45	1	123.45	\$/Hr	21,460	CY	204	CY/Hr	105.2	Hrs.	12,988
	3,580	25.05	0.1	38.10	88.03	10	880.30	\$/Hr	21,460	CY	230	CY/Hr	93.3	Hrs.	82,136
Support Personnel and Labor															
				36.50	36.50	1	36.50	\$/Hr					115.4	Hrs.	4,211
	5,010	25.70	0.1	38.10	97.68	1	97.68	\$/Hr					115.4	Hrs.	11,270
	785	7.40	0.10		13.05	1	13.05	\$/Hr					115.4	Hrs.	1,506
				39.60	39.60	1	39.60	\$/Hr					115.4	Hrs.	4,569

Earth Work

41	Equipment Costs	Hourly Operating Costs	Hourly Equipment Costs	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
Stream Channel															
Excavator, Diesel hydraulic, 3-1/2 CY	15,130	53.15	0.1	47.15	200.18	1	200.18	\$/Hr	14,400	CY	392	CY/Hr	36.7	Hrs.	7,354
Front-End Loader (986G)	7,095	29.05	0.1	47.15	123.45	1	123.45	\$/Hr	1,500	CY	204	CY/Hr	7.4	Hrs.	908
20 CY Truck	3,580	25.05	0.1	38.10	88.03	6	528.18	\$/Hr	7,000	CY	50	CY/Hr	140.0	Hrs.	73,945
Machine Placed for Slope Protection							27.45	/CY	581	CY					15,399
Polypropylene Mesh, Stapled, 8.5 oz./SY							1.45	/SY	1,683	SY					2,440
Support Personnel and Labor															
Laborer (2)				36.50	36.50	2	73.00	\$/Hr					36.7	Hrs.	2,682
Pick-up 3/4 Ton 4x4	785	7.40	0.1		13.05	1	13.05	\$/Hr					36.7	Hrs.	479
Foreman Outside				39.60	39.60	1	39.60	\$/Hr					36.7	Hrs.	1,455
5,000 Gallon Water Wagon	5,010.00	25.70	0.1	38.10	97.68	1	97.68	\$/Hr					36.7	Hrs.	3,588

Ref	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
42	Gablon Baskets																			
	Structure Demolition Cost																			
	Structure Vol. Demolished																			
	Bubbles Weight (exclude steel)																			
	Truck Capacity																			
	Haulage																			
	Transportation Cost Non-Steel Truck																			
	Transportation Cost Non-Steel Drive																			
	Disposal Cost Non-Steel																			
	Steel Weight																			
	Truck Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Drive																			
	Disposal Cost Steel																			
	Equipment Disposal Cost																			
	Dismantling Cost																			
	Equipment Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Cost																			
	Excavation																			
	Excavation Bitwall																			
	Excavate	Excavator, Diesel Hydraulic, 2 CY	02315 400 0280	1.71	/CY						88					CY		88	CY	150
	Vol. To Be Disposed																			
	Loading Cost	Laborers (2) 4 Hours/Laborer	City Service Price	38.50	/HR						8					Hrs		8	Hrs.	292
	Transportation Cost			4.00	/CY						1.22					CY		1.22	CY	5
	Disposal Costs																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Cost																			

Earth Work

Ref	Description	Materials	Means Reference Number	Unit Cost	Unit	Hourly Operating Costs	Hourly Equipment Costs	Operator's Hourly Wage Rate	Hourly Cost	Number or Men or Eq.	Total Eq. & Lab. Costs	Units	Quantity	Units	Production Rate	Unit	Equip. + Labor Time/Die.	Unit	Cost	
43																				
Refuse Site	Structure Demolition Cost	Fencing, barbed wire, 3 strand	0200 875 0800	1.36	LF								3250	LF			1.36	LF	4,420	
	Grading and Backfilling	D9R U-Blade ROPS Operating Rate		17,590		70.00	0.1	47.15	234.09	1	234.09	\$/hr	9687	CY	102	CTA/hr	96.9	hrs	22,863	
	Spread Topsoil	Front-End Loader 5 CY (966G)		7,095		29.05	0.1	47.15	123.45	1	123.45	\$/hr	36700	CY	203	LCY/hr	180.8	Hrs	22,318	
	Foreman							39.60	39.60	1	39.60	\$/hr					277.7	Hrs	10,996	
	Truck, Picked 24 ton, 4 Wheel drive			785		7.40	0.1	13.05	13.05	1	13.05	\$/hr					277.7	Hrs	3,624	
	1,000 Gallon Water Wagon			6,010		26.70	0.1	26.10	87.69	1	87.69	\$/hr					277.7	Hrs	27,125	

Earthwork

Ref	Description	Materials	Means Reference Number	Unit Cost	Unit	Hourly Operating Costs	Hourly Equipment Costs	Operator's Hourly Wage Rate	Hourly Cost	Number or Men or Eq.	Total Eq. & Lab. Costs	Units	Quantity	Units	Production Rate	Unit	Equip. + Labor Time/Dia.	Unit	Cost	
44																				
MW-05	Grading and Backfilling																			
	Fill in Mud Pit	Front-End Loader 5 CY (800G) Rental Rate	Blue Book	7,095.00	\$/Month	29.05	40.31	47.15	116.51	1	116.51	\$/hr	2074	CY	193	CY	10.7	Hrs	1,252	
	Fill Drill Pad	Excavating 2-1/2 CY hydraulic backhoe	02315 900 0820	2.58	\$/CY														11,912	
	Plug Well Casing	Concrete - Genva Rock	R03310-080	69	\$/CY														1,449	
	Spread Topsoil	Front-End Loader 5 CY (800G) Rental Rate	Blue Book	7,095.00	\$/Month	29.05	40.31	47.15	116.51	1	116.51	\$/hr	640	CY	84	CY	6.4	Hrs	749	
	Spread Topsoil	Excavating 2-1/2 CY hydraulic backhoe	02315 900 0820	2.58	\$/CY														1,393	
	Remove barbed wire	Fencing, barbed wire, 3 strand	0200 878 0900	1.38	\$/LF														1,170	
	Grout							39.60	39.60	1	39.60	\$/hr							27.2	Hrs
	Track Drive 34 In. 4 Wheel drive			785		7.40	0.1	13.05	13.05	1	13.05	\$/hr							27.2	Hrs

Earthwork

Ref	Description	Materials	Means Reference Number	Unit Cost	Unit	Hourly Operating Costs	Hourly Equipment Costs	Operator's Hourly Wage Rate	Hourly Cost	Number or Men or Eq.	Total Eq. & Lab. Costs	Units	Quantity	Units	Production Rate	Unit	Equip. + Labor Time/Dia.	Unit	Cost	
46																				
MW-06	Grading and Backfilling																			
	Fill in Mud Pit	Front-End Loader 5 CY (959G) Rental Rate	Blue Book	7,095.00	\$/Month	29.05	40.31	47.15	116.51	1	116.51	\$/hr	2074	CY	193	CY	10.7	Hrs	1,252	
	Fill Drill Pad	Excavating 2-1/2 CY hydraulic backhoe	02318 900 0820	2.58	\$/CY											2294	CY		5,919	
	Plug Well Casings	Concrete - Genva Rock	R03310-060	69	\$/CY									21	CY				1,449	
	Spread Topsoil	Front-End Loader 5 CY (959G) Rental Rate	Blue Book	7,095.00	\$/Month	29.05	40.31	47.15	116.51	1	116.51	\$/hr	2987	CY	84	CY	35.3	Hrs	4,115	
	Spread Topsoil	Excavating 2-1/2 CY hydraulic backhoe	02318 900 0820	2.58	\$/CY									2987	CY				7,655	
	Remove barbed wire	Fencing, barbed wire, 3 strand	0200 875 0800	1.38	\$/LF									1070	FT				1,455	
	Foreman							39.00	39.00	1	39.00	\$/hr						56.0	Hrs	2,218
	Track Pileus 3/4 ton, 4 Wheel drive			7.65		7.40	0.1		13.05	1	13.05	\$/hr						56.0	Hrs	731

Revegetation

Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost	
46 Vegetation																				
Soil Preparation																				
Poaching	Excavator, Diesel Hydraulic, 2 CY (325B)	02315 400 200	1.71 /CY						14.56						AC		23,490	CY	40,168	
Fence																				
Silt Fence	Silt Fence	02370 550 1100	0.93 /LF		7480										FT		7,480	FT	6,956	
Chicken Wire	Fence Chicken Wire	02820 500 0010	6.56 /LF		4500										FT		4,500	FT	29,520	
Seed Mix No. 1																				
Hydroseed Equipment and Labor	Hydro Spreader (equip. & labor) B-81	Reveg005	19.95 /MSF						13.9						AC		605	MSF	12,070	
Hydroseed Material	Dugout Seed Mix No. 1	Dugout 07391	394.75 /AC						13.9						AC		13.9	AC	5,487	
Transplant Area No. 1																				
Area										13.9					AC					
Transplant Materials	Snowberry		0.66 EA												75 /AC		1,043	EA	688	
	Utah Serviceberry		0.66 EA												75 /AC		1,043	EA	688	
	Pinon Pine		0.59 EA												200 /AC		2,780	EA	1,640	
	Utah Juniper		0.66 EA												200 /AC		2,780	EA	1,835	
Transplant Labor	Bare root seedlings 6 to 10 inch, heavy soil		1.15 EA														7,845	EA	8,792	
Seed Mix No. 2																				
Hydroseed Equipment and Labor	Hydro Spreader (equip. & labor) B-81	Reveg005	19.95 /MSF						2.45						AC		107	MSF	2,135	
Hydroseed Material	Dugout Seed Mix No. 2	Dugout 07391	362.25 /AC						2.45						AC		2	AC	868	
Transplant Area No. 2																				
Area										2.45					AC					
Transplant Materials	Narrowleaf Cottonwood		0.83 EA												250 /AC		613	EA	506	
	Rocky Mountain Maple		1.00 EA												250 /AC		613	EA	613	
	Willow		0.84 EA												4000 /AC		9,800	EA	8,223	
	Woods Rose		0.55 EA												1000 /AC		2,450	EA	1,346	
	Snowberry		0.66 EA												250 /AC		613	EA	404	
	Utah Serviceberry		0.66 EA												250 /AC		613	EA	404	
	Blue Elderberry		8.95 EA												250 /AC		613	EA	5,482	
	Chokecherry		0.73 EA												250 /AC		613	EA	447	
	Golden Currant		0.66 EA												250 /AC		613	EA	404	
	Carex Spp.		0.75 EA												500 /AC		1,225	EA	919	
	Hornetall		0.75 EA												500 /AC		1,225	EA	919	
Transplant Labor	Bare root seedlings 6 to 10 inch, heavy soil		1.15 EA														18,968	EA	21,836	
Seed Mix No. 3 Refuse Site																				
Hydroseed Equipment and Labor	Hydro Spreader (equip. & labor) B-81	Reveg005	19.95 /MSF						15.6						AC		680	MSF	13,566	
Hydroseed Material	Refuse Seed Mix No. 1	Maple Leaf	164.95 /AC						15.6						AC		16	AC	2,573	
Transplant Area No. 3																				
Area										15.6					AC					
Transplant Materials	Black Sagebrush		0.40 EA												200 /AC		3,120	EA	1,248	
	Schadscale		0.75 EA												200 /AC		3,120	EA	2,340	
Transplant Labor	Bare root seedlings 6 to 10 inch, heavy soil		1.15 EA														6,240	EA	7,176	
Revegetation																				
25% Vegetation Rate																				25,661

Revegetation

Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
47 Vegetation for MW-06 and MW-08																			
Soil Preparation Packing	Excavator, Diesel Hydraulic, 2 CY (325B)	02315 400 260	1.71	/CY					2.27						AC		3,662	CY	6,262
Fence																			
Silt Fence	Silt Fence	02370 550 1100	0.93	/LF	965										FT		965	FT	897
Chicken Wire	Fence Chicken Wire	02820 500 0010	6.56	/LF	965										FT		965	FT	6,330
De-Gas Seed Mix No. 1																			
Hydroseed Equipment and Labor	Hydro Spreader (equip. & labor) B-61	Reveg005	19.95	/MSF					2.27						AC		99	MSF	1,975
Hydroseed Material	De-Gas Seed Mix No. 1	Granite Seed Co.	170.00	/AC					2.27						AC		2.3	AC	396
Transient Area No. 1																			
Area										2.27					AC				
Transient Materials	Snowberry		0.66	EA											125	/AC	284	EA	187
	Woods Rose		0.56	EA											125	/AC	284	EA	159
	Oregon Grape		1.00	EA											125	/AC	284	EA	284
	Current		0.66	EA											125	/AC	284	EA	187
Transient Labor	Bare root seedlings 8 to 10 inch, heavy soil		1.15	EA													1,136	EA	1,305
Revegetation																			
25% Vegetation Rate																			1,121

Earth Work
Mine Site

Productivity and Hours Required for Dozer Use

Earthmoving Activity:

Rough grading and backfilling

Characterization of Dozer Used (type, size, etc.):

Caterpillar Dozer D0R-9SU

Description of Dozer Use (origin, destination, grade, haul distance, materials, etc.):

Level grade, 21 feet blade width, 11.4 cu. yd. Capacity, 500 foot push

Productivity Calculations:

Operating =	0.85 x	0.9 x	0.83 x	1.0
Adjustment	operation	material	efficiency	grade
Hours	factor	factor	factor	factor
	0.97 x	1.0 x	1.0 x	1.0
	weight	production	visibility	elevation
	correction	method/blade	factor	factor
	factor	factor		
	=	0.62		

Net Hourly =	300 LCY/Hr	x	0.62 =	186 LCY/Hr
Production	normal hourly		operating adjustment	
	production		factor	

Data Source:

Caterpillar Performance Handbook - Edition 30

Productivity and Hours Required for Compactor Use

Earthmoving Activity:

Rough grading of loose and compacted material

Characterization of Compactor Used (type, size, etc.):

Caterpillar Sheepfoot Compactor 815F

Description of Compactor Used (loading, geometry, materials, etc.):

3 passes per lift, 8-inch lifts, 4 MPH, 80% efficiency, 77 inches width of wheel

Productivity Calculations:

Production Table = 1095 LCY/Hr

Net Hourly = 1095 LCY/Hr x 0.8 = 876 LCY/Hr
Production production efficiency

Data Source:

Caterpillar Performance Handbook - Edition 30

Productivity and Hours Required for Excavator Use

Earthmoving Activity:

Rough grading of loose and compacted material

Characterization of Excavator Used (type, size, etc.):

Caterpillar Excavator 325 BL

Description of Excavator Used (loading, geometry, materials, etc.):

Loose and compacted dirt, 3.5 C.Y.

Productivity Calculations:

$$\begin{array}{rclclcl} \text{Net Bucket} & = & & & & & \\ \text{Capacity} & & 3.5 \text{ LCY} & \times & 0.9 & = & 3.15 \text{ LCY} \\ & & \text{heaped} & & \text{bucket} & & \\ & & \text{bucket} & & \text{fill} & & \\ & & \text{capacity} & & \text{factor} & & \end{array}$$

$$\begin{array}{rclclcl} \text{Hourly} & = & & & & & \\ \text{Production} & & 3.15 \text{ LCY} & \times & 60 \text{ min/hr} & / & \\ & & \text{net} & & & & \\ & & \text{bucket} & & & & \\ & & \text{capacity} & & & & \\ & & 0.4 \times & & 0.83 & = & 392 \text{ LCY/Hr} \\ & & \text{cycle} & & \text{efficiency} & & \\ & & \text{time} & & \text{factor} & & \end{array}$$

Data Source:

Caterpillar Performance Handbook - Edition 30

Earth Work
Mine Site

Productivity and Hours Required for Loader Use

Earthmoving activity:

Rough grading of loose and compacted materials

Characterization of Loader Used (type, size, etc.):

Caterpillar Front End Loader 966G

Description of Loader Used (loading, geometry, materials, etc.):

Loose and compacted dirt, 2.5 C.Y.

Productivity Calculations:

$$\begin{aligned} \text{Cycle Time} &= 0.18 \text{ min haul time (loaded)} + 0.18 \text{ min return time (empty)} + 0.25 \text{ min basic cycle time} = 0.61 \text{ min} \\ \text{Net Bucket Capacity} &= 2.5 \text{ LCY heaped bucket capacity} \times 1 = 2.5 \text{ LCY bucket fill factor} \\ \text{Hourly Production} &= \frac{2.5 \text{ LCY net bucket capacity}}{0.61 \text{ min cycle time}} \times 0.83 \text{ efficiency factor} \times 60 \text{ min/hr} = 204 \text{ LCY/Hr} \end{aligned}$$

Data Source:

Caterpillar Performance Handbook - Edition 30

Earth Work
Mine Site

Productivity and Hours Required for Truck Use

Earthmoving Activity:
Hauling Topsoil

Characterization of Trucks Used (type, size, etc.):
Trailer and pup, 18 C.Y.

Description of Trucks Used (origin, destination, grade, haul distance, capacity, etc.):

Productivity Calculations

No. Loader Passes/ Truck	=	18 C. Y.	/	2.5 LCY	
		truck capacity		loader bucket capacity	
	=	7.2 passes			
Net Truck Capacity	=	2.5 LCY	x	7.2 =	18 LCY
		loader bucket capacity		no. loader passes/truck	
Loading Time/Truck	=	0.61 min	x	7.2 =	4.39 min.
		loader cycle time		no. loader passes/truck	
Truck Cycle Time	=	19 min	+	18 min	+
		haul time		return time	
		4.392 min	+	2 min	=
		loading time		dump and maneuver time	
		43.392 min			
No. Trucks Required	=	43.392 min	/	4.392 min	=
		9.88 trucks	use	10 trucks	
Production Rate	=	20 LCY	x	10 /	43.392 min
				no. trucks	truck cycle time
	=	4.61 LCY/min			
Hourly Production	=	4.61 LCY/min	x	60 min/hr	x
		production rate			
		0.83 =		230 LCY/Hr	
		efficiency			

Productivity and Hours Required for Truck Use

Earthmoving Activity:
Hauling Topsoil

Characterization of Trucks Used (type, size, etc.):
Trailer and pup, 12 C.Y.

Description of Trucks Used (origin, destination, grade, haul distance, capacity, etc.):

Productivity Calculations

No. Loader =	12 C. Y.	/	2.5 LCY	
Passes/ Truck	truck capacity		loader bucket capacity	
	=		4.8 passes	
Net Truck =	2.5 LCY	x	4.8 =	12
Capacity	loader bucket capacity		no. loader passes/truck	
Loading =	0.61 min	x	4.8 =	2.93
Time/Truck	loader cycle time		no. loader passes/truck	
Truck =	33 min	+	33 min	+
Cycle Time	haul time		return time	
	2.93 min	+	3 min	=
	loading time		dump and maneuver time	
			71.93 min	
No. Trucks =	71.93 min	/	2.93 min	=
Required				
	24.57 trucks	use	6 trucks	
Production =	12 LCY	x	6 /	71.93
Rate			no. trucks	truck cycle time
	=		1.00 LCY/min	
Hourly =	1.00 LCY/min	x	60 min/hr	x
Production	production rate			
	0.83 =		50 LCY/Hr	
	efficiency			

Earth Work
MW-02

Productivity and Hours Required for Loader Use

Earthmoving activity:
Fill in mud pit

Characterization of Loader Used (type, size, etc.):
Caterpillar Front End Loader 966G

Description of Loader Used (loading, geometry, materials, etc.):
5 CY bucket, haul distance 50 feet, zero percent grade

Productivity Calculations:

$$\begin{array}{rclclcl} \text{Cycle} & = & 0.5 \text{ min} & + & 0.5 \text{ min} & + \\ \text{Time} & & \text{haul time} & & \text{return time} & \\ & & \text{(loaded)} & & \text{(empty)} & \\ & & & & & \\ & & 0.55 \text{ min} & = & 1.55 \text{ min} & \\ & & \text{basic} & & & \\ & & \text{cycle time} & & & \end{array}$$

$$\begin{array}{rclclcl} \text{Net} & = & 5 \text{ LCY} & \times & 1.2 = & 6 \text{ LCY} \\ \text{Bucket} & & \text{heaped bucket} & & \text{bucket} & \\ \text{Capacity} & & \text{capacity} & & \text{fill factor} & \end{array}$$

$$\begin{array}{rclclcl} \text{Hourly} & = & 6 \text{ LCY} & / & 1.55 \text{ min} & \times \\ \text{Production} & & \text{net bucket} & & \text{cycle time} & \\ & & \text{capacity} & & & \\ & & & & & \\ & & 0.83 \times & & 60 \text{ min/hr} & = \\ & & \text{efficiency} & & & \\ & & \text{factor} & & & 193 \text{ LCY/Hr} \end{array}$$

Data Source:
Caterpillar Performance Handbook - Edition 30

Earth Work
MW-02

Productivity and Hours Required for Loader Use

Earthmoving activity:
Spread topsoil

Characterization of Loader Used (type, size, etc.):
Caterpillar Front End Loader 966G

Description of Loader Used (loading, geometry, materials, etc.):
5 CY bucket, haul distance 350 feet, zero percent grade

Productivity Calculations:

$$\begin{array}{rclclcl} \text{Cycle} & = & 2 \text{ min} & + & 1 \text{ min} & + \\ \text{Time} & & \text{haul time} & & \text{return time} & \\ & & \text{(loaded)} & & \text{(empty)} & \\ & & 0.55 \text{ min} & = & 3.55 \text{ min} & \\ & & \text{basic} & & & \\ & & \text{cycle time} & & & \end{array}$$

$$\begin{array}{rclclcl} \text{Net} & = & 5 \text{ LCY} & \times & 1.2 & = & 6 \text{ LCY} \\ \text{Bucket} & & \text{heaped bucket} & & \text{bucket} & & \\ \text{Capacity} & & \text{capacity} & & \text{fill factor} & & \end{array}$$

$$\begin{array}{rclclcl} \text{Hourly} & = & 6 \text{ LCY} & / & 3.55 \text{ min} & \times \\ \text{Production} & & \text{net bucket} & & \text{cycle time} & \\ & & \text{capacity} & & & \end{array}$$

$$\begin{array}{rclclcl} & & 0.83 \times & & 60 \text{ min/hr} & = & 84 \text{ LCY/Hr} \\ & & \text{efficiency} & & & & \\ & & \text{factor} & & & & \end{array}$$

Data Source:
Caterpillar Performance Handbook - Edition 30

Productivity and Hours Required for Dozer Use

Earthmoving Activity:

Rough grading and backfilling

Characterization of Dozer Used (type, size, etc.):

Caterpillar Dozer D0R-9SU

Description of Dozer Use (origin, destination, grade, haul distance, materials, etc.):

Level grade, 21 feet blade width, 11.4 cu. yd. Capacity, 400 foot push

Productivity Calculations:

Operating =	0.85 x	0.8 x	0.83 x	1.0
Adjustment	operation	material	efficiency	grade
Hours	factor	factor	factor	factor
	0.9 x	1.0 x	1.0 x	1.0
	weight	production	visibility	elevation
	correction	method/blade	factor	factor
	factor	factor		
	=	0.51		

Net Hourly =	200 LCY/Hr	x	0.51 =	102 LCY/Hr
Production	normal hourly		operating adjustment	
	production		factor	

Data Source:

Caterpillar Performance Handbook - Edition 30

Earth Work
Refuse Site

Productivity and Hours Required for Loader Use

Earthmoving activity:

Moving and spreading topsoil

Characterization of Loader Used (type, size, etc.):

Caterpillar Front End Loader 966G

Description of Loader Used (loading, geometry, materials, etc.):

5 CY bucket, haul distance 500 feet, -2% grade

Productivity Calculations:

$$\begin{array}{rclcl}
 \text{Cycle} & = & 0.38 \text{ min} & + & 0.4 \text{ min} & + \\
 \text{Time} & & \text{haul time} & & \text{return time} & \\
 & & \text{(loaded)} & & \text{(empty)} & \\
 & & & & & \\
 & & 0.5 \text{ min} & = & 1.28 \text{ min} & \\
 & & \text{basic} & & & \\
 & & \text{cycle time} & & &
 \end{array}$$

$$\begin{array}{rclcl}
 \text{Net} & = & 5 \text{ LCY} & \times & 0.95 & = & 4.75 \text{ LCY} \\
 \text{Bucket} & & \text{heaped bucket} & & \text{bucket} & & \\
 \text{Capacity} & & \text{capacity} & & \text{fill factor} & &
 \end{array}$$

$$\begin{array}{rclcl}
 \text{Hourly} & = & 4.75 \text{ LCY} & / & 1.28 \text{ min} & \times \\
 \text{Production} & & \text{net bucket} & & \text{cycle time} & \\
 & & \text{capacity} & & &
 \end{array}$$

$$\begin{array}{rclcl}
 & & 0.91 \times & 60 \text{ min/hr} & = & 203 \text{ LCY/Hr} \\
 & & \text{efficiency} & & & \\
 & & \text{factor} & & &
 \end{array}$$

Data Source:

Caterpillar Performance Handbook - Edition 30

CHAPTER 1

LEGAL, FINANCIAL, COMPLIANCE AND RELATED INFORMATION

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

111 Introduction

The de-gasification wells will be located on property owned by Canyon Fuel Company, LLC. The well locations are found in Table 1-1 and are shown in Figure 1-1.

**TABLE 1-1
Well Site Locations
Pine Canyon, Utah Quadrangle
Salt Lake Meridian**

Hole Number	Section	Township and Range
MW-06	Portion of SW1/4SW1/4NE1/4 Section 16	Township 13 South, Range 12 East
MW-08	Portion of SE1/4SE1/4NE1/4 Section 15	Township 13 South, Range 12 East

112 Identification of Interests

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

112.100 Business Entity

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

112.200 Applicant and Operator

APPLICANT: Operations, Administration, Permit Revisions, and Amendments

Canyon Fuel Company, LLC
6955 South Union Park Center
Suite 540
Midvale, Utah 84047
Telephone: (801) 569-4700
Employer Identification: 87-0567183

Operator: Canyon Fuel Company, LLC
6955 South Union Park Center
Suite 540
Midvale, Utah 84047
Telephone: (801) 569-4700

Resident Agent: C. T. Corporation Systems
50 West Broadway
Salt Lake City, Utah 84104
Telephone: (801) 658-9486

Contact Person: Reed Olsen
Canyon Fuel Company, LLC
Dugout Canyon Mine
P. O. Box 1029
Wellington, Utah 84542
Telephone: (435) 637-6360

PERSON WHO WILL PAY ABANDON MINE RECLAMATION FEES:

Richard D. Pick
Canyon Fuel Company, LLC
6955 South Union Park Center
Suite 540
Midvale, Utah 84047

112.300 Officers of the Applicant

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

112.400 Coal Mining and Reclamation Operation Owned or Controlled

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

112.500 Legal or Equitable Owner of the Surface and Mineral Properties

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

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

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

112.600 Owners of Record of Property Contiguous to Proposed Permit Area

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

United States of America	State of Utah	Canyon Fuel Company, LLC
Department of Interior	School and Industrial	6955 South Union Park Center
Bureau of Land Management	Trust Lands Administration	Suite 540
Price Field Office	675 East 500 South	Midvale, Utah 84047
125 South 600 West	Salt Lake City, Utah 84102-2818	
Price, Utah 84501		

Milton & Ardith Thayne Trust	George & Alice Conover Etal.	KFJ Ranch Partnership
Sunnyside Star Route	2701 Georgia Way	C/O Kerwin Jensen
Price, Utah 84501	Sandy, Utah 84092	Cleveland, Utah 84518

112.700 MSHA Numbers

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

112.800 Interest In Contiguous Lands

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

112.900 Certification of Submittal Information

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

113 Violation Information

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

114 Right-of-Entry Information

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

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

TABLE 1-2
Disturbed Acres by Well Site

Well Site	Disturbed Acres
MW-06	0.86
MW-08	1.41

115 Status of Unsuitability Claims

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

116 Permit Term

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

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

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

118 Filing Fees

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

120 PERMIT APPLICATION FORMAT AND CONTENTS

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

130 REPORTING OF TECHNICAL DATA

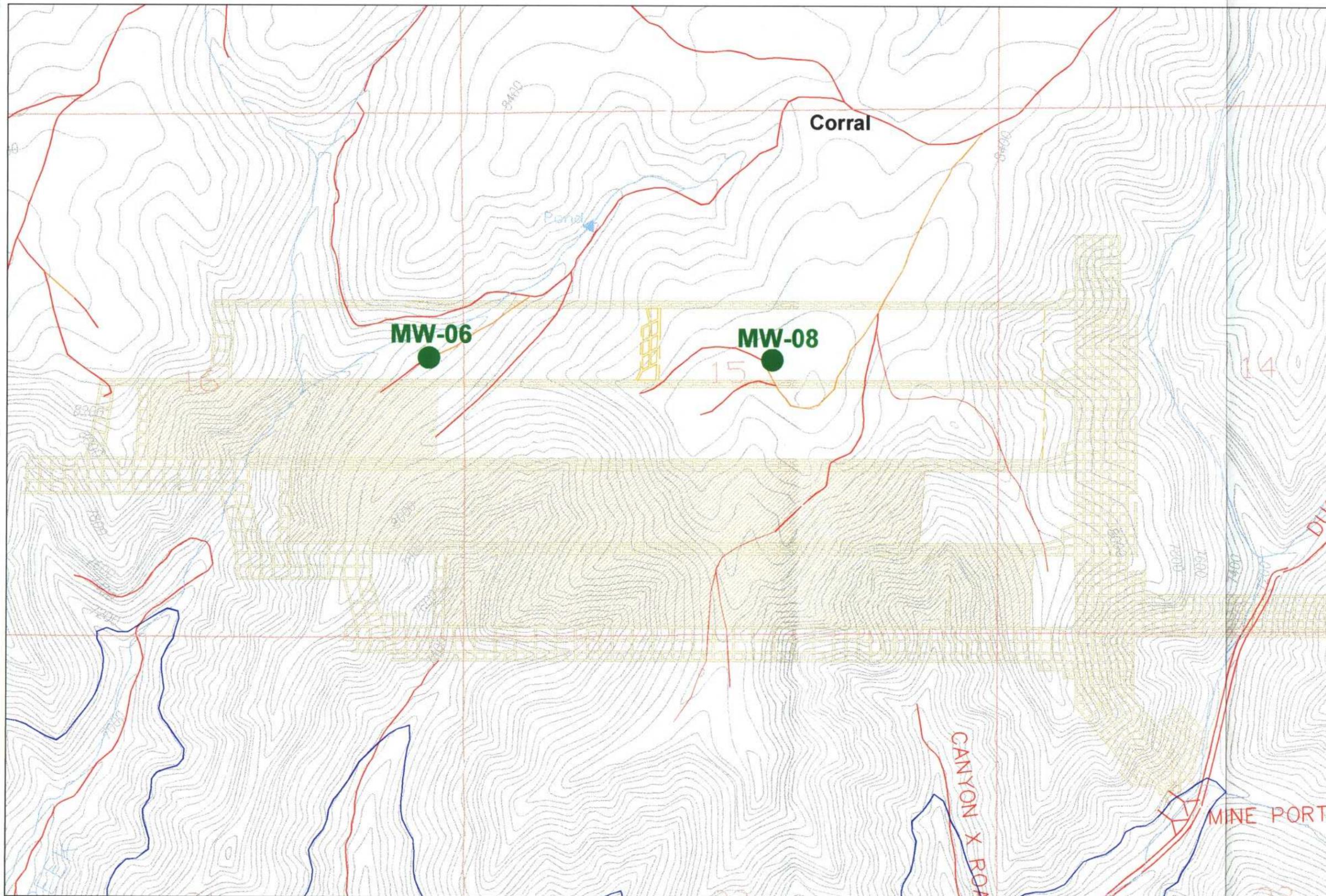
All technical data submitted in the amendment will be accompanied by the name or organization responsible for the collection and analysis of data, dates of collection and descriptions of methodology used. Technical analyses will be planned by or under the direction of a qualified professional in the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

140 MAPS AND PLANS

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

150 COMPLETENESS

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



EXPLANATION

- Existing Road No Upgrade
- Existing Road Requires Upgrade
- Newly Constructed Road
- - - Trail
- - - Lease Boundary
- Rock Canyon Seam Outcrop
- Dugout Mine Works
- Dugout Projected Mine Works
- Proposed Borehole

Scale: 1" = 1000'

Figure 1-1 Dugout Canyon Mine Methane Degas Bore Hole Location			
Canyon Fuel Company, C Dugout Mine			
PIA AND NEPA REGULATORY REVIEW SHEET CWD FILE: 45-627-6260	DATE: 02.25.2003 SCALE: 1 : 1000	CK.BY: DR.BY: MAS	REVISION:
DWG. NO.:			

CHAPTER 2

SOILS

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Attachment 2-1 Topsoil Evaluation For Methane Degas Wells

210 INTRODUCTION

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

220 ENVIRONMENTAL DESCRIPTION

The well sites are at an elevation of about 8000 to 8500 feet in the Book Cliffs area between Dugout and Soldier Canyons. General vegetation includes sagebrush, serviceberry, aspen, Douglas-fir, Ponderosa pine, and snowberry. Bedrock materials are primarily sandstone and shale.

221 Prime Farmland Investigation

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

222 Soil Survey

222.100 Soils Map

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

A description of the soils is included in Appendix 2-2 of the approved M&RP and in Attachment 2-1, *Topsoil Evaluation for Methane Degas Wells, Dugout Canyon Mine, Carbon County Utah*.

222.200 Soil Identification

<u>Well No.</u>	<u>Soil Map Unit</u>	<u>Soil Components</u>
MW-06	62	Midfork-Comodore complex
MW-08	7	Beje-Trag complex, 3-30% slopes

222.300 Soil Description

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

222.400 Soil Productivity

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

TABLE 2-1
Topsoil Volumes

Well No.	Cubic Yard of Material
MW-06	540
MW-08	2967

Figure 5-1 and Figure 5-2 show the layout and approximate size of each well pad.

223 Soil Characterization

The topsoil evaluation described in this chapter was performed by Daniel M. Larsen, Professional Soil Scientist in accordance with the standards of the National Cooperative Soil Survey.

