REFUSE PILE AMENDMENT

DUGOUT CANYON MINE
C/007/039
FEBRUARY 2003

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

VOLUME 1
CHAPTERS 1 - 4

File in:
☐ Confidential
☒ Shelf
☐ Expandable
Refer to Record No 0009 Date 02/32003
In C/0070039, 2003, Incoming
For additional information

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

COPY

0009

February 13, 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: Refuse Pile Amendment, Incorporation of Additional Information and Text for Refuse Pile, C/007/039 -SR02D-2, Canyon Fuel Company, LLC, Dugout Mine, C/007/039

Dear Ms. Grubaugh-Littig:

Enclosed please find four copies of the submittal to address questions and comments from UDOGM staff pertaining the refuse pile amendment submittal made January 2003. The changes required in Chapter 2, moved the text enough to change multiple pages requiring the entire chapter to be resubmitted. The changes in RA Attachment 7-4 although not extensive, made it necessary to provide a complete copy of the attachment to replace the currently submitted attachment. The changes in RA Attachment 7-4 have been provided in a highlighted form.

If you would like assistance in the incorporation of this information into the previous submittals, please contact either myself or Chris Hansen (435) 448-2669.

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

Please contact Vicky Miller at (435) 636-2869 if there are any question concerning this submittal.

Sincerely yours,

Vicky S. Miller

Vicky S. Miller

C/0070039, 2003 Incoming
Refer to:
☐ Confidential
☒ Shelf
Expandable
Date 02/13/03 For additional information

Cc: Chris Hansen (no enclosures)
Dave Spillman (enclosures)
Steve Demczak (enclosures)

RECEIVED
FEB 13 2003
DIV. OF OIL, GAS & MINING

APPLICATION FOR COAL PERMIT PROCESSING

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

Permittee: Canyon Fuel Company, LLC
Mine: Dugout Canyon Mine **Permit Number:** C/007/039
Title: Incorporation of Additional Information and Text for Refuse Pile, C/007/039 - SR02D-2
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: 26.8 Disturbed Area: 26.8 ☒ 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)
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☐ 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 2/13/03
Sign Name, Position, Date

Subscribed and sworn to before me this 13 day of February, 2003

Dionne M. Oman
Notary Public

My commission Expires: 12-15, 2006
Attest: State of Utah } ss:
County of Carbon

DIONNE M. OMAN
NOTARY PUBLIC • STATE of UTAH
1015 EAST 2640 SOUTH
PRICE, UTAH 84501
COMM. EXPIRES 12-15-2006

For Office Use Only:	Assigned Tracking Number:	Received by Oil, Gas & Mining
		RECEIVED FEB 13 2003 DIV. OF OIL, GAS & MINING

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

COPY

Permittee: Canyon Fuel Company, LLC
Mine: Dugout Canyon Mine **Permit Number:** C/007/039
Title: Incorporation of Additional Information and Text for Refuse Pile, C/007/039 - SR02D-2

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

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☐ Add	☒ Replace	☐ Remove	Refuse Pile, Chapter 1, Page 1-iii
☐ Add	☒ Replace	☐ Remove	Refuse Pile, Chapter 2, Pages 2-1, 2-2 , 2-5, 2-6 and 2-14, entire Chapter has been provided
☐ Add	☒ Replace	☐ Remove	Refuse Pile, Chapter 3, Page 3-20
☐ Add	☒ Replace	☐ Remove	Refuse Pile, Chapter 7, Pages 7-v, 7-3, 7-5, 7-10, 7-12, and 7-28
☒ Add	☐ Replace	☐ Remove	RA Attachment 5-4, add data provided to the back of the existing information
☐ Add	☒ Replace	☐ Remove	RA Attachment 7-4, Pages 2, 8, 9, 33 (revisions are highlighted), entire Attachment provided
☒ Add	☐ Replace	☐ Remove	RA Attachment 7-5, Climatological Informaion
☒ Add	☐ Replace	☐ Remove	RA Attachment 7-6, Soldier Canyon Plate 7-1
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Any other specific or special instruction required for insertion of this proposal into the Mining and Reclamation Plan.

2-13-03

Received by Oil, Gas & Mining

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FEB 13 2003

DIV. OF OIL, GAS & MINING

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Soldier Canyon Mine
P.O. Box 1029
Wellington, Utah 84542
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Dear Ms. Grubaugh-Littig:

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C/0070039, 2003 Incoming
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Date 02/13/03 For additional information

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Steve Demczak (enclosures)

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DIV. OF OIL, GAS & MINING

APPLICATION FOR COAL PERMIT PROCESSING

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

Permittee: Canyon Fuel Company, LLC
Mine: Dugout Canyon Mine **Permit Number:** C/007/039
Title: Incorporation of Additional Information and Text for Refuse Pile, C/007/039 - SR02D-2
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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 2/13/03
Sign Name, Position, Date

Subscribed and sworn to before me this 13 day of February, 2003

Dionne M. Oman
Notary Public

My commission Expires: 12-15, 2006
Attest: State of Utah } ss:
County of Carbon

DIONNE M. OMAN
NOTARY PUBLIC • STATE of UTAH
1015 EAST 2640 SOUTH
PRICE, UTAH 84501
COMM. EXPIRES 12-15-2006

For Office Use Only:	Assigned Tracking Number:	Received by Oil, Gas & Mining
		RECEIVED FEB 13 2003 DIV. OF OIL, GAS & MINING

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

COPY

Permittee: Canyon Fuel Company, LLC
Mine: Dugout Canyon Mine **Permit Number:** C/007/039
Title: Incorporation of Additional Information and Text for Refuse Pile, C/007/039 - SR02D-2

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

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☐ Add	☒ Replace	☐ Remove	Refuse Pile, Chapter 2, Pages 2-1, 2-2 , 2-5, 2-6 and 2-14, entire Chapter has been provided
☐ Add	☒ Replace	☐ Remove	Refuse Pile, Chapter 3, Page 3-20
☐ Add	☒ Replace	☐ Remove	Refuse Pile, Chapter 7, Pages 7-v, 7-3, 7-5, 7-10, 7-12, and 7-28
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☐ Add	☒ Replace	☐ Remove	RA Attachment 7-4, Pages 2, 8, 9, 33 (revisions are highlighted), entire Attachment provided
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Any other specific or special instruction required for insertion of this proposal into the Mining and Reclamation Plan.

2-13-03

Received by Oil, Gas & Mining

RECEIVED

FEB 13 2003

DIV. OF OIL, GAS & MINING

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

COPY

February 20, 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: Refuse Pile Amendment, Replacement of Figures and Text, C/007/039 -SR02D-2, Canyon Fuel Company, LLC, Dugout Mine, C/007/039

Dear Ms. Grubaugh-Littig:

Enclosed please find four copies of the submittal to address changes to RA Figures 3-1 and 3-2 and the text in Chapter 3 of the Refuse Pile amendment. In addition, certain information is to be removed from RA Attachment 3-2 of the Refuse Pile amendment.

If you would like assistance in compiling the various revisions to Refuse Pile amendment, please contact either myself or Chris Hansen.

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

Please contact Vicky Miller at (435) 636-2869 if there are any question concerning this submittal.

Sincerely yours,

Vicky S. Miller

Vicky S. Miller

Cc: Chris Hansen (no enclosures)
Dave Spillman (enclosures)
Steve Demczak (enclosures)

APPLICATION FOR COAL PERMIT PROCESSING

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

Permittee: Canyon Fuel Company, LLC
Mine: Dugout Canyon Mine **Permit Number:** C/007/039
Title: Replacement of Chapter 3, Figures and Text for Refuse Pile, C/007/039 - SR02D-2
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.

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☐ 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: _____
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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 2/19/03
Sign Name, Position, Date

Subscribed and sworn to before me this 19 day of February, 2003

Dionne M Oman
Notary Public

My commission Expires: 12-15, 2006
Attest: State of Utah } ss:
County of Carbon

DIONNE M. OMAN
NOTARY PUBLIC • STATE of UTAH
1015 EAST 2640 SOUTH
PRICE, UTAH 84501
COMM. EXPIRES 12-15-2006

For Office Use Only:	Assigned Tracking Number:	Received by Oil, Gas & Mining
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Form DOGM- C1 (Revised March 12, 2002)

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

COPY

Permittee: Canyon Fuel Company, LLC
Mine: Dugout Canyon Mine **Permit Number:** C/007/039
Title: Replacement of Chapter 3, Figures and Text for Refuse Pile, C/007/039 - SR02D-2

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

			DESCRIPTION OF MAP, TEXT, OR MATERIAL TO BE CHANGED
☐ Add	☐ Replace	☒ Remove	RA Attachment 3-2, Remove all information and maps EXCEPT 2002 Raptor Survey Map and Letter dated April 12, 1996 from Robert D. Williams of Fish and WIldlife Services
☐ Add	☒ Replace	☐ Remove	Refuse Pile, Chapter 3, RA Figures 3-1 and 3-2, pages 3-22 and 3-23.
☐ Add	☒ Replace	☐ Remove	Refuse Pile, Chapter 3, Pages 3-iv, 3-5, 3-6, and 3-9.
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Any other specific or special instruction required for insertion of this proposal into the Mining and Reclamation Plan.

2-20-03

Received by Oil, Gas & Mining

RECEIVED
FEB 2 0 2003
DIV. OF OIL, GAS & MINING

COPY

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

January 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: Refuse Pile Amendment, Response to Technical Analysis, C/007/039 -SR02D-2, Canyon Fuel Company, LLC, Dugout Mine, C/007/039

Dear Ms. Grubaugh-Littig:

Enclosed please find four copies of the submittal to address the deficiencies associated with the Technical Analysis, dated October 24, 2002.

We have prepared a cross reference noting where each deficiency is address within the submittal or in a previous submittal. The cross reference is included with each of the copies, as are the C-1, C-2 forms and cover letter.

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

Please contact Vicky Miller at (435) 636-2869 if there are any question concerning this submittal.

Sincerely yours,

Vicky S. Miller

Vicky S. Miller

Cc: Chris Hansen (no enclosures)
Dave Spillman (enclosures)
Steve Demczak (enclosures)

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JAN 0 8 2003
DIV. OF OIL, GAS & MINING

APPLICATION FOR COAL PERMIT PROCESSING

COPY

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Permittee: Canyon Fuel Company, LLC
Mine: Dugout Canyon Mine **Permit Number:** C/007/039
Title: Response to Deficiencies
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.

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☒ 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

D. G. Spillman, Engineering Manager 1/7/03
Sign Name, Position, Date

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

John C. Pappas
Notary Public

My commission Expires: MARCH 7, 2006
Attest: State of UTAH } } ss:
County of CARBON

JOHN C. PAPPAS
NOTARY PUBLIC • STATE of UTAH
1646 E. CASTLE CIRCLE
PRICE, UTAH 84501
COMM. EXP. 3-7-2006

For Office Use Only:	Assigned Tracking Number:	Received by Oil, Gas & Mining
		RECEIVED JAN 08 2003 DIV. OF OIL, GAS & MINING

Form DOGM- C1 (Revised March 12, 2002)

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

COPY

Permittee: Canyon Fuel Company, LLC
Mine: Dugout Canyon Mine **Permit Number:** C/007/039
Title: Response to the Deficiencies

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

			DESCRIPTION OF MAP, TEXT, OR MATERIAL TO BE CHANGED
☒ Add	☐ Replace	☐ Remove	RA Plate 1-1, Permit Area; RA Plate 2-2 Soil Stockpiles
☐ Add	☒ Replace	☐ Remove	RA Plates 2-1, 5-1, 7-1, 7-3
☐ Add	☒ Replace	☐ Remove	Refuse Pile - Chapter 1
☐ Add	☒ Replace	☐ Remove	Refuse Pile - Chapter 2
☐ Add	☒ Replace	☐ Remove	Refuse Pile - Chapter 3
☐ Add	☒ Replace	☐ Remove	Refuse Pile - Chapter 5
☐ Add	☒ Replace	☐ Remove	Refuse Pile - Chapter 7
☐ Add	☒ Replace	☐ Remove	Refuse Pile - Chapter 8
☐ Add	☒ Replace	☐ Remove	M&RP - Chapter 1, pages 1-ii, 1-17, 1-18, 1-19, 1-21 thru 1-28
☐ Add	☒ Replace	☐ Remove	RA Figures 1-1A, 1-1B, 3-1, 3-2, 5-1, 6-1 and 7-1
☐ Add	☒ Replace	☐ Remove	RA Attachment 2-2, 7-1, 7-2, 7-4 and 8-1
☒ Add	☐ Replace	☐ Remove	RA Attachment 1-1, 3-3, 5-4
☐ Add	☒ Replace	☐ Remove	RA Attachment 5-2, replace Figure 1, Test Pit Locations
☒ Add	☐ Replace	☐ Remove	RA Attachment 2-1, Appendix S-5
☒ Add	☐ Replace	☐ Remove	M&RP, Chapter 4, Appendix 4-1 , Climate Information Tab
☒ Add	☐ Replace	☐ Remove	RA Figure 5-2
☐ Add	☐ Replace	☐ Remove	
☐ Add	☐ Replace	☐ Remove	
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Any other specific or special instruction required for insertion of this proposal into the Mining and Reclamation Plan.