224 Substitute Topsoil

Dugout Canyon does not plan to use substitute topsoil as growth media.

230 OPERATION PLAN

231 General Requirements

231.100 Removing and Storing Topsoil Methods

Prior to disturbance at each well site, the topsoil will be removed and stockpiled. The topsoil will be stored at the well pad and protected with a berm and/or silt fence around the soil. A qualified person will be on site during soil salvage to monitor and supervise the operation for the purpose of maximizing salvage volumes.

After the topsoil is removed, the mud pit will be excavated and the soils stored immediately adjacent to the mud pit.

231.200 Suitability of Topsoil Substitutes/Supplements

See Section 224.

**231.300 Testing of Topsoil Handling and Reclamation Procedures
Regarding Revegetation**

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

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

Phase two (2) reclamation grading of the sites will occur after venting of the methane gas is completed. See De-Gasification Well Reclamation on Figure 5-7 for details on timing.

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

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

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

The slopes of the stockpile will be 1.25H:1V or approximately 38° the natural angle of repose for earth.

**TABLE 2-2
Topsoil Stockpile Dimensions***

Well No.	Length (ft)	Width (ft)	Height (ft)
MW-06	120	20	6.1
MW-08	160	40	12.5

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

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

232 Topsoil and Subsoil Removal

232.100 Topsoil Removal and Segregation

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

232.200 Poor Topsoil

No poor soils exist at either well site see Attachment 2-1.

232.300 Thin Topsoil

Not applicable.

232.400 Minor Disturbances Not Requiring Topsoil Removal

Not applicable.

232.500 Subsoil Segregation

The B and C soil horizons will not be removed.

232.600 Timing

Topsoil removal will take place after all vegetation that could interfere with salvaging the topsoil has been grubbed and moved to the disturbed area perimeter. If space is not available to temporary store all the vegetation, the excess will be burned. Burning permits will be obtained and burning will only occur when allowed by the burning index.

232.700 Topsoil and Subsoil Removal Under Adverse Conditions

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

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

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

233 Topsoil Substitutes and Supplements

233.100 Overburden Materials Supplementing and/or Replacing Topsoil

No overburden material will be used.

233.200 Suitability of Topsoil Substitutes and Supplements

Not applicable.

233.300 Physical and Chemical Analysis

Not applicable.

233.400 Testing of Substitute Topsoil

No substitute topsoil if planned.

234 Topsoil Storage

234.100 Topsoil Stockpiling

Topsoil will be stockpiled for later use in reclamation operations.

234.200 Topsoil Stockpile

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

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

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

Wind and Water Erosion Protection - The topsoil stockpile will be protected from water erosion by berms and/or silt fence to help trap sediment runoff from the stockpile. The stockpile will be surface pitted and/or roughened and revegetated to prevent wind erosion.

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

234.300 Topsoil Stockpile Relocation

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

240 RECLAMATION PLAN

241 General Information

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

242 Soil Redistribution

242.100 Soil Redistribution Practices

The topsoil will be placed after recontouring of the site has occurred. The approximate amount of topsoil available for each site is shown in Table 2-1.

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

Topsoil will be moved from the stockpile and spread using a front-end loader and/or track excavator.

Soil Thickness - The topsoil will be distributed to the disturbed area as shown in Table 2-3.

TABLE 2-3
Topsoil Distribution Thickness

Well No.	Approximate Topsoil Thickness
MW-06	8½"
MW-08	16¼"

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

The dirt excavated to create the mud pit will be mixed with the drill cutting to prevent a boundary of hard material from forming in the mud pit area that would hamper root penetration.

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

242.200 Regrading

The area will be graded to the approximate original topographic configuration.

242.300 Topsoil Redistribution on Impoundments and Roads

The mud pits and embankments will be dismantled and reclaimed with the well site. The access roads will not be reclaimed.

243 Soil Nutrients and Amendments

The soils will be analyzed before being redistributed to determine if amendments are needed. Testing of the topsoil will be done according to Table 6 of the Division's Topsoil and Overburden Guidelines. The topsoil will be tested at a minimum for the following parameters: pH, electrical conductivity, total carbon, SAR, water holding capacity, plant available nitrogen, and phosphorus.

244 Soil Stabilization

244.100 Protection and Stabilization of Surface Area

All reclaimed areas will be stabilized to control erosion by application of mulch and roughening of the surface. The areas will be graded to the approximately original topographic configuration. Seeding will be accomplished with the application of seeds and mulch with a long fiber tackifier. Methods of protection and stabilization are further discussed in Section 340.341.

244.200 Mulch Application

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

244.300 Rills and Gullies

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

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

250 PERFORMANCE STANDARDS

251 Topsoil, Subsoil, and Topsoil Supplements Management

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

252 Stockpiled Topsoil and Subsoil

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

**Canyon Fuel Company, LLC
Dugout Canyon Mine**

**Methane De-Gasification Amendment
March 2003**

Attachment 2-1
Topsoil Evaluation For Methane Degas Wells

ATTACHMENT 2-1

**Topsoil Evaluation for Methane Degas Wells
Dugout Canyon Mine
Carbon County Utah**

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

**By: EIS, Environmental and Engineering Consulting
31 North Main St.
Helper, UT. 84526**

May 20, 2002

Topsoil Evaluation for Methane Degas Wells, Dugout Canyon Mine

Introduction

On May 7th and 8th 2002, Daniel M. Larson Soil Scientist, Environmental Industrial Services, made a field assessment of the soil resources for eight proposed methane degas wells above the Dugout Canyon Mine. The objective was primarily to determine the amount of suitable topsoil available for salvage at each well site and on two segments proposed for new road construction. Site evaluation included an area of approximately 200 feet in radius from the well site location stakes and centerline of proposed roads.

The project is located in sections 15 and 16, township 13 south, range 12 east; about 14 miles northeast of Wellington, Utah.

Setting

The well sites are at the elevation of about 8000 to 8500 in the Book Cliffs area between Dugout Canyon and Soldier Canyon. General vegetation includes sagebrush, serviceberry, aspen, Douglas-fir, ponderosa pine, and snowberry. Bedrock materials are primarily sandstone and shale.

Soil Resources- Existing Inventories

The soils have been mapped at the order 3 intensity level (scale of 1:24,000) as part of the Soil Survey of the Carbon Area, Utah by the Soil Conservation Service, issued 1988. This report was referred to for general information on each of the well sites. The soil map units identified for each well site are listed below. Map unit descriptions are presented in appendix A.

<u>Well No.</u>	<u>Soil Map Unit</u>	<u>Soil Components</u>
MW-01	7	Beje-Trag complex, 3-30% slopes
	84	Podo-Rock outcrop complex
MW-02	62	Midfork- Comodore complex
MW-03	7	Beje-Trag complex, 3-30% slopes
	97	Rottulee family- Trag complex, 30-60% slopes
MW-04	7	Beje-Trag complex, 3-30% slopes
	97	Rottulee family- Trag complex, 30-60% slopes
MW-05	7	Beje-Trag complex, 3-30% slopes
MW-06	62	Midfork- Comodore complex
MW-07	62	Midfork- Comodore complex
MW-08	7	Beje-Trag complex, 3-30% slopes

Topsoil Assessment by Proposed Well Site

Sketches were prepared to show the approximate distribution of available topsoil for each proposed well site. Most of the sites have already been effected by previous drilling and logging activities resulting in some displacement and mixing of soil materials. Topsoil was identified as the surface layer expressing dark colors and higher amounts of organic matter compared to the underlying soil. Typically this represents the A-horizon.

MW-01

Much of this site has been disturbed by previous drilling activity including an access road. Near the MW-01 center stake some topsoil is present on the cleared area and can be salvaged. There is mixing of soil materials, however about 8 inches would be available. On the sagebrush slope on the west side of the site

the topsoil consists of 7 to 10 inches of very dark grayish brown to dark brown sandy loam. North of the access road there is a similar portion having sagebrush and 7 to 10 inches of topsoil and a portion supporting ponderosa pine having 4 to 8 inches of topsoil along with some rocky and eroded parts. The south and east edges of the site break off into rocky and steep slopes. About 4 to 5 inches of topsoil is available where rock is not at the surface.

MW-02

This site includes a previously cleared drill site along a narrow ridge that supports Douglas-fir where it slopes off to the northwest and ponderosa pine to the southwest. Topsoil has mostly been removed from the present pad and pushed to the sides. On the northwest slope the topsoil is at a fairly uniform thickness of 8 inches. Along the ridgeline and the south and east slopes the topsoil is thin and broken by rock outcrop and eroded spots. Topsoil ranges from about 2 to 6 inches on these sites. Rock outcrop is present along the southern edge.

MW-03

This site includes an access road and previously distributed drill site near a ridge top. Vegetation includes sagebrush, serviceberry, and a patch of aspen. A rocky ridgeline is present along the west and south sides of the site. Near the center of the proposed drill site there is about 10 to 15 inches of topsoil within the disturbed area that could be salvaged. The thickest topsoil is from the MW-03 stake to the north, and extending into an aspen patch on the north edge. Within the aspen stand the topsoil is a very dark grayish brown sandy loam that is 18 to 20 inches thick. Soils to the east of center are cobbly and have 8 to 10 inches of suitable topsoil. Along the ridge on the west and south portion the soils are very stony with about 4 to 6 inches of topsoil and inclusions of up to 8 inches.

MW-04

This site is along an upper mountain slope which slopes moderately to the southeast than breaks to a very steep slope. It includes an access road and an older drill site. Vegetation is mostly sagebrush and serviceberry. Topsoils are thickest on the north in a slight swale and thinnest to the south and as the steepness of the slope increases. Most of the site has 8 to 14 inches of very dark grayish brown sandy loam topsoil. Deepest soils are where the sagebrush is most dense (up to 20 inches). As vegetation becomes sparser along the southern portion, the soils become shallower and topsoil is only about 5 inches thick with pockets up to about 8 inches thick. Some topsoil is available within the presently disturbed area.

MW-05

The site is along the northeast edge of a ridge and includes a segment proposed for an access road. North of the centerline for the access road the topsoil generally ranges from 10 to 13 inches in thickness from the beginning stake to about 300 feet in distance. On the access road centerline topsoils are mostly about 6 to 8 inches thick, and to the south, toward the ridgeline, they are only 2 to 6 inches thick.

The well site has thin topsoil near the center stake and to the east and south, with only about 2 to 6 inches present. Topsoil increases in thickness to the northwest as the density of sagebrush and serviceberry increases, 6 to 10 inches is a typical topsoil thickness range. Most of these soils are cobbly.

MW-06

This site includes an access road and disturbed area related to logging. On the west side of the road is a large slash burning site composed of ash and charred logs. Below this the slope breaks steeply toward a drainage. The east side of the road appears to have been a landing and has some minor soil disturbance. The site supports aspen and Douglas-fir. Topsoil is mostly 6 to 9 inches in thickness and commonly overlies a

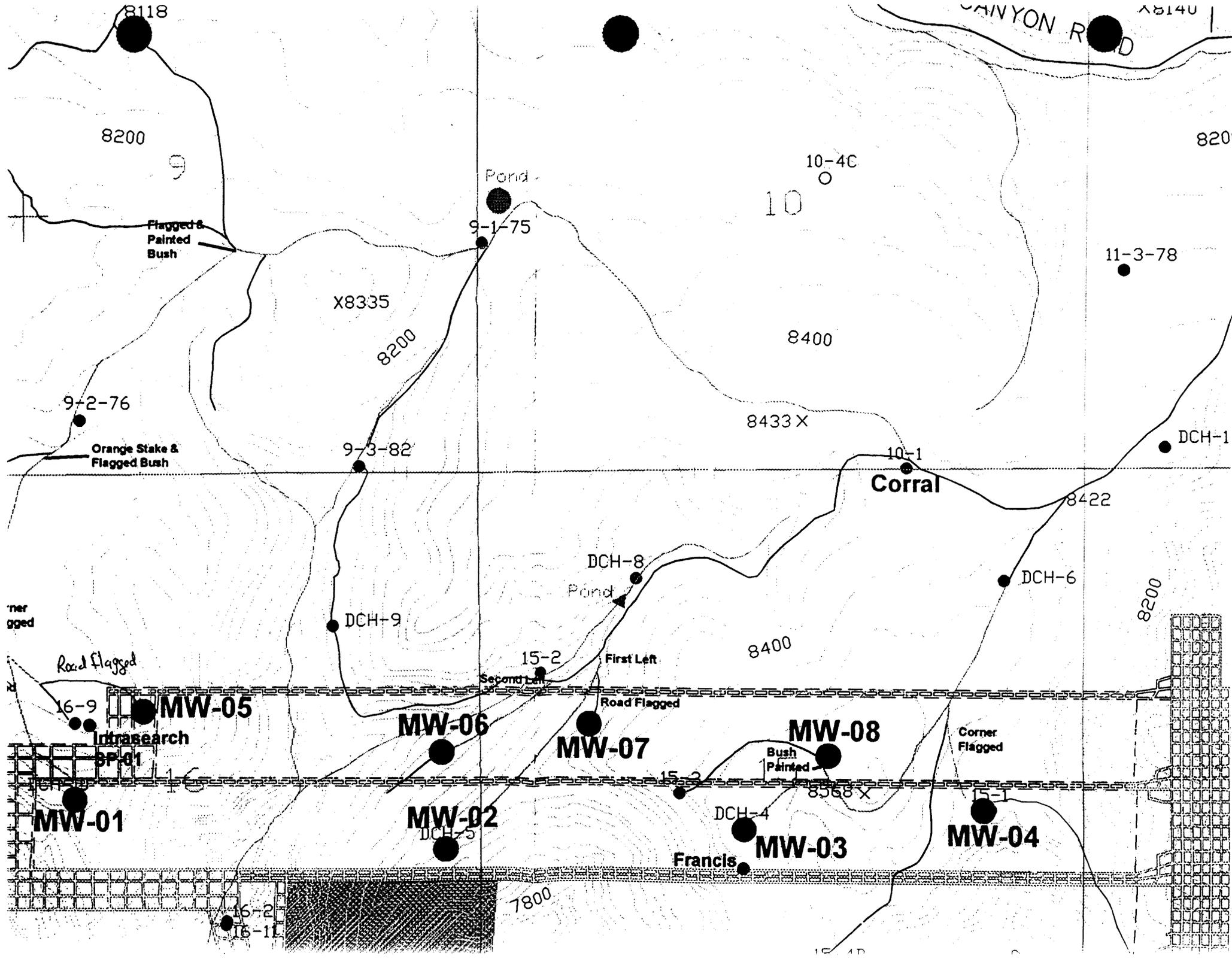
reddish brown clayey subsoil material. The thickest topsoil was noted along the northwest portion of the site where it is 10 to 14 inches thick. The slopes along the west side have a gradient of about 60 to 70% and have very thin topsoil.

MW-07

This site is on a northwest facing slope of about 18 to 20% supporting aspen and Douglas-fir. It includes a short portion of proposed access road and a well site on land that had been logged but has very little surface disturbance. A road presently passes along the west side of the site. Topsoils are typically 5 to 8 inches thick along the proposed access route and near the MW-07 center stake. A reddish brown clayey subsoil is common. Thickest topsoils occur at the very north portion of the access road (may not be affected) and to the south and east. The thickest topsoil areas have 9 to 14 inches of topsoil and a light brown colored subsoil.

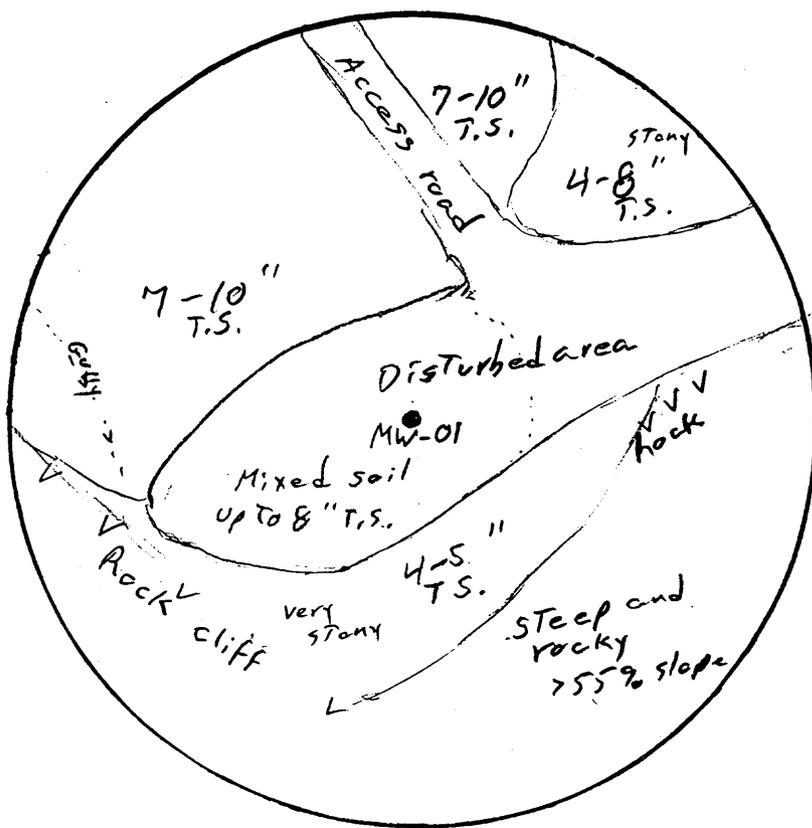
MW-08

This site is near a mountain top with a convex slope of about 10 to 12% to the north. It supports sagebrush and scattered Douglas-fir. Topsoils are commonly 10 to 14 inches thick south and west of the center stake, along with one very rocky portion which has very little topsoil. The soils in the northeast section are less stony and have topsoil that is 18 to 25 inches thick. An access road transects the site about 65 feet south of the center stake.



5-8-02 DML

Dugout Canyon Mine
Methane Degas Well MW-01
Site Sketch
Approx. 200' radius



Topsoil (T.S.)

7 To 10 inches in sagebrush area NW.

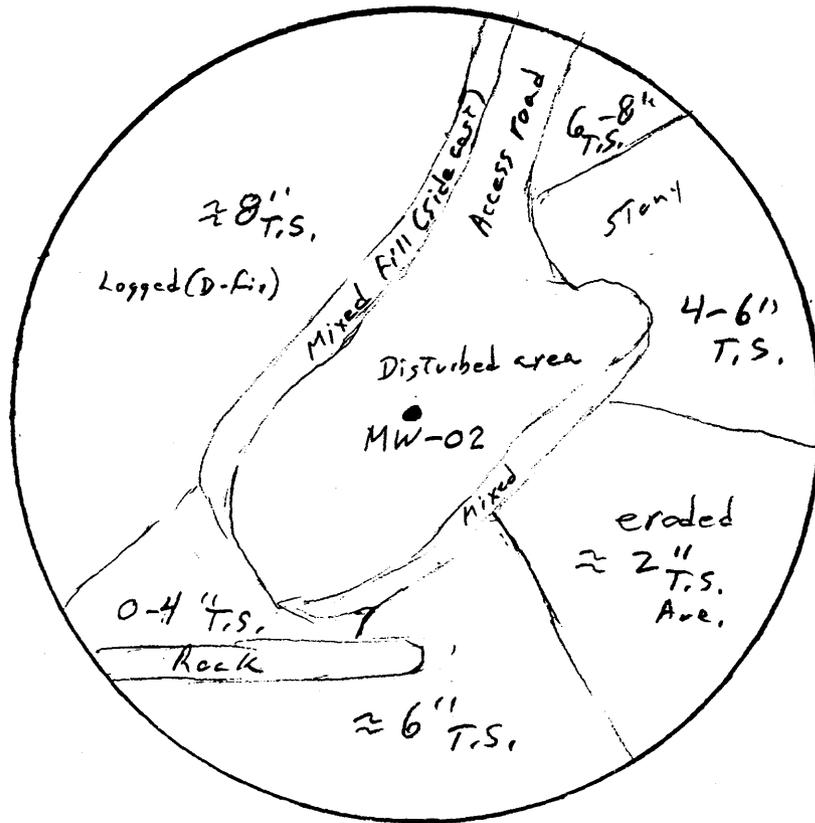
4-5" along south and east edge of presently disturbed area.

Limited by rock outcrop and steep slopes on south and east portion

5-7-02 DML

Dugout Canyon Mine
Methane Degas Well MW-02

Site Sketch
Approx. 200' radius



Topsoil (T.S.)

About 8 inches on the Douglas-fir (logged) slope NW

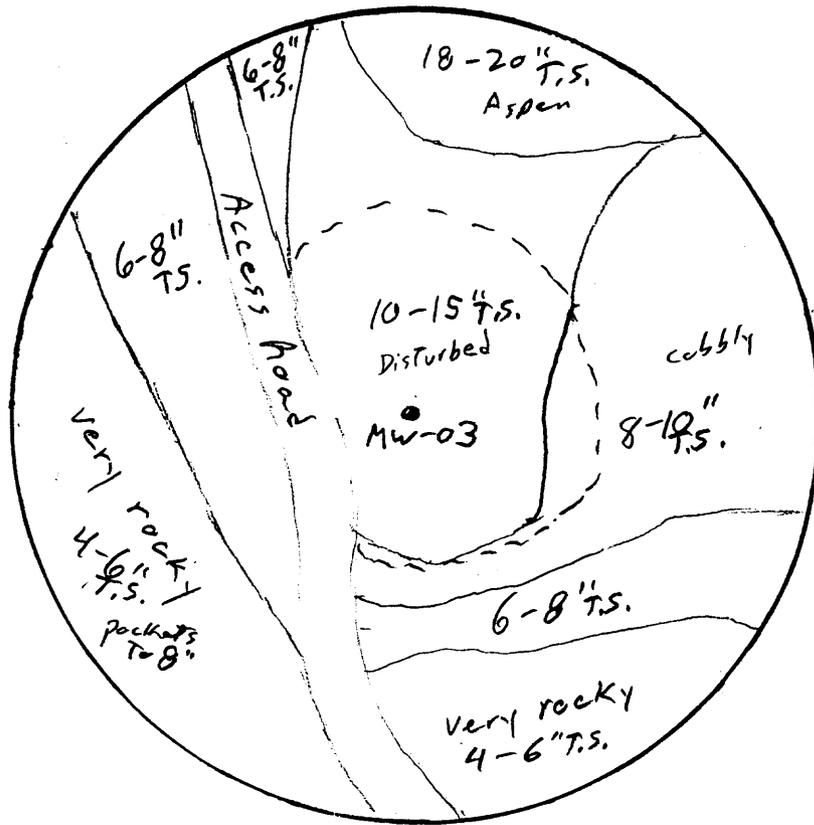
About 6 inches under Ponderosa pine - interspersed with rock and eroded spots.

Very shallow soils and rock outcrop along ridge SW of disturbed area.

5-7-02 DML

Dugout Canyon Mine
Methane Degas Well MW-03

Site Sketch
Approx. 200' radius



Topsoil (T.S.)

--- Disturbed area - Has
10 to 15 inches of Topsoil.
Some mixing and cobbly spots

Very stony ridge to the west and
south

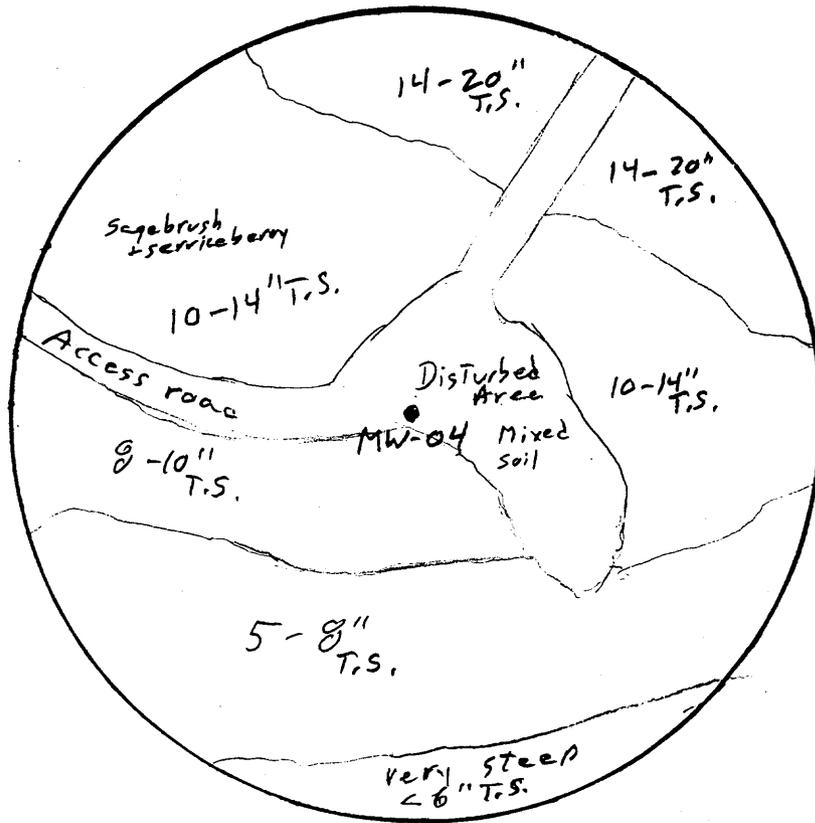
Thick Topsoil under aspen
along north edge (18+")
Cobbly soil along the east side

5-7-02

Dugout Canyon Mine
Methane Degas Well MW-04

Site Sketch

Approx. 200' radius



Topsoil (T.S.)

Thin Topsoil along southern portion
Disturbed area has some Topsoil
mixed in where material is
piled.

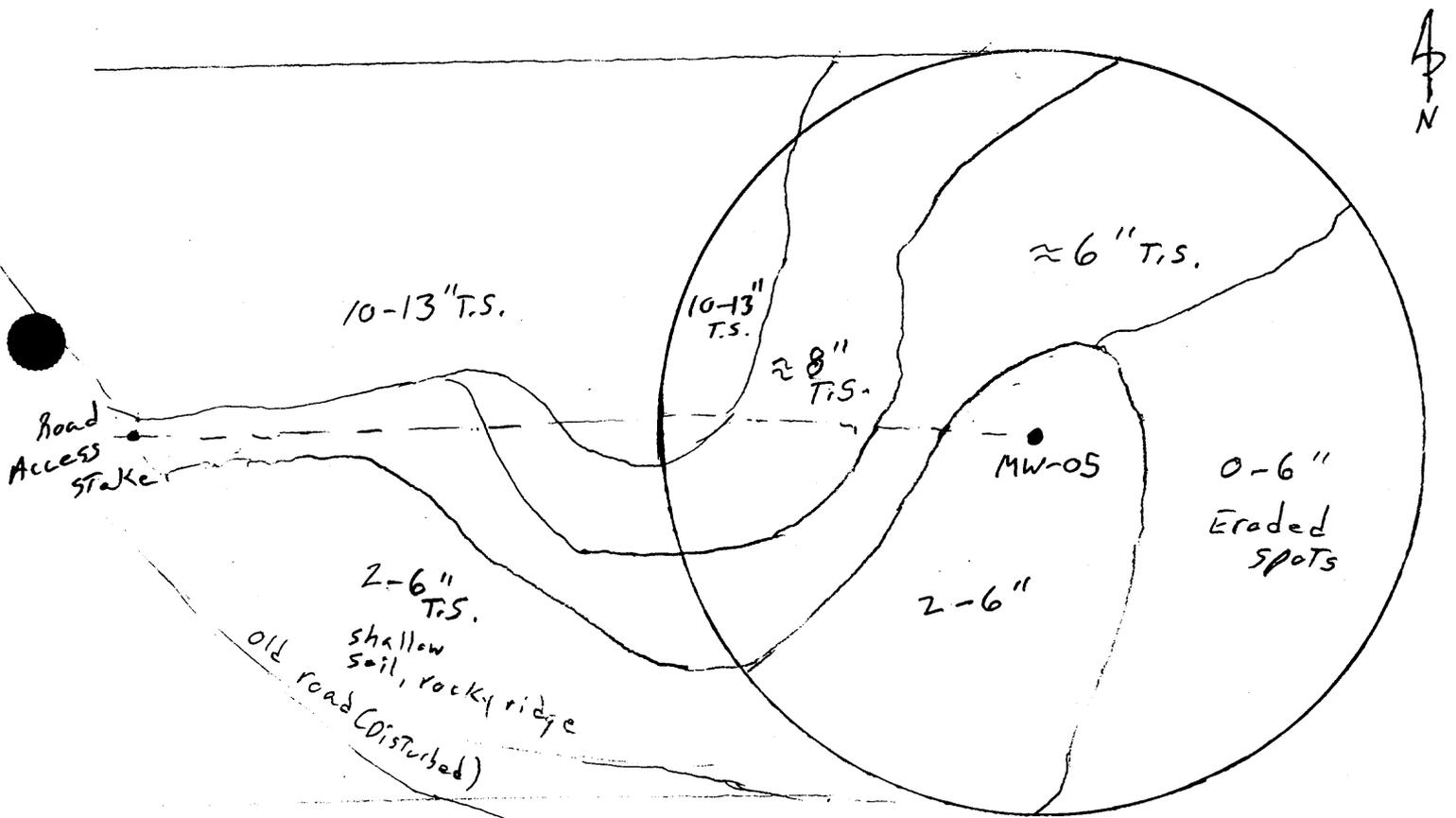
Mostly 8-14" of Topsoil

Deeper soil in swale on the
north edge

5-8-02 DML
 Dugout Canyon Mine
 Methane Degas Well MW-05

Site Sketch

Approx 1" = 100 ft.



Topsoil (T.S.)

Thick Topsoil in the northwest portion (> 10")

Thin Topsoil along ridge and eroded spot along the east slope

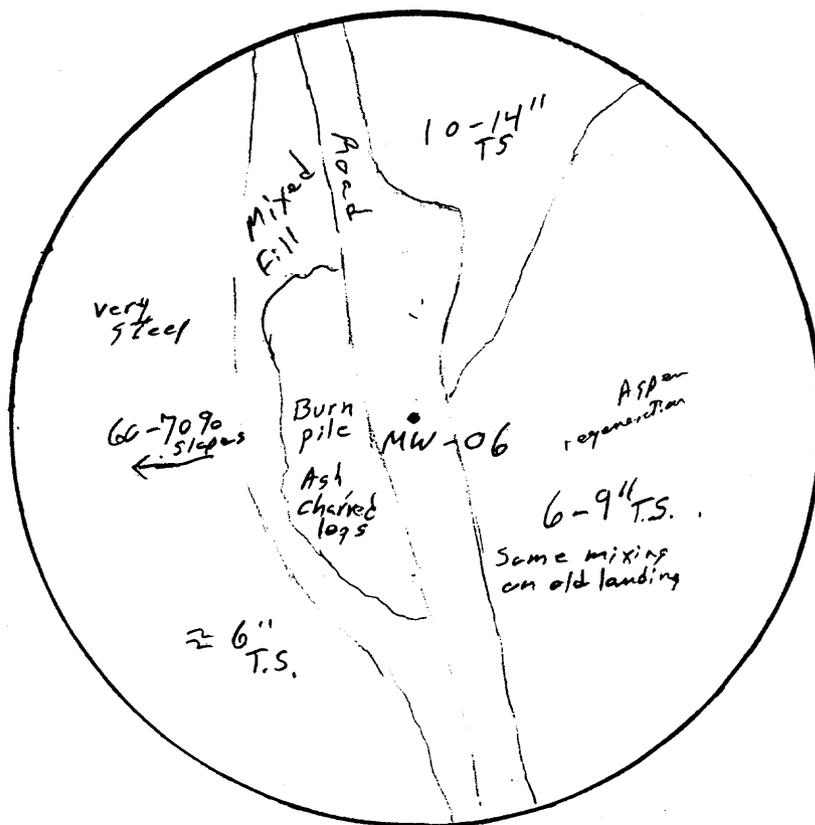
Cobbly soils with 6-8" of Topsoil cover most of the north and west portion of the

--- Approx. access road location

5-8-02 DML

Dugout Canyon Mine
Methane Degas Well MW-06
Site Sketch

Approx. 200' radius



Topsoil (T.S.)

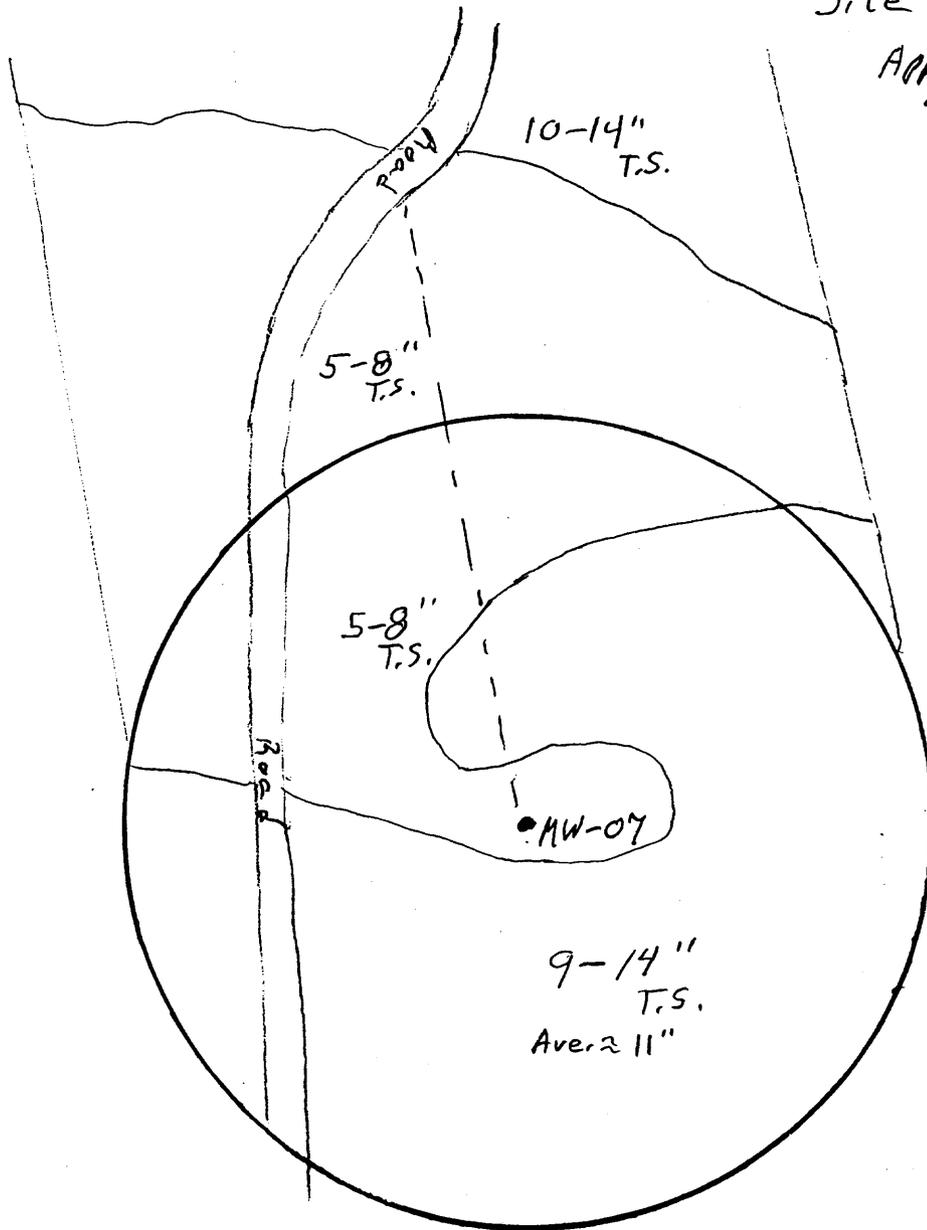
The northeast corner has the thickest topsoil (10-14")

The old landing area east of the road has some mixed soil but about 6 to 9 inches is suitable topsoil.

There is a large burn pile site and very steep slopes on the west half

5-7-02 DML
Dugout Canyon Mine
Methane Degas Well MW-07
Site Sketch

Approx. 200' radius
at well site



Topsoil (T.S.)

--- Access road
location (new)

Reddish brown clayey
subsails are common on
the sites with 5 to 8
inches of topsoil.

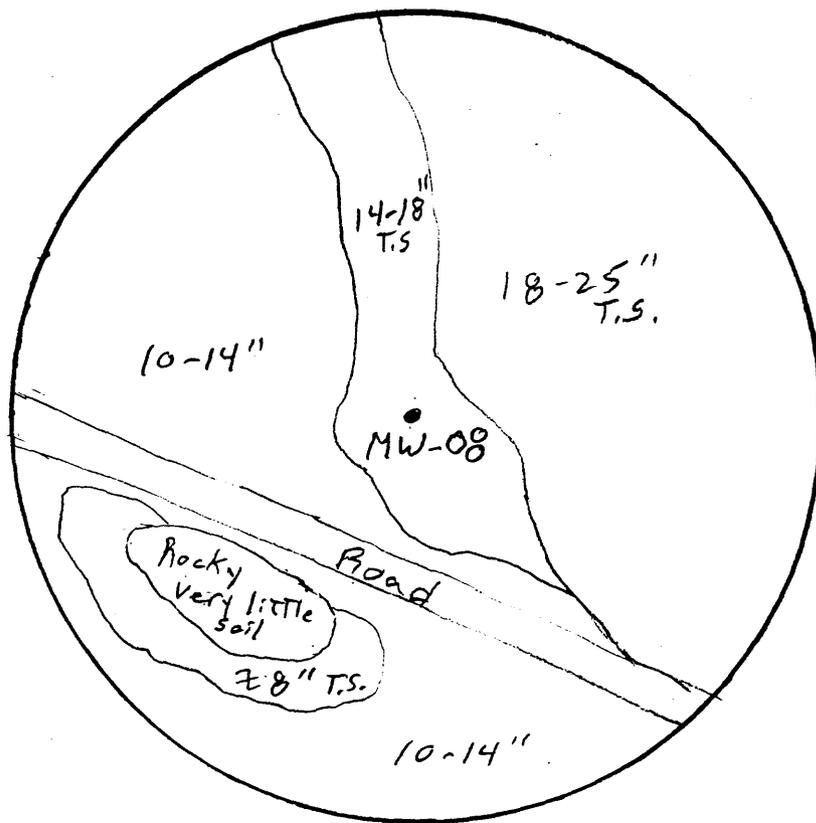
5-7-02 DML

Dugout Canyon Mine

Methane Degas Well MW-08

Site Sketch

Approx. 200' radius



Topsoil (T.S.)

Very thick topsoil on NE $\frac{1}{3}$
($> 18"$)

Very rocky on south side of
the road

Soils with less than 14 inches
of topsoil are very cobbly
and stony.

Appendix A

Soil map unit descriptions from the Soil Survey, Carbon Area, Utah, USDA, Soil Conservation Service, 1988.

7—Beje-Trag complex. This map unit is on gently sloping to sloping plateaus. It is in the Price Canyon and Minniemaud Creek areas. Slopes are 3 to 30 percent. They are 200 to 300 feet long and convex. The present vegetation is mainly mountain big sagebrush, serviceberry, Salina wildrye, and western wheatgrass. Elevation is 7,000 to 9,700 feet. The average annual precipitation is about 16 to 20 inches, the average annual air temperature is 38 to 45 degrees F, and the average freeze-free period is 60 to 100 days.

This unit is 55 percent Beje loam, 3 to 15 percent slopes; 20 percent Trag clay loam, 3 to 30 percent slopes; and 25 percent other soils. The Beje soil is on ridges. The Trag soil is in draws. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are about 8 percent Doney family soils on ridges, 5 percent Trag loam in swales, 8 percent Senchert family soils, 2 percent Rock outcrop, and 2 percent Silas soils. Also included are small areas of a soil that is similar to the Beje soil but has a layer of calcium carbonate accumulation.

The Beje soil is shallow and well drained. It formed in residuum derived dominantly from calcareous sandstone. Typically, the surface layer is brown loam about 6 inches thick. The subsoil, to a depth of 14 inches, is brown clay loam over fractured sandstone. Depth to sandstone ranges from 10 to 20 inches.

Permeability of the Beje soil is moderate. Available water capacity is about 2 to 3 inches. Water supplying capacity is 4 to 6 inches. Effective rooting depth is 10 to 20 inches. The organic matter content of the surface layer is 3 to 5 percent. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is slight.

The Trag soil is very deep and well drained. It formed in alluvium derived dominantly from sandstone and shale. Typically, the surface layer is dark brown clay loam about 5 inches thick. The subsoil is brown and light brown clay loam about 34 inches thick. The substratum to a depth of 60 inches or more is light yellowish brown clay loam.

Permeability of the Trag soil is moderate. Available water capacity is about 10 to 11 inches. Water supplying capacity is 10 to 16 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 3 to 5 percent. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used as rangeland and wildlife habitat.

The potential plant community on the Beje soil is 60 percent grasses, 15 percent forbs, and 25 percent

shrubs. Among the important plants are Salina wildrye, mountain big sagebrush, bluegrass, and slender wheatgrass.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, a planned grazing system, and proper location of water developments. Suitable brush management practices include prescribed burning and chemical spraying.

The suitability of this soil for rangeland seeding is very poor. The main limitations for rangeland seeding are the shallow depth to bedrock and steepness of slope.

The potential plant community on the Trag soil is 60 percent grasses, 10 percent forbs, and 30 percent shrubs. Among the important plants are Salina wildrye, bluegrass, mountain big sagebrush, and snowberry.

If the desirable forage plants are mostly depleted, brush management and seeding can be used to improve the rangeland vegetation. Suitable brush management practices include prescribed burning, chemical spraying, and mechanical treatment.

The suitability of this soil for rangeland seeding is good. Plants suitable for rangeland seeding include all adapted native plants, intermediate wheatgrass, smooth brome, regar brome, slender wheatgrass, and alfalfa. The suitability for grazing is good.

This map unit is in capability subclass VIe, nonirrigated. The Beje soil is in the Mountain Shallow Loam (Mountain Big Sagebrush) range site. The Trag soil is in the Mountain Loam (Saline Wildrye) range site.

62—Midfork family-Comodore complex. This map unit is on mountain slopes. It is along the Book Cliffs and Whitmore and Price Canyons. Slopes are 200 to 300 feet long and are convex. The present vegetation is mainly Douglas-fir, snowberry, and quaking aspen. Elevation is 7,900 to 9,500 feet.

This unit is 50 percent Midfork family bouldery loam, 50 to 70 percent slopes; 20 percent Comodore bouldery loam, 50 to 70 percent slopes; and 30 percent other soils. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are about 15 percent soils that are similar to the Midfork family soil but have a dark-colored surface layer less than 6 inches thick; 10 percent soils that are similar to the Midfork family soil but have a thick surface layer and a layer of calcium carbonate accumulation; and 5 percent Comodore very stony fine sandy loam, moist.

The Midfork family soil is very deep and well drained. It formed in colluvium derived dominantly from sandstone and shale. The average annual precipitation is 20 to 25 inches, the average annual air temperature is 34 to 38 degrees F, and the average freeze-free period is 40 to 60 days.

Typically, the surface is covered with a mat of partially decomposed twigs, leaves, and needles about 2 inches thick. The surface layer is brown bouldery loam about 7 inches thick. The next layer is yellowish brown very channery loam 10 inches thick. Below this to a depth of 60 inches or more is yellowish brown very gravelly loam.

Permeability of the Midfork family soil is moderate. Available water capacity is about 5.5 to 7.0 inches. Water supplying capacity is 10 to 17 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 5 to 10 percent. Runoff is rapid, and the hazard of water erosion is high.

The Comodore soil is shallow and well drained. It formed in colluvium derived dominantly from sandstone, siltstone, and shale. The average annual precipitation is 16 to 20 inches, the average annual air temperature is 38 to 45 degrees F, and the average freeze-free period is 60 to 80 days.

Typically, the surface is covered with a mat of needles and twigs about 1 inch thick. The surface layer is brown bouldery loam about 6 inches thick. The underlying material to a depth of 19 inches is brown very stony loam over sandstone. Depth to sandstone ranges from 10 to 20 inches.

Permeability of the Comodore soil is moderate. Available water capacity is about 1.5 to 2.5 inches. Water supplying capacity is 3 to 5 inches. Effective rooting depth is 10 to 20 inches. The organic matter content of the surface layer is 3 to 5 percent. Runoff is rapid, and the hazard of water erosion is high.

This unit is used for wildlife habitat and woodland.

The potential vegetation on this unit includes an overstory of Douglas-fir with a canopy of 90 percent. The understory vegetation is 10 percent grasses, 5 percent forbs, and 85 percent shrubs. Among the important plants are sedge, mountainlover, and snowberry.

The site index for Douglas-fir is 50. Average yield is about 27,200 board feet per acre for 100-year-old trees 12 inches in diameter or more.

This unit is severely limited for the harvesting of wood products because of the steepness of slope and the hazard of erosion.

This map unit is in capability subclass VIle, nonirrigated, and in the High Mountain Very Steep Loam (Douglas-fir) woodland site.

84—Podo-Rock outcrop complex. This map unit is on mountain slopes between the Green River and Range Creek. Slopes are 50 to 70 percent, 300 to 400 feet long, and plane to slightly convex. They have south aspect at lower elevations and north aspect at higher elevations. The present vegetation is mainly pinyon, Utah juniper, Salina wildrye, Mormon-tea, and Douglas-fir. Elevation is 5,200 to 8,900 feet. The average annual precipitation is about 14 to 16 inches, the average annual air temperature is 42 to 45 degrees F, and the average freeze-free period is 100 to 120 days.

This unit is 50 percent Podo very bouldery sandy loam, dry, 50 to 70 percent slopes; 30 percent Rock outcrop; and 20 percent other soils. The Podo soil is on mountain slopes, and the areas of Rock outcrop occur as nearly vertical ledges and cliffs. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are about 10 percent Cabba bouldery loam, 40 to 70 percent slopes; 5 percent Beje very gravelly fine sandy loam; and 5 percent Guben soils that have slopes of 50 to 80 percent. These included soils are intermingled throughout the unit.

The Podo soil is shallow and well drained. It formed in colluvium and residuum derived dominantly from sandstone and shale. Typically, the surface layer is brown very bouldery sandy loam about 5 inches thick. The underlying material to a depth of 12 inches is strong brown gravelly sandy loam. Depth to sandstone ranges from 10 to 20 inches.

Permeability of the Podo soil is moderately rapid. Available water capacity 1 to 2 inches. Water supplying capacity is 2 to 4 inches. Effective rooting depth is 10 to 20 inches. The organic matter content of the surface layer is 1 to 3 percent. Runoff is rapid, and the hazard of water erosion is high.

Rock outcrop consists of areas of exposed bedrock, dominantly sandstone.

This unit is used for wildlife habitat.

The potential vegetation on the Podo soil includes an overstory of pinyon, Utah juniper, and Douglas-fir with a canopy of 50 percent. The understory vegetation is 10 percent grasses, 15 percent forbs, and 75 percent shrubs. Among the important plants are birchleaf mountainmahogany, Utah serviceberry, bluegrass, and Salina wildrye.

The site index for pinyon and Utah juniper is 37. Average yield is 6 cords of wood per acre. The potential for the production of posts or Christmas trees is poor. Limitations for the harvesting of wood products are severe because of the steepness of slope, the hazard of erosion, and rock fragments on the surface.

This unit is not grazeable by livestock because of the steepness of slope and the bouldery surface layer.

The Podo soil is in capability subclass VIle, nonirrigated, and the Rock outcrop is in capability subclass VIlls. The Podo soil is in the Upland Very Steep Shallow Loam (Pinyon-Utah Juniper) woodland site. Rock outcrop is not placed in a range site.

97—Rottulee family-Trag complex. This map unit is on mountain slopes and canyon sides. It is in the vicinity of Whitmore and Emma Parks. Slopes are 30 to 60 percent. Elevation is 7,100 to 8,700 feet. The average annual precipitation is about 16 to 20 inches, the average annual air temperature is 38 to 45 degrees F, and the average freeze-free period is 60 to 100 days.

This unit is 60 percent Rottulee family loam, 30 to 60 percent slopes; 20 percent Trag stony loam, 30 to 60 percent slopes, eroded; and 20 percent other soils.

About 30 percent of the acreage of this unit has slopes of 30 to 50 percent. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are about 8 percent Trag clay loam, 5 percent Curecanti family soils, and small areas of Rock outcrop, Badland, and Senchert loam, 30 to 50 percent slopes.

The Rottulee family soil is moderately deep and well drained. It formed in colluvium and residuum derived dominantly from sandstone and shale. Slopes are 50 to 100 feet long and are convex. The present vegetation is serviceberry, Salina wildrye, and mountain big sagebrush. Typically, the surface layer is reddish brown loam about 2 inches thick. The upper 13 inches of the subsoil is reddish brown loam and clay loam, and the lower 8 inches is reddish brown gravelly silty clay loam. The substratum to a depth of 34 inches is reddish brown gravelly silt loam over shale. Depth to shale ranges from 20 to 40 inches.

Permeability of the Rottulee family soil is moderate. Available water capacity is about 5 to 6 inches. Water supplying capacity is 7 to 10 inches. Effective rooting

depth is 20 to 40 inches. The organic matter content of the surface layer is 3 to 5 percent. Runoff is rapid, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate.

The Trag soil is very deep and well drained. It formed in colluvium derived dominantly from sandstone and shale. Slopes are 75 to 100 feet long and are concave. The present vegetation is mainly mountain big sagebrush, Salina wildrye, snowberry, serviceberry, and scattered Douglas-fir. Typically, the surface layer is dark grayish brown stony loam about 10 inches thick. The subsoil is dark grayish brown clay loam about 26 inches thick. The substratum to a depth of 60 inches or more is dark grayish brown and very pale brown clay loam.

Permeability of the Trag soil is moderate. Available water capacity is about 9.0 to 10.5 inches. Water supplying capacity is 10 to 16 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 3 to 5 percent. Runoff is rapid, and the hazard of water erosion is high.

This unit is used for wildlife habitat and rangeland.

The potential plant community on the Rottulee family soil is 20 percent grasses, 10 percent forbs, and 70 percent shrubs. Among the important plants are birchleaf mountainmahogany and serviceberry.

For critical erosion control, small areas can be mechanically treated and seeded. Plants that may be suitable for critical area seedings are those native to the soil and intermediate wheatgrass, orchardgrass, smooth brome, ladak alfalfa, Lewis flax, small burnet, and yellow sweetclover.

This soil is not grazeable by livestock because of the steepness of slope.

The potential plant community on the Trag soil is 60 percent grasses, 10 percent forbs, and 30 percent shrubs. Among the important plants are Salina wildrye, bluegrass, mountain big sagebrush, and snowberry.

If the desirable forage plants are mostly depleted, brush management and seeding can be used to improve the rangeland vegetation. Suitable brush management practices include prescribed burning, chemical spraying, and mechanical treatment.

The suitability of the Trag soil for rangeland seeding is good. Plants suitable for seeding include those native to this soil and intermediate wheatgrass, smooth brome, regar brome, slender wheatgrass, and alfalfa. The suitability for grazing is good.

This unit is in capability subclass VIIe, nonirrigated. The Rottulee family soil is in the Mountain Very Steep Stony Loam (Browse) range site. The Trag soil is in the Mountain Loam (Saline Wildrye) range site.

EIS ENVIRONMENTAL & ENGINEERING CONSULTING STAFF



Daniel M. Larsen
Soil Scientist/ Soil Management Specialist

Mr. Larsen (B.S. Conservation of Natural Resources, Wisconsin State University; & M.S. Soil Science, University of Minnesota) has been a professional soil scientist for over 30 years. Dan served as a teaching and research assistant, with emphasis on soil fertility evaluation. After graduation he was a Soil Scientist with the USDA, Forest Service until 1997. Assignments included the Tongass National Forest in Alaska; Superior National Forest in Minnesota; Wayne-Hoosier National Forest in Indiana and Ohio; and the Manti-La Sal National Forest in Utah and Colorado. Dan served as a soils and reclamation specialist on an inter-agency environmental task force on coal in Salt Lake City, Utah which developed the EIS for proposed mining in Central and Southern Utah. Other work includes Forest Service projects and cooperative soil surveys with the Natural Resources Conservation Service. He authored the Soil Resource Inventory of the Deschutes National Forest, Oregon, a soil inventory of 1.8 million acres, and participated in the field work for the preparation of the Soil Survey of Canyonlands Area, Utah, Soil Survey of the Fairfield-Nephi Area, Utah, and the Soil Survey of the San Miguel Area, Colorado manuals.

Dan's experience has covered a wide array of activities related to soil management and soil survey. He has served as an interdisciplinary team member on numerous projects to develop project plans and conduct environmental analyses. Activities included assessment of timber harvest and reforestation, watershed evaluation and improvement, range management, wildlife habitat improvement, minerals exploration and development, mine reclamation, recreation use, land management planning, and ecosystems classification. His interests lie in total resource management, with an emphasis on soil and associated environmental factors in perspective to understand environmental relationships and identify capabilities, limitations, and management options of the land.

CHAPTER 3

BIOLOGY

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- Attachment 3-1** Vegetation Inventory
- Attachment 3-2** Threatened, Endangered, and Sensitive Species Inventory Report
- Attachment 3-3** Assessing the Impact of Scale on the Performance of GIS Habitat Models
For Mexican Spotted Owls in Utah

LIST OF PLATES

- Plate 3-1** Dugout Canyon Mine Raptor Survey 2002
- Plate 3-2** Vegetation Reference Areas

310 INTRODUCTION

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

311 Vegetative, Fish and Wildlife Resources

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

312 Potential Impacts to Vegetative, Fish, and Wildlife Resources

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

313 Description of Reclamation Plan

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

320 ENVIRONMENTAL DESCRIPTION

321 Vegetation Information

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

321.100 Plant Communities Within the Proposed Permit Area

During June 2002, the de-gasification well sites were surveyed by Melvin Coonrod, David Steed, and M. Dean Stacy of Environmental Industrial Services (EIS). The report and survey for the areas are included in Attachment 3-1.

321.200 Land Productivity Prior to Mining

Ocular estimations for productivity and percent over-story are shown in Table 3-1.

TABLE 3-1
Productivity and Percent Over-story

Well No.	Productivity (lbs.)	Over-Story
MW-06	100	Spruce/fir
MW-08	300	Zero

322 Fish and Wildlife Information

A summary of the fish and wildlife resource information for the permit and adjacent areas is contained in Sections 322.100 through 322.200 of the approved M&RP.

322.100 Level of Detail

The scope and level of detail within the approved M&RP are sufficient to design the protection and enhancement plan for wildlife and fish in the area.

322.200 Site-Specific Resource Information

Raptors - An aerial raptor nest survey was done in the Pine Canyon area by the Utah Division of Wildlife Resource (DWR) and CFC personnel in the Spring of 2002, refer to Plate 3-1. In SW 1/4 of Section 16, Township 13 South, Range 12 East, two inactive Golden Eagle nests were found. In the NE 1/4 of Section 22, Township 13 South, Range 12 East, one inactive Golden Eagle nest was found.

A raptor survey will be conducted each year that the wells are in operation.

Bats - A bat survey was conducted on 4 and 5 June 2002, JBR Environmental Consultants found suitable bat habitat in the area. The report on the bat survey will be included in the Dugout Canyon Mine 2002 Annual Report. The survey found bats in the area but no threatened or endangered bat species were found.

Mexican Spotted Owl - In the Summer of 2002, an aerial survey was conducted in the Pine Creek area above the Dugout Canyon Mine. The survey members included Chris Colt-DWR, Dave Mills-Price Field Office Bureau of Land Management, Mel Coonrod-Environmental Industrial Service, and Dr. David W. Willey-High Desert Research, Bozeman Montana. Dr. Willey stated in his report that he believes that the Pine Creek and Pine Canyon area represent unsuitable habitat for the spotted owl. He concludes that the bulk of the area does not warrant surveys for the Mexican Spotted Owls due to an overall lack of suitable habitat. Both well sites are within the unsuitable habitat area and do not need to be surveyed. The report is included in Attachment 3-3.

Threatened and Endangered Plant and Wildlife Species - There are no known threatened and endangered plant and wildlife species within the sites planned for de-gasification wells. A threatened, endangered, and sensitive species survey report is included in Attachment 3-2.

322.300 Fish and Wildlife Service Review

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

323 Maps and Aerial Photographs

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

323.100 Location and Boundary of Proposed Reference Area

Reference areas for the de-gasification wells were not established during the vegetative study conducted in the Summer of 2002. A reference area will be developed adjacent to the well prior to drilling, during the growing season of 2003 and will be placed on the vegetation drawing, Plate 3-2. Productivity of the reference area will be based on the Division's 1992 Vegetation Guidelines and the Natural Resources Conservation Service evaluate productivity estimates.

323.200 Elevation and Locations of Monitoring Stations

Refer to Section 323.200 of the approved M&RP.

323.300 Facilities for Protection and Enhancement

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

323.400 Vegetation Type and Plant Communities

Vegetative types and plant communities are outlined in the vegetative report in Attachment 3-1. Plate 3-1 in the approved M&RP gives details of the vegetation types located adjacent to the well sites.

330 OPERATION PLAN

331 Measures Taken to Disturb the Smallest Particle Area

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

332 Description of Anticipated Impacts of Subsidence

No subsidence is anticipated with the installation of the de-gasification wells

333 Plan to Minimize Disturbances and Adverse Impacts

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

- Minimizing the total area of disturbance,
- Design, construction, and operation of the well sites to minimize biological impacts including

- barriers to wildlife movement,
- Exclusion of wildlife from potentially hazardous areas, and
- Reclamation of disturbed areas when they are no longer needed.

333.100 Minimize Disturbance to Endangered or Threatened Species

Dugout Canyon will apply all methods necessary to minimize disturbances or any adverse effects to threatened or endangered species of special interest.

333.200 Species and Habitats

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

333.300 Protective Measures

Refer to Section 333.300 of the approved M&RP.

340 RECLAMATION PLAN

341 Revegetation

Revegetation of the sites will occur in two phases. The first phase is to redistribute topsoil and seed the well area not needed for access to the gas exhaust blower. The second phase will consist of plugging the well and distributing the remaining topsoil and seeding.

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

The long-term goals are to establish useful, productive range and wildlife habitat. These goals will be attained through the selection and placement of desirable and productive plant species and a commitment to monitor

and maintain revegetated areas throughout the bond liability period.

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

341.100 Schedule and Timetable

The reclamation timetable as shown in Figure 5-7 of this submittal and reclamation monitoring schedule is found in Chapter 3, Table 3-3 of the approved M&RP.

341.200 Descriptions

Species and Amounts of Seed - The well sites will be planted with the seed mixes listed in Table 3-2. The seed mix will be used in both contemporaneous and final reclamation phases. The seed will be incorporated with mulch and applied by hydroseeding.

Methods Used for Planting and Seeding - The de-gasification sites will be graded and reclaimed. Refer to Chapter 5 for discussion of the sequence of the construction and reclamation of the sites.

The area will be graded to final contour, then ripped to relieve compaction. The depth of ripping will be from 18 to 24 inches. Following ripping, topsoil will be applied to the ripped surface and left in a roughened state.

Mulching Techniques - Organic mulch will be applied at the rate of 2,000 pounds per acre and anchored with a tackifier.

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

Measures Proposed for Revegetation Success - Refer to Section 356.

341.300 Greenhouse Studies, Field Trials or Other Equivalent Studies

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

342 Fish and Wildlife

Prior to collecting and stockpiling topsoil, rock and woody vegetation will be removed and piled on disturbed area perimeter. The rocks and woody vegetation piles will provide cover and protection from adverse weather and predators for small mammals and upland game birds. These structures will provide perches for song birds and small raptors species.

342.100 Enhancement Measures

No enhancements are planned other than those described in this section.

342.200 Plants Used for Wildlife Habitat

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

Cover - The goal is to establish plant species which will provide sufficient cover for wildlife of the area.

Ability to Support and Enhance - Refer to the Section 342 in the approved M&RP.

342.300 Cropland

Cropland is not a postmining land use.

342.400 Residential, Public Service, and Industrial Land Use

No residential, industrial or public service use is planned.

350 PERFORMANCE STANDARDS

351 General Requirements

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

352 Contemporaneous Reclamation

Reclamation activities prior to final reclamation will, to the extent feasible, be preformed contemporaneously with construction operations. In Chapter 5 see Figure 5-7.

**Table 3-2
Reclamation Seed Mix**

<u>SPECIES</u>	<u># pls/acre</u>	<u># pls/sq. ft.**</u>
Grasses, Forbs, and Shrubs		
Blue Grama(724,000 seeds/lb)*	2.0	33
Needle & Thread(150,000 seeds/lb)*	1.0	3
Palmer Penstemon(610,000 seeds/lb)*	1.0	14
Sandberg Bluegrass(1,100,00 seeds/lb)*	1.0	25
Western Wheatgrass(114,000 seeds/lb)*	3.0	8
Wyoming Big Sage(2,500,000 seeds/lb)*	<u>0.5</u>	<u>29</u>
TOTAL	8.5	112

Transplants and/or seedings per acre

Snowberry*	125
Woods Rose*	125
Oregon Grape*	125
Current*	<u>125</u>
TOTAL	500

* Native Plants

** Rounded nearest whole seed

353 Revegetation: General Requirements

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

353.100 Vegetative Cover

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

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

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

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

353.200 Reestablished Plant Species

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

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

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

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

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

353.300 Vegetative Exception

Dugout Canyon does not require vegetative exception at this time.

353.400 Cropland

The permit area contains no land designated as cropland.

354 Revegetative: Timing

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

355 Revegetation: Mulching and Other Soil Stabilizing Practices

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

356 Revegetation: Standards for Success

The success standards will be developed once reference areas have been established and prior to site disturbance.

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

356.100 Success of Revegetation

The success standards for approval will be judged on the effectiveness of the vegetation for postmining land use, the extent of cover on each de-gasification well site compared to the success standard outlined in Section 356.

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

Standards for Success - The standards for success will include criteria representative of undisturbed lands in the area of the permit and as discussed in Section 356.200.

356.200 Standards for Success

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

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

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

Fish and Wildlife Habitat - The success of revegetation for wildlife habitat will be determined on the basis of tree and shrub stocking and vegetative ground cover. Cover success will not be less than that required to achieve the approved postmining land use.

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

Previously Disturbed Areas - Neither of the sites have been previously disturbed. The sites have been used as livestock open range, and wildlife habitat.

356.300 Siltation Structures

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

356.400 Removal of Siltation Structures

The land on which siltation structures are located will be revegetated in accordance with the reclamation plan discussed in Section 353 and 357.

357 Revegetation: Extended Responsibility Period

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

357.100 Extended Period Begins

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

357.200 Vegetation Parameters

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

357.300 Husbandry Practices

Dugout Canyon will comply with Division approved husbandry practices which will be normal conservation practices within the region for the well sites. These practices may include disease, pest, and vermin control: and any pruning, seeding, and transplanting required.

358 Protection of Fish, Wildlife, and Related Environmental Values

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

358.100 Existence of Endangered or Threatened Species

The well sites will not be constructed or operated where they might jeopardize the existence of any endangered or threatened species. A threatened, endangered, and sensitive species survey report is included in Attachment 3-2.

Any state or federally listed endangered or threatened species will be reported to the Division upon its discovery. Lists of threatened, endangered, and sensitive species are included as Tables 3-1 and 3-3 of the approved M&RP.

358.200 Bald and Golden Eagles

Refer to Section 358.200 of approved M&RP.

358.300 Taking of Endangered or Threatened Species

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

358.400 Replacement of Wetland or Riparian Vegetation

The sites contain no wetland or riparian vegetation.

358.500 Manmade Wildlife Protection Measure

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

Potential Barriers - No potential barriers will exist at any of the well sites, except for the perimeter fence.

Pond Protection - See Section 241.

Canyon Fuel Company, LLC
Dugout Canyon Mine

Methane De-Gasification Amendment
March 2003

Reference:

Utah State University. 1995. *Forage and Conservation Planting Guide, Appendix C*, Compiled by the Utah State Interagency Plant Materials Committee, Published by SARE Western Region.

**Canyon Fuel Company, LLC
Dugout Canyon Mine**

**Methane De-Gasification Amendment
March 2003**

**Attachment 3-1
Vegetation Inventory**

ATTACHMENT 3-1

VEGETATION INVENTORY

**CANYON FUEL COMPANY, LLC
DUGOUT CANYON MINE METHANE DEGAS WELLS
(MW-01 THROUGH MW-08)**

**CONDUCTED
JUNE 4, 2002**

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Introduction

The Dugout Canyon Mine is located east of Wellington in Dugout Canyon, Carbon County, Utah. The Dugout Canyon Mine is owned and operated by Canyon Fuel Company, LLC. This report contains the vegetation inventory for the eight proposed methane degas wells located on the ridge atop the mines current underground operations. The areas were surveyed June 4th, 2002 by Melvin Coonrod, David Steed and M. Dean Stacy of EIS Environmental & Engineering Consulting.

Methodology

During the vegetation inventory information acquired was recorded onto inventory field sheets (See Attachment 1). Sampling of vegetation was accomplished by surveying a combined 15 transects for the eight proposed wells with each transect spanning 100 feet (See Figure 1). Each transect associated with the proposed development was randomly placed and inventoried on 10 foot intervals along the 100 foot transect, giving each transect a total of 100 sampling points. Each area surveyed was thoroughly inspected and given an estimated total above ground biomass for herbaceous materials. In areas that contained trees, an ocular estimation for total canopy cover.

Findings

The proposed area supports relatively simple plant communities with a few conspicuous dominant vegetation types. The area proposed for development is comprised of all vegetation life forms including trees, shrubs, grasses and forbs. For a complete list of species intercepted within the transects see Table 1. Total ground cover, which comprised all herbaceous species, woody species and litter was 67 percent, while woody plant cover alone totaled 22 percent.

Ocular estimations for productivity and percent overstory were also recorded during this survey. Results for proposed location MW-04 and access route were 300 pounds per acre, and zero percent overstory. MW-03 was estimated at 400 pounds per acre and zero percent overstory. MW-08 was estimated at 300 pounds per acre and zero percent overstory. Ocular estimates for MW-07 resulted in a 90 percent aspen overstory for transect number six and 20 percent spruce/fir overstory for transect number seven. Productivity for this area was estimated at 100 pounds per acre. MW-02 and MW-06 shared similar productivity values of 100 pounds per acre and ten percent spruce fir overstory. Transects 10 and 11 associated with proposed well location MW-01 had approximately 100 pounds per acre present and zero percent overstory. Transects 12 and 13 associated with proposed well location MW-05 had approximately 380 pounds per acre and zero percent overstory. Transects 14 and 15 associated with access routes to proposed well locations MW-01 and MW-05 had approximately 150 pounds per acre present and zero percent overstory.

Observations

It is important to note that the majority (six) of the proposed locations had been previously disturbed and reclaimed, as evidenced by the non-native species that dominated the majority of the sites. All of the locations are accessible from existing roads that will require only minimal upgrade to facilitate drill access. In addition it was apparent that the overall area has experienced drought conditions over the last two to three years, this in combination with evidence of heavy domestic livestock grazing is reflected in lower than expected productivity estimates. The majority of the locations having been reseeded with a desirable seed mix for livestock and has resulted in concentrated by livestock at those sites.