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

COPY

April 22, 2002

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: Refuse Pile Amendment, Canyon Fuel Company, LLC, Dugout Mine, C/007/039

Dear Ms. Grubaugh-Littig:

Enclosed please find five copies of the submittal to address the addition of a refuse pile to the Dugout Canyon Mine facilities. The amendment document is being submitted as a stand alone document. However, RA Attachment 8-1 will become part of the bond in Appendix 5-6 of the M&RP upon approval. I believe the current CHIA may include the refuse pile area since it lies between the Soldier Canyon and Dugout Canyon Mines.

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

Please contact Vicky Miller at (435) 636-2869 or Chris Hansen at (435) 448-2669 if there are any question concerning this submittal.

Sincerely yours,

Vicky S. Miller

Vicky S. Miller

Cc: Chris Hansen (enclosures)
Dave Spillman (enclosures)
Steve Demczak (enclosures)

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Application for Permit Processing
Detailed Schedule of Changes to the MRP

Title of Application: Refuse Pile Amendment, Canyon Fuel Company, LLC, Dugout Canyon Mine	Permit Number: C/007/039
	Mine: DUGOUT CANYON
	Permittee: CANYON FUEL CO., LLC

Provide a detailed listing of all changes to the mining and reclamation plan which will be required as a result of this proposed permit application. Individually list all maps and drawings which are to be added, replaced, or removed from the plan. Include changes of the table of contents, section of the plan, pages, or other information as needed to specifically locate, identify and revise the existing mining and reclamation plan. **Include page, section and drawing numbers as part of the description.**

			DESCRIPTION OF MAP, TEXT, OR MATERIALS TO BE CHANGED
X ADD	☐ REPLACE	☐ REMOVE	Refuse Pile Amendment, See note under specific instructions.
☐ ADD	☐ REPLACE	☐ REMOVE	
☐ ADD	☐ REPLACE	☐ REMOVE	
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Any other specific or special instructions required for insertion of this proposal into the Mining and Reclamation Plan?

This document will be a stand alone document, the only portion of this amendment which will be incorporated into the chapters of the current M&RP will be the bond calculations. Upon approval the bond calculations will be removed from RA Attachment 8-1 and become part of the bond in Appendix 5-6.

April 22, 2002

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DIV OF OIL GAS & MINING

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

COPY

August 30, 2002

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: Refuse Pile Amendment, Response to Administrative Completeness Review Comments, C/007/039 -SR02D, Canyon Fuel Company, LLC, Dugout Mine, C/007/039

Dear Ms. Grubaugh-Littig:

Enclosed please find five copies of the submittal to address the comment made in the "administrative completeness review". This submittal can be combined into the binder of the original submittal made in April 2002. If you would like assistance in combining the two submittal, please let us know when you are ready for us to assist you.

We have also prepared a table showing where the various comment have been addressed within this submittal or in the previous submittal. The table is included with each of the five copies, as are the C-1 and C-2 forms.

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

Please contact Vicky Miller at (435) 636-2869 or Chris Hansen at (435) 448-2669 if there are any question concerning this submittal.

Sincerely yours,

Vicky S. Miller

Vicky S. Miller

Cc: Chris Hansen (no enclosures)
Dave Spillman (enclosures)
Steve Demczak (enclosures)

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OIL, GAS AND MINING

Form DOGM - C1 (Last Revised August 29, 2002)

COPY

File Folder # 3

APPLICATION FOR PERMIT PROCESSING

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

Permit Number: C/007/039

Title of Proposal: Refuse Pile Amendment, Response to Administrative Completeness Review Comments, C/007/039 - SR02D, Canyon Fuel Company, LLC, Dugout Mine

Mine: DUGOUT CANYON

Permittee: CANYON FUEL CO., LLC

Description, include reason for application and timing required to implement: Addition of refuse pile to facilitate storage of waste rock, and etc. from the Dugout Canyon Mine.

Instructions: *If you answer yes to any of the first 8 questions (gray), submit the application to the Salt Lake Office. Otherwise, you may submit it to your reclamation specialist.*

X Yes	☐ No	1. Change in the size of the Permit Area? 15.6 acres Disturbed Area? 15.6 acres increase.
☐ Yes	X No	2. Is the application submitted as a result of a Division Order? DO #
☐ Yes	X No	3. Does application include operations outside a previously identified Cumulative Hydrologic Impact Area?
☐ Yes	X No	4. Does application include operations in hydrologic basins other than as currently approved?
X Yes	☐ No	5. Does application result from cancellation, reduction or increase of insurance or reclamation bond?
X Yes	☐ No	6. Does the application require or include public notice/publication?
X Yes	☐ No	7. Does the application require or include ownership, control, right-of-entry, or compliance information?
X Yes	☐ No	8. Is proposed activity within 100 feet of a public road or cemetery or 300 feet of an occupied dwelling?
☐ Yes	X No	9. Is the application submitted as a result of a Violation? NOV #
☐ Yes	X 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	X No	12. Does the application require or include underground design or mine sequence and timing? (Modification of R2P2?)
X Yes	☐ No	13. Does the application require or include collection and reporting of any baseline information?
X Yes	☐ No	14. Could the application have any effect on wildlife or vegetation outside the current disturbed area?
X Yes	☐ No	15. Does application require or include soil removal, storage or placement?
X Yes	☐ No	16. Does the application require or include vegetation monitoring, removal or revegetation activities?
X Yes	☐ No	17. Does the application require or include construction, modification, or removal of surface facilities?
X Yes	☐ No	18. Does the application require or include water monitoring, sediment or drainage control measures?
X Yes	☐ No	19. Does the application require or include certified designs, maps, or calculations?
☐ Yes	X No	20. Does the application require or include subsidence control or monitoring?
X Yes	☐ No	21. Have reclamation costs for bonding been provided for?
☐ Yes	X No	22. Does application involve a perennial stream, a stream buffer zone or discharges to a stream?
X Yes	☐ No	23. Does the application affect permits issued by other agencies or permits issued to other entities?

X Attach 5 complete copies of the application and 1 copy will be sent to 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. (R645-301-123)

Signed - Name - Position - Date: Engineering Manager, 8/29/02

Subscribed and sworn to before me this 29 day of Aug, 20 02.

Dionne M Oman
Notary Public

My Commission Expires: 12-15, 2002

Attest: STATE OF Utah
COUNTY OF Carbon

DIONNE M. OMAN
NOTARY PUBLIC • STATE of UTAH
891 NORTH 300 EAST
PRICE, UTAH 84501
COMM. EXP. 12-15-2002

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ASSIGNED TRACKING NUMBER

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Application for Permit Processing
Detailed Schedule of Changes to the MRP

Title of Application: Refuse Pile Amendment, Response to Administrative Completeness Review Comments, C/007/039 - SR02D, Canyon Fuel Company, LLC, Dugout Mine	Permit Number: C/007/039 Mine: DUGOUT CANYON Permittee: CANYON FUEL CO., LLC

Provide a detailed listing of all changes to the mining and reclamation plan which will be required as a result of this proposed permit application. Individually list all maps and drawings which are to be added, replaced, or removed from the plan. Include changes of the table of contents, section of the plan, pages, or other information as needed to specifically locate, identify and revise the existing mining and reclamation plan. **Include page, section and drawing numbers as part of the description.**

			DESCRIPTION OF MAP, TEXT, OR MATERIALS TO BE CHANGED
☐ ADD	X REPLACE	☐ REMOVE	RA Attachment 2-2, Soil Volume Calculations
X ADD	☐ REPLACE	☐ REMOVE	RA Attachment 3-2, 2002 Raptor Survey Map
X ADD	☐ REPLACE	☐ REMOVE	RA Attachment 3-3, T & E Data
☐ ADD	X REPLACE	☐ REMOVE	RA Attachment 5-2, replace Figure 1
X ADD	☐ REPLACE	☐ REMOVE	RA Attachment 5-4, Waste Rock Analysis
X ADD	☐ REPLACE	☐ REMOVE	Chapter 1, Figures 1-1A and 1-1B, pages 1-iii and 1-1
☐ ADD	X REPLACE	☐ REMOVE	Chapter 2
☐ ADD	X REPLACE	☐ REMOVE	Chapter 3
☐ ADD	X REPLACE	☐ REMOVE	Chapter 5, page 5-v and 5-18
☐ ADD	X REPLACE	☐ REMOVE	Chapter 7, pages 3, 4, 10, 11, 12, and 13
☐ ADD	X REPLACE	☐ REMOVE	RA Plate 5-4
☐ ADD	☐ REPLACE	☐ REMOVE	
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Any other specific or special instructions required for insertion of this proposal into the Mining and Reclamation Plan?

These revisions are to a stand alone document, the only portion of this amendment document which will be incorporated into the chapters of the current M&RP will be the bond calculations. Upon approval the bond calculations will be removed from RA Attachment 8-1 and become part of the bond in Appendix 5-6.

August 30, 2002

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AUG 30 2002

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OIL, GAS AND MINING

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RESPONSE TO ADMINISTRATIVE COMPLETENESS REVIEW WORKSHEET

DATED: July 22, 2002
REVIEWER(S): Gregg A. Galecki, Stephen J. Demczak, Susan M. White, Priscilla W. Burton
APPLICANT: Canyon Fuel Company, LLC. **MINE NAME:** Dugout Mine
FILE NO.: C/007/039 - SR02D

SECTION	UDOGM COMMENT	RESPONSE
301-200 SOILS		
211 -Description of Premining Soil Resources	Volume of previously salvaged soil (1998-9) not disclosed.	Volume not recorded by excavation company, See RA Attachment 2-2 for further explanation.
221 - Prime Farmland Investigation	Referred to in Section 221, but not found in submittal	Refer to the back of RA Attachment 3-1
222 - Soil Survey	Attachment 5-2. Figure 1 of Attachment 5-2 not legible.	Figure 1 provided for replacement
224 - Substitute Topsoil	Information on substitute topsoil is contradictory in Section 233	Contradiction has been corrected in section.
230 - Operation Plan Topsoil Handling/Removal/Storage	Contradictory soil removal plans in Section 231.100 and Section 242.100. Stockpile location noted on Plate 5-1, but operational cross sections do not show a stockpile and dimensions not noted in Section 234.200.	Section 231.100 has been revised. In response to Section 234.200 refer to change in Section 234.100.
240 - Reclamation Plan Soil Redistribution/Stabilization	Nutrient testing Section 243 requires modification as does sequence of seeding and mulching in Section 341.200.	Sections 243 and 341.200 have been revised.
301-300 BIOLOGY		
320 - Vegetation Information	No current T & E and sensitive species information. No analysis to show similarity of reference area to disturbed area. Clarify that entire disturbed area has been previously disturbed. Sample adequacy not demonstrated for Reference Area.	T&E and Sensitive species information in RA Attachment 3-3. Clarification of previously disturbed nature of site. Sample adequacy for Reference Area being preformed by Patrick Collins, report will be included in Refuse Pile Submittal upon completion.
322 - Fish and Wildlife Information	No current T & E information.	T&E information can be found in RA Attachment 3-3.
323 - Maps/Photos Vegetation/Fish/Wildlife Areas	Unclear what areas disturbed by gravel pit.	Entire area to be redisturbed has been previously disturbed.
341 - Reclamation Plan for Revegetation	Will need to provide #seed/SF.	Refer to Section 341.200 for revision.