Table 1
Canyon Fuel Company
Eight Well Degas Percentage Ground Cover Data

Well Name	Common Name	Scientific Name	Transect Numbers			SUM	
			10	11	12		
MW-01	Alfalfa	<i>Meticago sp</i>	0	0	8	8	
	Cicer milkvetch	<i>Astragalus cicer</i>	0	1	1	2	
	Dandelion	<i>Taraxacum officinale</i>	0	1	0	1	
	Daisy sp	<i>Erigeron sp</i>	0	0	1	1	
	Needle & Thread	<i>Stipa comata</i>	0	5	0	5	
	Penstemon	<i>Penstemon sp</i>	0	0	1	1	
	Salina wildrye	<i>Elymus salinus</i>	4	0	0	4	
	Sandberg bluegrass	<i>Poa secunda</i>	3	11	0	14	
	Wheat grass	<i>Agropyron sp</i>	3	2	0	5	
	Winter fat	<i>Ceratoides lanata</i>	0	0	1	1	
	Total Species		10	20	12	42	
	Physical Characteristics						
	Bare ground	<i>Soil surface</i>	51	42	39	132	
	Litter	<i>Leaves, Stems, O.M.</i>	28	25	16	69	
	Rock	<i>Rock</i>	1	5	10	16	
	Total Physical Characteristics		80	72	65	217	
	Trees/Shrubs						
	Artemesia tridentata	<i>Wyoming big sage</i>	10	8	23	41	
	MW-02			8			
		Alfalfa	<i>Meticago sp</i>	1			1
Needle & Thread		<i>Stipa comata</i>	3			3	
Wheat grass		<i>Agropyron sp</i>	7			7	
Total Species			11			11	
Physical Characteristics							
Bare ground		<i>Soil surface</i>	64			64	
Litter		<i>Leaves, Stems, O.M.</i>	15			15	
Rock		<i>Rock</i>	9			9	
Total Physical Characteristics			88			88	
Trees/Shrubs							
Snowberry	<i>Symphoricarpos oreophilus</i>	1			1		

MW-03

Blue grama	<i>Bouteloua gracilis</i>	<u>4</u>
Dandelion	<i>Taraxacum officinale</i>	13
Needle & Thread	<i>Stipa comata</i>	1
Wheat grass	<i>Agropyron sp</i>	8
Total Species		29

Physical Characteristics

Bare ground	<i>Soil surface</i>	18
Litter	<i>Leaves, Stems, O.M.</i>	43
Total Physical Characteristics		61

Trees/Shrubs

Artemesia tridentata	<i>Wyoming big sage</i>	7
Snowberry	<i>Symphoricarpos oreophilus</i>	3

MW-04

Blue grama	<i>Bouteloua gracilis</i>	<u>1</u>	<u>2</u>	<u>3</u>
Cicer milkvetch	<i>Astragalus cicer</i>	6	5	6
Dandelion	<i>Taraxacum officinale</i>	0	0	2
Daisy sp	<i>Erigeron sp</i>	3	1	0
Lupine	<i>Lupinus sp</i>	0	0	3
Penstemon	<i>Penstemon sp</i>	0	0	2
Phlox sp	<i>Phlox sp</i>	1	0	0
Wheat grass	<i>Agropyron sp</i>	0	0	2
Total Species		4	0	5

Physical Characteristics

Bare ground	<i>Soil surface</i>	8	2	28
Litter	<i>Leaves, Stems, O.M.</i>	22	8	28
Rock	<i>Rock</i>	6	2	2
Total Physical Characteristics		36	12	58

Trees/Shrubs

Artemesia tridentata	<i>Wyoming big sage</i>	45	79	20
Rubber rabbitbrush	<i>Chrysothammus nauseosus</i>	5	0	2
Snowberry	<i>Symphoricarpos oreophilus</i>	0	3	0

13
1
8
7
29

18
43
61

7
3

17
2
4
3
2
1
2
9
40

38
58
10
106

144
7
3

MW-05

		<u>13</u>	<u>14</u>	<u>15</u>
Alfalfa	<i>Meticago sp</i>	8	9	8
Cryptantha sp	<i>Cryptantha sp.</i>	1	0	0
Dandelion	<i>Taraxacum officinale</i>	0	1	0
Daisy sp	<i>Erigeron sp</i>	0	0	1
Wheat grass	<i>Agropyron sp</i>	1	0	2
Total Species		10	10	11

Physical Characteristics

Bare ground	<i>Soil surface</i>	31	35	40
Litter	<i>Leaves, Stems, O.M.</i>	26	31	26
Rock	<i>Rock</i>	14	11	6
Total Physical Characteristics		71	77	72

Trees/Shrubs

Artemesia tridentata	<i>Wyoming big sage</i>	17	9	13
Rubber rabbitbrush	<i>Chrysothamnus nauseosus</i>	2	4	4

MW-06

		<u>9</u>
Alfalfa	<i>Meticago sp</i>	2
Current	<i>Ribes sp</i>	2
Oregon grape	<i>Mahonia repens</i>	4
Sandberg bluegrass	<i>Poa secunda</i>	2
Wheat grass	<i>Agropyron sp</i>	5
Total Species		15

Physical Characteristics

Bare ground	<i>Soil surface</i>	38
Litter	<i>Leaves, Stems, O.M.</i>	19
Rock	<i>Rock</i>	8
Total Physical Characteristics		65

Trees/Shrubs

Snowberry	<i>Symphoricarpos oreophilus</i>	7
Woods Rose	<i>Rosa woddsi</i>	13

25
1
1
1
3
31
106
83
31
220
39
10

2
2
4
2
5
15
38
19
8
65
7
13

MW-07

		<u>6</u>	<u>7</u>
Blue grama	<i>Bouteloua gracilis</i>	1	0
Dandelion	<i>Taraxacum officinale</i>	3	0
Oregon grape	<i>Mahonia repens</i>	2	4
Sandberg bluegrass	<i>Poa secunda</i>	6	3
Wheat grass	<i>Agropyron sp</i>	11	9
Yarrow	<i>Achillea sp</i>	1	0
<u>Total Species</u>		24	16

Physical Characteristics

Bare ground	<i>Soil surface</i>	7	0
Litter	<i>Leaves, Stems, O.M.</i>	61	57
<u>Total Physical Characteristics</u>		68	57

Trees/Shrubs

Douglas fir	<i>Pseudotsuga menziesii</i>	0	3
Snowberry	<i>Symphoricarpos oreophilus</i>	7	24
Aspen	<i>Populus tremuloides</i>	1	0

MW-08

		<u>5</u>	
Blue grama	<i>Bouteloua gracilis</i>	17	
Dandelion	<i>Taraxacum officinale</i>	3	
Needle & Thread	<i>Stipa comata</i>	1	
Penstemon	<i>Penstemon sp</i>	1	
Phlox sp.	<i>Phlox sp</i>	5	
Sedge	<i>Carex sp.</i>	1	
Wheat grass	<i>Agropyron sp</i>	5	
<u>Total Species</u>		33	

Physical Characteristics

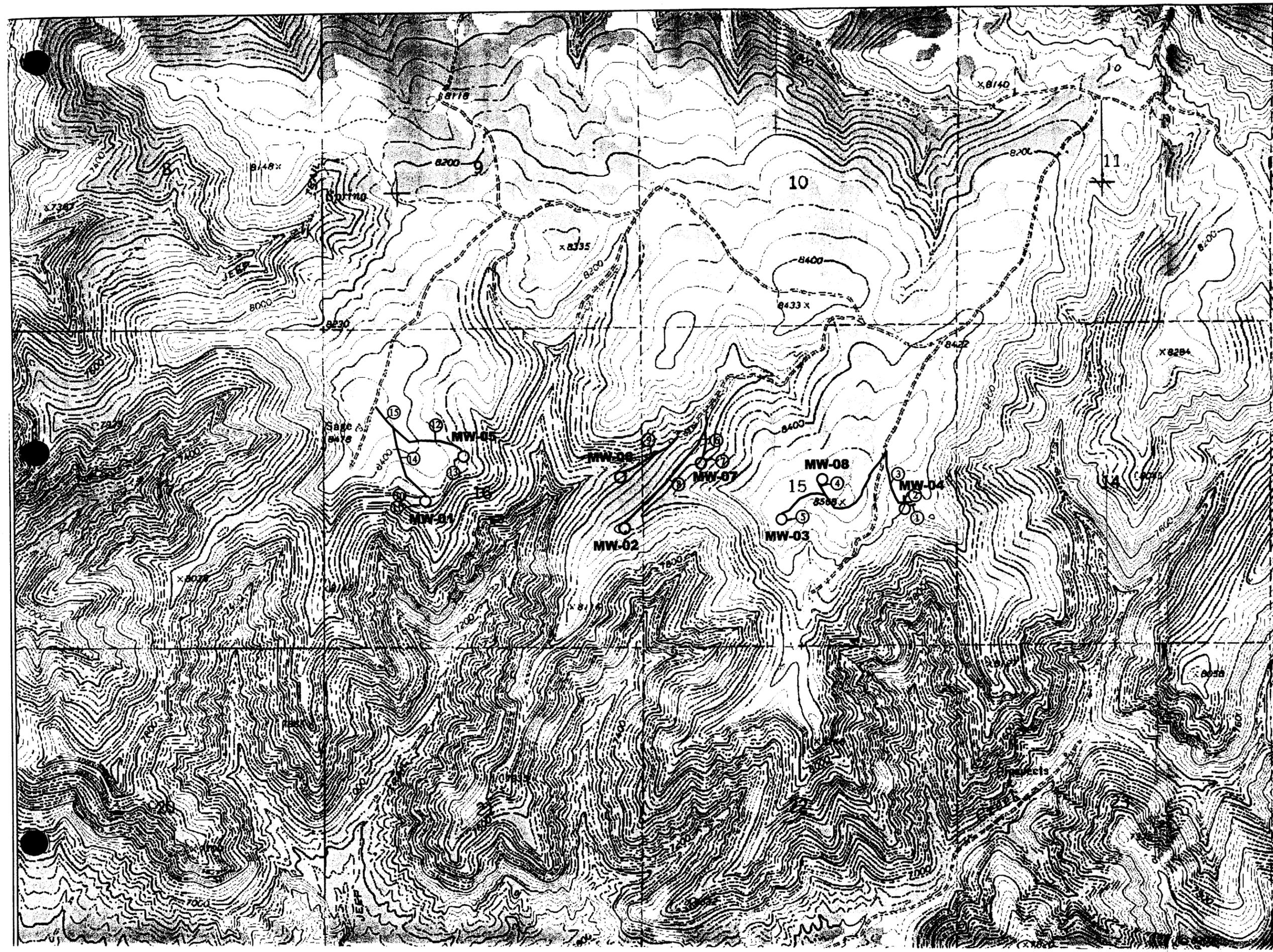
Bare ground	<i>Soil surface</i>	13	
Litter	<i>Leaves, Stems, O.M.</i>	35	
<u>Total Physical Characteristics</u>		48	

Trees/Shrubs

Artemesia tridentata	<i>Wyoming big sage</i>	17	
Snowberry	<i>Symphoricarpos oreophilus</i>	2	

1
3
6
9
20
1
40
7
118
125
3
31
1

17
3
1
1
5
1
5
33
13
35
48
17
2



LEGEND

- PROPOSED DE-GAS WELLS
- PROPOSED ACCESS ROUTE
- - - VEGETATION TRANSECT
- ① TRANSECT NUMBER

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T13S, R12E Sections 15 & 16

Date: June, 2002

Scale: 1:1500

Drawn by: B Jensen

Map Title:
Figure 1
 Designed by: M. Dean Stacy

Client: **Canyon Fuel Company, LLC**

Project: **Dugout Mine Methane De-gas Wells**



ATTACHMENT 1

Vegetation Field Notes

Company Name Dougout/Canyon Fuel Date 6/14/02

Location MW-4/ Road Time 9:10 AM

Magnetic Heading W 114° E / 2 Transect # 1 / 2

Species vigor and/or % cover. 10 10³ 10¹⁰ 50

AKTR	L	B	L	B	B	R	R	G	L	
	CRNU	→	DRONFLON	L	L	ARTR	→	L	B	
Agropyron	R	Agropyron SP	ARTR	Agropyron SP	ARTR	DRONFLON	→	B	B	
GRAMA	L	ARTR	PENS.SP	GRAMA	ARTR	→	→	→	→	
L	→		→	ARTR	→				→	
ARTR	B	L	ARTR	→						→
ARTR	ARTR	→								
ARTR	GRAMA	GRAMA	R	L	L	R	CRNU	→	GRAMA	
L	CRNU	Agropyron SP	L	GRAMA	L	GRAMA	ARTR	→	L	
ARTR	→	→	L	ARTR	ARTR	→				
ARTR	→									
ARTR	L	ARTR	→							→
ARTR	→	L	ARTR	→					DRONFLON	GRAMA
ARTR	→									
ARTR	→	L	ARTR	→						→
ARTR	→	GRAMA	ARTR	→						→
GRAMA	SB	→	R	B	GRAMA	R	L	L	ARTR	
ARTR	→				L	L	ARTR	→	B	
ARTR	→							GRAMA	ARTR	

Comments and Observations _____

Rescue - GRAMA ?
SB - snowberry

Vegetation Field Notes

Company Name Canyon Fuel Date 6/4/02

Location MW-04/ROAD Time 12:25

Magnetic Heading SEE UTM/GPS Transect # 3 (ROAD)

Species vigor and/or % cover.

B	L	B	L	AGPY	→	GRASS	B	B	L
L	ARTR	B	L	ARTR	L	B	L	B	ARTR
R	B	L	ARTR	→	L	ARTR	L	L	L
L	ARTR	B	ARTR	②	B	ARTR	ARTR	L	B
ARTR	AGPY	B	ARTR	L	B	LUPINE	B	ARTR	L
L	ARTR	GRASS	L	GRASS	B	B	L	B	B
B	ARTR	→	L. STEW WOOD	→	B	B	ARTR	L	L
ARTR	L	GRASS	B	→	②	ARTR	GRASS	B	B
R	L	GRASS	AGPY	CHALK	→	LUPINE	L	DICEL VEGET	B
	ARTR	B	L	②	AGPY	L	VEGET	L	B

Comments and Observations MW-04 productivity - due to sage & shrubs
& 220 lbs/acre - low grasses in assoc w/ sage/woody shrub

② ASTEN 30P?
(GRASS 12059)

Vegetation Field Notes

Company Name Campco Fuel - Pleasant Date 6/4/02

Location MW-03 / 08 Time 13:00

Magnetic Heading SEE WTM/GPS Transect # 4/5 (MW-08)

Species vigor and/or % cover.

B			→		L	L	L		B	grama	B	L	
ASPY			→		ARTK	ASPY	L		ARTK	ASPY	→	L	
grama	L	L		B	grama	→		L	L	ASPY		grama	
ANDRUM	L	L		L	B	STIPA						→	
L	L	L		STIPA	L	L		STIPA	STIPA	L		L	
grama	grama	B		L	L	L		ARTK		→		L	
L	B	L		B	L	B		B	grama	L		grama	
L	L	grama		L	B	L		SUBSER	L	L		ARTK	
L	L	L		L	B	B		ARTK	SUBSER	SUBSER		grama	
	L	L		grama	B	B		grama	B	L		L	
L	L	SEGE		L	ANDRUM	grama			→	L		L	
B	L	L		L	PENST	B		L	ANDRUM	B		L	
L	L	grama	→		B	SUBSER		grama	→	STIPA	rumor	L. leaf phlox	
ARTK	L	B		ARTK	L	ARTK						→	
ARTK									→	L	ASPY	L	ARTK
L. leaf phlox	B	B		ASPY	L. leaf phlox	ANDRUM		L	L	L		L	B
L	grama	→		L	L	L		L	ASPY	L		L	L
B		→		grama	L. leaf phlox	grama				→	CHAMA		B
L	ARTK	L. leaf phlox		ASPY	L	L		grama	B	L		ASPY	
grama	SUBSER	L		L	ARTK	→		L	L	grama		L	L

Comments and Observations prod. ~ 400 lbs/ac (MW-03)
prod. ~ 300 lbs/ac (MW-08)

Vegetation Field Notes

Company Name Canyon Fuel Date 6/4/02

Location MW-07 Time 13:43

Magnetic Heading WTM/625 Transect # 6/7 (road/pan)

Species vigor and/or % cover.

L	L	L	L	Sucker	→	B	L	subony	13	
L	Sucker	L	Aspen	L	grass	Sucker	one spot	L	L	
L	L	L	_____						→	
L	L	L	L	L	L	Aspen	L	L	Double	
L	L	L	L	L	L	L	Aspen	subony	L	
Aspen	→	Pop	L	Pop	Pop	L	L	L	L	
Aspen	L	L	L	Double	L	L	Aspen	L	L	
Aspen	→	→	Aspen	L	B	B	Aspen	subony	L	
Pop	→	B	B	L	L	Aspen	L	L	B	
L	Aspen	L	L	Double	L	L	L	Pop	B	
L	MARE	→	L	L	Sucker	L	L	MARE	L	
subony	→	L	_____						→	Aspen
L	L	L	L	Aspen	→	L	Pop	L	Aspen	
L	L	L	L	L	subony	L	L	subony	L	
DF	L	L	L	DF	L	L	L	L	L	
subony	_____						DF	Sucker	→	
L	L	subony	L	subony	L	Sucker	→	L	L	
L	L	L	Aspen	→	subony	Aspen	subony	L	L	
L	L	L	Pop	L	L	Pop	L	L	Aspen	
L	MARE	L	L	Sucker	L	L	L	L	subony	

Comments and Observations _____

6/#9 - 90% Aspen over stone
 7/# - " " " " MARE - one spot
 JWA - bungegrass?
 DF - Pop. Fir

Vegetation Field Notes

Company Name Canyon Free Date 6/4/02

Location MW-02 / MW-06 Time 14:00

Magnetic Heading _____ Transect # 8/9

Species vigor and/or % cover.

B	B	B	B	(4)	ASPY	L	B	B	L
B						L	R	B	B
L	ASPY	B	B	L	B	L	B	B	B
B	L	L	R	R	R	B	B	B	B
B	STIP CORNIO	R	B						
L	STIP		B	B	L	B	B		
B									L
L	R	B							
R	ASPY		subony	R	R	ASPY			L
B									L
B	subony			B	B	gru	subony		
SALICINA	ASPY	L	N. ROSE	L	L	B	B	B	B
N. ROSE	ASPY	N. ROSE ROUND	ASPY	L	MARE	MARE		L	MARE
RIBES		L	B						R
B	L	L	MELA	B	B	MELA	B	R	L
L	ASPY	R	R	B	ASPY	L	L	L	L
L	B	gru	B	R	B	L	L	L	B
B	B	B	R	B	B	L	R	R	B
B									
RUSA									

Comments and Observations _____

MW-02 probe 2 100 lbs/pc.
 MW-06 " " "
 Ribes - common

(4) ?
 mela - white

Vegetation Field Notes

Company Name Canyon Fuel Date 6/4/02

Location MW-01 Time _____

Magnetic Heading _____ Transect # 10/11

Species vigor and/or % cover.

B	G.B. WILLOW	B	B	B	B	R	G.B. WILLOW	L	L
B	L	L	G.B. WILLOW	ANTR	L	B	B	L	L
ANTR					B	B	B	POA	
L	L	GREAT GRASS	ANTR	B	B	ANTR	B	B	B
B	B	ANTR	B	B	ANTR	POA	B	B	B
B	B	B	B	B	B	B	L	B	B
L	B	B	L	B	B	L	B	B	B
B									
L	B	L	L	B	ANTR	L			
STCO	L	L	L	L	L	ANTR	L	L	L
L	STCO	STCO	B	B	STCO	B	L	STCO	R
L	L	B	L	B	B	STCO	B	B	L
B	R	G. BASSIN WILLOW	B	L	B	B			
L	L	ANTR	L	L	L	ANTR	B	L	L
B	B	R	L	B					
G. BASSIN WILLOW	L	ANTR	L	L	R	B			
ANTR	B	L	G. BASSIN WILLOW	B					
L	L	ANTR		L	B	B	ANTR		
L	L	POA	ANTR	L	ANTR	POA	B	G.B. WILLOW	
B	B	L	G.B. WILLOW	POA	ANTR	POA	G.B. WILLOW	B	B

Comments and Observations _____

Vegetation Field Notes

Company Name Canyon Fuel Date _____

Location MW-05 Time 15:18

Magnetic Heading _____ Transect # 12/13

Species vigor and/or % cover.

R	R	PERST.	R	B	B	B	R	B	B
L	ANTR	→	B	B	ANTR	R	ANTR	B	
R	R	GRAND	B	L	R	ANTR	B	B	L
ANTR	ANTR	L	ANTR	L	B	L	L	L	ANTR
ANTR	ANTR	B	ANTR	→	→	→	R	ANTR	→
GRAND	→	→	B	L	ANTR	FRISON	B	B	ANTR
GRAND	B	L	L	VERL	WINDY	ANTR	ANTR	B	B
R	B	B	B	GRAND	B	B	GRAND	ANTR	B
B	B	L	L	L	B	L	L	B	B
→	→	→	→	→	→	→	→	GRAND	B
B	→	→	→	→	→	→	→	→	→
B	GRAND	GRAND	GRAND	B	B	B	L	GRAND	L
B	→	→	→	→	→	→	→	B	R
L	R	B	→	→	→	→	→	→	→
ANTR	→	L	L	R	L	L	R	R	R
ANTR	ANTR	→	→	→	→	→	→	→	→
GRAND	→	→	L	L	R	B	B	L	R
L	L	R	L	L	L	R	GRAND	L	L
GRAND	→	→	→	→	→	→	→	→	→
GRAND	L	L	B	GRAND	→	R	L	R	GRAND

Comments and Observations _____

ANNU - BIRCH SAGE / *argentea*
 ANTR.
 ON THIS
 2.17

EIS ENVIRONMENTAL & ENGINEERING CONSULTING STAFF

Melvin A. Coonrod Owner, EIS

Mel Coonrod has a Bachelors of Science Degree in Vertebrate Zoology and Chemistry, a Masters Degree in Silviculture, and Post-Graduate work in ecology. Mel has a wide range of experience in the environmental arena. Beginning as an instructor in two major universities, then into the private sector where he built the largest reforestation TSI contracting firm in the Intermountain West, planting in excess of one million trees per year. In the mid-1970's, he was hired by Getty Oil Company as an environmental coordinator; and completed the second Approved Mine Reclamation Plan in Utah. When Texaco purchased Getty Oil in 1981, Mel founded EIS Environmental Industrial Service. Under his direction, the firm has implemented numerous NEPA documents, PAP's, LBA's. reclamation and engineering plans throughout the west. The first two coal mines to receive Phase II Bond Release were projects in which EIS played a major role in both planning and implementation. Mel is licensed in engineering; landscape architecture; general contracting; and is certified for Threatened, Endangered, and Sensitive Species surveys; wetland delineation; raptor inventories; asbestos inspection; and numerous MSHA ratings. He is also a licensed pilot and a fully certified diver in open water, with scuba ratings in various areas.

In addition to his vast experience in a variety of fields, he has published a number of articles and has worked extensively with several government agencies in developing training films and literature used to instruct both industry and agency personnel in areas of reclamation and wildlife enhancement. Mel's philosophy relative to development is to create a win-win scenario, wherein the resource can be utilized in a cost-effective manner, while at the same time the environment can be enhanced to such a degree through cost-effective mitigation that there is no net loss for the life of the project.

David K. Steed Project Manager/Ecologist

Mr. Steed (B.S. Ecology, 1993 Idaho State University) is an experienced Environmental Consultant and Project Manager with highly developed administrative and decision-making skills. Since joining EIS in 1993, he has overseen the coordination and management of regulatory documentation and baseline analysis required for state and federal mandates. Mr. Steed develops and acts as primary author of most of the NEPA and EPA related regulatory documentation produced, and is proficient with all CERCLA, RCRA, and TSCA related documentation. He is able to interface with agency personnel on all levels and in the absence of the supervisor, is responsible for the functions of the firm. Other specific duties include the supervision of water, soil and vegetation monitoring; wetland delineations, threatened, endangered and sensitive species inventories, stream classification, aquatic restoration, compliance coordination, reclamation supervision, GIS mapping, marketing solicitation; and contract management.

In 1998, Mr. Steed conducted an independent review for the Utah Regulatory Office of the U.S. Army Corp of Engineers of developed wetland mitigation projects throughout the state of Utah. Through his role as Lead Project Ecologist, his study was utilized to determine the rate of functional success, as well as to develop a set of guidelines for insuring the success of future projects. Associated duties while assisting the COE included independent review of federal wetland guidelines, wetland delineations, project management assistance, new-site review and interagency coordination on policy action and design.

Other studies that Mr. Steed has been associated with include: a nutrient cycling stream study in Yellowstone National Park for the National Park Service to examine the impacts to burned watersheds from the 1988 fire; a two-year Department of Energy telemetry study at the Idaho Nuclear Engineering Laboratory upon the potential for radioisotope transport by small mammals; a comparative U.S. Forest Service stream study in Southeastern Idaho to determine the level of stream degradation from year-long grazing; and numerous toxicity studies to determine the impact of heavy metals, pesticides, and nutrient enrichment upon salmonid communities.

Canyon Fuel Company, LLC
Dugout Canyon Mine

Methane De-Gasification Amendment
March 2003

Attachment 3-2
Threatened, Endangered, and Sensitive Species Inventory Report

ATTACHMENT 3-2

**THREATENED, ENDANGERED,
AND SENSITIVE SPECIES
INVENTORY REPORT**

**CANYON FUEL COMPANY, LLC
METHANE DEGAS WELLS
(MW-01 through MW-08)**

**CONDUCTED
May 10, 2002**

**BY
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www.eisenviro.com**

Introduction

Canyon Fuel Company (CFC) has contracted EIS Environmental & Engineering Consulting to conduct a Threatened, Endangered and Sensitive Species (TES) survey for eight proposed methane de-gasification well locations. The proposed area is located in Carbon County east of Wellington, Utah in T. 13 S. R. 12 E., Sec. 15 and 16 (Figure 1). The proposed wells and access routes (Figures 2 through 7) are required to be surveyed for a variety of TES species. Several TES species have been identified by the U.S. Fish and Wildlife Service (USFWS), State of Utah and BLM through past studies as having the potential of occurring within the general area of the disturbance associated with the proposed wells. On May 10th, 2002, using established protocols, federally approved Field Biologists of EIS conducted inventories for the following federally listed threatened and endangered species believed to occur within this portion of Utah: Uinta Basin hookless cactus (*Sclerocactus glaucus*), Wright fishhook cactus (*Sclerocactus wrightiae*), despain footcactus (*Pediocactus despainii*), Winkler footcactus (*Pediocactus winkleri*), last chance townsendia (*Townsendia aprica*), Jones cycladenia (*Cycladenia humilis* var. *Jonesii*), Graham beardtonque (*Penstemon grahamii*), Maguire daisy (*Erigeron maguirei* Cronq. var. *maguirei*), shrubby reed-mustard (*Schoenocrambe suffrutescens*), barneby peppergrass (*Lepidium barnebyanum*), and barneby reed-mustard (*Schoenocrambe barnebyi*).

EIS also conducted inventories for the following State of Utah and BLM candidate and sensitive species which occur or have the potential of occurring in Emery, Carbon and Duchesne Counties, including; tufted cryptantha (*Cryptantha caespitosa*), Creutzfeldt-flower (*Cryptantha creutzfeldtii*), canyon sweetvetch (*Hedysarum occidentale* var. *canone*), low hymenoxys (*Hymenoxys depressa*), helenium hymenoxys (*Hymenoxys helenioides*), Bicknell milkvetch (*Astragalus consobrinus*), basalt milkvetch (*Astragalus subcinereus*), sedge fescue (*Festuca dasyclada*), mussentuchit gilia (*Gilia tenuis*), entrada rushpink (*Lygodesmia entrada*), Book Cliffs blazing star (*Mentzelia multicaulis* var. *librina*), Jones indigo-bush (*Psoralea ploydenius* var. *jonesii*), psoralea globemallow (*Sphaeralcea psoraloides*), Thompson talinum (*Talinum thompsonii*), and the avian species; burrowing owl (*Athene cunicularia*) and loggerhead shrike (*Lanius ludovicianus*).

Methodology

Uinta Basin hookless cactus

Areas suspected to contain potential habitat for the Uinta Basin hookless cactus consists of openings in scattered pinyon-juniper woodlands, in association with gravelly hills and terraces on Quaternary and Tertiary alluvium soils in cold desert shrub communities between 4,700 to 6,000 feet elevation, flowering from May to June. As with all the TES species mentioned, if target species were located, field personnel would flag the location, collect voucher specimens, mark the location on a quad-map, and take a photograph of the species and habitat.

Wright fishhook cactus

Areas suspected to contain potential habitat for the Wright fishhook cactus consists of openings in salt desert shrub to the juniper community at 4,790 to 6,120 feet elevation on the Mancos Shale Formation, flowering from April to May.

Despain footcactus

Areas suspected to contain potential habitat for the despain footcactus consists of open pinyon-juniper community on limestone gravels at 6,000 to 6,200 feet elevation, flowering from late April to early May.

Winkler footcactus

Areas suspected to contain potential habitat for the Winkler footcactus consist of salt desert shrub communities between 4,790 and 5,210 feet elevation, flowering from late March to Mid May.

Last chance townsendia

Areas suspected to contain potential habitat for the last chance townsendia consist of salt desert shrub and pinyon-juniper communities on clay or clay silt soils of the Arapien and Mancos Shale formations between 6,100 and 8,000 feet elevation, flowering from April to May.

Jones cycladenia

Areas suspected to contain potential habitat for Jones cycladenia consist of gypsiferous saline soils on the Chinle, Cutler and Summerville formations in cool desert shrub and juniper communities between 4,400 and 6,000 feet elevation, flowering from mid May to June.

Graham beardtongue

Areas suspected to contain potential habitat for Graham beardtongue consist of sparsely vegetated desert shrub and pinyon-juniper communities on shaley talus knolls between 4,600 and 6,700 feet elevation, flowering from May to mid June.

Maguire daisy

Areas suspected to contain potential habitat for Maguire daisy consist of cool, moist mesic wash bottoms and dry, partially shaded slopes of eroded sandstone cliffs. Wingate, Chinle and Navajo Sandstone formations in mountain shrub, Douglas fir, ponderosa pine, and lower limits of the juniper woodland communities between 5,600 and 7,200 feet elevation, flowering from June and July.

Shrubby reed-mustard

Areas suspected to contain potential habitat for shrubby reed-mustard consist of calcareous shale of the Green River Shale formation in shadscale, pygmy sagebrush, mountain mahogany, juniper, and other mixed desert shrub communities between 5,400 and 6,000 feet elevation, flowering from May to mid August.

Barneby peppergrass

Areas suspected to contain potential habitat for Barneby peppergrass consist of white shale outcrops on the Uinta formation in pinyon-juniper (mainly on ridge crests) between 6,200 and 6,500 feet elevation, flowering from May to June.

Barneby reed-mustard

Areas suspected to contain potential habitat for Barneby reed-mustard consist of mixed shadscale, eriogonum and ephedra communities on the Chinle formation between 5,600 and 5,700 feet elevation, flowering in May.

Tufted cryptantha

Areas suspected to contain potential habitat for tufted cyptantha consist of forb-grass, pinyon-juniper, mountain brush, limber pine, and spruce-fir communities on clay soils between 4,950 and 10,235 feet elevation, flowering from May to June.

Creutzfeldt cryptantha

Areas suspected to contain potential habitat for creutzfeldt cyptantha consist of shadscale and mat atriplex communities on the Mancos Shale Formation between 5,250 and 6,495 feet elevation, flowering from April to June.

Canyon sweetvetch

Areas suspected to contain potential habitat for canyon sweetvetch consist of pinyon-juniper, sagebrush, and wash communities between 5,000 and 8,000 feet elevation, flowering from June to mid-August.

Low hymenoxys

Areas suspected to contain potential habitat for low hymenoxys consist of ephedra, sagebrush, shadscale and pinyon-juniper communities of fine silty clay to clay loam soils between 4,400 and 7,120 feet elevation, flowering from late May to June.

Helenium hymenoxys

Areas suspected to contain potential habitat for helenium hymenoxys consist of mountain brush, sagebrush, aspen, and meadow communities on clay loam soils between 8,800 and 10,700 feet elevation, flowering from June to late-August.

Bicknell milkvetch

Areas suspected to contain potential habitat for Bicknell milkvetch consist of sagebrush-grassland and pinyon-juniper communities on the Mancos Shale formation, volcanic gravel, open gravelly or sandy knolls, and barren stony hillsides between 5,200 and 9,000 feet elevation, flowering from May to July.

Basalt milkvetch

Areas suspected to contain potential habitat for basalt milkvetch consist of pinyon-juniper and ponderosa communities between 4,520 and 7,970 feet elevation, flowering between May and July.

Sedge fescue

Areas suspected to contain potential habitat for sedge fescue consist of open slopes and ridges in sagebrush, mountain brush and juniper communities on the Green River Shale formation and limestone gravels between 6,990 and 10,000 feet elevation, flowering from June to August.

Mussentuchit gilia

Areas suspected to contain potential habitat for mussentuchit gilia consist of open habitat of pinyon-juniper woodland, growing on sparsely vegetated, fine textured, pale, poorly cemented limestone, flowering between May and June.

Entrada rushpink

Areas suspected to contain potential habitat for entrada rushpink consist of mixed desert shrub and juniper communities between 4,400 and 4,800 feet elevation, flowering in June.

Book Cliffs blazing star

Areas suspected to contain potential habitat for Book Cliffs blazing star consist of sagebrush, rabbitbrush and pinyon-juniper communities at about 6,200 feet elevation, on Mancos Shale and Price River formations.

Jones indigo-bush

Areas suspected to contain potential habitat for Jones indigo-bush consist of salt desert shrub communities on Mancos Shale formation (Blue Gate and Tununk members) and less commonly elsewhere at approximately 4,820 feet elevation, flowering from May to mid-July.

Psoralea globemallow

Areas suspected to contain potential habitat for Psoralea globemallow consist of Zuckia-ephedra communities on saline and gypsiferous Entrada siltstone between 4,000 and 6,000 feet elevation, flowering from mid-May to June.

Thompson talinum

Areas suspected to contain potential habitat for Thompson talinum consist of silicious conglomeratic gravels in pinyon-juniper and ponderosa pine communities at about 7,500 feet elevation, flowering from mid-July to August.

Loggerhead shrike

A thorough walk over of the entire area was done between 06:30 and 11:00 (period of highest bird activity). Habitat present was noted, as was the general topography and weather conditions. When filling out inventory report sheets (Attachment 1), the criteria use for good, fair and poor shrike habitat are as follows; good habitat was considered to be a semi-open area of scattered, mature pinyon-juniper where shrike could nest in close proximity to a sparsely vegetated area in which they could hunt, fair was considered to be an area of dense pinyon-juniper where food sources were less abundant, poor was considered to be an area with no nesting habitat.

Burrowing owl

A thorough walk over of the entire area was done between 06:30 and 11:00 (period of highest bird activity). Areas determined to have a potential for owl use either contained or were within the vicinity of known white-tailed prairie dog (*Cynomys leucurus*) towns. Field data similar to that described for the shrike inventory was recorded for each site. When filling out inventory report sheets (Attachment 1), criteria for burrowing owl habitat suitability was as follows; good habitat consisted of an open region in which white-tailed prairie dog towns, occupied or not, were present, poor habitat was considered to be an area where no prairie dog holes or colonies were present.

Results

Although suitable habitat was encountered for some of the species inventoried for (last chance townsendia, tufted cryptantha, canyon sweetvetch, helenium hymenoxys, Bicknell milkvetch, basalt milkvetch, and sedge fescue) none were encountered during this inventory.

Copies of the field data sheets are included in this report (Attachment 1).

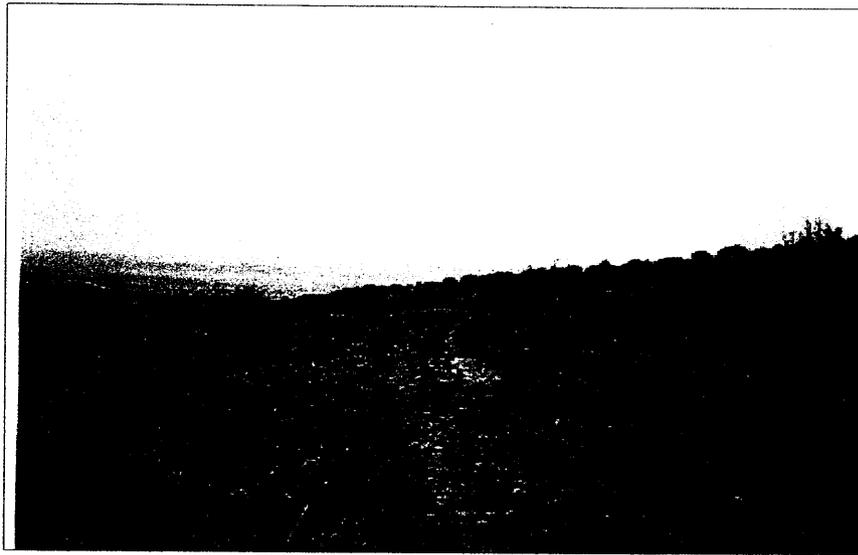


Figure 2. Proposed access route to MW-04

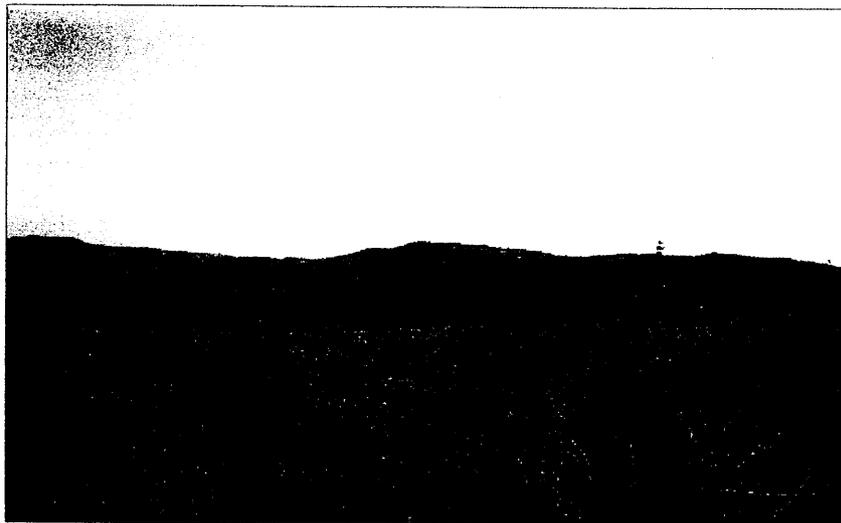


Figure 3. Proposed access route and pad location for MW-08.



Figure 4. Proposed access route to MW-07.



Figure 5. Proposed access route to MW-06 on previously disturbed road.



Figure 6. Proposed well location for MW-01 on previously disturbed site.

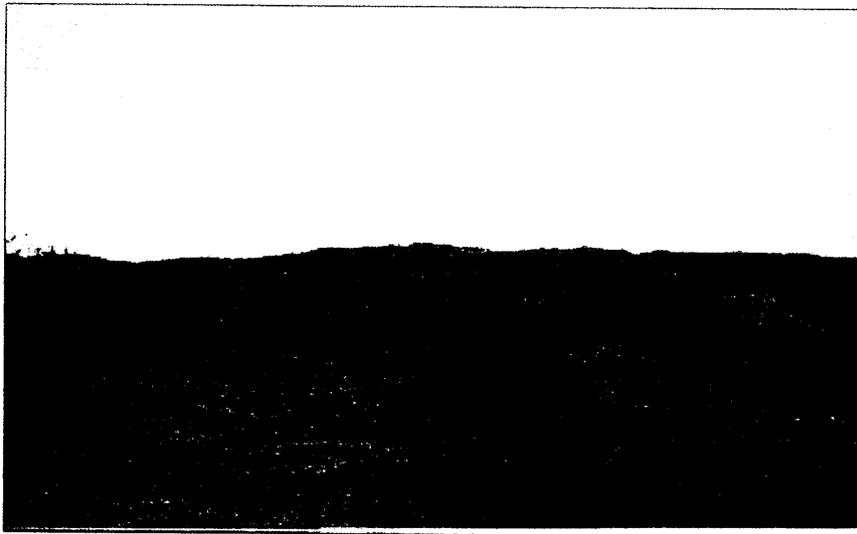
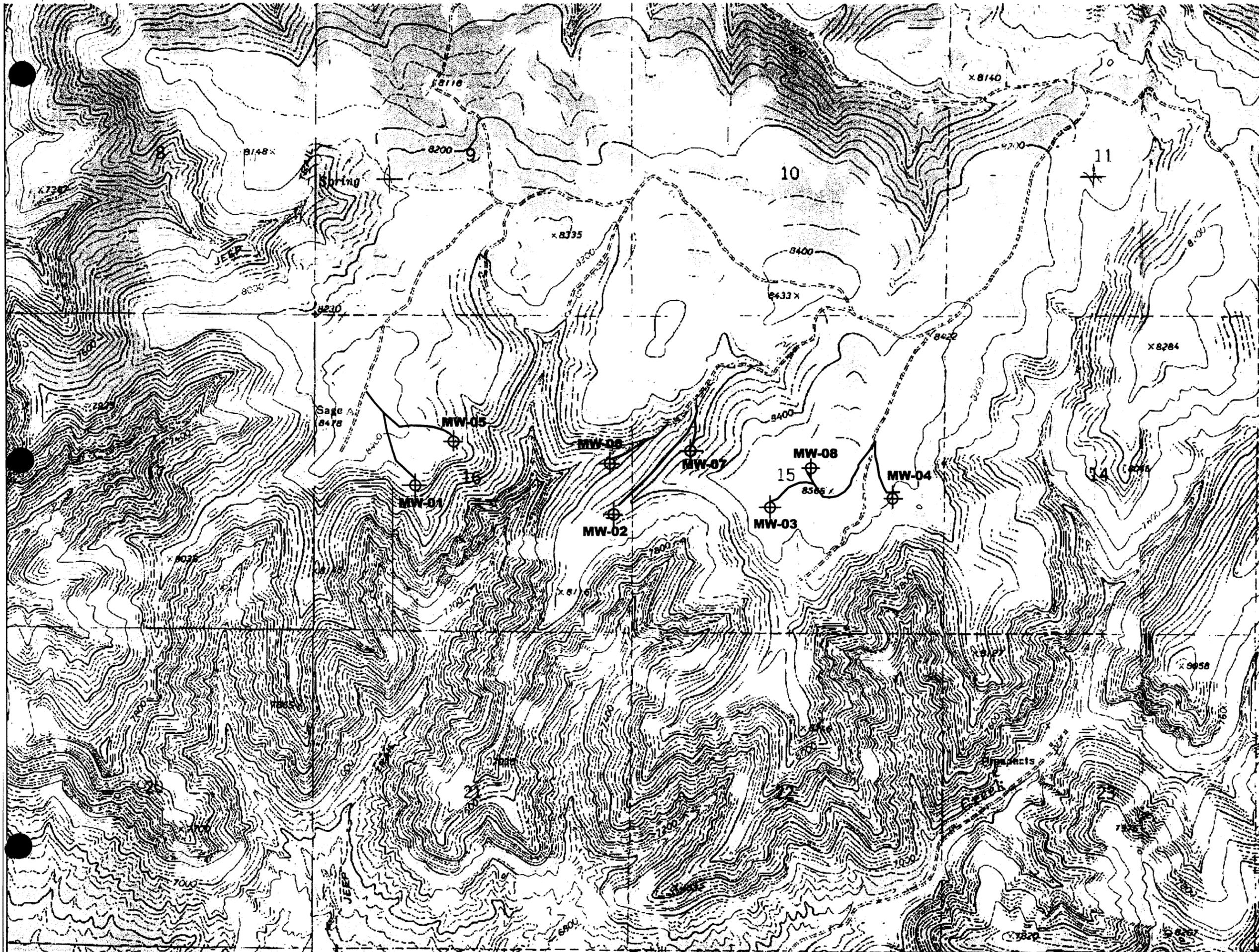


Figure 7. Proposed access route to MW-05.



LEGEND

-  PROPOSED DE-GAS WELLS
-  PROPOSED ACCESS ROUTE

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T13S, R12E Sections 15 & 16

Date: June, 2002

Scale: 1:1500

Drawn by: B Jensen

Map Title:
Figure 1

Designed by: M. Dean Stacy

Client:
Canyon Fuel Company, LLC

Project: **Dugout Mine Methane De-gas Wells**



Environmental Industrial Services
 Environmental & Engineering Consulting

ATTACHMENT 1
FIELD DATA SHEETS

Canyon Fuel Company
TES Inventory Report
May 2002

EIS ENVIRONMENTAL CONSULTING
DATA FORM

FLORA SPECIES _____

Date 5.10.02 Observer D. Steed / M. D. Stacy

Survey Start Time 07:15 Survey End Time _____

Weather Conditions clear

Site Rd. & MW-04 USGS Quad _____

Township 13S Range 12E Section 15

Proposed Activity (road/well; size of inventory area) One well pad 0.5 acres
and approx. 0.25 miles of road

General Habitat Description (vertical structure, dominant vegetative species, topography)

On road predominantly sagebrush w/ M. Mahogany, Sweetroot
spring parsley, Lupine sp. arrowleaf balsam root, snowberry

Soil Characteristics sandy loam

POSITIVE IDENTIFICATION

Number of plants Located NI Flowers Present (Y/N) _____

Key Characteristic _____

Other Species Identified _____

MANAGEMENT OPPORTUNITIES (Mitigation/Habitat Improvement)

DS, MDS

EIS ENVIRONMENTAL CONSULTING
DATA FORM

AVIAN SPECIES B. Owl / N. Shrike

Date 5.10.02 Observer D. Steed / M. D. Stacy

Survey Start Time 07:15 Survey End Time _____

Weather Conditions clear

Site Rd. to MW.04 USGS Quad _____

Township 13S Range 12E Section 15

Proposed Activity (road/well; size of inventory area) One well pad 0.5 acres
and approx. 0.25 miles of road

General Habitat Description (vertical structure, dominant vegetative species,
topography)

Pred. sagebrush on road w/ Mt Mahogany, Sweetroot,
spring parsley, Lupine sp., arrowleaf balsam root, snowberry

Habitat Suitability Poor/Poor

POPULATION IDENTIFICATION

Population size NI Male _____ Female _____

Nest (Y/N) _____ Birds I.D. (Song/visual/both) _____

Behavior Exhibited _____

Other Species Identified _____

RECOMMENDATIONS

Mitigation/Habitat Improvement

DS, MDS

EIS ENVIRONMENTAL CONSULTING
DATA FORM

FLORA SPECIES _____

Date 5.10.02 Observer D. Steed / M. D. Stacy

Survey Start Time 07:45 Survey End Time _____

Weather Conditions clear

Site MW-03 & 08 USGS Quad _____

Township 13S Range 12E Section 15

Proposed Activity (road/well; size of inventory area) Two well pads 0.5 acres/pad
and approx. 0.5 miles of road

General Habitat Description (vertical structure, dominant vegetative species, topography)

same as 04 ... sagebrush/grass/mt. mahogany
(mt. shrub community)

Soil Characteristics sandy loam

POSITIVE IDENTIFICATION

Number of plants Located NI Flowers Present (Y/N) _____

Key Characteristic _____

Other Species Identified _____

MANAGEMENT OPPORTUNITIES (Mitigation/Habitat Improvement)

DS, MDS

EIS ENVIRONMENTAL CONSULTING
DATA FORM

AVIAN SPECIES L. Shrike / B. Owl

Date 5.10.02 Observer D. Steed / B. Owl

Survey Start Time 07:45 Survey End Time _____

Weather Conditions clear

Site MW. 03 & 08 USGS Quad _____

Township 13S Range 12E Section 15

Proposed Activity (road/well; size of inventory area) Two well pads

0.5 acres/pad and approx 0.5 miles of road

General Habitat Description (vertical structure, dominant vegetative species, topography)

same as 04 (slightly higher elevation)

Habitat Suitability Poor/Poor

POPULATION IDENTIFICATION

Population size NI Male _____ Female _____

Nest (Y/N) _____ Birds I.D. (Song/visual/both) _____

Behavior Exhibited _____

Other Species Identified _____

RECOMMENDATIONS

Mitigation/Habitat Improvement

DS, MDS

EIS ENVIRONMENTAL CONSULTING
DATA FORM

FLORA SPECIES _____

Date 5.10.02 Observer D. Steed / M. D. Stacy

Survey Start Time 08:00 Survey End Time _____

Weather Conditions clear

Site MW-07 & road (new) USGS Quad _____

Township 13S Range 12E Section 15

Proposed Activity (road/well; size of inventory area) One well pad 0.5 acres
and approx. 0.10 miles

General Habitat Description (vertical structure, dominant vegetative species, topography)

Aspen, D. Fir, Oregon grape, snowberry,

Soil Characteristics sandy loam

POSITIVE IDENTIFICATION

Number of plants Located NI Flowers Present (Y/N) _____

Key Characteristic _____

Other Species Identified _____

MANAGEMENT OPPORTUNITIES (Mitigation/Habitat Improvement)

DS, MDS

EIS ENVIRONMENTAL CONSULTING
DATA FORM

AVIAN SPECIES L. Shrike / B. Owl

Date 5.10.02 Observer D. Steed / M. D. Stacy

Survey Start Time 08:00 Survey End Time _____

Weather Conditions clear

Site MW.07 & road (new) USGS Quad _____

Township 13S Range 12E Section 15

Proposed Activity (road/well; size of inventory area) One well pad 0.5 acres
and approx. 0.10 miles

General Habitat Description (vertical structure, dominant vegetative species,
topography)

Aspen, D. Fir, Oregon grape, snowberry

Habitat Suitability Poor/Poor

POPULATION IDENTIFICATION

Population size NI Male _____ Female _____

Nest (Y/N) _____ Birds I.D. (Song/visual/both) _____

Behavior Exhibited _____

Other Species Identified _____

RECOMMENDATIONS

Mitigation/Habitat Improvement

DS, MDS.

EIS ENVIRONMENTAL CONSULTING
DATA FORM

FLORA SPECIES _____

Date 5.10.02 Observer D. Steed / M. D. Stacy

Survey Start Time 08:20 Survey End Time _____

Weather Conditions clear

Site MW-02 $\frac{1}{2}$ road steady dist. USGS Quad _____

Township 13S Range 12E Section 15 $\frac{1}{16}$

Proposed Activity (road/well; size of inventory area) One well pad 0.5 acres
and approx .5 miles of road

General Habitat Description (vertical structure, dominant vegetative species, topography)

Indian paintbrush, yellow cryptantha, milkvetch sp, flax
(apparent seed mix) ribes, buckwheat sp
re-seeded contact CFC for mix

Soil Characteristics _____

POSITIVE IDENTIFICATION

Number of plants Located NI Flowers Present (Y/N) _____

Key Characteristic _____

Other Species Identified _____

MANAGEMENT OPPORTUNITIES (Mitigation/Habitat Improvement)

DS, MDS

EIS ENVIRONMENTAL CONSULTING
DATA FORM

AVIAN SPECIES L. Shrike / B. Owl

Date 5.10.02 Observer D. Steed / M. D. Stacy

Survey Start Time 08:20 Survey End Time _____

Weather Conditions clear

Site MW-02 & road USGS Quad _____

Township 13S Range 12E Section 15 & 16

Proposed Activity (road/well; size of inventory area) One well pad .5 acres
& approx .5 miles of road

General Habitat Description (vertical structure, dominant vegetative species, topography)

Indian paintbrush, yellow cryptantha, milkvetch sp., flax sp,
ribes, buckwheat sp. (apparent seed mix)

Habitat Suitability Poor / Poor

POPULATION IDENTIFICATION

Population size NI Male _____ Female _____

Nest (Y/N) _____ Birds I.D. (Song/visual/both) _____

Behavior Exhibited _____

Other Species Identified _____

RECOMMENDATIONS

Mitigation/Habitat Improvement

DS, MDS

EIS ENVIRONMENTAL CONSULTING
DATA FORM

FLORA SPECIES _____

Date 5-10-02 Observer D. Steed / M. D. Stacy

Survey Start Time 08:30 Survey End Time _____

Weather Conditions clear

Site MW-06 USGS Quad _____

Township 13S Range 12E Section 16

Proposed Activity (road/well; size of inventory area) One well pad ^{.5 acres}

approx. .25 miles of road

General Habitat Description (vertical structure, dominant vegetative species, topography)

Appears to have been re-seeded

interm creek

Soil Characteristics _____

POSITIVE IDENTIFICATION

Number of plants Located NI Flowers Present (Y/N) _____

Key Characteristic _____

Other Species Identified _____

MANAGEMENT OPPORTUNITIES (Mitigation/Habitat Improvement)

DS, MDS

EIS ENVIRONMENTAL CONSULTING
DATA FORM

AVIAN SPECIES L. Shrike / B. Owl

Date 5-10-02 Observer D. Steed / M.D. Stacy

Survey Start Time 08:30 Survey End Time _____

Weather Conditions clear

Site MW.06 USGS Quad _____

Township 13S Range 12E Section 16

Proposed Activity (road/well; size of inventory area) One well pad^{5 species}

approx .25 miles of road

General Habitat Description (vertical structure, dominant vegetative species, topography)

Habitat Suitability Poor / Poor

POPULATION IDENTIFICATION

Population size NI Male _____ Female _____

Nest (Y/N) _____ Birds I.D. (Song/visual/both) _____

Behavior Exhibited _____

Other Species Identified _____

RECOMMENDATIONS

Mitigation/Habitat Improvement

DS, MDS

EIS ENVIRONMENTAL CONSULTING
DATA FORM

FLORA SPECIES _____

Date 5-10-02 Observer D. Steed / M.D. Stacy

Survey Start Time 09:00 Survey End Time _____

Weather Conditions clear

Site MW-01 § 05 USGS Quad _____

Township 13 S Range 12 E Section 16

Proposed Activity (road/well; size of inventory area) Two 0.5 acre pads &
approx. 0.5 miles of road

General Habitat Description (vertical structure, dominant vegetative species, topography)

sagebrush, ponderosa pine, antelope bitterbrush, mt. mahogany
Appears to have been re-seeded

Soil Characteristics sandy-gravelly loam

POSITIVE IDENTIFICATION

Number of plants Located NI Flowers Present (Y/N) _____

Key Characteristic _____

Other Species Identified _____

MANAGEMENT OPPORTUNITIES (Mitigation/Habitat Improvement)

DS, MDS

EIS ENVIRONMENTAL CONSULTING
DATA FORM

AVIAN SPECIES L. Shrike / B. Owl

Date 5-10-02 Observer D. Steed / M.D. Stacy

Survey Start Time 09:00 Survey End Time _____

Weather Conditions clear

Site MW-01 & 05 USGS Quad _____

Township 13S Range 12E Section 16

Proposed Activity (road/well; size of inventory area) Two 0.5 acre pads &
approx. 0.5 miles of road

General Habitat Description (vertical structure, dominant vegetative species,
topography)
sagebrush, P. pine, antelope bitterbrush, mt. mahogany
(mt. shrub community)

Habitat Suitability Poor / Poor

POPULATION IDENTIFICATION

Population size NI Male _____ Female _____

Nest (Y/N) _____ Birds I.D. (Song/visual/both) _____

Behavior Exhibited _____

Other Species Identified _____

RECOMMENDATIONS

Mitigation/Habitat Improvement

DH, MDS

EIS ENVIRONMENTAL & ENGINEERING CONSULTING STAFF

Melvin A. Coonrod Owner, EIS

Mel Coonrod has a Bachelors of Science Degree in Vertebrate Zoology and Chemistry, a Masters Degree in Silviculture, and Post-Graduate work in ecology. Mel has a wide range of experience in the environmental arena. Beginning as an instructor in two major universities, then into the private sector where he built the largest reforestation TSI contracting firm in the Intermountain West, planting in excess of one million trees per year. In the mid-1970's, he was hired by Getty Oil Company as an environmental coordinator; and completed the second Approved Mine Reclamation Plan in Utah. When Texaco purchased Getty Oil in 1981, Mel founded EIS Environmental Industrial Service. Under his direction, the firm has implemented numerous NEPA documents, PAP's, LBA's. reclamation and engineering plans throughout the west. The first two coal mines to receive Phase II Bond Release were projects in which EIS played a major role in both planning and implementation. Mel is licensed in engineering; landscape architecture; general contracting; and is certified for Threatened, Endangered, and Sensitive Species surveys; wetland delineation; raptor inventories; asbestos inspection; and numerous MSHA ratings. He is also a licensed pilot and a fully certified diver in open water, with scuba ratings in various areas.

In addition to his vast experience in a variety of fields, he has published a number of articles and has worked extensively with several government agencies in developing training films and literature used to instruct both industry and agency personnel in areas of reclamation and wildlife enhancement. Mel's philosophy relative to development is to create a win-win scenario, wherein the resource can be utilized in a cost-effective manner, while at the same time the environment can be enhanced to such a degree through cost-effective mitigation that there is no net loss for the life of the project.

David K. Steed Project Manager/Ecologist

Mr. Steed (B.S. Ecology, 1993 Idaho State University) is an experienced Environmental Consultant and Project Manager with highly developed administrative and decision-making skills. Since joining EIS in 1993, he has overseen the coordination and management of regulatory documentation and baseline analysis required for state and federal mandates. Mr. Steed develops and acts as primary author of most of the NEPA and EPA related regulatory documentation produced, and is proficient with all CERCLA, RCRA, and TSCA related documentation. He is able to interface with agency personnel on all levels and in the absence of the supervisor, is responsible for the functions of the firm. Other specific duties include the supervision of water, soil and vegetation monitoring; wetland delineations, threatened, endangered and sensitive species inventories, stream classification, aquatic restoration, compliance coordination, reclamation supervision, GIS mapping, marketing solicitation; and contract management.

In 1998, Mr. Steed conducted an independent review for the Utah Regulatory Office of the U.S. Army Corp of Engineers of developed wetland mitigation projects throughout the state of Utah. Through his role as Lead Project Ecologist, his study was utilized to determine the rate of functional success, as well as to develop a set of guidelines for insuring the success of future projects. Associated duties while assisting the COE included independent review of federal wetland guidelines, wetland delineations, project management assistance, new-site review and interagency coordination on policy action and design.

Other studies that Mr. Steed has been associated with include: a nutrient cycling stream study in Yellowstone National Park for the National Park Service to examine the impacts to burned watersheds from the 1988 fire; a two-year Department of Energy telemetry study at the Idaho Nuclear Engineering Laboratory upon the potential for radioisotope transport by small mammals; a comparative U.S. Forest Service stream study in Southeastern Idaho to determine the level of stream degradation from year-long grazing; and numerous toxicity studies to determine the impact of heavy metals, pesticides, and nutrient enrichment upon salmonid communities.

During the growing season of 2003, reference areas for the de-gasification wells will be developed adjacent to the well prior to drilling. The location of the reference areas will be placed on Plate 3-2.

Plate 3-2. Vegetation Reference Areas.

CONFIDENTIAL

ATTACHMENT 3-3

**Assessing the Impact of Scale of Performance of GIS
Habitat Models for Mexican Spotted Owls in Utah**

CONFIDENTIAL

CHAPTER 4

LAND USE AND AIR QUALITY

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LIST OF ATTACHMENTS

Attachment 4-1 An Intensive Cultural Resource Survey and Inventory of the Dugout Canyon Mine Drill Holes and Access Roads

410 LAND USE

411 Environmental Description

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

411.100 Premining Land Use

The area is utilized as open range for livestock and as wildlife habitat.

411.110 Land Use Map and Narrative

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

411.120 Land Capability

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

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

411.130 Land Use Description

The wells are located on land administered by Canyon Fuel Company, LLC and zoned by Carbon County for mining and grazing (MG-1).

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

411.140 Cultural and Historic Resources Information

Cultural and Historic Resource Maps - Archaeological surveys were conducted 25 June and 1 July 2002, of the well sites. Nothing was found that required future investigation. There are no cemeteries, public parks, or units of the National System of Trails or the Wild and Scenic Rivers System located within the well site boundaries. The report can be found in Attachment 4-1 of this submittal.

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

411.200 Previous Mining Activity

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

412 Reclamation Plan

412.100 Postmining Land-Use Plan

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

Dugout Canyon intends the postmining land use to be wildlife habitat and livestock grazing. Final reclamation activities will be completed in a manner to provide the lands able to parallel the premining land use.

412.200 Land Owner or Surface Manager Comments

Canyon Fuel Company, LLC is the land owner.

413 Performance Standards

413.100 Postmining Land Use

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

413.200 Determining Premining Uses of Land

Premining land use was wildlife habitat and livestock grazing.

413.300 Criteria for Alternative Postmining Land Uses

No alternative postmining land uses have been planned.

414 Alternative Land Use

No alternative postmining land uses have been planned.

420 AIR QUALITY

421 Air Quality Standards

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

422 Compliance Efforts

See Fugitive Dust Control Plan, Section 424.

423 Monitoring Program

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

424 Fugitive Dust Control Plan

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

425 Additional Division Requirements

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

**Canyon Fuel Company, LLC
Dugout Canyon Mine**

**Methane De-Gasification Amendment
March 2003**

Attachment 4-1
An Intensive Cultural Resource Survey and Inventory of the Dugout Canyon Mine
Drill Holes and Access Roads

ATTACHMENT 4-1



SENCO-PHENIX

**AN INTENSIVE CULTURAL RESOURCE SURVEY AND INVENTORY
OF THE DUGOUT CANYON MINE DRILL HOLES AND ACCESS ROADS**

Private Land

Carbon County, Utah

PERFORMED FOR
**Dugout Canyon Mine of
Canyon Fuel Company, LLC**

In Accordance with
Utah State Guidelines
Antiquities Permit #U02SC0203p

SPUT-413
July 8, 2002

John A. Senulis

Direct Charge of Fieldwork

UTAH SHPO

COVER SHEET

Project Name: AN INTENSIVE CULTURAL RESOURCE SURVEY AND INVENTORY
OF THE DUGOUT CANYON MINE DRILL HOLES AND ACCESS ROADS

Dugout Canyon Mine of Canyon Fuels LLC.

State #U02SC0203p

Report Date: July 8, 2002

County (ies): Carbon

Principal Investigator/ Field Supervisor: John A. Senulis/John Senulis

Records Search/Location/Dates: April 25, 2002 Antiquities; April 29, 2002, Price River Field Office
of the BLM

Acreage Surveyed: 32 acres

Intensive Acres: 32

Recon/Intuitive Acres: 0

U.S.G.S. 7.5 Quad: Pine Canyon, Utah (1972)

Sites Reported	Number	Smithsonian Site #(s):
Archeological Sites:	0	
Revisit (No IMACS update)	0	
Revisit (IMACS update atch.)	0	
New Sites (IMACS attached)	0	
Archeological Site Total:	0	
Historic Structures:		
(USHS Site Form Attached)		
Total NRHP Eligible Sites,	0	

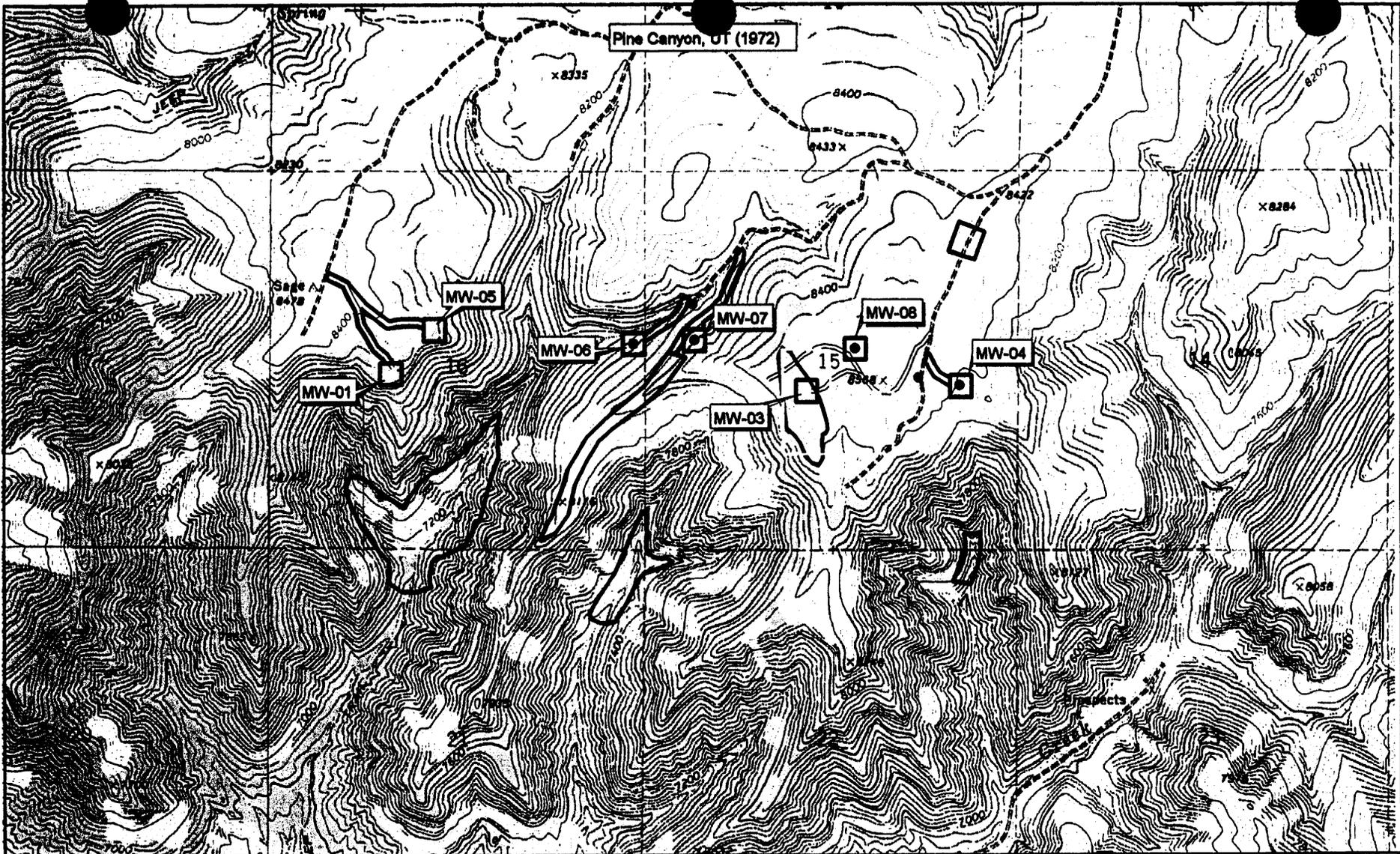
Checklist of Required Items:

1. X 1 Copy of Final Report
2. X Copy of U.S.G.S. 7.5' map showing surveyed/excavated area
3. Completed IMACS Site Inventory Forms Including
 - _____ Parts A and B or C
 - _____ IMACS Encoding Form
 - _____ Site Sketch Map
 - _____ Photographs
 - _____ Copy of USGS 7.5' Quad with Smithsonian site Number
4. X Completed Cover Sheet

Abstract

SENCO-PHENIX performed an intensive cultural resource survey on seven of the eight proposed drill holes and connecting access roads for the Dugout Canyon Mine of Canyon Fuel LLC. Drill hole MW-2 was not surveyed because it was in a previously surveyed area. The proposed drill holes and access roads are located on private land. The purpose of the survey was to identify and evaluate cultural resources that may exist within the project area.

No cultural resources were located and the potential for undetected remains is remote. A finding of no effect is appropriate and archeological clearance without stipulations is recommended.



SENCO-PHENIX



Scale 1:24000
1"=2,000'

-  Previous Survey
-  Current Survey
-  Eligible Sites
-  Ineligible Sites

Drill Holes and Access Roads
Dugout Mine of Canyon Fuel Company, LLC
Sections 15, 16, T13S, R12E
Carbon County, Utah
July 2002
SPUT- 413

Project Location

The project area is the hills above the Dugout Canyon Coal Mine. All drill holes and access corridors are on private land in Sections 15 and 16, T13S, R12E, Carbon County, Utah. Access to the drill holes will mostly follow existing improved dirt roads that were built to facilitate logging in the general area. All drill locations and the access corridors were flagged. The proposed project is noted on the enclosed copy of U.S.G.S. 7.5' Quad: Pine Canyon, Utah (1972).

Environment

The project area is the hills above the Fish Creek and Soldier Creek drainages. The extensive bench is basically a sagebrush flat intermixed with pockets of Pinyon-Juniper and stands of Aspen. The understory consists of mountain mahogany, rabbitbrush, ephedra, galleta grass, yucca, and serviceberry. Elevation averages about 8,500 feet. There is no permanent water in the project area.