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SECTION	UDOGM COMMENT	RESPONSE
301-500 ENGINEERING		
520 - Maps, Locations, Cross-Sections, Narrative, Descriptions & Calculations	Location map that included both the Refuse Pile and surface facilities at the mine. Map to show major topographic and water features.	Refer to RA Figures RA 1-1A and 1-1B, in Chapter 1.
540 -Reclamation Narrative, Maps and Plans	Add the original ground surface to the cross-sections on RA Plate 5-4.	Addition made to RA Plate 5-4.
301-700 HYDROLOGY		
722 - Subsurface Water, Surface Water, Monitoring Stations, Wells	Additional information may be necessary to demonstrate no potentially acid/toxic material could enter Dugout Creek.	Site visit by Gregg Galecki verified actual distance between refuse pile and creek sufficient to eliminate concern of acid/toxic material reaching Dugout Creek. Rfer to modified Section 536.200, 731.300 and RA Attachment 5-4.
724 - Baseline Information Groundwater, Surface Water, Geology, Climatological & Supplimental	Additional information necessary to show where groundwater samples were collected relative to the current application.	Refer to Plate 7-1 of the Soldier Canyon Mine M&RP and RA Attachment 7-1. Wells referenced are in T13S R11E, Sections 25 and 36.
731 - Ground and Surface Water Protection	Information too general. A monitoring program outlining analysis and frequency need to be outlined.	Sections 731.200 and 731.300 have been modified.
732 - Ground and Surface Water Monitoring	The Division requests groundwater analysis sampling of DH-1 or a clear demonstration that potentially acid/toxic materials will not enter Dugout Creek.	See comment above for 722. Acid/toxic sampling data included in RA Attachment 5-4.

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OIL, GAS AND MINING

CHAPTER 1

LEGAL, FINANCIAL, COMPLIANCE AND RELATED INFORMATION

File in:
☐ Confidential
☒ Shelf
☐ Expandable
Refer to Record No 0009 Date 02/32003
In C/0070039 2003 Incoming
For additional information

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OCT 11 2006
Div. of Oil, Gas & Mining

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LIST OF PLATES

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Div. of Oil, Gas & Mining

CHAPTER 1

LEGAL, FINANCIAL, COMPLIANCE AND RELATED INFORMATION

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

111 Introduction

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

112 Identification of Interests

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

112.100 Business Entity

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

112.200 Applicant and Operator

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

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112.300 Officers of the Applicant

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

112.400 Coal Mining and Reclamation Operation Owned or Controlled

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

112.500 Legal or Equitable Owner of the Surface and Mineral Properties

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

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

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

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

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OCT 1 1 2006
Div. of Oil, Gas & Mining

Reference Plates1-2 and 1-3 in the M&RP and RA Figure 1-1B of this amendment for ownership information.

112.600 Owners of Record of Property Contiguous to Proposed Permit Area

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

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

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

112.700 MSHA Numbers

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

112.800 Interest in Contiguous Lands

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

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Div. of Oil, Gas & Mining

112.900 Certification of Submitted Information

Refer to the approved M&RP.

113 Violation Information

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

114 Right-of-Entry Information

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

115 Status of Unsuitability Claims

Refer to the approved M&RP.

116 Permit Term

Refer to the approved M&RP.

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OCT 11 2006
Div. of Oil, Gas & Mining

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

The certificate of insurance(s) and the newspaper advertisement and the verification of the advertisement appearing in the appropriate newspapers will be included in Appendix 1-2 of the approved M&RP and refer to the General Chapter 1 binder for Canyon Fuel Company, LLC prepared for the Dugout Canyon Mine, Soldier Canyon Mine and Banning Loadout operations for additional information.

The refuse pile site will have no facilities or structures.

118 Filing Fee

Refer to the approved M&RP.

120 PERMIT APPLICATION FORMAT AND CONTENTS

Refer to the approved M&RP.

130 REPORTING OF TECHNICAL DATA

Refer to the approved M&RP.

140 MAPS AND PLANS

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

INCORPORATED
OCT 11 2006
Div. of Oil, Gas & Mining

150 COMPLETENESS

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

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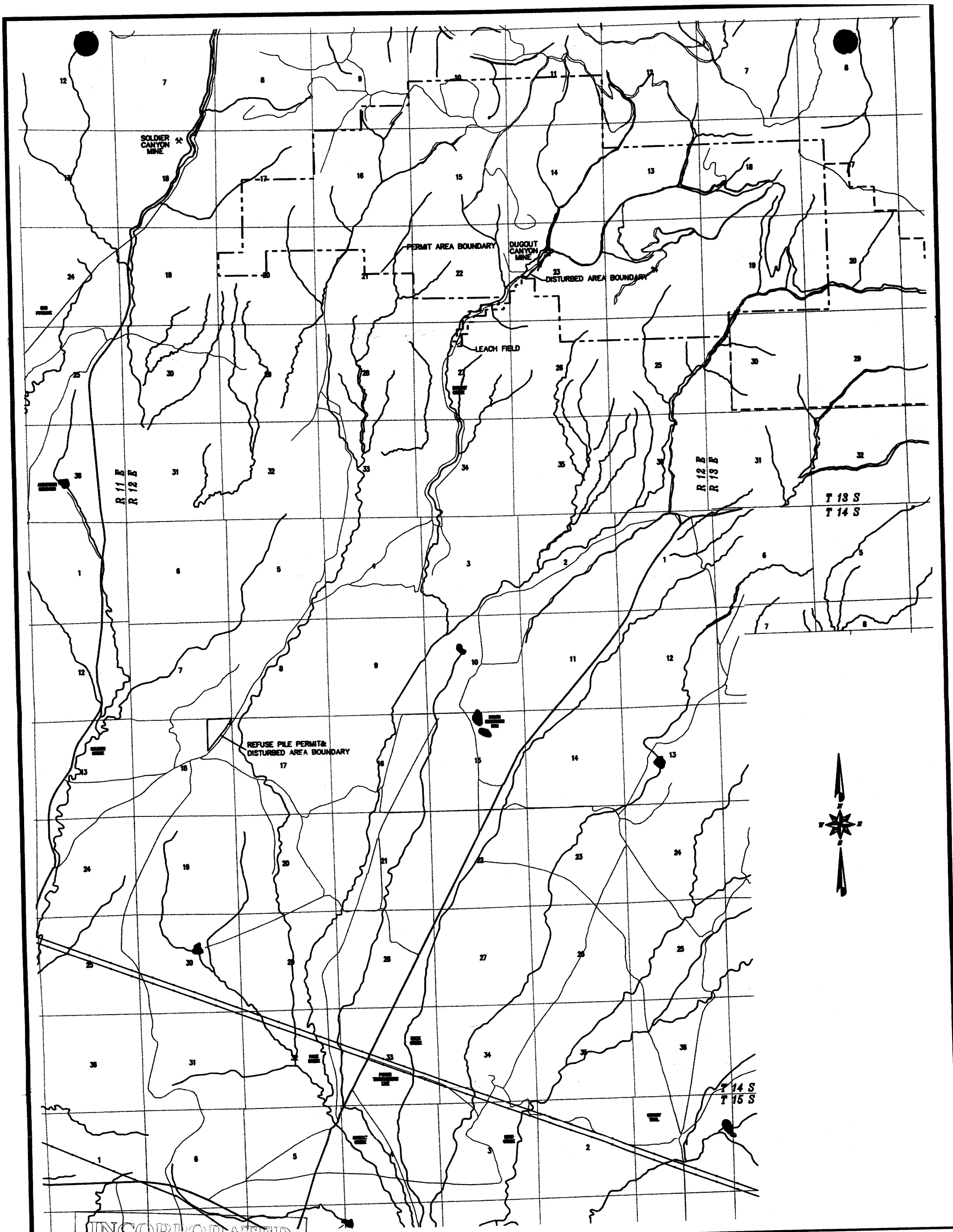
OCT 11 2006
Div. of Oil, Gas & Mining



INCORPORATED
EFFECTIVE:
MAR 03 2003
UTAH DIVISION OIL, GAS AND MINIING
PRICE FIELD OFFICE

NOTES:
REFUSE PILE IS LOCATED IN SECTION 18, T 14S R 12E

REVISIONS OR UP-DATES		
NO.	DATE	BY
1	01/06/03	RR

FILENAME: RAFigure 1-1A.dwg

DATE:	08/26/02
DESIGNED BY:	VSM
DRAWN BY:	RR
CHECKED BY:	DGF
SCALE:	NTS

Canyon Fuel Company, LLC
Dugout Canyon Mine

REFUSE PILE LOCATION MAP

P.O BOX 1029
WELLINGTON, UTAH 84542

DRAWING OR MAP NUMBER
RA FIGURE 1-1A

T14S R11E
T14S R12E

MAHLERES SAMPINOS (MINERAL)

SURFACE CANYON FUEL CO. LLC

USA (USA)

CFC (USA)

REFUSE PILE PERMIT & DISTURBED AREA BOUNDARY

SOLDIER CREEK

MAHLERES SAMPINOS (MINERAL)

SURFACE USA

CANYON FUEL CO. LLC (MINERAL & SURFACE)

PACE CREEK

12 7 8 9 13 18 17 16 24 19 20 21 25 30 29 28 36 31 32 33

REGISTERED PROFESSIONAL ENGINEER
No. 151610
DAVID G. SPILLMAN
1/7/03
STATE OF UTAH

NOTES:
REFUSE PILE IS LOCATED IN SECTION 18, T14S R12E

LEGEND:
SURFACE OWNERSHIP - UNITED STATES - USA
CANYON FUEL CO. LLC - CFC

COAL OWNERSHIP - UNITED STATES - (USA)

INCORPORATED
EFFECTIVE:
MAR 03 2003
OTAH DIVISION OF OIL, GAS AND MINING
PRICE FIELD OFFICE

REVISIONS OR UP-DATES		
NO.	DATE	BY

FILENAME: RAFigure 1-1B.dwg

DATE:	01/06/03
DESIGNED BY:	VSM
DRAWN BY:	RR
CHECKED BY:	DGS
SCALE:	1" = 2000'

Canyon Fuel Company, LLC
Dugout Canyon Mine

REFUSE PILE
SURFACE AND COAL OWNERSHIP

P.O. BOX 1029
WELLINGTON, UTAH 84542

DRAWING OR MAP NUMBER
RA FIGURE 1-1B

RA ATTACHMENT 1-1

Documents and Correspondence

INCORPORATED
FEB 2 5 2005
DIV OF OIL GAS & MIN

U. S. Department of Labor Mine Safety and Health Administration

DEC 16 2002

Coal Mine Safety and Health
District 9

RECEIVED
DEC 19 2002
DUGOUT MINE PROJECT

Reid W. Olsen
General Manager
Canyon Fuel Company, LLC
P.O. Box 1029
Wellington, UT 84542

RE: Dugout Canyon Mine
Mine ID No. 42-01890
Refuse Pile
ID No. 1211-UT-09-01890-01
Refuse Pile Construction Plan

Dear Mr. Olsen:

The construction plan, dated November 21, 2002, for the referenced coal refuse pile, has been reviewed by MSHA personnel and is acknowledged in accordance with 30 CFR 77.215-2.

The identification number assigned to the proposed refuse pile is 1211-UT-09-01890-01. The refuse pile must be maintained in a manner to prevent impoundment of water or other hazards to miners.

If you have any question regarding this letter, please contact Billy Owens at 303-231-5463 extension 145 or 303-231-5458.

Sincerely,

Bob Elwett

for Allyn C. Davis
District Manager

INCORPORATED
MAR 03 2003
DIV OF OIL GAS & MINING

AFFIDAVIT OF PUBLICATION

STATE OF UTAH)

ss.

County of Carbon,)

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Ken G. Larson

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Subscribed and sworn to before me this 10th day of September, 2002.

Linda Thayn

Notary Public My commission expires January 10, 2003 Residing at Price, Utah

Publication fee, $ 470.40

LINDA THAYN
NOTARY PUBLIC • STATE of UTAH
[illegible] EAST MAIN
PRICE, UTAH 84501
[illegible] EXP. 1-10-2003

LEGAL NOTICE

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Canyon Fuel Company, LLC, operates the Dugout Canyon Mine which is located thirteen (13) miles northeast of Wellington, Utah, in Dugout Canyon within the west half of Section 23, Township 13 South, Range 12 East, Salt Lake Base Meridian. The currently approved Dugout Canyon Mine mining permit number is C/007/039.

The road accessing the storage facility will be within 100 feet of the Carbon County's Dugout Canyon Road. Use of the Carbon County's Dugout Canyon Road to access the wasterock storage facility will not require the county road to be relocated or closed. The wasterock facility will not be mined, therefore there will be no mining or storage within 100 feet of the outside right-of-way line of the county road.