Previous Research

A file search by the Antiquities Section of the Utah Division of State History on April 25, 2002 and by SENCO-PHENIX at the Price River Field Office of the BLM on April 29, 2002 revealed that the following projects are reported for the current project area:

- 1978, 78-AF-497, AERC surveyed drill pad locations in the current project area, no archaeological sites were located.
- 1979, 79-AF-485, AERC did an intensive survey of drill pad locations, no archaeological sites were located.
- 1982, 82-UB-632, Five drill hole locations were surveyed by UARC in the vicinity of the current project, no archaeological sites were discovered.
- 1983, 83-MA-793, Metcalf-Zier surveyed areas in Sections 27,28 & 33, south of the current project area. Three non-significant archaeological sites were recorded:
 - 42CB379 - a lithic scatter with a hearth feature that is located on a bench above an intermittent drainage.
 - 42CB380 - a lithic scatter with tools and debitage located on the eastern bank of an intermittent stream.
 - 42CB381 - a lithic scatter composed of debitage and one tool located west of Dugout Creek on the southern side of an intermittent stream.
- 1995, 95-AF-640bp, AERC for the Dugout Mine Development Project surveyed areas south of the current project. Two archaeological sites were recorded:
 - 42CB0167 - a series of pictograph panels on ledges located above Dugout Creek. The site is eligible for nomination to the NRHP. The site will not be impacted by the proposed project.
 - 42CB168 - is the Dugout Creek coal mine opened in 1913 and actively mined between 1940-1965. The site is not eligible based on the extensive cleanup that has occurred.
- 1996, 96-SC-102, SENCO-PHENIX surveyed the realigned Dugout Canyon road. Archeological sites noted above, 42CB167 and 168 were re-recorded and evaluated.
- 1998, 98-AF-0367b, Drill pad locations and access corridors were surveyed by AERC in the current project area; no archaeological sites were located.
- 1999, 99-AF-270p, 53 acres were intensively surveyed by AERC in the current project area; no archaeological sites were located.

Methodology

SENCO-PHENIX performed a Class III intensive walkover survey on June 25 and July 1, 2002. John Senulis directed the field crew consisting of Jeanne Senulis and Cathy Dodt-Ellis. Meandering transects no further spaced than 15 meters were employed for the well pad and drill holes. The drill holes, which were mostly in previously disturbed areas, were given a roughly 3 acre buffers. The access roads were surveyed to a right of way of 30 meters. Special attention was given to those areas of subsurface soil exposure from animal burrowing and erosion.

All field notes and digital photographs are on file at the offices of SENCO-PHENIX in Price, Utah.

Findings and Recommendations

No cultural resources were located and the potential for undetected remains is remote. A finding of no effect is appropriate and archeological clearance without stipulations is recommended.

These recommendations are subject to modification and review by the Utah SHPO.

CHAPTER 5

ENGINEERING

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Plate 5-2	MW-08 - Cross-Sections

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 de-gasification well sites. The activities associated with the construction and reclamation of the well sites have been or will be designed, located, constructed, maintained, and reclaimed in accordance with the operation and reclamation plans.

511 General Requirements

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

512 Certification

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

512.100 Cross Sections and Maps

Cross-sections for the de-gasification well pads are shown on Plates 5-1 and 5-2 and typical road cross section is shown in Figure 5-5.

512.200 Plans and Engineering Designs

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

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

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

Impoundments - Refer to Section 733.200 of this submittal.

Primary Roads - No primary roads will exist within the well sites.

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

513 Compliance with MSHA Regulations and MSHA Approval

513.100 Coal Processing Waste Dams and Embankments

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

513.200 Impoundments and Sedimentation Ponds

Refer to Section 733.200 of this submittal.

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

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

513.400 Refuse Piles

No refuse piles will exist at the well sites.

513.500 Underground Openings to the Surface

The well will be equipped with a valve that will be closed and locked when not in use. A typical well head is shown in Figure 5-6.

513.600 Discharge to Underground Mine

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

513.700 Surface Coal Mining and Reclamation Activities

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

513.800 Coal Mine Waste Fire

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

514 Inspection

514.100 Excess Spoil

No excess spoil will be stored at the well sites.

514.200 Refuse Piles

No refuse piles will exist at the well sites.

514.300 Impoundments

Refer to Section 733.200 of this submittal.

515 Reporting and Emergency Procedures

515.100 Slides

Refer to Section 515.100 in the approved M&RP.

515.200 Impoundments Hazards

No permanent impoundments will exist at the well sites.

515.300 Temporary Cessation of Operations

If temporary cessation of the mining operations does occur, the wells will remain open. Once liberation of the methane gas is completed, the wells will be sealed as discussed in Section 551 of this submittal.

520 OPERATION PLAN

521 General

See Figures 5-1 and 5-2 for the layout of the well sites during the drilling pad. See Figures 5-3 and 5-4 for layout of exhaust blower pads.

521.100 Cross Sections and Maps

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

Landowner, Right-of-Entry, and Public Interest - Canyon Fuel Company, LLC is the landowner of the well sites .

Mining Sequence and Planned Subsidence - Not applicable.

Land Surface Configuration - Surface contours of undisturbed well sites are included in Figures 5-8 and 5-9.

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

521.200 Signs and Markers

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

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

Perimeter Markers - The perimeter will be fenced with field fence and will act as the perimeter marker.

Buffer Zone Markers - Stream buffer zone markers will be required at the of MW-06. MW-08 will not required stream buffer zone markers.

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

Construction Markers - Not applicable.

522 Coal Recovery

No coal recovery will be performed at the well sites.

523 Mining Methods

No mining will be performed at the well sites.

524 Blasting and Explosives

No explosives are to be used at the well sites.

525 Subsidence

No subsidence will occur at the well sites because of drilling. Subsidence could occur at the well site because of underground mining see Section 525 of the approved M&RP. Figure 1-1 shows the well site locations in relationship to the underground workings.

526 Mine Facilities

526.100 Mine Structures and Facilities

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

526.200 Utility Installation and Support Facilities

No utilities are to be installed at the well sites. A portable methane exhaust unit will be temporary installed to draw methane to the surface. The methane will be used to power the exhaust blower unit and any excess methane will be vented to the atmosphere. A portable exhaust blower will be used to draw methane gas from the mined panel. The blower will be started by using propane from portable tanks. Once the exhaust blower is running, the unit will be powered by burning the extracted methane gas from the longwall gob. The blower is approximately 12-feet long by 6-feet wide and about 10-feet tall. The de-gasification of the longwall panel will take about two to three years after mining has been completed.

527 Transportation Facilities

527.100 Road Classification

MW-06 and MW-08 will be developed on or next to existing private roads as shown on Figure 1-1. The existing roads will be classified as primary roads and will be maintained as required by landowner.

527.200 Description of Transportation Facilities

The well sites were chosen close to existing roads in the area to prevent disturbing more surface. The existing roads shown on Figure 1-1 are classified as an existing road with no up-grade (red) and existing roads requiring up-grade (yellow). The roads requiring up-grade will be regraded, but will not be cut any wider. The existing roads are approximately 20 feet wide. See Figure 5-5 for a typical cross section of the existing roads.

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

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

529 Management of Mine Openings

The perimeter of the sites will be fenced. MW-06 will have two (2) gates to allow access through the site since the pad will be built on the existing road. The well casing will have a valve that is closed and locked. The valve will also prevent access by animals or other material. A 20 foot radius around the well casing will be free of any plant life to reduce the possibility of fuel for fires.

530 OPERATIONAL DESIGN CRITERIA AND PLANS

531 General

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

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

532 Sediment Control

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

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

533 Impoundments

No permanent impoundments will exist at the well sites.

534 Roads

Refer to Section 527 of this submittal.

535 Spoil

No spoil will be generated at the well sites.

536 Coal Mine Waste

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

537 Regraded Slopes

537.100 Division Approval

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

537.200 Regrading of Settled and Revegetated Fills

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

540 RECLAMATION PLAN

541 General

541.100 Commitment

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

541.200 Surface Coal Mining and Reclamation Activities

Not applicable.

541.300 Underground Coal Mining and Reclamation Activities

The wells will intercept the gob areas in the underground workings. Upon completion of venting activities the wells will be reclaimed.

541.400 Environmental Protection Performance Standards

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

542 Narratives, Maps, and Plans

542.100 Reclamation Timetable

A timetable for the completion of each major step in the reclamation plan is presented in Figure 5-7.

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

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

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

542.300 Final Surface Configuration Maps and Cross Sections

Refer to Plates 1 and 2 for final surface configuration.

542.400 Removal of Temporary Structures

The well sites will not have surface structures.

542.500 Removal of Sedimentation Pond.

No sediment pond will be constructed at the well sites. The temporary incised mud pit will be allowed to dry. When the impoundment is sufficiently dry, it will be filled with soil and compacted to minimize settling.

The material in the mud pit will be tested for acid/toxic forming characteristics as described in Table 6 of the Division's Topsoil and Overburden Guidelines. If the material is acid/toxic, four (4) feet of non-acid/toxic material will be placed on the mud pit to prevent the material from leaching to the surface.

542.600 Roads

The roads to MW-06 and MW-08 will be left because they existed prior to the drilling program.

542.700 Final Abandonment of Mine Openings and Disposal Areas.

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

542.800 Estimated Cost of Reclamation.

Refer to the existing M&RP. It is anticipated that the cost of reclamation of the well sites is adequately covered by the Dugout Canyon Reclamation Bond.

550 RECLAMATION DESIGN CRITERIA AND PLANS

551 Casing and Sealing of Underground Openings

Permanent sealing is described in Section 542.700.

552 Permanent Features

552.100 Small Depressions

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

552.200 Permanent Impoundments

See Section 515.200 of this submittal.

553 Backfilling and Grading

553.100 Disturbed Area Backfilling and Grading

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

Erosion and Water Pollution - Temporary sediment controls will consist of silt fences and/or straw bales during and following regrading. As vegetation becomes established on the reclaimed surface, erosion potentials will be further minimized.

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

553.200 Spoil and Waste

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

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

553.250 Refuse Piles

No refuse piles will exist at the well sites.

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

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

553.400 Cut and Fill Terraces

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

553.500 Highwall From Previously Mined Areas

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

553.600 Previously Mined Area

No previously mined areas exist at the well sites.

553.700 Backfilling and Grading - Thin Overburden

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

553.800 Backfilling and Grading - Thick Overburden

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

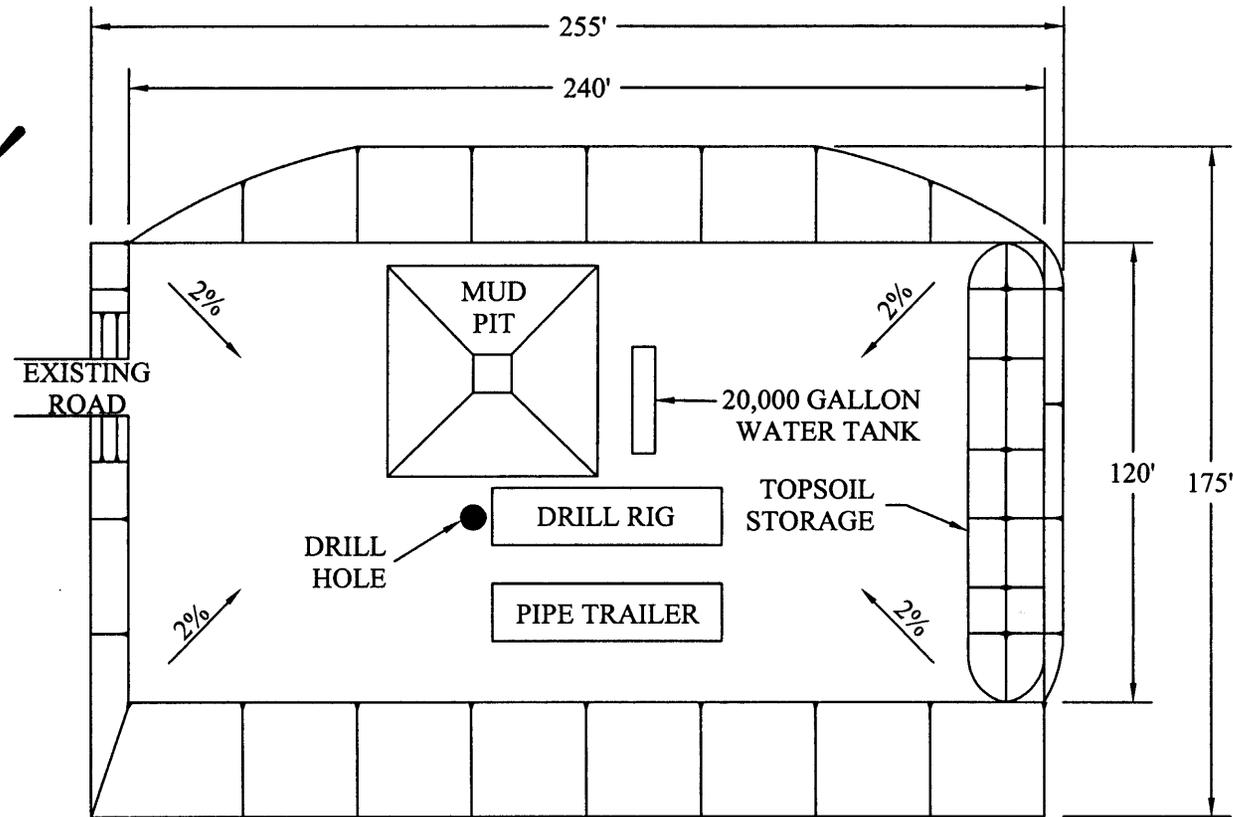
553.900 Regrading of Settled and Revegetated Rills

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

560 PERFORMANCE STANDARDS

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

51-5



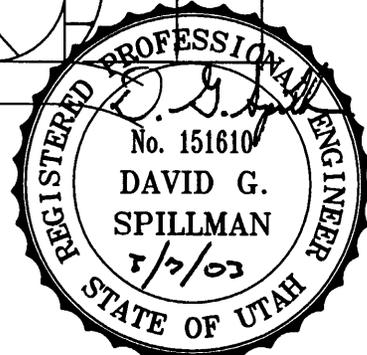
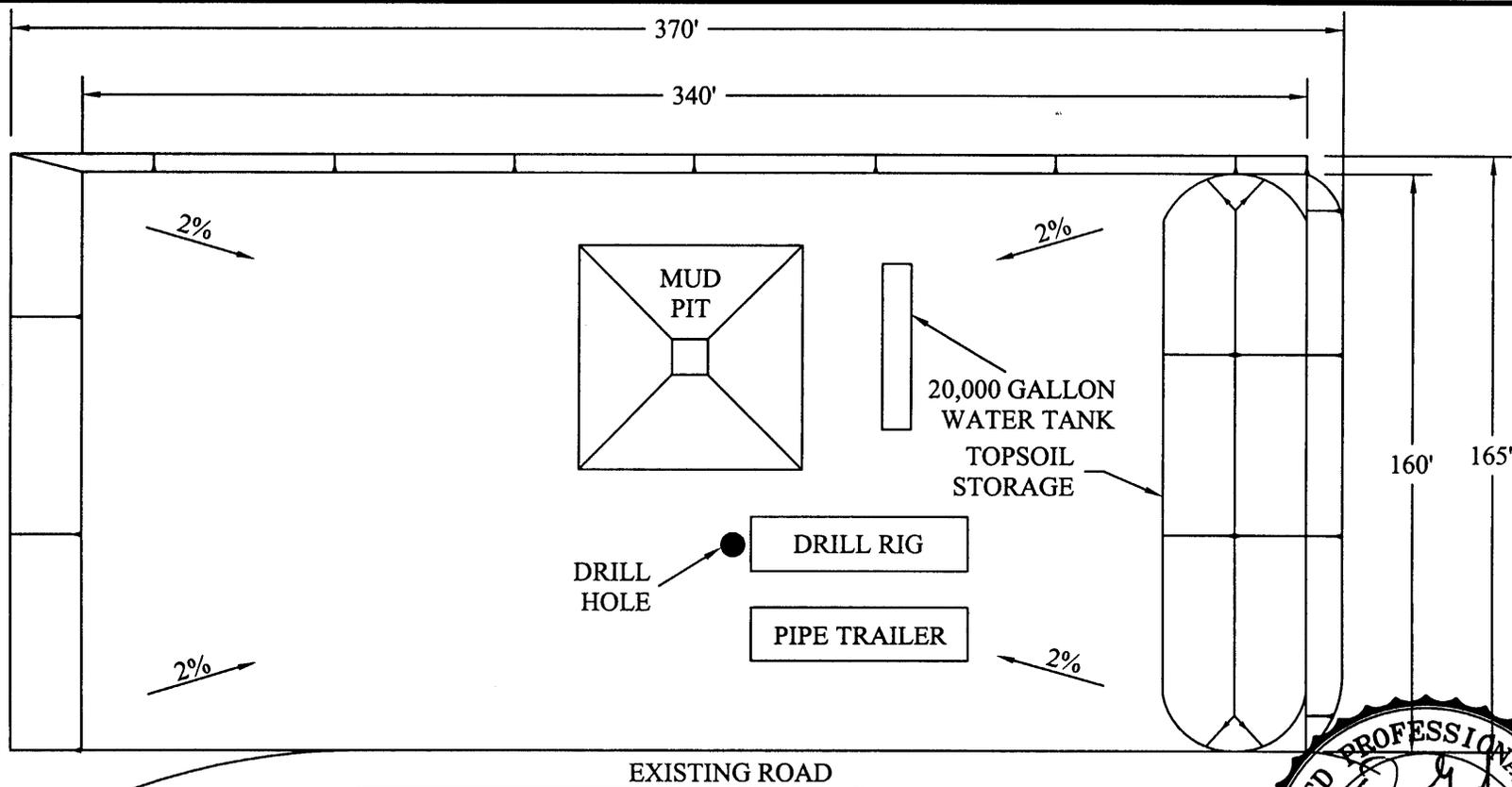
NOTE:

1. THE DRILL PAD WILL BE SLOPED TOWARDS THE MUD PIT.
2. MUD PIT DESIGNED FOR TOTAL CONTAINMENT OF A 10 YR. - 24 HR. EVENT.
3. SILT FENCE AND /OR STRAW BALES WILL BE PLACED AT THE TOE OF THE FILL SLOPES.
4. ACTUAL EQUIPMENT LOCATIONS MAY VARY AT THE SITE.
5. DRILL HOLE LOCATION MAY VARY.
6. THE TOTAL DISTURBED AREA WILL BE FENCED.
7. PAD ELEVATION IS APPROXIMATELY 7987.5 FT.
8. MUD PIT WILL BE KEPT PUMPED DOWN TO ENSURE RUNOFF STORAGE.



REVISIONS OR UP-DATES			DATE: 02/17/03	
NO.	DATE	BY	DESIGNED BY:	
			DRAWN BY:	RR
			CHECKED BY:	GT
			SCALE:	1" = 50'
FILENAME: Y:\Richey\Gary Taylor\MW-06_fig 5-1.dwg			 Canyon Fuel Company, LLC Dugout Canyon Mine	
			DRILLING LAYOUT MW-06	
			P.O BOX 1029 WELLINGTON, UTAH 84542	DRAWING OR MAP NUMBER FIGURE 5-1

91-5



NOTE:

1. THE DRILL PAD WILL BE SLOPED TOWARDS THE MUD PIT.
2. MUD PIT DESIGNED FOR TOTAL CONTAINMENT OF A 10 YR. - 24 HR. EVENT.
3. SILT FENCE AND/OR STRAW BALES WILL BE PLACED AT THE TOE OF THE FILL SLOPES.
4. ACTUAL EQUIPMENT LOCATIONS MAY VARY AT THE SITE.
5. DRILL HOLE LOCATION MAY VARY.
6. THE TOTAL DISTURBED AREA WILL BE FENCED.
7. PAD ELEVATION IS APPROXIMATELY 8520.0 FT.
8. MUD PIT WILL BE KEPT PUMPED DOWN TO ENSURE RUNOFF STORAGE.

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Canyon Fuel Company, LLC
Dugout Canyon Mine

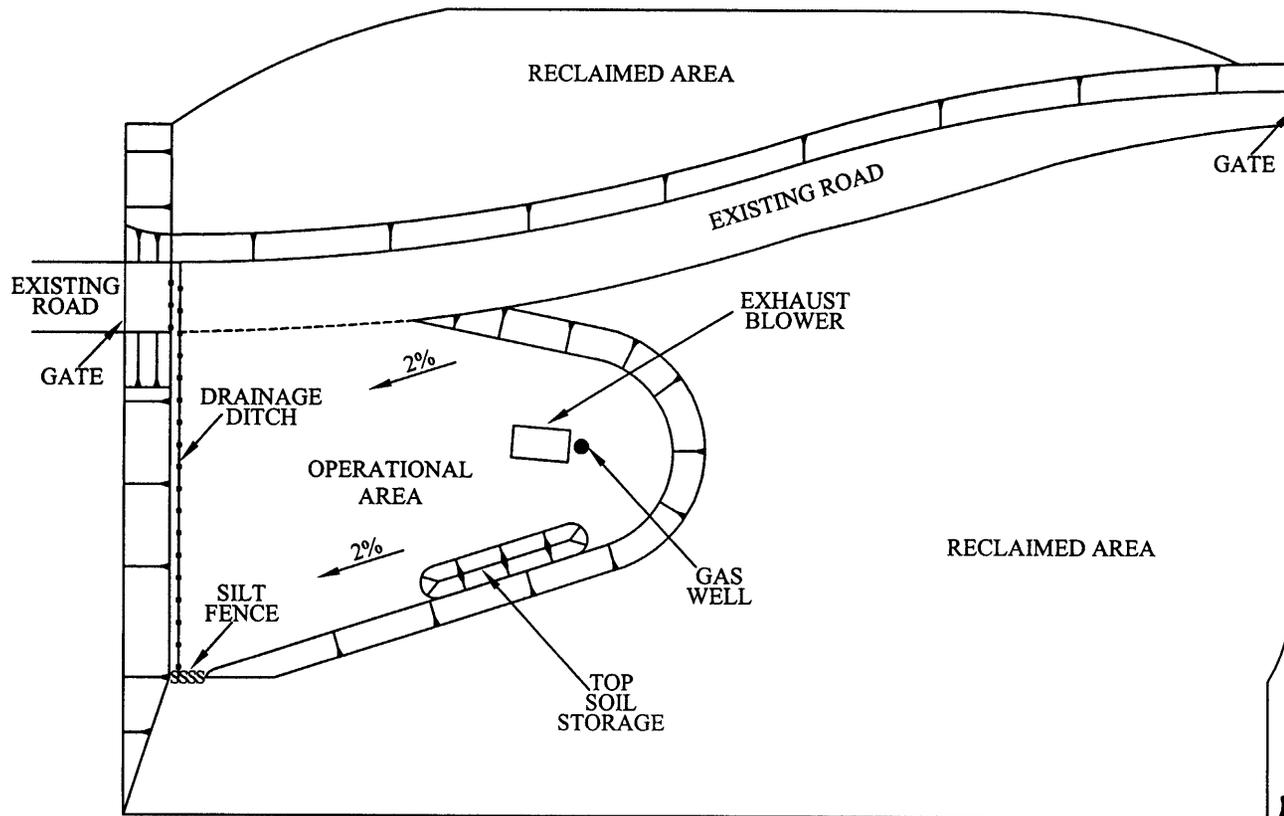
DRILLING LAYOUT
MW-08

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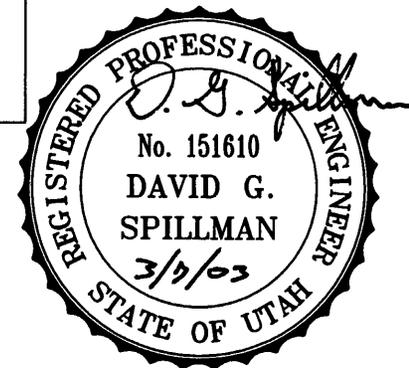
FIGURE 5-2

5-17



NOTE:

1. SILT FENCE AND/OR STRAW BALES LOCATED AT THE LOWEST POINT ON THE OPERATIONAL PAD.
2. SILT FENCE AND/OR STRAW BALES WILL BE PLACED AT THE TOE FILL SLOPE AND RECLAIM AREA.
3. RUNOFF FROM RECLAIM AREA PAD AND ROAD WILL BE TREATED BY PAD SILT FENCE.



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Dugout Canyon Mine

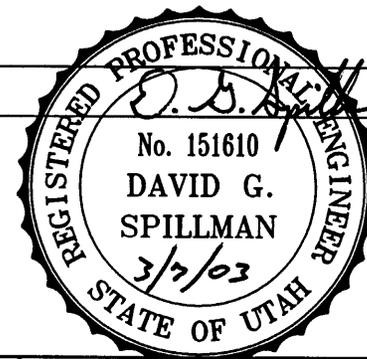
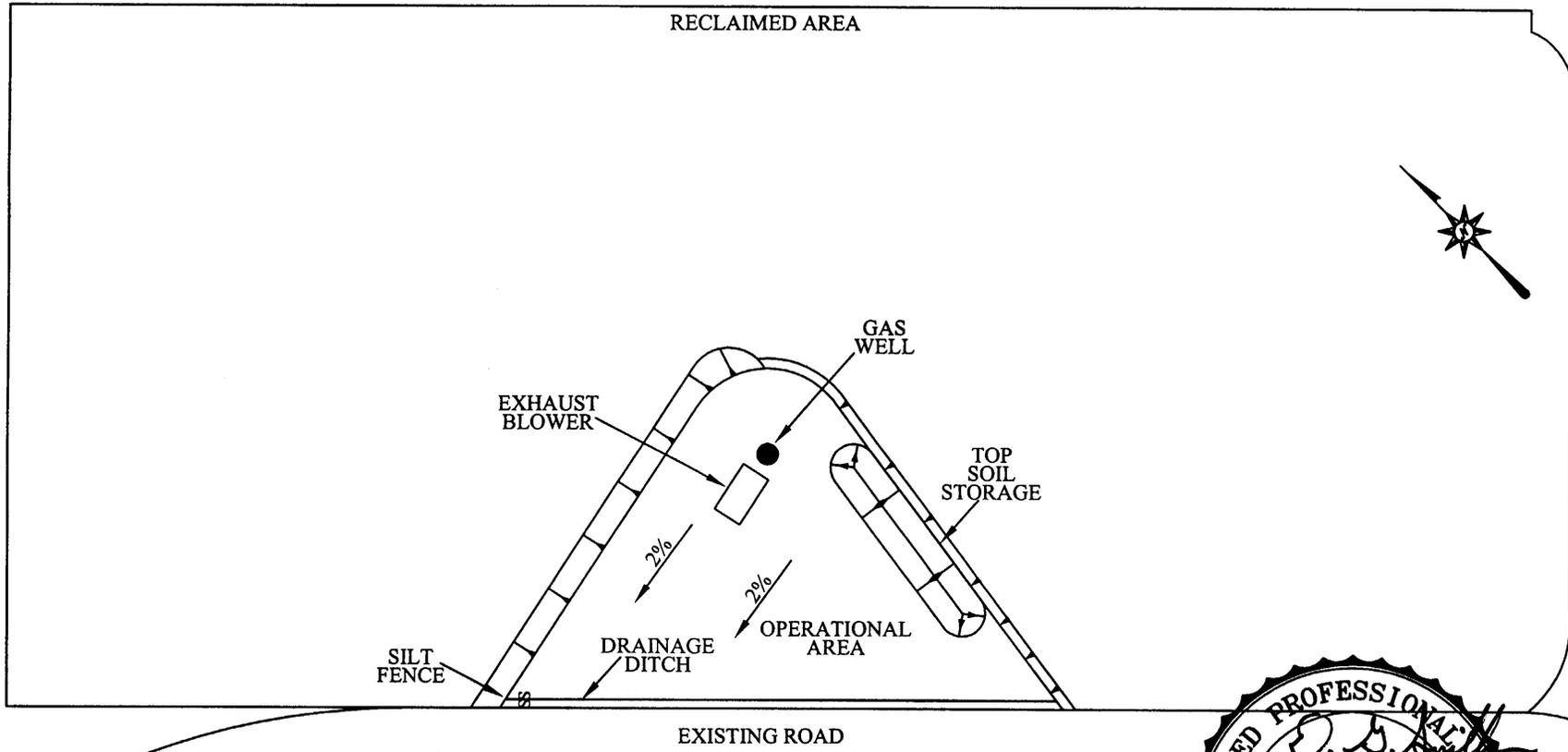
OPERATIONAL LAYOUT
MW-06

P.O BOX 1029
WELLINGTON, UTAH 84542

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FIGURE 5-3

5-18



- NOTE:
1. SILT FENCE AND/OR STRAW BALES LOCATED AT THE LOWEST POINT ON THE OPERATIONAL PAD.
 2. SILT FENCE AND/OR STRAW BALES WILL BE PLACED AT THE TOE OF FILL SLOPE AND RECLAIM AREA.