The wasterock storage facility is located approximately 6.5 miles southwest of the Dugout Canyon Mine in portions of the NE1/4, SW 1/4 and SE 1/4 of the NE 1/4, in a portion of the NW 1/4 of the SE1/4, and in the NW1/4 of the NE 1/4 of Section 18, Township 14 South, Range 12 East, Salt Lake Base Meridian. The addition of this area will increase the permit area and disturbed area for the Dugout Canyon Mine by 15.6 acres.

Dugout Canyon Mine plans to store wasterock materials from the mine at this site. In addition, the mine intends to store supplies associated with the mining operations at the site. A plan has been submitted to the Division of Oil, Gas and Mining for approval.

A copy of the permit will be available for inspection at the following locations:

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Salt Lake City, Utah 84114

Carbon County Courthouse
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Price, Utah 84501

The address of the applicant is: Canyon Fuel Company, LLC
6955 South Union Park Center, Suite 540
Midvale, Utah 84047
Phone: (801) 569-4700

Written comments or request for a hearing regarding this application must be submitted within 30 days of the last publication date of this notice, to the Utah Division of Oil, Gas and Mining, Attention Coal Regulatory Program, 1594 West North Temple, Suite 1210, Salt Lake City, Utah 84114-5801.

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INCORPORATED

MAR 0 3 2003

DIV OF OIL GAS & MINING

Canyon Fuel Company, LLC
P.O. Box 1029
Wellington, Utah 84542
435/636-2880 Fax: 435/637-0109

Ken M. Payne
Project Manager

August 30, 2002

Commissioner William Krompel
Carbon County Court House
120 East Main St.
Price, UT 84501

RE: Access to Waste Rock Refuse Disposal Site

Dear Commissioner Krompel,

Canyon Fuel Company is in the process of permitting a waste rock disposal site for the Dugout Mine with the Utah Division of Oil, Gas and Mining (DOGM). The proposed waste rock site will be located on property that is owned by Canyon Fuel Company and is adjacent to the Dugout County Road in Section 18, T14S R12E. The proposed waste rock site is the disturbed area that was a gravel pit used during the upgrade to the Dugout County Road. A proper sized culvert will be placed in the drainage ditch along the county road at the point the access road intersects the county road. A sign will be placed along the access road that will define the ownership and permit numbers for the site. Access to the site upon completion will be controlled with a locked gate arrangement. Enclosed are maps that show the location and layout of the proposed waste rock site.

DOGM Rule R645-300-121.150 addresses mining activity within 100 feet of a public road right-of-way. Written approval is required from the governmental agency that has jurisdiction over the public road before DOGM will approve the permit. Although the actual waste rock site is not within 100 feet of the Dugout County Road the access road to the site is.

Approval is requested from Carbon County to use the Dugout County Road to access the proposed waste rock site to comply with the If there are any questions, please call.

Best Regards,

Ken Payne
Project Manager

INCORPORATED
MAR 0 3 2003
DIV OF OIL GAS & MINING

Enclosures: Refuse Pile Location Maps, RA Figure 1-1A and 1-1B
Storage Area Layout
cc: R. Olsen, D. Spillman, and V. Miller

CARBON COUNTY 18 94 COAL IS KING

"Strength Through Diversity"

SEP 2 6 2002

September 23, 2002

Mr. Ken M. Payne
Project Manager
Canyon Fuel Company LLC
PO Box 1029
Wellington, UT 84542

Michael Milovich
Commissioner
(435) 636-3272

Re: ***Access to Waste Rock Refuse Disposal Site***

Dear Mr. Payne:

Carbon County approves Canyon Fuel Company's request to use the Dugout County Road to access the proposed waste rock site.

William D. Krompel
Commissioner
(435) 636-3273

Canyon Fuel Company's August 30th letter and attached map relating to this matter was fully reviewed by Evan Hansen, the County Engineer and Ray Hanson, the County Road Supervisor.

Please contact myself, Evan or Ray if we can be of further assistance.

Sincerely,

William D. Krompel

William D. Krompel
Road Commissioner

Tom Matthews
Commissioner
(435) 636-3271

WDK/sl

INCORPORATED

MAR 0 3 2003

DIV OF OIL, GAS & MINING

INCORPORATED

MAR 0 3 2003

DIV OF OIL GAS & MINING

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STATE OF UTAH)

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Ken G. Larson

Ken G Larson - Publisher

Subscribed and sworn to before me this 9th day of January, 2003.

Linda Thayn

Notary Public My commission expires January 10, 2003 Residing at Price, Utah

Publication fee, $ 595.84

LINDA THAYN
NOTARY PUBLIC • STATE of UTAH
845 EAST MAIN
PRICE, UTAH 84501
COMM. EXP. 1-10-2003

LEGAL NOTICE

Canyon Fuel Company, LLC of Midvale, Utah, hereby announces its intent to renew its coal mining permit for the Dugout Canyon Mine under the laws of the State of Utah and the U.S. Office of Surface Mining. The currently approved mining permit is number C/ 007/039.

Canyon Fuel Company, LLC, operates the Dugout Canyon Mine which is located thirteen (13) miles northeast of Wellington, Utah, with facilities in Dugout Canyon located in the west half of Section 23, Township 13 South, Range 12 East, Salt Lake Base Meridian.

Underground coal mining will take place in coal reserves owned or leased by Canyon Fuel Company, LLC. A legal description of the permit boundary includes:

Township 13 S., Range 12 E., Salt Lake Base and Meridian

Section 9:	S1/2SE1/4
Section 10:	S1/2
Section 11:	S1/2
Section 13:	All except N1/2N1/2
Section 14:	All
Section 15:	All
Section 16:	All
Section 17:	E1/2SW1/4; SE1/4
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Section 23:	NW1/4;NE1/4; SE1/4, NW1/4NW1/4SW1/4; N1/2NE1/4NW 1/4SW1/4; NW1/4SW1/4NW1/4SW1/4; NE1/4SW1/4
Section 24:	All
Section 25:	N1/2N1/2
Section 26:	N1/2NE1/4
Section 27:	NE1/4SE1/4NE1/4NW1/4; S1/2SE1/4NE1/4NW1/4; SE1/4NE1/4NE1/4NW1/4; W1/2NW1/4NW1/4NE1/4

Township 13 S., Range 13 E., Salt Lake Base and Meridian

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Section 18	All except N1/2N1/2
Section 19	All
Section 20	W1/2W1/2
Section 30	NW1/4NW1/4

Topsoil to be used in reclamation of the Dugout Canyon Mine disturbed areas is being stored in T14S, R12E, Section 8, a storage area permitted to Soldier Canyon Mine.

A copy of the permit renewal application will be available for inspection at the following locations:
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INCORPORATED

MAR 0 3 2003

DIVISION OF OIL, GAS & MINING

CHAPTER 2

SOILS

INCORPORATED
OCT 1 1 2006
Div. of Oil, Gas & Mining

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CHAPTER 2
SOILS

210 INTRODUCTION

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

220 ENVIRONMENTAL DESCRIPTION

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

221 Prime Farmland Investigation

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

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222 Soil Survey

222.100 Soils Map

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

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

222.200 Soil Identification

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

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

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113 Strych stony loam, 3 to 15 percent slopes.

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

222.300 Soil Description

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

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

222.400 Soil Productivity

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

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

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

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% Saturation - 17 samples rates good (25.1 to 45.3) and 5 samples rated fair (21.6 to 24.9).
Electrical Conductivity - 17 samples rates good (0.038 to 1.93 umhos/cm) and 5 samples rated fair (2.12 to 4.68 umhos/cm).
Sodium Adsorption Ratio - 20 sampled rated good (0.56 to 3.71) and 2 samples rated fair (4.64 and 6.03).
Texture - 12 samples rated good (loam and sandy clay loam) and 10 samples rated fair (clay loam and silty clay loam)
Available Water Capacity - 6 samples rated good (0.11 to 0.14 inches per inch) and 16 samples rated fair (0.05 to 0.10 inches per inch)
Boron - All samples rated good (0.05 to 0.50 ppm)
Selenium - All samples rated good (0.02 ppm or less)
Acid/Base Potential - All samples rated good (90.0 to 282 0 T/1000 tons)

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

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

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223 Soil Characterization

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

224 Substitute Topsoil

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

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

Prior to salvaging soil to cover the waste at the refuse pile, 12- inches of soil will be salvaged from the borrow area to be used to reclaim the borrow area. This soil will be stockpiled in berms around the area to be salvaged. An additional 24 to 40 inches of soil will then be salvaged from the borrow area and transported to the refuse pile site to be used as cover over the waste in preparation for reclamation.

At the borrow site the southwestern quarter will be salvaged first, followed by the northwestern quarter (SB1 thru SB5, Figure 2, RA Attachment 2-3). Only the quantity of soil necessary for reclamation will be removed from the borrow area, thus if sufficient substitute soil is available from these areas, the area containing sites SB6 thru SB9 shown on Figure 2 will remain intact and undisturbed. The soil salvage will be between gullies, the boundary of the borrow area on the

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southern, eastern and western edges are gullies as drawn on Figure 2, including a gully running through the middle of the borrow area site separating samples sites SB1 thru SB5 from sites SB6 thru SB9 (Figure 2, RA Attachment 2-3).

230 OPERATION PLAN

231 General Requirements

231.100 Removing and Storing Soil Methods

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

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

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and placed in the topsoil pile. The majority of the salvaged topsoil come from the G and F soil units noted on the soils map. The remainder of the areas to be salvaged will be placed in the subsoil stockpile. Daniel M. Larsen, Professional Soil Scientist was on site during the salvage operations and determined in which pile the salvaged soils were placed.

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

231.200 Suitability of Topsoil Substitutes/Supplements

See Section 233.200.

231.300 Testing of Topsoil Handling and Reclamation Procedures Regarding Revegetation

See Sections 232 through 234 and Section 240.

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

See Section 234.

232 Topsoil and Subsoil Removal

232.100 Topsoil Removal and Segregation

Due to the disturbed nature of the site area, all available soil materials will be removed and stockpiled, since the soil resource is limited on the site (refer to Section 231.100). RA Plate 2-1 shows the areas of soils to be stripped and the approximate depth ranges for each soil. RA Table 2-2 presents an estimate of the soil materials that are available for salvage from each of the soil

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units within the disturbed area. Supporting calculations are presented in Attachment 2-2. The estimate is based on an average of the recommendations of Mr. Larsen's soils report presented in Attachment 2-1. During the actual salvaging activities, efforts will be made to maximize the soil volume to be salvaged.

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

232.200 Poor Topsoil

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

232.300 Thin Topsoil

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

232.400 Minor Disturbances Not Requiring Topsoil Removal

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

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

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232.500 Subsoil Segregation

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

232.600 Timing

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

232.700 Topsoil and Subsoil Removal Under Adverse Conditions

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

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

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

233 Topsoil Substitutes and Supplements

233.100 Overburden Materials Supplementing and/or Replacing Topsoil

Selected overburden materials may be used below the salvaged soils during reclamation operations, if sufficient soil materials are not available for the proposed reclamation activities.

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Where overburden materials are used, the operator commits to demonstrating to the Division prior to salvaged soil emplacement that the overburden materials are non-toxic, non-acid forming, and non-combustible. Refer to Section 536.200 discussion of waste sampling/testing.

The mixing of coal waste and subsoil is discussed in Section 242 and RA Attachment 2-2.

233.200 Suitability of Topsoil Substitutes and Supplements

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

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

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

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

PH - Samples rated from mildly alkaline to moderately alkaline, with a range of 7.6 to 8.4.
% Saturation - 42 samples rated good (25 to 46.4) and 1 sample in SB8 rated fair (23.8).

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

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

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

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

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

Borrow Area Soil Salvage Procedures - The soil borrow area will only be impacted during the short period during which the refuse pile is being reclaimed. The top 12-inches of soil from the borrow area will be removed/salvaged and placed as berms surrounding the salvage area. Once the salvage of soil to reclaim the waste rock site has been completed, the soil from the borrow area stored in the berms will be replaced, deep gouged, mulched and seeded. These activities should insure adequate revegetation potential at the borrow area.

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

233.300 Physical and Chemical Analyses

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

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

Certification of Reclamation Topsoil Suitability. The borrow area substitute topsoil was certified by an approved laboratory in accordance with at least one of the following: Soil Conservation Service published data and technical guides, state agricultural agency, Tennessee

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Valley Authority, BLM - USFS published data, physical and chemical analyses results, field-site trials, or greenhouse tests.