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Canyon Fuel Company, LLC
Dugout Canyon Mine

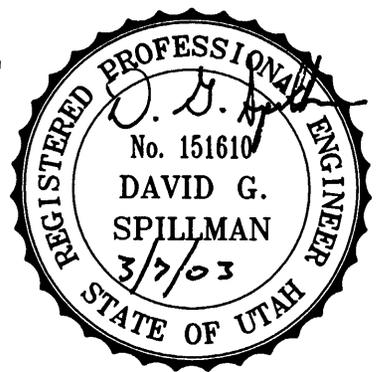
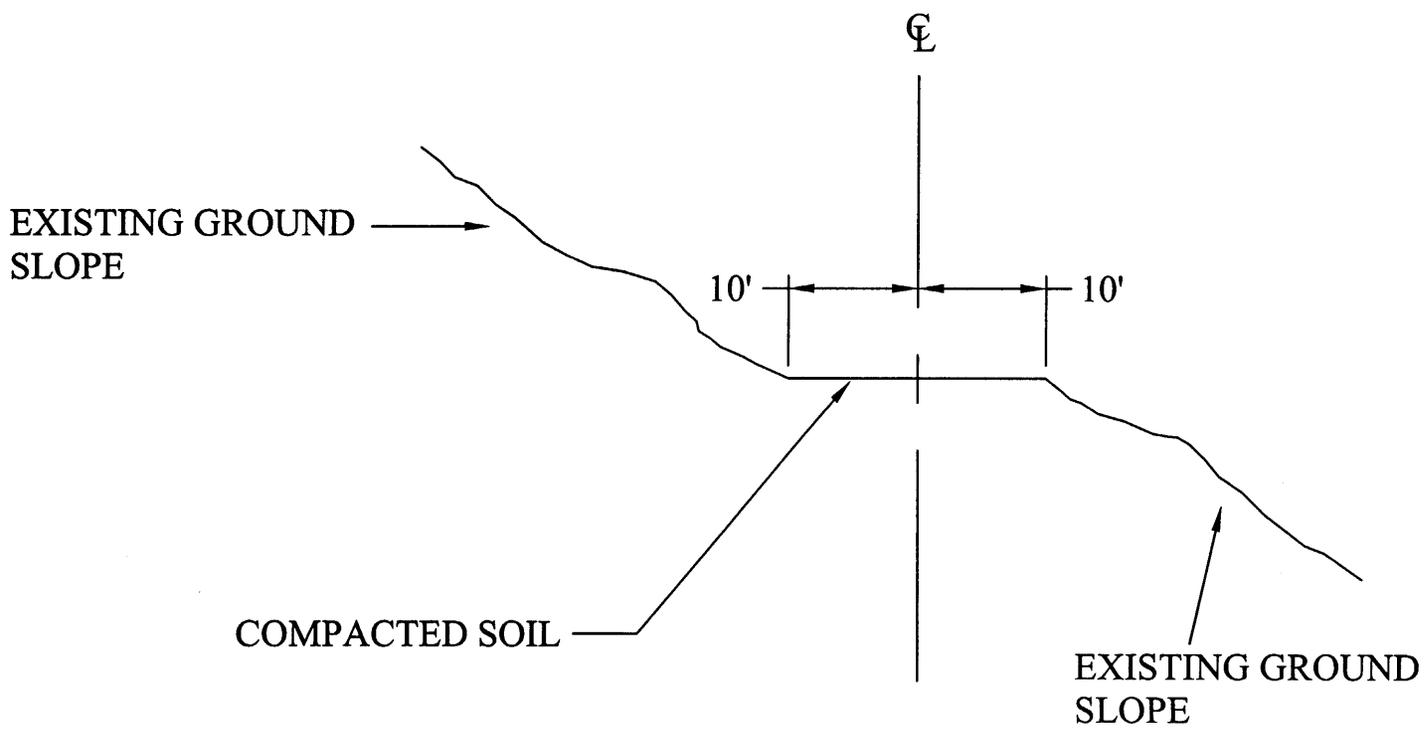
OPERATIONAL LAYOUT
MW-08

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FIGURE 5-4

5-19



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Canyon Fuel Company, LLC
Dugout Canyon Mine

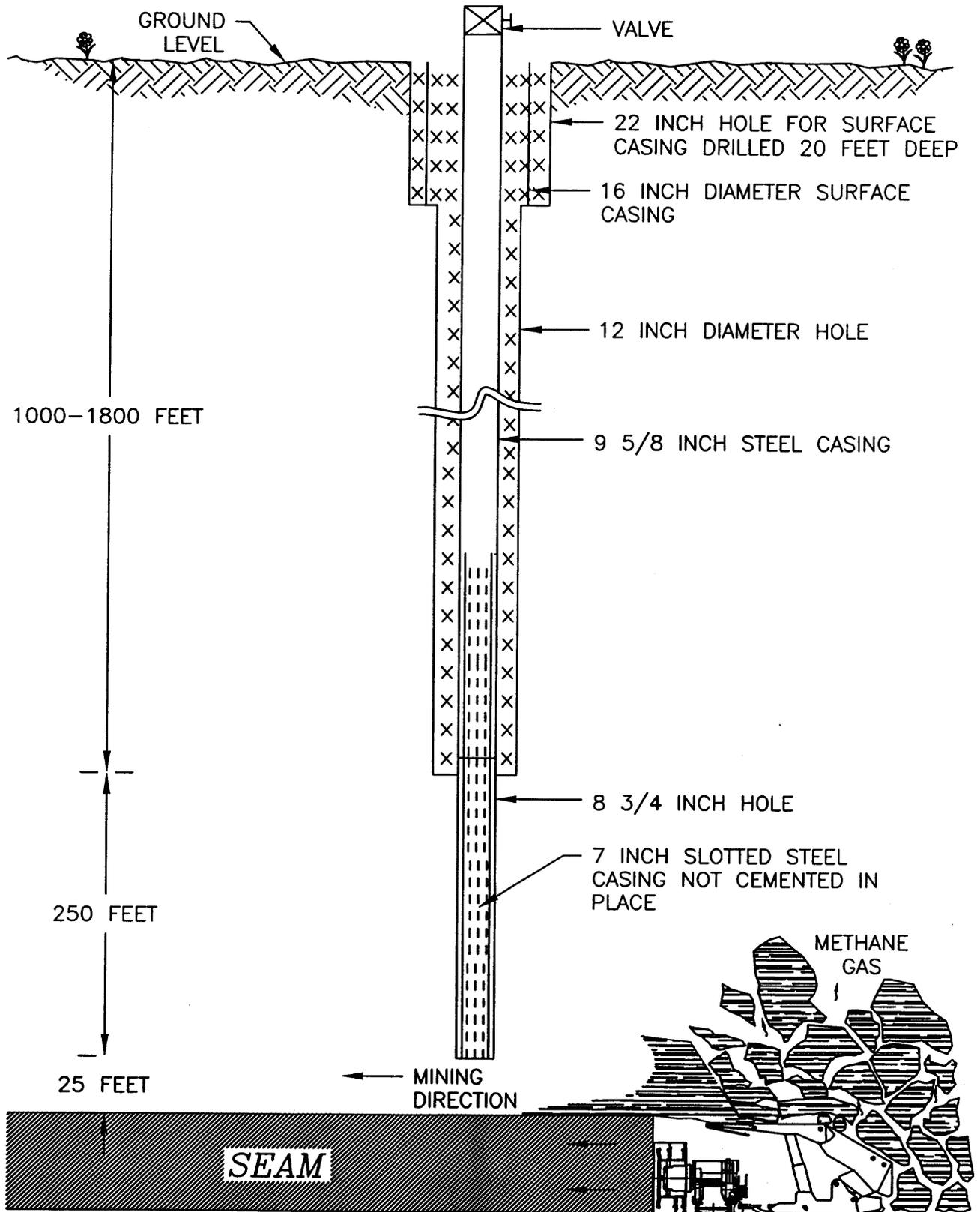
**TYPICAL CROSS SECTION
PRIMARY ROAD**

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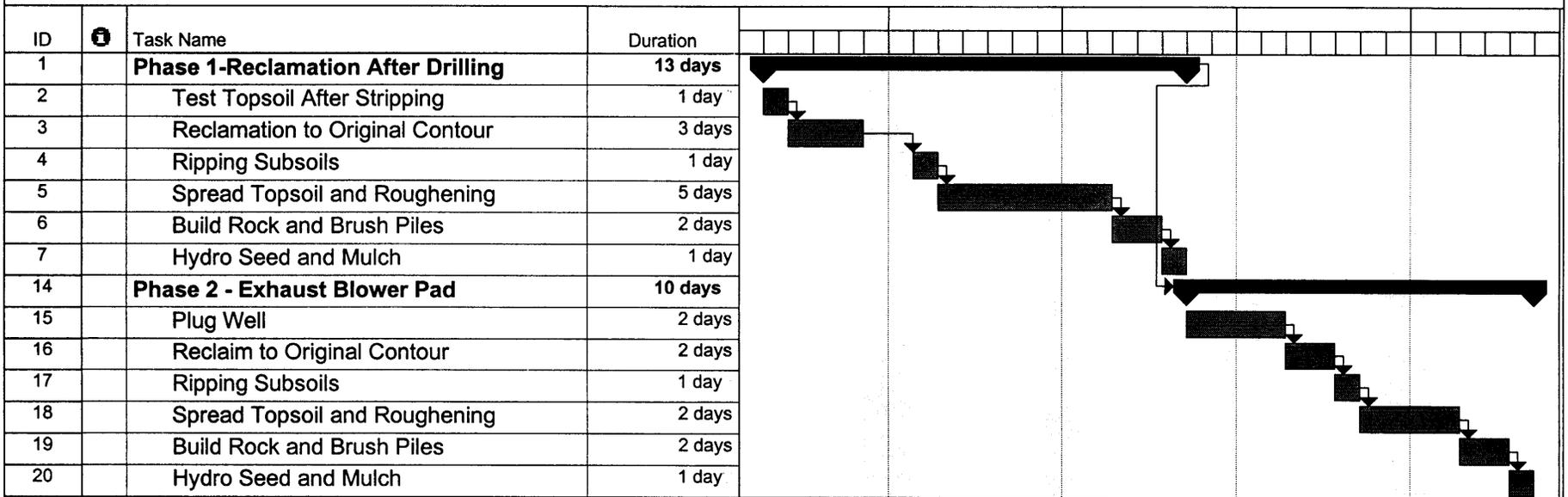
FIGURE 5-5

Figure 5-6
METHANE DRAINAGE WELL DESIGN



5-21

De-Gasification Well Reclamation

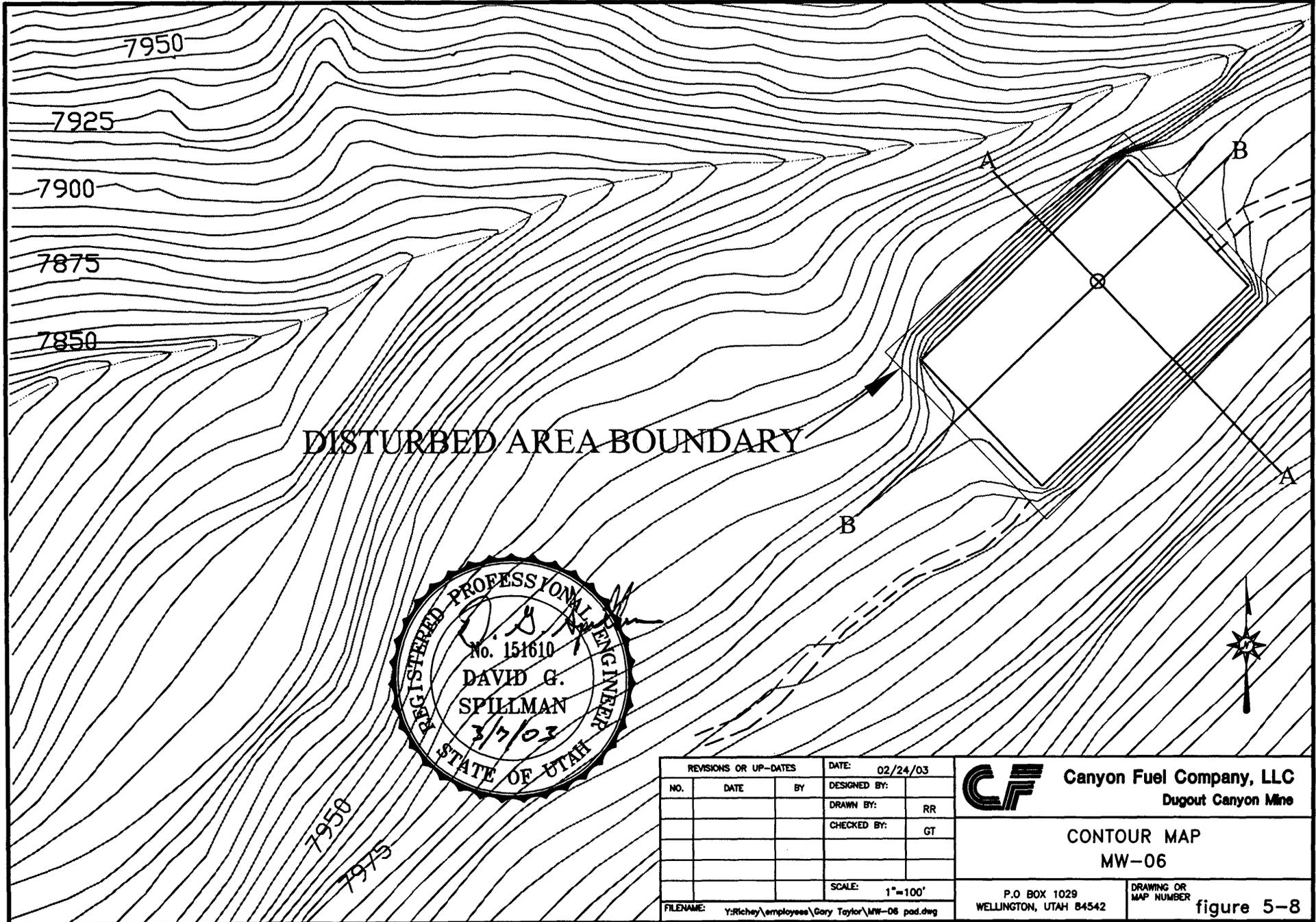


Project: Reclamation Time Table 23 Days
 Arch Coal, Inc. : Dugout Canyon Mine
 Date :03/03/03

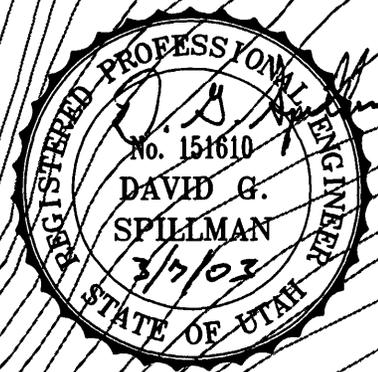
Task		Milestone	
Split		Summary	
Progress		Project Summary	
		External Tasks	
		External Milestone	
		Deadline	

Figure 5-7

5-22



DISTURBED AREA BOUNDARY



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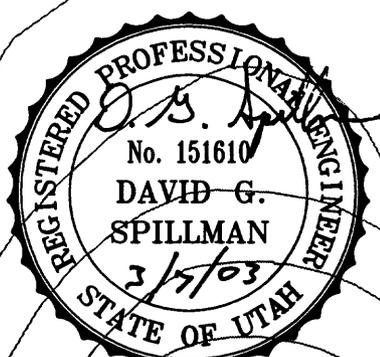
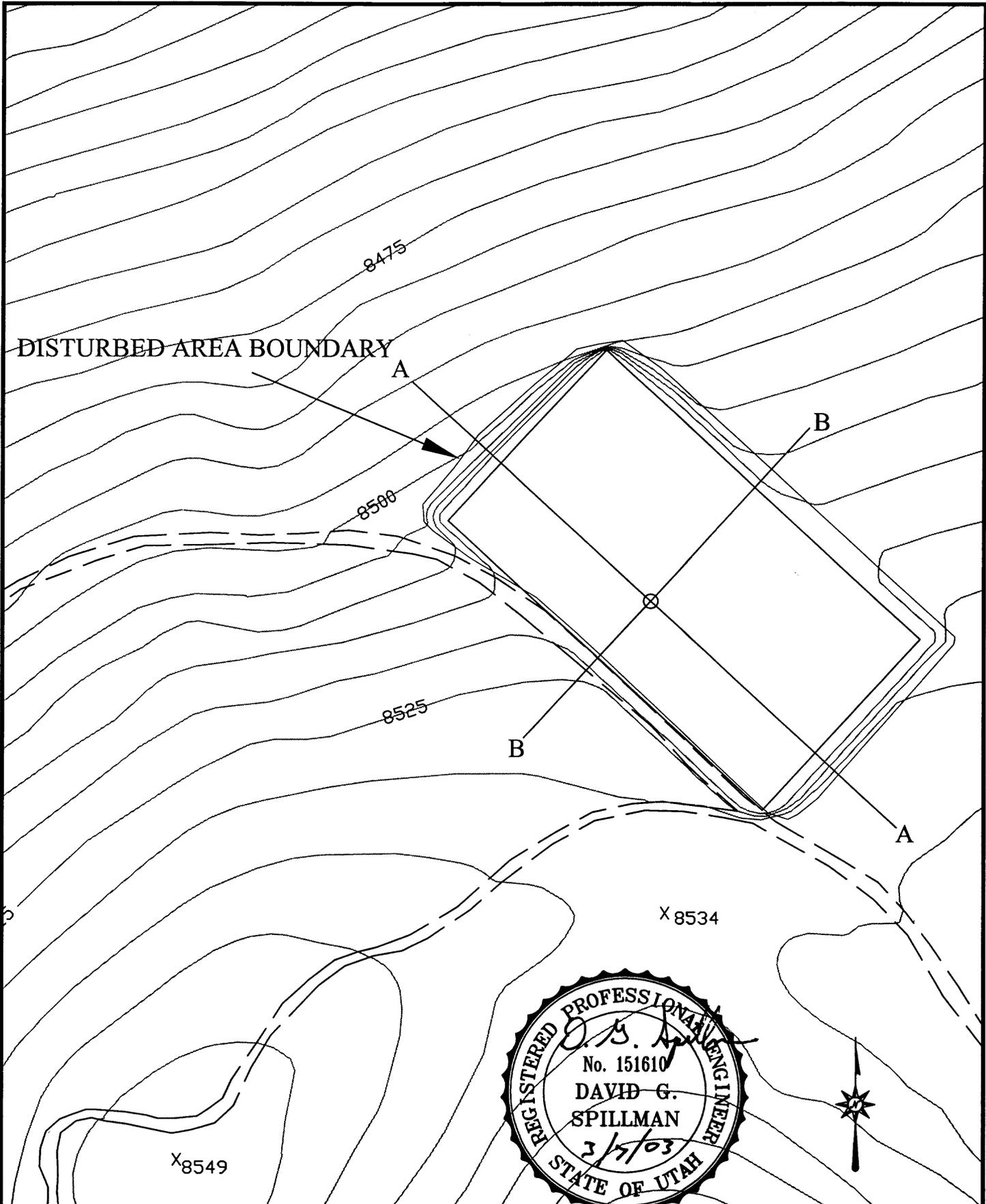
Canyon Fuel Company, LLC
Dugout Canyon Mine

CONTOUR MAP
MW-06

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WELLINGTON, UTAH 84542

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figure 5-8



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Canyon Fuel Company, LLC
Dugout Canyon Mine

CONTOUR MAP
MW-08

5-23

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P.O BOX 1029
WELLINGTON, UTAH 84542

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MAP NUMBER
Figure 5-9

Map(s) is kept with this application located in the Public Information Center of our Salt Lake City office.

CHAPTER 6

GEOLOGY

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610 INTRODUCTION

This chapter presents a description of the geologic resources in the area of the Dugout Canyon Mine. Most of this chapter has been compiled from the approved Geology section of the Dugout Canyon Mine, Mining and Reclamation Plan.

611 General Requirements

The geologic resources in the Dugout Canyon Mine area are discussed in Sections 621 through 627 of the M&RP. Information pertaining to the well sites is discussed below.

612 Certification

All maps, plans, and cross-sections presented in this chapter, required by the regulations, have been certified by a professional engineer.

620 ENVIRONMENTAL DESCRIPTION

This section presents a description of the geologic resources in the Dugout Canyon Mine well site areas.

621 General Requirements

This section presents the regional and site-specific geologic information for the Dugout Canyon Mine well sites.

622 Cross Sections, Maps and Plans

Refer to Plate 6-1 of the approved M&RP for geology associated with well site locations.

623 Geologic Determinations

The information required by the Division to make a determination of the acid and toxic forming characteristics of the well site strata is presented in Chapter 2, Appendix 2-1 of the approved M&RP. No acid or toxic forming materials will originate at the well sites.

624 Geologic Information

624.100 Regional Setting

Refer to Section 624 of the approved M&RP.

624.200 Test Boring and Drill Hole Data (overburden removed)

No test boring or drill cores are planned at the well sites.

624.300 Test Boring and Drill Hole Data (overburden not removed)

No test boring or drill cores are planned at the well sites.

625 Additional Geologic Information

It is not anticipated that any additional geologic data will need to be collected at the well sites.

626 Sampling Waivers

A sampling waiver is not requested at this time for the well sites.

627 Description of the Overburden Thickness and Lithology

Not applicable to this amendment.

630 OPERATION PLAN

631 Casing and Sealing of Exploration Holes

Not applicable to this amendment.

632 Subsidence Monitoring

See Section 525 for additional information.

640 PERFORMANCE STANDARDS

641 Exploration and Drill Holes

The performance standards used in the casing and sealing of all exploration holes and drill holes are outlined in the approved M&RP, Section 542.700.

642 Monuments and Surface Markers of Subsidence Monitoring Points

The performance standards used in the reclamation of all monuments and surface markers used in subsidence monitoring points are outlined in the approved M&RP, Section 525.

CHAPTER 7

HYDROLOGY

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LIST OF ATTACHMENTS

Attachment 7-1 Hydrology Calculations for Mud Pit and Ditches

710 INTRODUCTION

711 General Requirements

This chapter presents a description of the following:

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

712 Certification

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

713 Inspection

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

720 ENVIRONMENTAL DESCRIPTION

721 General Requirements

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

722 Cross Sections and Maps

722.100 Location and Extent of Subsurface Water

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

722.200 Location of Surface Water Bodies

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

722.300 Locations of Monitoring Stations

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

722.400 Locations and Depth of Water Wells

Plate 7-1 in the approved M&RP shows the groundwater monitoring wells. Refer to Appendix 7-9 of approved M&RP for details pertaining to the Gilson well.

722.500 Surface Topography

Surface topography features in the well sites and adjacent areas are shown on Figure 1-1, Figures 5-8 and 5-9.

723 Sampling and Analysis

Refer to Section 723 of the approved M&RP.

724 Baseline Information

Refer to Section 724 of the approved M&RP.

724.100 Groundwater Information

Refer to Section 724.100 of the approved M&RP.

724.200 Surface Water Information

Refer to Section 724.200 of the approved M&RP.

724.300 Geologic Information

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

724.400 Climatological Information

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

724.500 Supplemental Information

Refer to Section 724.500 of the approved M&RP.

724.600 Survey of Renewable Resource Lands

Refer to Section 724.600 of the approved M&RP.

724.700 Alluvial Valley Floor Requirements

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

725 Baseline Cumulative Impact Area Information

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

726 Modeling

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

727 Alternative Water Source Information

Not Applicable

728 Probable Hydrologic Consequences

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

728.100 Potential Impacts of Surface and Groundwater

Potential impacts of the well sites in this area on the quality and quantity of surface and groundwater flow may include, contamination from materials such as diesel fuel, drilling fluids, etc.

The potential impact is addressed in the Section 728.300 of this submittal and the approved M&RP.

728.200 Baseline Hydrologic and Geologic Information

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

728.300 PHC Determination

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

Acid and Toxic Forming Materials - No acid or toxic forming materials have been identified in the soils or strata of the Dugout Canyon Mine (Chapter 6, Section 623 of this submittal). Additional information is located in Section 542.500 of this submittal.

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

Potential Hydrocarbon Contamination - Diesel fuels, oils and greases, and other hydrocarbon products will not be stored at the well sites. Fuels, greases, and other oils may leak from equipment during drilling operations. Absorbent materials will be used for the collection of leaked fuels, greases, and other oils. The saturated absorbent materials will be disposed of at an appropriate landfill facility.

729 Cumulative Hydrologic Impact Assessment (CHIA)

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

730 OPERATION PLAN

731 General Requirements

731.100 Hydrologic -Balance Protection

Groundwater Protection - The effect on groundwater at the well sites is expected to be minimal. Groundwater encountered during drilling will be sealed off using drilling mud.

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

During initial drilling, the sites will be graded to ensure that storm runoff will flow to the mud pit. After drilling, the pad size will be reduced for exhausting operations. The mud pit will be filled in and the pad regraded to cause the storm runoff to flow to a ditch. A silt fence and/or straw bale dikes will be installed in the ditch to treat runoff before it leaves the pad (see Figures 5-3 and 5-4). The silt fences and/or straw bale dikes will be periodically inspected, and accumulated sediment will be removed as needed to maintain functionality. The sediment from the silt fence and/or straw bales dikes will be piled on the pad and will be used for fill during final reclamation of the well site. Ditch and silt fence calculations are in Attachment 7-1.

731.200 Water Monitoring

No water monitoring will be conducted at the de-gas well sites.

731.300 Acid or Toxic Forming Materials

No acid or toxic forming materials are anticipated at the well sites (see Section 732.200). Refer to Section 728.100 for information concerning petroleum products.

731.400 Transfer of Wells

Refer to Section 731.400 of the approved M&RP.

731.500 Discharge

No discharges to underground workings.

731.600 Stream Buffer Zones

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

Buffer Zone Designation - MW-06 is located on part of the Fish Creek drainage and buffer zone will established at the well site.

731.700 Cross Section and Maps

Not applicable.

731.800 Water Rights and Replacement

Refer to Section 731.800 of the approved M&RP.

732 Sediment Control Measures

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

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

732.100 Siltation Structures

Refer to Section 733.200 of this submittal for discussion about the mud pit design and see Attachment 7-1 for information about the silt fence design.

732.200 Sedimentation Pond

The incised mud pit will act as a temporary sedimentation basin during drilling operations. The mud pit will be used to settle out the drill cutting from the drilling fluid and to contain storm runoff from a 10-year 24-hour event. The site will be graded to drain all runoff towards the mud pit. The drill cuttings are non-toxic since the rock formations are considered non-toxic. The drilling fluid is made up of water and bentonite clay or a surfactant, which are not considered toxic. The water in the mud pit will be pumped periodically to ensure that room is available to contain storm event. Mud pit calculations are located Attachment 7-1.

See Figures 5-1 and 5-2 for drill pad layout and Figures 5-3 and 5-4 for operational pad layout.

732.300 Diversions

Refer to Section 731.100 of this submittal.

732.400 Road Drainage

No diversion ditches will be constructed along the primary roads leading to the well sites. See Figure 5-5 for typical cross section.

733 Impoundments

733.100 General Plans

Not applicable.

733.200 Permanent and Temporary Impoundments

No permanent impoundments will exist at the well sites.

734 Discharge Structures

Ditch with silt fence and/or straw bale dikes will be the discharge structure for each of the well sites.

735 Disposal of Excess Spoil

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

736 Coal Mine Waste

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

737 Non-Coal Mine Waste

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

738 Temporary Casing and Sealing of Wells

Refer to Section 542.700 of this submittal.

740 DESIGN CRITERIA AND PLANS

741 General Requirements

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

742 Sediment Control Measures

742.100 General Requirements

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

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

742.200 Siltation Structures

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

Design - The silt fence at the well sites was designed using the 10-year, 24-hour precipitation event. Ditch and silt fence calculations are in Attachment 7-1. Locations of the silt fence are shown on Figures 5-3 and 5-4.

742.300 Diversions

A diversion ditch will be used to direct storm runoff from the operational pad.

742.400 Road Drainage

Refer to Section 732.300 of this submittal.

743 Impoundments

No impoundments will exist at the well sites.

744 Discharge Structures

No discharge structures have been planned or designed.

745 Disposal of Excess Spoil

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

746 Coal Mine Waste

746.100 General Requirements

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

746.200 Refuse Piles

There will be no refuse piles at the well sites.

746.300 Impounding Structures

Refer to Section 733.200 of this submittal.

746.400 Return of Coal Processing Waste to Abandoned Underground Workings

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

747 Disposal of Non-Coal Mine Waste

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

748 Casing and Sealing Wells

Refer to Section 542.700 of this submittal.

750 PERFORMANCE STANDARDS

751 Water Quality Standards and Effluent Limitations

Water encountered during drilling will flow into the mud pit and will be pumped into a storage tank and will not be discharged to a stream channel. Runoff water will flow to the mud pit for treatment during drill operations and will be treated during exhausting operations using silt fence and/or straw bales prior to leaving the site.

752 Sediment Control Measures

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

752.100 Siltation Structures and Diversions

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

752.200 Road Drainage

Refer to Section 732.400 of this submittal.

753 Impoundments and Discharge Structures

Refer to Section 733.200 of this submittal.

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

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

755 Casing and Sealing

Refer to Section 542.700 of this submittal.

760 RECLAMATION

761 General Requirements

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

762 Roads

Primary roads to the well sites will not be reclaimed since they are existing roads.

762.100 Restoring the Natural Drainage Patterns

The natural drainage patterns will be restored after de-gasification is completed.

762.200 Reshaping Cut and Fill Slopes

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

763 Siltation Structures

763.100 Maintenance of Siltation Structures

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

763.200 Removal of Siltation Structures

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

764 Structure Removal

A timetable for the reclamation of the sites is presented in Figure 5-7.

765 Permanent Casing and Sealing of Wells

Refer to Section 542.700 of this submittal.

**Canyon Fuel Company, LLC
Dugout Canyon Mine**

**Methane De-Gasification Amendment
March 2003**

Attachment 7-1
Hydrology Calculations for Mud Pit and Ditches

ATTACHMENT 7-1

Hydrology Calculations for MW-06 and MW-08

I, being a professional engineer hereby certify that these calculations were prepared under my direct supervision and that all information contained thereon is true and correct to the best of my knowledge and information.



Canyon Fuel Company, LLC - Dugout Canyon Mine
P. O. Box 1029
Wellington, Utah 84642

Phone: (435) 636-2893
Email: gtaylor@archcoal.com

MW-06 Mud Pit

Note: The mud pit will be a total containment for the storm runoff from a 10-year, 24-hour event and drilling fluid. The program requires a discharge from the mud pit to show the mud pit capacity.

Gary E. Taylor

Canyon Fuel Company, LLC - Dugout Canyon Mine
P. O. Box 1029
Wellington, Utah 84642

Phone: (435) 636-2893
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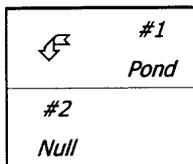
General Information

Storm Information:

Storm Type:	NRCS Type II
Design Storm:	10 yr - 24 hr
Rainfall Depth:	1.950 inches

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Pond	#1	==>	#2	0.079	0.146	
Null	#2	==>	End	0.000	0.000	



Structure Routing Details:

Stru #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	2. Minimum tillage cultivation	2.00	4.00	200.00	0.70	0.079
#1	Muskingum K:					0.079

Structure Summary:

		Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#1	In			0.79	0.07
	Out	0.720	0.720	0.20	0.07
#2		0.000	0.720	0.20	0.07

Structure Detail:

Structure #1 (Pond)

Pond Inputs:

Permanent Pool Elev:	7,983.50
Permanent Pool:	0.40 ac-ft

V-notch Weir

Notch Angle (deg)	Spillway Elev
60.00	7,983.50

Pond Results:

Peak Elevation:	7,983.90
H'graph Detention Time:	1.58 hrs
Dewater Time:	0.57 days

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)
7,974.00	0.002	0.000	0.000	
7,974.50	0.013	0.003	0.000	
7,975.00	0.033	0.014	0.000	
7,975.50	0.062	0.037	0.000	
7,976.00	0.100	0.077	0.000	
7,976.50	0.074	0.121	0.000	
7,977.00	0.052	0.152	0.000	
7,977.50	0.034	0.174	0.000	
7,978.00	0.020	0.187	0.000	
7,978.50	0.022	0.198	0.000	
7,979.00	0.025	0.210	0.000	
7,979.50	0.027	0.223	0.000	
7,980.00	0.030	0.237	0.000	
7,980.50	0.035	0.253	0.000	
7,981.00	0.039	0.271	0.000	
7,981.50	0.045	0.292	0.000	
7,982.00	0.050	0.316	0.000	

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Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
7,982.50	0.055	0.342	0.000		
7,983.00	0.060	0.371	0.000		
7,983.50	0.065	0.402	0.000		Spillway #1
7,983.90	0.069	0.429	0.204	13.60	Peak Stage
7,984.00	0.070	0.435	0.255		

Detailed Discharge Table

Elevation	V-notch Weir (cfs)	Combined Total Discharge (cfs)
7,974.00	0.000	0.000
7,974.50	0.000	0.000
7,975.00	0.000	0.000
7,975.50	0.000	0.000
7,976.00	0.000	0.000
7,976.50	0.000	0.000
7,977.00	0.000	0.000
7,977.50	0.000	0.000
7,978.00	0.000	0.000
7,978.50	0.000	0.000
7,979.00	0.000	0.000
7,979.50	0.000	0.000
7,980.00	0.000	0.000
7,980.50	0.000	0.000
7,981.00	0.000	0.000
7,981.50	0.000	0.000
7,982.00	0.000	0.000
7,982.50	0.000	0.000
7,983.00	0.000	0.000
7,983.50	0.000	0.000
7,984.00	0.255	0.255

Structure #2 (Null)

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	0.720	0.079	0.079	0.146	91.000	M	0.82	0.067
	Σ	0.720						0.79	0.067
#2	Σ	0.720						0.20	0.067

Subwatershed Time of Concentration Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	2. Minimum tillage cultivation	2.00	4.00	200.00	0.700	0.079
#1	1	Time of Concentration:					0.079

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	2. Minimum tillage cultivation	2.00	4.00	200.00	0.700	0.079
#1	1	Muskingum K:					0.079

Drainage Ditch for MW-06

Gary E. Taylor

Canyon Fuel Company, LLC - Dugout Canyon Mine
P. O. Box 1029
Wellington, Utah 84642

Phone: (435) 636-2893
Email: gtaylor@archcoal.com

General Information

Storm Information:

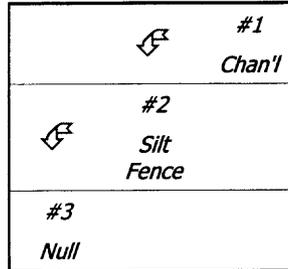
Storm Type:	NRCS Type II
Design Storm:	10 yr - 24 hr
Rainfall Depth:	1.950 inches

Particle Size Distribution:

Size (mm)	Sediment
4.0000	100.000%
2.0000	85.510%
1.0000	82.720%
0.6000	79.400%
0.2500	68.850%
0.0750	32.230%
0.0320	23.480%
0.0160	8.080%
0.0080	2.070%
0.0040	0.380%
0.0020	0.010%
0.0010	0.000%

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Channel	#1	==>	#2	0.078	0.189	
Silt Fence	#2	==>	#3	0.000	0.000	
Null	#3	==>	End	0.000	0.000	



Structure Routing Details:

Stru #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	2. Minimum tillage cultivation	4.31	12.50	290.00	1.03	0.078
#1	Muskingum K:					0.078

Structure Summary:

	Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc. (ml/l)	24VW (ml/l)
#1	0.440	0.440	0.48	0.04	1.4	46,752	35.25	20.29
#2 In	0.000	0.440	0.47	0.04	1.4	89,213	67.27	20.25
Out			0.37	0.04	0.0	4,298	0.66	0.12
#3	0.000	0.440	0.37	0.04	0.0	4,297	0.66	0.12

Particle Size Distribution(s) at Each Structure

Structure #1:

Size (mm)	In/Out
4.0000	100.000%
2.0000	87.992%
1.0000	85.121%
0.6000	81.704%
0.2500	70.848%
0.0750	33.165%
0.0320	24.161%
0.0160	8.314%
0.0080	2.130%
0.0040	0.391%
0.0020	0.010%
0.0010	0.000%

Structure #2:

Size (mm)	In	Out
4.0000	100.000%	100.000%
2.0000	87.992%	100.000%
1.0000	85.121%	100.000%
0.6000	81.704%	100.000%
0.2500	70.848%	100.000%
0.0750	33.165%	100.000%
0.0320	24.161%	100.000%
0.0160	8.314%	100.000%
0.0080	2.130%	74.602%
0.0040	0.391%	13.695%
0.0020	0.010%	0.360%
0.0010	0.000%	0.000%

Structure #3:

Size (mm)	In/Out
4.0000	100.000%
2.0000	100.000%
1.0000	100.000%
0.6000	100.000%
0.2500	100.000%
0.0750	100.000%
0.0320	100.000%
0.0160	100.000%
0.0080	74.602%
0.0040	13.695%
0.0020	0.360%
0.0010	0.000%

Structure Detail:

Structure #1 (Erodible Channel)

Triangular Erodible Channel Inputs:

Material: Stiff clay very colloidal

Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
2.0:1	2.0:1	2.0	0.0250	0.30			3.8

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	0.48 cfs	
Depth:	0.32 ft	0.62 ft
Top Width:	1.29 ft	2.49 ft
Velocity:	2.32 fps	
X-Section Area:	0.21 sq ft	
Hydraulic Radius:	0.145	
Froude Number:	1.02	

Structure #2 (Silt Fence)

Silt Fence Inputs:

Fence Flow Rate (gpm/sq ft)	Width along contour (ft)	Height (ft)	Land Slope (%)	Tie-back distance (ft)
2.5	10.0	2.5	2.00	125.0

**Sediment Storage: 0.00 ac-ft*

**No sediment capacity defined*

Silt Fence Results:

Peak Fence Stage:	1.05 ft
Peak Water Stage:	1.05 ft
Dewater Time:	0.34 days
Trap Efficiency:	97.14 %

Dewatering time is calculated from peak stage to lowest spillway

Stage-Capacity-Discharge Table

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Fence Stage (ft)	Water Stage (ft)	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
0.00	0.00	0.000	0.000	0.000		Top of Sediment
0.10	0.10	0.001	0.000	0.008	0.05	
0.20	0.20	0.002	0.000	0.022	4.90	
0.30	0.30	0.003	0.000	0.042	1.75	
0.40	0.40	0.005	0.001	0.067	0.50	
0.50	0.50	0.006	0.001	0.097	0.20	
0.60	0.60	0.007	0.002	0.134	0.15	
0.70	0.70	0.008	0.003	0.175	0.15	
0.80	0.80	0.009	0.004	0.223	0.10	
0.90	0.90	0.010	0.005	0.276	0.10	
1.00	1.00	0.011	0.006	0.334	0.10	
1.05	1.05	0.012	0.006	0.369	0.02	Peak Stage
1.10	1.10	0.013	0.007	0.398		
1.20	1.20	0.014	0.008	0.468		
1.30	1.30	0.015	0.010	0.543		
1.40	1.40	0.016	0.011	0.624		
1.50	1.50	0.017	0.013	0.710		
1.60	1.60	0.018	0.015	0.802		
1.70	1.70	0.020	0.017	0.900		
1.80	1.80	0.021	0.019	1.003		
1.90	1.90	0.022	0.021	1.111		
2.00	2.00	0.023	0.023	1.225		
2.10	2.10	0.024	0.025	1.345		
2.20	2.20	0.025	0.028	1.471		
2.30	2.30	0.026	0.030	1.601		
2.40	2.40	0.028	0.033	1.738		
2.50	2.50	0.029	0.036	1.880		