233.400 Testing of Substitute Topsoil

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

234 Topsoil Storage

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

234.100 Topsoil Stockpiling

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

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

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The stockpiles will be kept isolated from the main area of the refuse site to protect the material from contaminants and unnecessary compaction that would interfere with vegetation. A sign will be installed on the stockpiles to identify one as a topsoil storage area and the second as the subsoil storage area. The stockpiles will be protected from wind and water erosion by being revegetated with a quick growing vegetative cover (interim seed mix) and by installing berms around the stockpiles to help trap sediment coming off the stockpiles. The stockpiled soils will be moved if necessary to facilitate the expansion of the waste rock site and for contemporaneous reclamation. Following the expansion, these stockpiled soils will not be moved or disturbed until required for redistribution during contemporaneous reclamation. The boulders designated in area "K" (RA Plate 2-1) will be stockpiled separately from the soils salvaged from the refuse site. The boulders will either be placed along the perimeter of the substitute topsoil pile, access road, on top of the subsoil pile or will be transported to the rock stockpile at the Dugout/Soldier Canyon Mine topsoil stockpile adjacent to the Soldier Canyon Road.

234.200 Stockpiled Topsoil

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

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

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

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

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Wind and Water Erosion Protection. The stockpiles will be protected from wind and water erosion by prompt establishment and maintenance of a vegetative cover. Berms will be constructed around the stockpiles to help trap sediment runoff from the stockpiles. Refer to Section 242 .100 for additional protection information.

Topsoil Redistribution. A limited quantity of stockpiled soil may be distributed on the refuse pile to determine the quantity of soil cover necessary to meet revegetation reclamation requirements. The remainder of the stockpiled soil will not be moved until redistributed during reclamation operations unless approved by the Division.

234.300 Topsoil Stockpile Relocation

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

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

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

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240 RECLAMATION PLAN

241 General Requirements

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

242 Soil Redistribution

242.100 Soil Redistribution Practices

The stored soil will be redistributed after recontouring of the site has occurred during reclamation activities. The refuse pile will be covered with 1 foot of equally blended coal waste and subsoil, approximately 2.6 feet of subsoil and approximately 0.4 feet of topsoil, to obtain a total depth of cover on the pile of 4 feet. The volume of material needed to cover the refuse pile is 82,976 CY.

There are currently topsoil and subsoil stockpiles located in the northwestern portion of the site. Olympus Aerial Surveys estimated the volume in each stockpile as well as the volume of soil in the containment berms as:

Topsoil Stockpile volume = 7,298 CY
Subsoil Stockpile volume = 6,508 CY
Berm volume = 2,686 CY

An additional 6,317 CY of subsoil has been stripped from the site since construction of the original stockpiles. Total cover material currently available in the stockpiles is estimated to be 22,809 CY

When the topsoil and subsoil stockpiles are moved to facilitate the expansion of the refuse pile additional subsoil may be excavated from the northwest portion of the site. The volume of material is estimated to be 5,400 CY.

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During reclamation the berms and embankments that create the perimeter ditches and sediment pond will be pulled back to blend the undisturbed areas into the reclaimed refuse pile. This process will generate approximately 2,947 CY of additional cover material. The total available cover material at the refuse site is 31,156 CY

To reduce the volume of imported cover material the bottom foot of cover material will be a blend of coal waste and subsoil. Equal portions of coal waste and subsoil will be used to create this blended cover material. Thus, the volume of available cover material may be increased by 10,372 CY (560,088 ft2 x 0.5 ft / 27 ft3/CY) to a total of 41,528 CY.

Volume of cover material to be imported = 82,976 – 41,528 = 41,448 CY

Summary of Volumes

Volume of material needed to obtain 4 feet of cover = 82,976 CY
Total cover material available at the site = 31,156 CY
Vol. of coal waste blended with sub-soil to produce the first foot of cover = 10,372 CY
Vol. of subsoil blended with coal waste to produce the first foot of cover = 10,372 CY
Volume of subsoil and topsoil needed to cover the pile = 72,604 CY
Volume of cover material to be imported from borrow site = 41,448 CY

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

Contemporaneous Reclamation: In the future, the applicant may decide to demonstrate that two feet of cover material over the refuse pile is sufficient to meet reclamation standards for bond release. Additional information and clarification of the project will be provided at that time. An area on the refuse pile will receive reclamation treatments contemporaneously to justify the decrease of required cover soils from four feet to two feet for final reclamation.

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

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

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

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

242.200 Regrading

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

The surface of the refuse pile will be left in a roughened state and in addition will be ripped prior to the application of soil. After the 1st lift of subsoil is placed, the surface of the refuse pile will be ripped again to a depth of approximately 12 inches in an effort to promote root penetration and to mix the

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top layer of the refuse with the subsoil. Refer to Section 341.200 for further discussion of roughening methods.

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

242.300 Topsoil Redistribution on Impoundments and Roads

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

243 Soil Nutrients and Amendments

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

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

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244 Soil Stabilization

244.100 Protection and Stabilization of Surface Areas

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

244.200 Mulch Application

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

244.300 Rills and Gullies

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

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

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250 PERFORMANCE STANDARDS

251 Topsoil, Subsoil, and Topsoil Supplements Management

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

252 Stockpiled Topsoil and Subsoil

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

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REFERENCES:

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

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

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RA TABLE 2-1

SOIL MAP UNIT FEATURES

Map Unit Symbol	Material	Depth to Shale	Texture	Rock Fragments (%)	Average pH
A	Shale	0 - 6"	Clay loam, silty clay loam	5 - 15	7.5
B	Gravelly Alluvium over Shale	20 - 40"	Loam, clay loam	20 - 60	7.3
C	Gravelly to Stony Alluvium	40 - 100"	Loam, clay loam, sandy clay loam	20 - 60	7.3
D	Non-gravelly Alluvium, some wind blown material	40 - 100"	Loam, clay loam, sandy clay loam	5 - 15	7.5
E	Gravelly Alluvium, small amount of refuse with coal on surface	40 - 100"	Clay loam, loam	15 - 45	7.5
F	Non-gravelly Alluvium (topsoil storage)	40 - 100"	Clay loam, sandy clay loam	5 - 15	7.0
G	Alluvium and woody materials	40 - 100"	Clay loam, sandy clay loam	15 - 30	7.3
H	Relatively Non-gravelly Alluvium (undisturbed)	60 - 100"	Loam, clay loam, sandy clay loam	5 - 25	7.4
I	Cobbly and Gravelly Alluvium	40 - 100"	Sandy clay loam, clay loam	25 - 65	7.5
J	Gravelly to Stony Alluvium over Shale	10 - 40"	Silty clay loam, clay loam, sandy clay loam	10 - 60	7.5
K	Boulders	-*	-	-	-
M	Shale with thin layer of Gravelly Alluvium	4 - 20"	Silty clay loam, sandy clay loam	5 - 40	7.5

* Refer to RA Plate 2-1 for description.

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RA TABLE 2-2

SOIL SALVAGE VOLUMES

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

Soil Borrow Area (approximate available soil) 106,000 CY

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RA ATTACHMENT 2-1

SOILS REPORT

SOIL RESOURCE INVENTORY AND ASSESSMENT

DUGOUT CANYON MINE
COAL WASTE ROCK SITE
CARBON COUNTY, UTAH

PREPARED FOR:
EARTHFAX ENGINEERING
7324 SOUTH UNION PARK AVENUE
MIDVALE, UTAH 84047

DANIEL M. LARSEN
SOIL SCIENTIST
ENVIRONMENTAL INDUSTRIAL SERVICES
31 NORTH MAIN
HELPER, UTAH 84526

DECEMBER 1999

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MAPS

SM-1 Soil Inventory Map
SM-2 Soil Suitability Map

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1.0 INTRODUCTION

1.1 LOCATION AND SETTING

This report presents soils information compiled from a detailed soil survey (order one intensity level) of a site proposed for disposal of coal mining waste rock material from the Dugout Canyon Mine in Carbon County, Utah. The site is located about seven miles northeast of the town of Wellington and about 6 ½ miles southwest of the Dugout Canyon Mine facilities site (NE 1/4, Sec. 18, T14S, R12E). It consists of about 18 acres of disturbed land which was previously used as a barrow site as a gravel source.

The site is at an elevation of about 5,900 feet and has a semi-arid climate naturally supporting a pinyon and Utah juniper vegetation type. It is on a well drained bench (pediment) composed of gravelly to stony alluvial deposits which overlie shale of the Mancos formation. Rock fragments are composed almost entirely of sandstone.

1.2 OBJECTIVES

This soil inventory was conducted to provide sufficient information on the existing soil resources to facilitate the development and reclamation planning needs for the Dugout Canyon Mine Coal Waste Disposal Site. The objectives were to document physical and chemical properties of the soils and evaluate the soil suitability and limitations related to the proposed activities.

The information presented is to fulfill the requirements of the State of Utah Department of Natural Resources, Division of Oil, Gas, and Mining (UDOGM) pertaining to management of topsoil and overburden for mining. Requirements for meeting the state regulations are outlined in "Guidelines for Management of Topsoil and Overburden for Underground and Surface Coal Mining", revised by James Leatherwood and Dan Duce, April 1988.

Standards for this soil inventory are intended to conform to the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other federal, state, and local agencies.

2.0 METHODS AND PROCEDURES

2.1 DATA REVIEW AND EVALUATION

The project area has been mapped at the order three soil survey intensity level as part of the Soil Survey of Carbon area, Utah; USDA, Soil Conservation Service (Natural Resources Conservation Service); 1988. Soil maps are at a scale of 1:24,000. The soil survey describes the project area in general as it was prior to disturbance for the barrow pit, and also provides a description of soils adjacent to the disturbed area. The information is valuable for a general understanding of the undisturbed soils and site capabilities but is not adequate for the detail needed for this project. Map unit and taxonomic unit descriptions

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identified by NRCS that were present in the area are given in Appendix S5.

2.2 SOIL INVENTORY AND MAPPING

Soil inventory and mapping was conducted by Daniel M. Larsen, Professional Soil Scientist, Environmental Industrial Services, Helper, Utah. Field work was done on September 16,1999 in conjunction with geotechnical data collection by Rhett Brooks, Geotechnical Engineer, Earthfax Engineering, Inc. Ten soil pits were excavated with a backhoe to depths of about six feet or to a depth limited by shale bedrock. Nine of the pits were within the disturbed area of the barrow site and one was on an undisturbed site where a sediment pond may be located. Soil descriptions were taken at each of these locations. In addition to the backhoe pits, spot checks were made throughout the area by digging with a spade and also observing cut slope and surface conditions. Photographs were taken of soils and surface features for further documentation.

2.3 SOIL PROFILE DESCRIPTIONS

The soil profile descriptions were made on a cleaned off representative section of the soil pit wall. They were taken on form SCS-Soils-232G and completed according to methods and standards of the National Cooperation Soil Survey as described in: the Soil Survey Manual (Soil Survey Staff, 1993); the National Soil Survey Handbook (Soil Survey Staff, 1993); and Keys to Soil Taxonomy, seventh edition (Soil Survey Staff, 1993). Soil descriptions for this project were coded with DCW-1 through DCW-10.

2.4 SOIL SAMPLING AND LABORATORY ANALYSIS

A total of 22 soil samples taken from nine locations were selected for detailed laboratory analysis. The samples were taken from representative soil layers and placed in clean plastic bags. About four to five pounds of each sample was sent to Inter-Mountain Laboratories, Inc., Sheridan, Wyoming.

The following parameters were included in the soil analysis.

PH
Electrical conductivity
Saturation percentage
Sodium Absorption Ratio
    includes Ca, Mg, and Na in meq/L
Mechanical Analysis (Particle Size)
    included very fine sand, sand, silt, clay, and texture classification
Total Organic Carbon
    includes calculation for % organic matter
% Calcium carbonate
Boron ($CaCl_2$ extraction)

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Available water capacity
includes 1/3 bar and 15 bar analyses
Exchangeable sodium percentage
includes available Na, exchangeable Na, and cation exchange capacity. Analyzed only if SAR > 15 for sandy soils or > 12 for clays.
Acid/Base Potential
Nitrate Nitrogen
Total Nitrogen (TKN)
Phosphorus
Total Sulfur

2.5 SOIL SUITABILITY FOR RECLAMATION

Criteria to establish suitability of soil material for revegetation were those contained in Table 2 of UDOGM "Guidelines for Management of Topsoil and Overburden for Underground and Surface Coal Mining" shown in Appendix S4. Although the UDOGM suitability criteria considers >30% (by volume) rock fragments (for both gravels <3" in size and cobbles 3 to 10" in size) to be unacceptable, and >10% stones and boulders >10"in size to also be unacceptable, discussion with Robert Davidson (Nyenhuis 1997) indicates a potential for salvaging soil with higher rock content. Although unacceptable thresholds were not set, the general idea is to salvage otherwise suitable soil with higher amounts of rock content in the soil than typical due to the naturally high rock fragment content of the native soils.

For those native sites that have a higher rock content than the UDOGM guideline deems acceptable, reclaiming with the higher rock content will give a greater opportunity for reclamation success. Rock content aids water holding capacity, can provide for a more stable reclaimed surface, and creates wildlife habitat niches on the surface where rocks are piled.

Potential salvage depths were generated for each map unit based on an evaluation of all of the field and laboratory data.

3.0 RESULTS AND DESCRIPTION

3.1 SOIL INVENTORY MAP

A detailed soil inventory map was compiled at a scale of one inch equal to one hundred feet (shown as **Map SM-1**). Thirteen soil map units are identified which represent areas having differences in soil and landscape characteristics. The map unit symbols and descriptions are specific to this report.

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3.2 SOIL AND MAP UNIT DESCRIPTIONS

The ten soil profile descriptions are presented in **Appendix S1.** Soil and site photographs are in **Appendix S2**.

The project area is mostly a disturbed site with little evidence of natural soils in place. Original surface soils are basically lacking except at the edges of the site and outside of the barrow area. In general, the site had gravelly and cobbly soils of the Strych series over much of the area where the gravel was removed. What remains is some coarse alluvium of varying thickness over the Mancos shale. In some places the shale is at or near the surface where overlying gravel has been removed. Some soils were noted that were not gravelly. Soil erosion potentials range from low on the very cobbly soils to high on the relatively stone free more silty soils. Based on the soil descriptions and other observations at the project site, thirteen soil map units have been identified. They are described below and in Table 3.21.

Map Unit A

This map unit consists of exposed shale and very shallow soils over shale bedrock. It is found where gravelly material has been removed and where the soils were naturally shallow over shale. The soil layer is commonly a silty clay loam or clay loam. Gravel content is generally low. This unit generally has a grayish surface color.

Map Unit B

This map has moderately deep (20 to 40 inches) gravelly to cobbly soils over shale. The area consists mostly of subsoil materials remaining after some gravelly deposits were removed. The upper 20 to 40 inches is typically a brown sandy clay loam or loam with 20 to 60 percent rock fragments. Underlying this soil is a grayish colored weathered shale which becomes harder with depth.

Map Unit C

This map unit has deep gravelly to stony alluvial soils over shale. Depth to shale is greater than 40 inches and may range up to about 100 inches. The material is mixed alluvium with no distinct soil horizons present. Soil textures are sandy clay loam and clay loam. Rock fragments are a mixture of gravel, cobble, stones, and boulders that make up about 20 to 60 percent of the volume.

Map Unit D

This area has deep soils that are low in rock fragment content. They have formed in alluvium and possible some wind blown materials derived from sandstone and shale. The soils have textures of loam, silty clay loam and clay loam with rock fragment content of less than 15 percent to a depth of about 4 to 6 feet. Underlying materials are gravelly alluvium and shale. These soils are relatively undisturbed and have

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horizons from natural soil development. They are classified as the Hernandez soil family as mapped in Carbon County.

Map Unit E

This map unit consists of an area having deep soils formed in gravelly alluvium over shale. A thin layer of waste rock with coal is present near the surface in this area. The soils from about 8 to 60 inches have a lower rock fragment content than most of the gravelly alluvium in the project area. At about 60 inches the rock fragment content increases. Shale bedrock is at depths estimated about 5 to 8 feet in the map unit.

Map Unit F

This map unit consists of an area that appears to be a topsoil storage site from the gravel pit operation. About 24 to 40 inches of soil material with mixed woody material overlies a relatively undisturbed soil similar to the Hernandez family. The surface soils are typically brown to dark yellowish brown clay loam and sandy clay loam with 5 to 15 percent rock fragments. Below this is soil material that is similar but apparently undisturbed. Carbonates increase with depth in the underlying soils. Shale bedrock was not encountered but is estimated to be at about four to eight feet in depth in the unit.

Map Unit G

This map unit consists of an area high in woody debris. It has a mixture of gravelly clay loam and sandy clay loam soil with woody material. The site was not extensively sampled. It appears to be an area of soil and woody materials salvaged from clearing for the gravel pit. Materials are estimated at 40 to 60 inches in depth.

Map Unit H

This map unit is on an undisturbed site adjacent to the gravel pit. It has deep alluvial soils that are relatively low in rock fragments. A thin, dark colored topsoil layer about 3 to 4 inches thick is present over weakly developed soil layers. Soil textures are loam to sandy clay loam and rock fragment content is about 5 to 25 percent. Slopes are gentle and the soil is well drained. This soil is classified as the Haverdad series, which is described in detail in **Appendix S5**.

Map Unit I

This map unit consists of deep cobbly alluvial deposits at the edge of the gravel pit. The map unit is mostly an undisturbed soil of the Strych series. It has a thin, dark colored topsoil layer and a calcium carbonate accumulation in the subsoils. Soil textures are sandy clay loam to clay loam and rock fragment content is 25 to 65 percent. The unit supports a pinyon and juniper vegetation type where it has not been disturbed. Some disturbed soil and woody materials are at the surface at the edge of the gravel pit in this unit. Up to about 20 inches of displaced material is present.

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Map Unit J

This map unit is on the undisturbed side slopes along the east and south edges of the gravel pit. Soils are shallow to deep cobbly alluvium over shale bedrock. The deepest soils are at the upper edge of the unit adjacent to the gravel pit. The unit includes Strych and Gerst soils as identified by the NRCS in the Carbon Area Soil Survey. Vegetation is mostly a pinyon and juniper type.

Map Unit K

This area is a boulder storage site from the gravel pit operation. It consists of boulders approximately three to six feet in diameter.

Map Unit L

This area is a gravel pile.

Map Unit M

This map unit is a relatively flat area at the gravel pit site that has shallow to moderately deep soils over shale. The unit is a complex of spots that have shale near the surface and pockets of moderately deep gravelly soils. It is a disturbed site that has had soils altered. The shallow soils are generally silty clay loam or clay loam and the moderately deep soils are gravelly to cobble sandy clay loam.

Table 3.21
Soil Map Unit Features
Dugout Canyon Mine Waste Rock Site

Soil Map Unit Symbol	Soil Materials	Soil Depth To Shale	Soils Texture	Rock Fragments (%)	Average PH
A	Shale	0 - 6"	Clay loam, Silty clay loam	5 - 15	7.5
B	Gravelly alluvium over shale	20 - 40"	Loam, sandy clay loam	20 - 60	7.3
C	Gravelly to stony alluvium	40 - 100"	Loam, clay loam, sandy clay loam	20 - 60	7.3

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D	Non-gravelly alluvium, some wind blown material over gravelly alluvium and shale	40 - 100"	Loam, clay loam, silty clay loam	5 - 15	7.5
E	Gravelly alluvium small amount of waste rock with coal on surface	40 - 100"	Clay loam, loam	15 - 45	7.5
F	Non-gravelly alluvium topsoil storage	40 - 100"	Clay loam, sandy clay loam	5 - 15	7.0
G	Alluvium and woody materials	40 - 100"	Clay loam, sandy clay loam	15 - 30	7.3
H	Relatively non-gravelly alluvium (Undisturbed site)	60 - 100"	Loam, clay loam, sandy clay loam	5 - 25	7.4
I	Cobbly and gravelly alluvium	Greater than 60"	Sandy clay loam, clay loam	25 - 65	7.5
J	Gravelly to stony alluvium over shale	10 - 40"	Silty clay loam, clay loam, sandy clay loam	10 - 60	7.5
K	Boulders	—	—	—	—
L	Gravel Pile	—	—	—	—
M	Shale with thin layer of gravelly alluvium	4 - 20"	Silty clay loam, sandy clay loam	5 - 40	7.5

3.3 SOIL LABORATORY TESTING RESULTS

The data obtained from soil testing conducted by Inter-Mountain Laboratories, Inc. are presented in **Appendix S3.** This information was used to characterize selected properties and evaluate the soils for

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suitability as material for reclamation as identified by the Utah Division of Oil, Gas, and Mining and shown in **Appendix S4.** All soil samples rated as fair to good based on the UDOGM criteria. Sample DCW10 (0-4 inches) rated good in all parameters, with the others having a rating of fair in at least one parameter. A summary of the soil test results and ratings are given below:

PH - All soil samples rated good with a range of pH 6.9 to 7.8

% Saturation - 17 samples rated good (25.1 to 45.3%) and 5 samples rated fair (21.6 to 24.9%)

EC (Electrical Conductivity) - 17 samples rated good (.038 to 1.93 mmhos/cm) and 5 samples rated fair (2.12 to 4.68 mmhos/cm).

SAR (Sodium Adsorption Ratio) - 20 samples rated good (0.56 to 6.03) and 2 samples rated fair (4.64 and 6.03).

Texture - 12 samples rated good (loam and sandy clay loam) and 10 samples rated fair (clay loam and silty clay loam)

AWC (Available water capacity) - 6 samples rated good (0.11 to 0.14 inches per inch) and 16 samples rated fair (0.05 to 0.10 inches per inch)

Boron - All samples rated good (0.05 to 0.50 ppm).

Selenium - All samples rated good (0.02 ppm or less).

Acid/Base Potential - All samples rated good (90.0 to 282 T/1000 tons)

Other tests not used in the UDOGM rating criteria indicate low phosphorus, nitrogen, and sulfur levels. Calcium carbonate content in relatively high, with a range of 9.3 to 26.9 percent. Organic matter is generally low although there are pockets of woody materials in some spots.

3.4 SALVAGE OF SUITABLE SOIL MATERIALS

Since the project area is primarily a disturbed site there is very little topsoil available. Nearly all of the soils that were tested rated as fair materials for reclamation purposes. Rock fragment content is high over much of the area and would be considered a poor feature in rating, however, this is a natural property of the native soils. In contrast to the gravelly alluvium is the shale. The thin soils over the shale have fair suitability although the shale bedrock is considered unacceptable. The most suitable materials found in the disturbed area are soil map units D, E, and F. These soils are deep and are relatively low in rock fragments. Soils in map unit H are the most suitable for reclamation but are outside of the disturbed barrow site. The more gravelly soils in map units B, C, and I would be better as a subsoil in site reclamation and not used as

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topsoil. The soils in map unit A have no salvageable soil or very little. Map unit M has shallow soils over shale with some salvageable material available. Map units L and K consist of boulders and a gravel pile and are not considered sources of soil material.

Map SM-2 shows the approximate depths of salvageable materials that would be considered suitable for reclamation.

Table 3.41

Soil Map Unit	Suitable Material Depth Range (in inches)	Est. Ave. Salvageable Depth (inches)	Approx. Acres	Approx. Volume (Cubic yards)
A	0 - 4	0	5.74	None practical
B	20 - 40	30	3.38	13,632
C	40 - 100	60	0.67	5,404
D	40 - 100	60	0.64	5,162
E	40 -100	48	0.71	4,582
F	40 - 100	48	0.60	3,872
G	40 - 100	48	0.40	2,581
H*	60 - 100	60	2.37	19,117
I	Greater than 60	60	0.59	4,759
J*	10 - 40	18	8.42	20,375
K	NA	NA	0.25	--
L	NA	NA	0.12	--
M	4 - 20	8	3.30	3,552

* Soil Map Units "H" and "J" are not within the disturbed gravel pit site.

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APPENDIX S1

SOIL PROFILE DESCRIPTIONS AND FIELD NOTES

DUGOUT CANYON MINE COAL WASTE DISPOSAL SITE

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SOIL PROFILE DESCRIPTIONS FOOTNOTES

[1] Soil Series, and Soil Classification according to current NRCS information. Soil classification based on Keys to Soil Taxonomy, 7th edition (Soil Survey Staff 1996).

[2] Horizon and Depth based on site-specific conditions at the sample location.