Structure #3 (Null)

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	0.440	0.078	0.078	0.189	91.000	M	0.50	0.041
	Σ	0.440						0.48	0.041
#2	Σ	0.440						0.47	0.041
#3	Σ	0.440						0.37	0.041

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VV (ml/l)
#1	1	0.320	290.00	4.31	0.4500	1.0000	1	1.4	48,083	36.32	20.90
	Σ							1.4	46,752	35.25	20.29
#2	Σ							1.4	89,213	67.27	20.25
#3	Σ							0.0	4,297	0.66	0.12

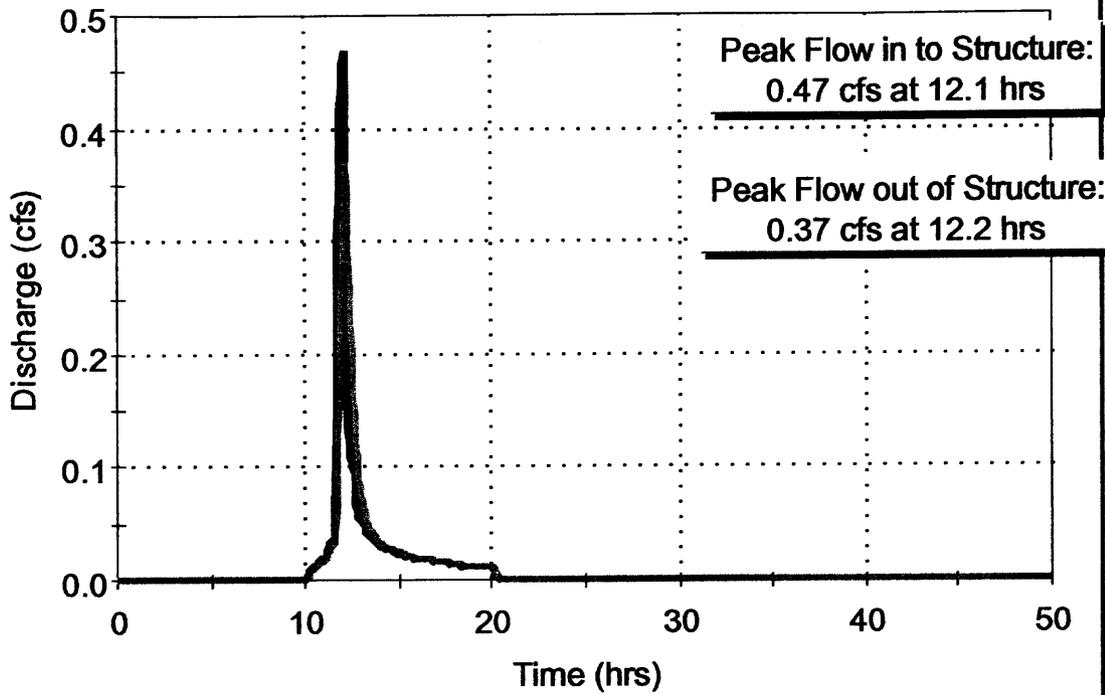
Subwatershed Time of Concentration Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	2. Minimum tillage cultivation	4.31	12.50	290.00	1.030	0.078
#1	1	Time of Concentration:					0.078

Subwatershed Muskingum Routing Details:

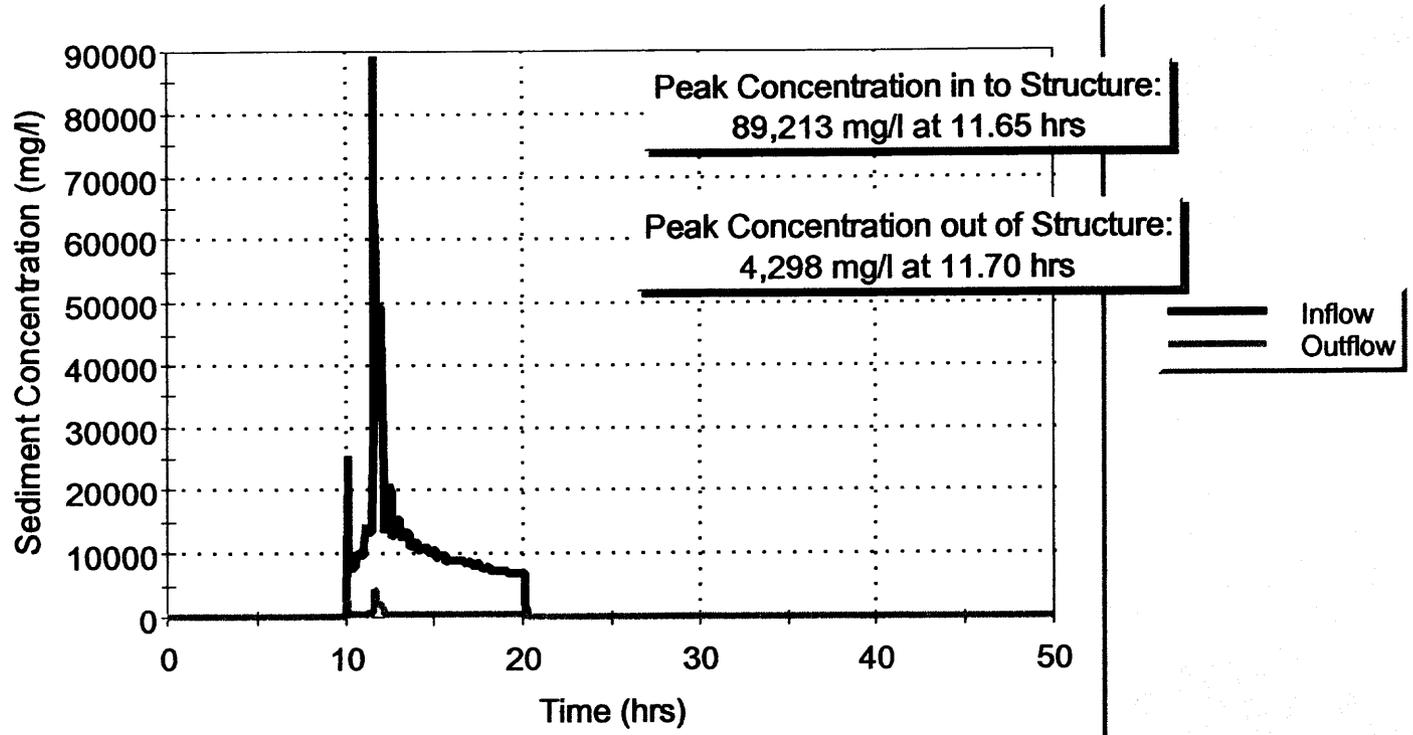
Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	2. Minimum tillage cultivation	4.31	12.50	290.00	1.030	0.078
#1	1	Muskingum K:					0.078

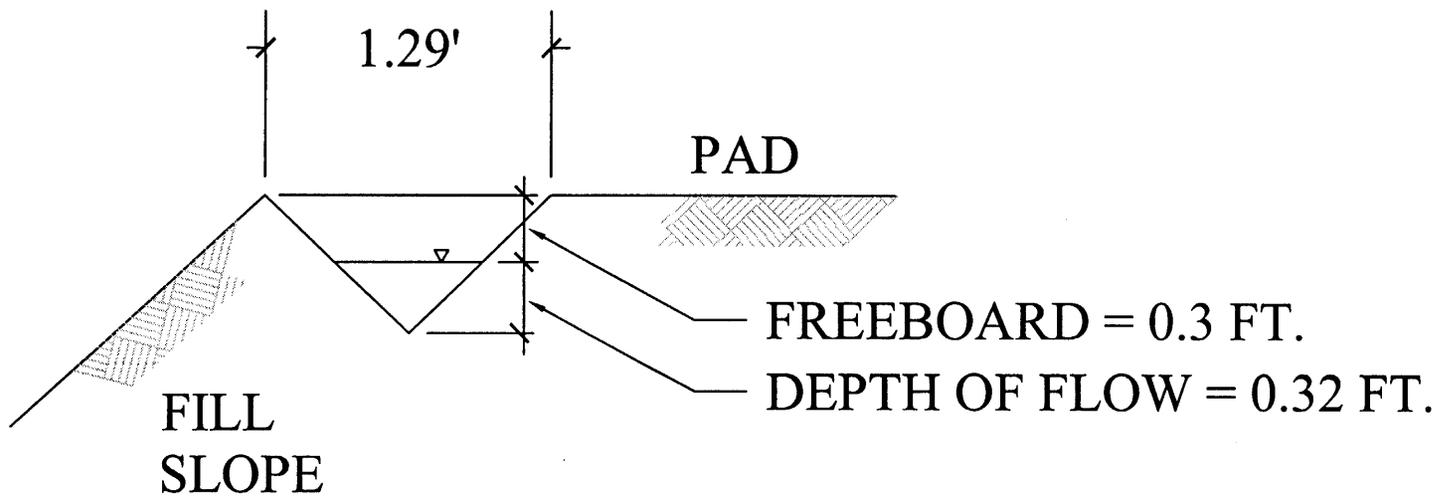
Inflow/Outflow Hydrographs for Structure # 2



— Inflow
— Outflow

Inflow/Outflow Sedimentgraphs for Structure # 2





REVISIONS OR UP-DATES			DATE: 02/19/03	
NO.	DATE	BY	DESIGNED BY:	
			DRAWN BY:	RR
			CHECKED BY:	GT
			SCALE:	AS SHOWN
FILENAME: Y:\Richey\Gary Taylor\TYP DRAINAGE DITCH_MW-06.dwg			P.O. BOX 1029 WELLINGTON, UTAH 84542	
			DRAWING OR MAP NUMBER MW-06	



Canyon Fuel Company, LLC
Dugout Canyon Mine

TYPICAL DRAINAGE DITCH
MW-06

MW-08 Mud Pit

Note: The mud pit will be a total containment for the storm runoff from a 10-year, 24-hour event and drilling fluid.

The program requires a discharge from the mud pit to show the mud pit capacity.

Gary E. Taylor

Canyon Fuel Company, LLC - Dugout Canyon Mine
P. O. Box 1029
Wellington, Utah 84642

Phone: (435) 636-2893
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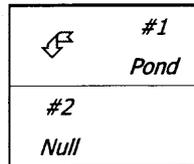
General Information

Storm Information:

Storm Type:	NRCS Type II
Design Storm:	10 yr - 24 hr
Rainfall Depth:	1.950 inches

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Pond	#1	==>	#2	0.079	0.146	
Null	#2	==>	End	0.000	0.000	



Structure Routing Details:

Stru #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	2. Minimum tillage cultivation	2.00	4.00	200.00	0.70	0.079
#1	Muskingum K:					0.079

Structure Summary:

		Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#1	In	1.170	1.170	1.28	0.11
	Out			0.27	0.11
#2		0.000	1.170	0.27	0.11

Structure Detail:

Structure #1 (Pond)

Pond Inputs:

Permanent Pool Elev:	8,519.50
Permanent Pool:	0.40 ac-ft

V-notch Weir

Notch Angle (deg)	Spillway Elev
60.00	8,519.50

Pond Results:

Peak Elevation:	8,520.03
H'graph Detention Time:	2.06 hrs
Dewater Time:	0.63 days

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)
8,508.00	0.002	0.000	0.000	
8,508.50	0.003	0.001	0.000	
8,509.00	0.005	0.003	0.000	
8,509.50	0.007	0.007	0.000	
8,510.00	0.010	0.011	0.000	
8,510.50	0.012	0.017	0.000	
8,511.00	0.015	0.023	0.000	
8,511.50	0.017	0.031	0.000	
8,512.00	0.020	0.040	0.000	
8,512.50	0.022	0.051	0.000	
8,513.00	0.025	0.063	0.000	
8,513.50	0.027	0.076	0.000	
8,514.00	0.030	0.090	0.000	
8,514.50	0.035	0.106	0.000	
8,515.00	0.039	0.125	0.000	
8,515.50	0.045	0.146	0.000	
8,516.00	0.050	0.169	0.000	

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Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)
8,516.50	0.055	0.195	0.000	
8,517.00	0.060	0.224	0.000	
8,517.50	0.065	0.255	0.000	
8,518.00	0.070	0.289	0.000	
8,518.50	0.075	0.325	0.000	
8,519.00	0.080	0.363	0.000	
8,519.50	0.085	0.405	0.000	Spillway #1
8,520.00	0.090	0.448	0.255	

Detailed Discharge Table

Elevation	V-notch Weir (cfs)	Combined Total Discharge (cfs)
8,508.00	0.000	0.000
8,508.50	0.000	0.000
8,509.00	0.000	0.000
8,509.50	0.000	0.000
8,510.00	0.000	0.000
8,510.50	0.000	0.000
8,511.00	0.000	0.000
8,511.50	0.000	0.000
8,512.00	0.000	0.000
8,512.50	0.000	0.000
8,513.00	0.000	0.000
8,513.50	0.000	0.000
8,514.00	0.000	0.000
8,514.50	0.000	0.000
8,515.00	0.000	0.000
8,515.50	0.000	0.000
8,516.00	0.000	0.000
8,516.50	0.000	0.000
8,517.00	0.000	0.000
8,517.50	0.000	0.000
8,518.00	0.000	0.000
8,518.50	0.000	0.000
8,519.00	0.000	0.000
8,519.50	0.000	0.000
8,520.00	0.255	0.255

Structure #2 (Null)

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	1.170	0.079	0.079	0.146	91.000	M	1.34	0.109
	Σ	1.170						1.28	0.109
#2	Σ	1.170						0.27	0.109

Subwatershed Time of Concentration Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	2. Minimum tillage cultivation	2.00	4.00	200.00	0.700	0.079
#1	1	Time of Concentration:					0.079

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	2. Minimum tillage cultivation	2.00	4.00	200.00	0.700	0.079
#1	1	Muskingum K:					0.079

Drainage Ditch for MW-08

Gary E. Taylor

Canyon Fuel Company, LLC - Dugout Canyon Mine
P. O. Box 1029
Wellington, Utah 84642

Phone: (435) 636-2893
Email: gtaylor@archcoal.com

General Information

Storm Information:

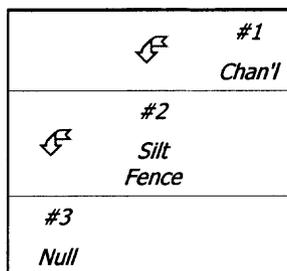
Storm Type:	NRCS Type II
Design Storm:	10 yr - 24 hr
Rainfall Depth:	1.950 inches

Particle Size Distribution:

Size (mm)	Sediment
4.0000	100.000%
2.0000	85.510%
1.0000	82.720%
0.6000	79.400%
0.2500	68.850%
0.0750	32.230%
0.0320	23.480%
0.0160	8.080%
0.0080	2.070%
0.0040	0.380%
0.0020	0.010%
0.0010	0.000%

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Channel	#1	==>	#2	0.041	0.146	
Silt Fence	#2	==>	#3	0.000	0.000	
Null	#3	==>	End	0.000	0.000	



Structure Routing Details:

Stru #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	2. Minimum tillage cultivation	2.00	2.08	104.00	0.70	0.041
#1	Muskingum K:					0.041

Structure Summary:

	Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc. (ml/l)	24VW (ml/l)	
#1	0.150	0.150	0.17	0.01	0.1	12,578	9.50	6.76	
#2	In Out	0.000	0.150	0.17 0.14	0.01 0.01	0.1 0.0	12,578 661	9.50 0.05	6.76 0.02
#3	0.000	0.150	0.14	0.01	0.0	661	0.05	0.02	

Particle Size Distribution(s) at Each Structure

Structure #1:

Size (mm)	In/Out
4.0000	100.000%
2.0000	86.155%
1.0000	83.344%
0.6000	79.999%
0.2500	69.370%
0.0750	32.473%
0.0320	23.657%
0.0160	8.141%
0.0080	2.086%
0.0040	0.383%
0.0020	0.010%
0.0010	0.000%

Structure #2:

Size (mm)	In	Out
4.0000	100.000%	100.000%
2.0000	86.155%	100.000%
1.0000	83.344%	100.000%
0.6000	79.999%	100.000%
0.2500	69.370%	100.000%
0.0750	32.473%	100.000%
0.0320	23.657%	100.000%
0.0160	8.141%	100.000%
0.0080	2.086%	87.300%
0.0040	0.383%	16.026%
0.0020	0.010%	0.422%
0.0010	0.000%	0.000%

Structure #3:

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Size (mm)	In/Out
4.0000	100.000%
2.0000	100.000%
1.0000	100.000%
0.6000	100.000%
0.2500	100.000%
0.0750	100.000%
0.0320	100.000%
0.0160	100.000%
0.0080	87.300%
0.0040	16.026%
0.0020	0.422%
0.0010	0.000%

Structure Detail:

Structure #1 (Erodible Channel)

Triangular Erodible Channel Inputs:

Material: Stiff clay very colloidal

Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
2.0:1	2.0:1	2.0	0.0250	0.30			3.8

Erodible Channel Results:

	w/o Freeboard	w/ Freeboard
Design Discharge:	0.17 cfs	
Depth:	0.22 ft	0.52 ft
Top Width:	0.88 ft	2.08 ft
Velocity:	1.79 fps	
X-Section Area:	0.10 sq ft	
Hydraulic Radius:	0.098	
Froude Number:	0.95	

Structure #2 (Silt Fence)

Silt Fence Inputs:

Fence Flow Rate (gpm/sq ft)	Width along contour (ft)	Height (ft)	Land Slope (%)	Tie-back distance (ft)
2.5	10.0	2.5	2.00	125.0

**Sediment Storage: 0.00 ac-ft*

**No sediment capacity defined*

Silt Fence Results:

Peak Fence Stage:	0.62 ft
Peak Water Stage:	0.62 ft
Dewater Time:	0.09 days
Trap Efficiency:	97.61 %

Dewatering time is calculated from peak stage to lowest spillway

Stage-Capacity-Discharge Table

SEDCAD 4 for Windows

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Fence Stage (ft)	Water Stage (ft)	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
0.00	0.00	0.000	0.000	0.000		Top of Sediment
0.10	0.10	0.001	0.000	0.008		
0.20	0.20	0.002	0.000	0.022	1.25	
0.30	0.30	0.003	0.000	0.042	0.30	
0.40	0.40	0.005	0.001	0.067	0.25	
0.50	0.50	0.006	0.001	0.097	0.15	
0.60	0.60	0.007	0.002	0.134		
0.62	0.62	0.007	0.002	0.142	0.01	Peak Stage
0.70	0.70	0.008	0.003	0.175		
0.80	0.80	0.009	0.004	0.223		
0.90	0.90	0.010	0.005	0.276		
1.00	1.00	0.011	0.006	0.334		
1.10	1.10	0.013	0.007	0.398		
1.20	1.20	0.014	0.008	0.468		
1.30	1.30	0.015	0.010	0.543		
1.40	1.40	0.016	0.011	0.624		
1.50	1.50	0.017	0.013	0.710		
1.60	1.60	0.018	0.015	0.802		
1.70	1.70	0.020	0.017	0.900		
1.80	1.80	0.021	0.019	1.003		
1.90	1.90	0.022	0.021	1.111		
2.00	2.00	0.023	0.023	1.225		
2.10	2.10	0.024	0.025	1.345		
2.20	2.20	0.025	0.028	1.471		
2.30	2.30	0.026	0.030	1.601		
2.40	2.40	0.028	0.033	1.738		
2.50	2.50	0.029	0.036	1.880		

Structure #3 (Null)

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	0.150	0.041	0.041	0.146	91.000	M	0.17	0.014
	Σ	0.150						0.17	0.014
#2	Σ	0.150						0.17	0.014
#3	Σ	0.150						0.14	0.014

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc. (ml/l)	24VW (ml/l)
#1	1	0.320	104.00	2.00	0.4500	1.0000	1	0.1	12,672	9.57	6.81
	Σ							0.1	12,578	9.50	6.76
#2	Σ							0.1	12,578	9.50	6.76
#3	Σ							0.0	661	0.05	0.02

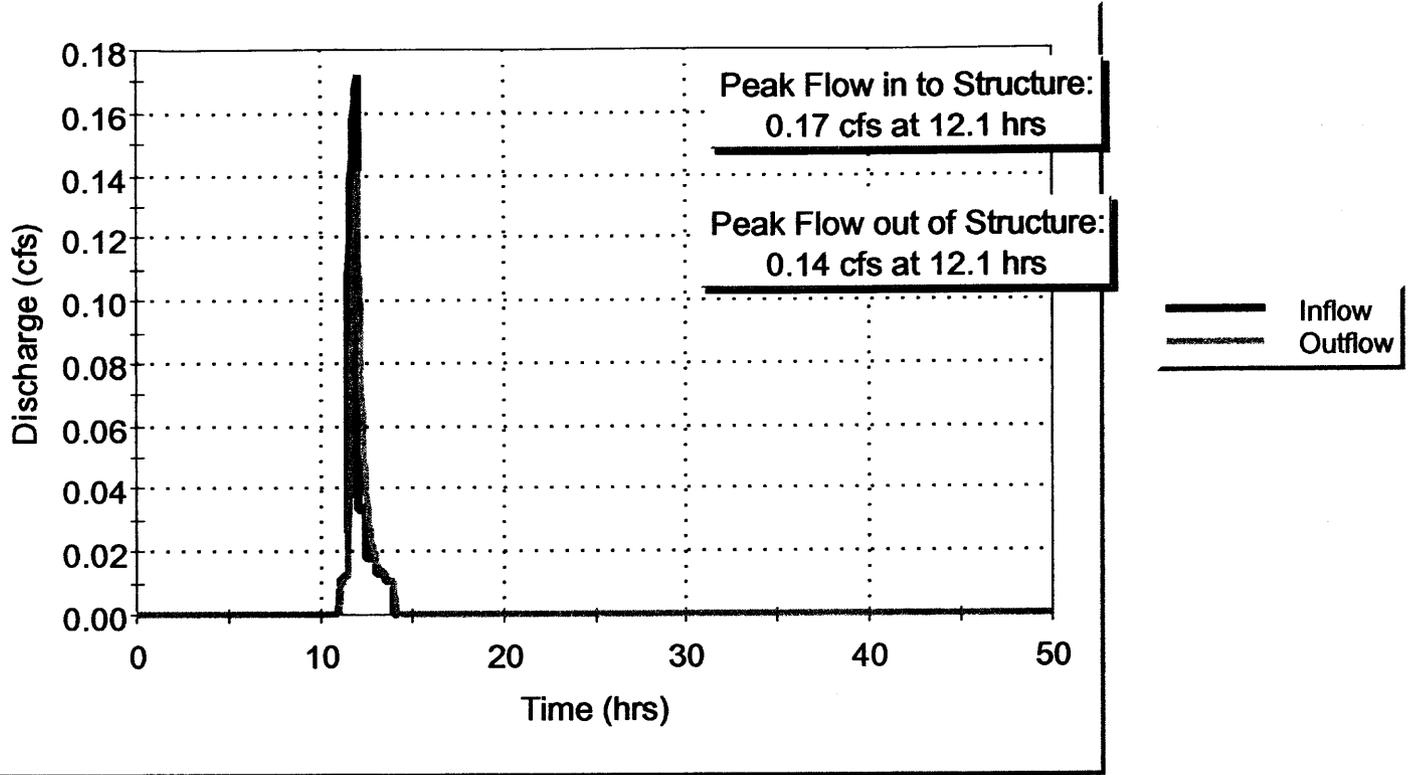
Subwatershed Time of Concentration Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	2. Minimum tillage cultivation	2.00	2.09	105.00	0.700	0.041
#1	1	Time of Concentration:					0.041

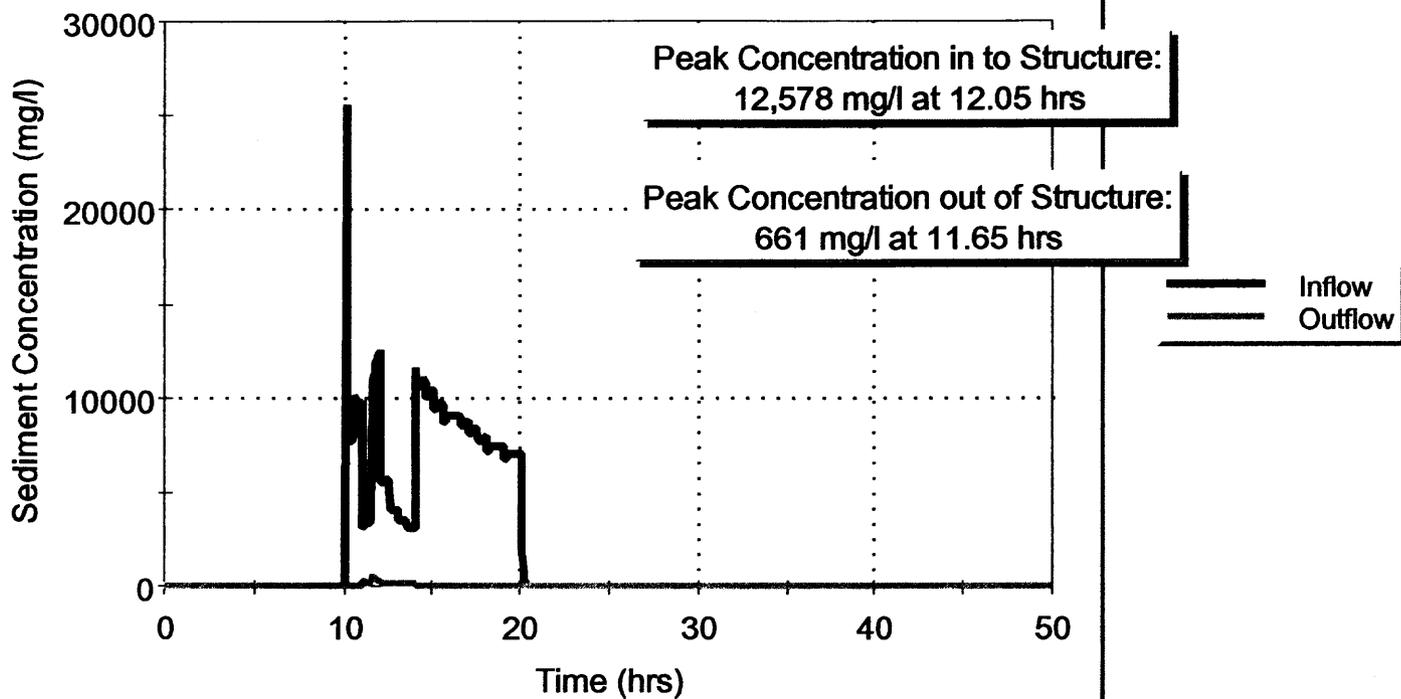
Subwatershed Muskingum Routing Details:

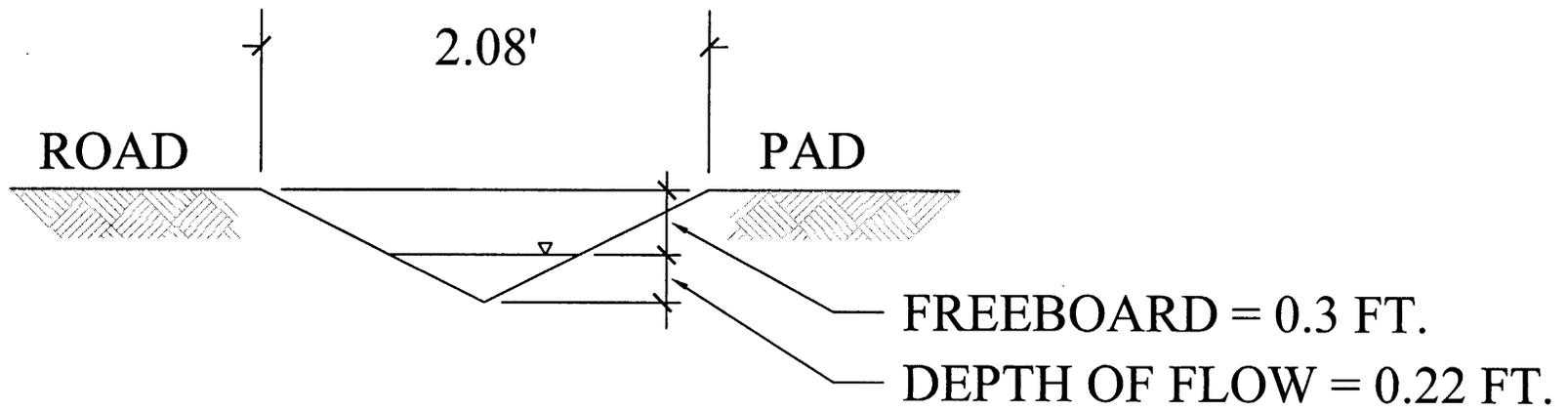
Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	2. Minimum tillage cultivation	2.00	2.09	105.00	0.700	0.041
#1	1	Muskingum K:					0.041

Inflow/Outflow Hydrographs for Structure # 2



Inflow/Outflow Sedimentgraphs for Structure # 2





REVISIONS OR UP-DATES			DATE: 02/19/03	
NO.	DATE	BY	DESIGNED BY:	
			DRAWN BY:	RR
			CHECKED BY:	GT
			SCALE:	AS SHOWN
FILENAME: Y:\Richey\Gary Taylor\TYP DRAINAGE DITCH_MW-08.dwg			P.O BOX 1029 WELLINGTON, UTAH 84542	



Canyon Fuel Company, LLC
Dugout Canyon Mine

TYPICAL DRAINAGE DITCH
MW-08

DRAWING OR
MAP NUMBER

MW-08

CHAPTER 8

BONDING AND INSURANCE

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810 BONDING DEFINITIONS AND DIVISION RESPONSIBILITIES

This chapter provides information regarding the bonding for reclamation of the well sites at the Dugout Canyon Mine. CFC has on file with the Division a bond or bonds payable to the Division for performance of all requirements of the State Program.

820 REQUIREMENTS TO FILE A BOND

The disturbed area created by the each well site is can be found in Table 1-1. The disturbed areas to be reclaimed are discussed in Section 340 of this submittal. The performance bond period is for the duration of 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 present bond of \$3,682,000 should be sufficient to assure the completion of the reclamation plan. The reclamation bond (direct and indirect costs) for the well sites is \$122,000 (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 2002). Detailed bond estimates concerning the well sites can be found in Sections 540 and 550. The bonding information pertaining to the well sites will be incorporated into Appendix 5-6 of the approved M&RP upon approval of the 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 Canyon Mine are included in Appendix 1-2 of the approved M&RP. For additional information, refer to Chapter 8 of the approved M&RP.

CHAPTER 9

ALLUVIAL VALLEY FLOORS

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302-321 ALLUVIAL VALLEY FLOOR DETERMINATION

302-321.100 Scope of Investigation

The purpose of this Chapter is to provide to the Division the results of an investigation which was performed to assess the potential valley floor (AVF) to exist within the permit and adjacent areas of the proposed Dugout Canyon Mine well sites. The scope of this investigation has involved:

- Geologic studies (detailed in Chapter 6 of the approved M&RP);
- Hydrologic studies (detailed in Chapter 7 of the approved M&RP);
- Land-use studies (detailed in Chapter 4 of the approved M&RP);
- Soils studies (detailed in Chapter 2 of the approved M&RP); and
- Vegetation studies (detailed in Chapter 3 of the approved M&RP).

These studies are summarized in this chapter as they relate to the potential for existence of an AVF within the permit or adjacent area. The individual chapters outlined above should be consulted for more detailed information.

302-321.200 Summary of Studies Performed

Mapping of Unconsolidated Stream-Laid Deposits - Plate 6-1 in Chapter 6 of the approved M&RP presents a map of the surface geology of the well sites and adjacent areas. Included on this map are unconsolidated stream-laid deposits identified with map symbol "Qal". Note that the plans for the well sites do not involve the removal or significant disturbance of alluvial fill. The well sites are located in either the North Horn Formation or the Flagstaff Formation. The stream-laid deposits in Pine Canyon and Fish Creek Canyon are 6,000 feet to 7,900 feet from the well sites and 13,000 feet to 14,800 feet from the well sites respectively..

Date presented in Section 728 of this submittal indicates that no significant impact to the availability of water in the permit or adjacent areas.

Agricultural Activities - As noted in Section 411 of this submittal and the approved M&RP, the only agricultural activities which occur within the permit and adjacent areas are grazing or range land. No irrigated agriculture occurs within permit and adjacent areas.

Flood Irrigation - No flood irrigation occurs within the permit or adjacent areas. According to Section 411.130 of this submittal and the approved M&RP, the nearest area of irrigated agriculture is located 4 miles southwest of the Dugout Canyon Mine.

Subirrigation - Refer to the approved M&RP.

Flood Irrigability - Refer to the approved M&RP

Analysis of Aerial Photographs - Refer to the approved M&RP.

302-321.300

The studies summarized above indicate that no alluvium is present at any of the well sites.

Based on a review of the above studies, AVF's are not present within the proposed well sites, as indicated by:

- Flood irrigation or sub irrigation of stream-laid deposits have not historically occurred within the proposed well site disturbed areas; and
- Soil and topographic conditions within the proposed well site disturbed areas preclude future flood irrigation of the well sites.

302-322 OPERATIONS AFFECTING DESIGNATED ALLUVIAL VALLEY FLOORS

Based on the information summarized in this chapter, no impacts will occur to designated alluvial valley floors due to the operation and reclamation of the well sites and adjacent areas.