[3] Texture and texture modifier abbreviations:

S	Sand	SCL	Sandy Clay Loam	CB	Cobbly	GR	Gravely
LS	Loamy Sand	CL	Clay Loam	CBV	Very Cobbly	GRV	Very Gravely
SL	Sandy Loam	SICL	Silty Clay Loam	CBX	Extremely Cobbly	GRX	Extremely Gravely
L	Loam	SIC	Silty Clay	CN	Channery	SH	Shaley
SIL	Silt Loam	C	Clay	CNV	Very Channery	SR	Stratified
SI	Silt			CNX	Extremely Channery		

[4] Color, Dry and Moist: Munsell Soil Color Chart, 1994 Edition.

[5] Structure:

Grade	Size	Type
W Weak	VF Very Fine	PL Platy
M Moderate	F Fine	GR Granular
S Strong	M Medium	SBK Subangular Blocky
	CO Coarse	ABK Angular Blocky
	VCO Very Coarse	PR Prismatic
		W Massive Weak Massive
		Massive
		S Massive Strong Massive
		SG Single Grained
		Cloddy

[6] Consistency:

Dry		Moist		Wet	
LO	Loose	LO	Loose	NS	Non Sticky
SO	Soft	VFR	Very Friable	SS	Slightly Sticky
SH	Slightly Hard	FR	Friable	S	Sticky
H	Hard	FI	Firm	VS	Very Sticky
VH	Very Hard	VFI	Very Firm	NP	Non Plastic
EH	Extremely Hard	EFI	Extremely Firm	SP	Slightly Plastic
				P	Plastic
				VP	Very Plastic

[7] Roots:

Number	Type	
Very Few	VF	Very Fine
Few	F	Fine
Com (Common)	M	Medium
Many	CO	Coarse

Roots are described in terms of a specified size (type) and quantity (number). The size classes are:

Very Fine: Less than 1 mm in diameter
Fine: 1 to 2 mm in diameter
Medium: 2 to 5 mm in diameter
Coarse: 5 mm or larger in diameter
Roots larger than 10 mm in diameter may be described separately.

Quantity classes or roots are defined in terms of numbers of each size per unit area—1 square centimeter for very fine and fine roots, and 1 square decimeter for medium and coarse roots. All roots smaller than 10 mm in diameter are described in terms of the following quantity classes:

Few: Less than 1 per unit area of the specified size
Common: 1 to 5 per unit area of the specified size
Many: More than 5 per unit area of the specified size
Roots are described as to number first, and type second.

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[8] Rock Fragments: All rock fragment percentages (% by volume) are taken from the field soil profile descriptions. Geologic modifier types (gravelly, channery, etc.) are also taken from the field soil profile description forms for each sampled profile.

[9] Reaction:

Effervescence	
EO	Non-Effervescent
SE	Slightly Effervescent
EM	Moderately Effervescent
ES	Strongly Effervescent
EV	Violently Effervescent

Reaction		pH
Str. Acid	Strongly Acid	5.1 - 5.5
Mod. Acid	Moderately Acid	5.6 - 6.0
Sl. Acid	Slightly Acid	6.1 - 6.5
Neutral	Neutral	6.6 - 7.3
Mild. Alk.	Mildly Alkaline	7.4 - 7.8
Mod. Alk.	Moderately Alkaline	7.9 - 8.4
Strong Alk.	Strongly Alkaline	8.5 - 9.0
Very Strong Alk.	Very Strongly Alkaline	>9.0

[10] Horizon Boundaries:

Distinctness	
A	Abrupt (<2 cm thick)
C	Clear (2 to 5 cm thick)
G	Gradual (5 to 15 cm thick)
D	Diffuse (>15 cm thick)

Topography	
S	Smooth (the boundary is a plane with few or no irregularities)
W	Wavy (the boundary has undulations in which depressions are wider than they are deep)
I	Irregular (the boundary has pockets that are deeper than they are wide)
B	Broken (at least one of the horizons or layers separated by the boundary is discontinuous and the boundary is interrupted).

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SCS-SOILS-232G
REV. 12-70
FILE CODE SOILS-11

SOIL DESCRIPTION

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

DCW 1

Soil type: Disturbed land — File No.

Area: Dugout Canyon Mine Waste Pile Site — Date: 9-16-99 D.L. — Stop No.: 1

Classification: Disturbed (Strych like)

Location: Near northend in small basin along east side

N. veg. (or crop): Pinyon-juniper, sagebrush prior to disturbance — Climate: Ustic/Mesic

Parent material: Gravelly alluvium over shale (Manoos)

Physiography: Gravel pit, low spot

Relief	Drainage	Salt or alkali
Elevation ≈ 5900'	Gr. water	Stoniness
Slope	Moisture: Dry to 1" moist below	
Aspect	Root distrib.	% Clay *
Erosion	% Coarse fragments *	% Coarser than V.F.S. *

Permeability

Additional notes: Backhoe pit
All mixed material over shale
No settled soil layers (pedogenic)
photos - pit with no label
pile note shale fragment on right
no veg.
Fairly compacted
Not much difference in soil layers described

GROUND COVER (%)	RANGE	AVERAGE
Gravel 2MM-3"		20
Cobble 3-10"		1
Stone 10-24"		
Boulder >24"		
Vegetation		
Litter		
Bare		

EST.

* Control section average

Horizon	Depth inches	Color Dry	Color Moist	Texture	Structure	Consistence Dry	Consistence Moist	Consistence Wet	Reaction Lab.	Boundary	% Rock Fragments	Root Distribution		
C1	0-11	10YR 5/3-6/3	Brown 10YR 4/3	26%c SCL	0m	sh	fr	ns np	7.4	gw	15 g 5 c	no roots		
C2	11-28		"	24%c L	0m	sh	fr-fi	ns np	7.3	gw	20 g 5 c			
C3	28-38		"	24%c SCL	0m	sh	fi	ns np	7.2	aw	25 g 5 c			
HCR		Hard shale ranges to 48"			some loose sandy pockets									

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SCS-SOILS-232G
REV. 12-70
FILE CODE SOILS-11

SOIL DESCRIPTION

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Soil type Disturbed land

File No. DCW 2

Area Dugout Canyon Waste fill site	Date 9-16-99	Stop No. 2
Classification		
Location South end of depression on E side		
N. veg. (or crop) Natural Prayer - Juniper site		Climate Ustic / Mesic
Parent material Alluvium from sandstone and shale		
Physiography Slight basin - Gravel pit		
Relief	Drainage	Salt or alkali
Elevation ≈ 5900'	Gr. water -	Stoniness
Slope < 5%	Moisture Moist Throughout	
Aspect	Root distrib. —	% Clay *
Erosion	% Coarse fragments *	% Coarser than V.F.S. *
Permeability Mod. slow		

Additional notes Backhoe pit
Standing water near pit
No shale encountered
Dug pit to 93"
photograph of DCW 2 doesn't show as much stone & boulder as most of the pit
No definite soil horizons
Boulder on E. side of pit at 6" to 48"

GROUND COVER (%)	RANGE	AVERAGE
Gravel 2MM-3"		20
Cobble 3-10"		
Stone 10-24"		
Boulder >24"		
Vegetation		
Litter		
Bare		

* Control section average

Horizon	Depth inches	Color Dry	Color Moist	Texture	Structure	Consistence Dry	Consistence Moist	Consistence Wet	Reaction	Boundary	% Rock Fragments	Root Distribution		
C1	0-6	10YR 5/3	Brown 10YR 4/3	L	OM	l	fr	ss p	≈ 7.4	gw	25 g 5 c	No roots		
C2	6-24		"	L		sh	fi	ns np	7.4	gw	30 g 10 c 5 s		Boulders 5-10%	
C3	24-60+		"	L		l	fr		7.3		25 g 10 c 25 s			

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FILE CODE SOILS-11

SOIL DESCRIPTION

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Soil type

File No. DCW3

Area Dugout Canyon Waste Pile Site | Date 9-16-99 DL | Stop No. 3

Classification

Location Southend between narrow spot + depression, along east side

N. veg. (or crop) P-J - natural site | Climate Ustic / mesic

Parent material Shale / Gravelly alluvium has been removed

Physiography, re-shaped, gravel pit

Relief smooth, nearly level | Drainage | Salt or alkali

Elevation ≈ 5900' | Gr. water | Stoniness - 0 -

Slope 5% | Moisture

Aspect East | Root distrib. | % Clay *

Erosion High | % Coarse fragments * | % Coarser than V.F.S. *

Permeability slow

Additional notes Runoff across here has cut the sideslope (3' gravel / 2' shale)

V. Shallow over shale

Sampled DCW3 0-3 soil
DCW3 4-10 weathered shale

3/4" crusted

edge of slope break

Some gravelly alluvium was probably removed

GROUND COVER (%)	RANGE	AVERAGE
Gravel 2MM-3"	5-10%	
Cobble 3-10"		
Stone 10-24"		
Boulder >24"		
Vegetation		
Litter		
Bare		

* Control section average

Horizon	Depth inches	Color Dry	Color Moist	Texture	Structure	Consistence Dry	Consistence Moist	Consistence Wet	Reaction Lab.	Boundary	% Rock Fragments	Root Distribution		
C	0-3	10YR 6/3 light y. br	10YR 4/3 olive br	34% c CL	1 fg-om	1		5 ?	7.6	cw	10% ?			
CR1	3-12	weathered shale		39% c SICL		rock structure			7.6	gs	70% platy shale fragments	few roots		
CR2	12-25	Denser	10YR 4/2 Dark grayish brown, some roots									To 25" between fractures		
R	25+	Hard shale												

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FILE CODE SOILS-11

SOIL DESCRIPTION

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Soil type

File No. DCW 4

Area Dugout Canyon Coal Waste Pile Site | Date, 9-16-99 DL, | Stop No. 4

Classification

Location S. end depression

N. veg. (or crop) P-d site | Climate Ustic/Mesic

Parent material Coarse alluvium over shale

Physiography Depression (Gravel pit)

Relief	Drainage	Salt or alkali
Elevation ≈ 5900'	Gr. water	Stoniness
Slope 5%	Moisture	
Aspect South	Root distrib.	% Clay *
Erosion	% Coarse fragments *	% Coarser than V.F.S. *

Permeability

Additional notes photos taken
Samples DCW 4 0-8"
DCW 4 10-24"

GROUND COVER (%)	RANGE	AVERAGE
Gravel 2MM-3"		60
Cobble 3-10"		10
Stone 10-24"		
Boulder >24"		
Vegetation		
Litter		
Bare		

* Control section average

Horizon	Depth	Color Dry	Color Moist	Texture Lab.	Structure	Consistence Dry	Consistence Moist	Consistence Wet	Reaction Lab.	Boundary	% Rock Fragments	Root Distribution
C1	0-10	10YR 5/3	10YR 4/3 - 4/4	24%c SCL	0m - 1 fgr	1	fr	ns-np spots ss/sp	7.6	gw	50g 10c	-
C2	10-24		Dark yellowish Brown 10YR 4/4	22%c SCL	0m sg	1	fr	ns np	7.0	aw	40g 20c 5s	—
IICR	24-	Hard shale										

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SOIL DESCRIPTION

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Soil type Strych

File No. DCW5

Area Dugout Canyon Mine Waste Pile Site | Date 9-16-99 D.L. | Stop No. 5

Classification Loamy-skeletal, mixed (calcareous), mesic Typic Haplocalcid

Location Cut slope at edge of S. end above small depression

N. veg. (or crop) Pinyon-Juniper | Climate Ustic / Mesic

Parent material Gravelly alluvium from sandstone & shale

Physiography Edge of an alluvial bench

Relief	Drainage Well drained	Salt or alkali
Elevation ≈ 5900'	Gr. water	Stoniness
Slope	Moisture	
Aspect	Root distrib.	% Clay *
Erosion	% Coarse fragments *	% Coarser than V.F.S. *

Permeability Rapid - Mod. rapid

Additional notes

roots to 5'

Undisturbed profile
- except at the surface
(Some mixing to about 8"

GROUND COVER (%)	RANGE	AVERAGE
Gravel 2MM-3"		25
Cobble 3-10"		10
Stone 10-24"		5
Boulder >24"		
Vegetation		
Litter		
Bare		

* Control section average

Horizon	Depth inches	Color Dry	Color Moist	Texture	Structure	Consistence Dry	Consistence Moist	Consistence Wet	Reaction lab.	Boundary	% Rock Fragments	Root Distribution		
A	0-8		Dark yellowish brown 10YR 3/4	29% c CL	1f gr om	l	vfr	ss sp	7.2	cw	30g 10c 5s	cvfr fm		
BK	8-24	Pale brown 10YR 6/3	Dark yellowish brown 10YR 4/4	32% c CL	om	sh	fr	ss sp	7.3	gw	"	ff	26% CO_3	
C1	24-50	10YR 5/3	"	20% c SCL	sg	l-sh	fr	ss sp	7.8	gw	35g 15c 10s	ff		
C2	50-in		"	SCL	sg	l-sh	fr	ss sp			"			

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SOIL DESCRIPTION

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Soil type Hernandez Family

File No. DCW 6

Area Dugout Canyon Mine Waste Pile Site | Date 9-16-99 | Stop No. 6

Classification Fine-loamy, mixed (calcareous), mesic Typic Haplocalcid

Location West edge, near center, above [illegible] rock pile

N. veg. (or crop) Pinyon - juniper site | Climate

Parent material Alluvial and wind blown materials from sandstone and shale

Physiography Bench

Relief	Drainage	Salt or alkali
Elevation ≈ 5900'	Gr. water	Stoniness
Slope	Moisture	
Aspect	Root distrib.	% Clay *
Erosion slight	% Coarse fragments *	% Coarser than V.F.S. *

Permeability Moderate

Additional notes Disturbed site for gravel pit - only surface veg. cleared

DCW6 0-12"
DCW6 20-30"
DCW6 40-60"

GROUND COVER (%)	RANGE	AVERAGE
Gravel 2MM-3"		
Cobble 3-10"		
Stone 10-24"		
Boulder >24"		
Vegetation		
Litter		
Bare		

* Control section average

Horizon	Depth	Color Dry	Color Moist	Texture	Structure	Consistence Dry	Consistence Moist	Consistence Wet	Reaction Lab.	Boundary	% Rock Fragments	Root Distribution
AC	0-12		10YR 4/3	28%c CL	1fgr	so	fr	ns sp	7.2	gw	5g	cf
BT	12-30		10YR 4/4	32%c SICL	1fsbk-om	sh	fr-fi	ss sp	7.6	gw	-	cf, m, l
BK	30-72		10YR 4/4	18%c L	om	sh	fr	ns np	7.5	cw	-	f fn m
		carbonates (soft pockets)										30-60"
II C	72-85	Cobbly alluvium						ns np				

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SOIL DESCRIPTION

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DCW7

Soil type | File No.

Area Dugout Canyon Mine Coal Waste Site | Date 9-16-99 D.L. | Stop No. 7

Classification

Location Between ground pile + road in narrow

N. veg. (or crop) | Climate

Parent material Alluvium (Transport waste material)

Physiography Flattened area, bench

Relief Bench, gentle | Drainage | Salt or alkali

Elevation ≈ 5,500' | Gr. water | Stoniness

Slope Nearly flat | Moisture

Aspect | Root distrib. | % Clay *

Erosion | % Coarse fragments * | % Coarser than V.F.S. *

Permeability

Additional notes Narrow site
Photo - last on roll
no ID card

Material below 60" is like the surface part of the area (surface)

Soil looks good for veg from 7 to 60"

GROUND COVER (%)	RANGE	AVERAGE
Gravel 2MM-3"		
Cobble 3-10"		
Stone 10-24"		
Boulder >24"		
Vegetation		
Litter		
Bare		

* Control section average

Horizon	Depth	Color Dry	Color Moist	Texture	Structure	Consistence Dry	Consistence Moist	Consistence Wet	Reaction lab.	Boundary	% Rock Fragments	Root Distribution		
mixed A	0-7		Black to reddish br.	27% c CL	om soil + sandstone	sh	fi	ss sp	7.4	as	40g 5c			
C1	7-36		10YR 3/4	24% c L	om	sh	fr	ss sp	7.6	gw	20g 5c	f m		
C2	36-60		10YR 3/4	L	om	sh	fr	ss sp	7.6	gw	20g 5c			
II C	60-77	cobble	10YR 4/4 alluvium			l	l	ns np			30g 15c 5s			

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SOIL DESCRIPTION

U.S. DEPARTMENT OF AGRICULTURE
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Soil type

File No. DCW 8

Area Dugout Canyon Mine Coal Waste Site		Date 9-16-99 D.L.	Stop No. 8
Classification			
Location Topsoil pile, NW part of disturbed area			
N. veg. (or crop) Pinyon-juniper		Climate Mesic / Ustic	
Parent material Alluvium from sandstone and shale, possibly some wind blown			
Physiography			
Relief	Drainage	Salt or alkali	
Elevation ≈ 5900'	Gr. water	Stoniness	
Slope 6%	Moisture		
Aspect S	Root distrib.	% Clay *	
Erosion	% Coarse fragments *	% Coarser than V.F.S. *	
Permeability			

Additional notes

Sampled
DCW 8 0-12"
DCW 8 18-36"

GROUND COVER (%)	RANGE	AVERAGE
Gravel 2MM-3"		
Cobble 3-10"		
Stone 10-24"		
Boulder >24"		
Vegetation		
Litter		
Bare		

* Control section average

Horizon	Depth	Color Dry	Color Moist	Texture	Structure	Consistence Dry	Consistence Moist	Consistence Wet	Reaction lab.	Boundary	% Rock Fragments	Root Distribution		
Disturbed AC	0-12		10YR 4/4	28% CL	1 fgr	so	vfr	SS SP	7.0	CW	5g 5c			
AC	12-36 *	Very woody, + juniper bark mixed soil and woody material		27% SCL	1 fgr om	1	vfr	SS SP	6.9	CW	10g 5c			
Buried soil AC	36+	parent material like DCW6				so 5h	fr	SS SP				cm		

* Varies 24-40"

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SOIL DESCRIPTION

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DCW 9

Soil type | File No.

Area Dugout Canyon Mine Waste Pile Site		Date 9-16-99 D.L.	Stop No. 9
Classification			
Location N. end, east of shale rise			
N. veg. (or crop) Pinyon-juniper sagebrush		Climate Ustic/Mesic	
Parent material Shale			
Physiography Bench			
Relief Nearly level	Drainage	Salt or alkali	
Elevation ≈ 5900'	Gr. water	Stoniness	
Slope 5	Moisture		
Aspect S	Root distrib.	% Clay *	
Erosion	% Coarse fragments *	% Coarser than V.F.S. *	
Permeability Slow			
Additional notes Cleared area for gravel pit			

GROUND COVER (%)	RANGE	AVERAGE
Gravel 2MM-3"		
Cobble 3-10"		
Stone 10-24"		
Boulder >24"		
Vegetation		
Litter		
Bare		

* Control section average

Horizon	Depth	Color Dry	Color Moist	Texture	Structure	Consistence Dry	Consistence Moist	Consistence Wet	Reaction lab	Boundary	% Rock Fragments	Root Distribution		
A1	2-4 0-3		grayish br.	37%c CL	1fgr	so	fr	s p	7.5					
CBk	3-8		gray to grayish br	CL	1fsbk	sh	fi	s p	est. 7.5					
CR	8-24+	weathered shale	y-br & gray	massive										

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REV. 12-70
FILE CODE SOILS-11

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL DESCRIPTION

Soil type Haverdad

File No. DCW 10

Area Dugout Canyon Mine Coal Waste Site | Date 9-16-99 | Stop No. 10

Classification Fine-loamy, mixed (calcareous), mesic Typic Torrifluvents

Location Sediment pond site, SE corner of area

N. veg. (or crop) Sagebrush, grass | Climate Aridic Ustic / Mesic

Parent material Alluvium

Physiography Slight basin, fan

Relief Gentle	Drainage Well drained	Salt or alkali
Elevation ≈ 5900'	Gr. water	Stoniness
Slope 5%	Moisture	
Aspect East	Root distrib.	% Clay *
Erosion	% Coarse fragments *	% Coarser than V.F.S. *

Permeability

Additional notes This site is outside of the area disturbed for a gravel source

GROUND COVER (%)	RANGE	AVERAGE
Gravel 2MM-3"		
Cobble 3-10"		
Stone 10-24"		
Boulder >24"		
Vegetation		
Litter		
Bare		

* Control section average

Horizon	Depth	Color Dry	Color Moist	Texture Lab.	Structure	Consistence Dry	Consistence Moist	Consistence Wet	Reaction Lab.	Boundary	% Rock Fragments	Root Distribution
A1	0-4	Crusted upper ½"	10YR 4/2	21%c L	1fgr	so	vfr	SS SP	7.1	CS	<5%	mf
Bw	4-13		10YR 4/3	28%c CL	1fgbk om	sh	fr	SS SP	7.3	CS	<5%	mf vf
C1	13-30		10YR 4/4	27%c SCl	om	sh	fr	SS SP	7.4	CS	25gr	cf
C2	30-102		10YR 4/4	26%c L	om	sh	fr	SS SP	7.7		10g 10c	ff to ≈ 60"

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APPENDIX S2

SOIL PROFILE AND SITE PHOTOGRAPHS

DUGOUT CANYON MINE COAL WASTE DISPOSAL SITE

Photographs were taken on September 16, 1999

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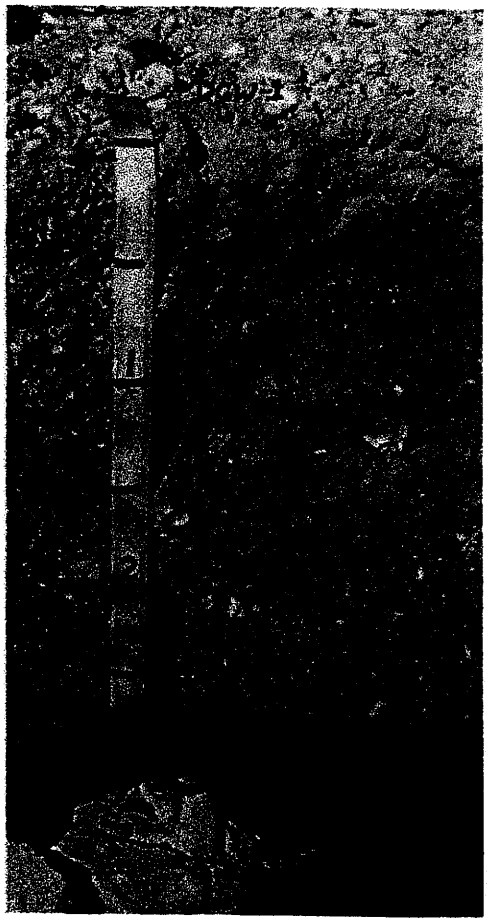

Soil Pit DCW-1 location and Soil Profile DCW-1. Gravelly alluvium over shale at 38 inches. Tape measure scale units are in feet. Photographs were taken on September 16, 1999.

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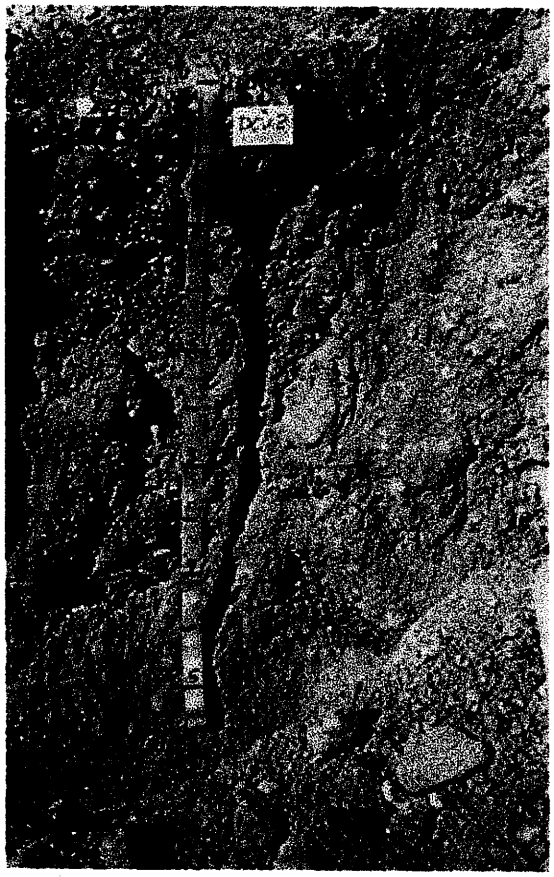

Soil Pit DCW-2 location and Soil Profile DCW-2. Deep, gravelly alluvium. Shale was not encountered at this site which was dug to 93 inches.

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Soil Pit DCW-3 location and Soil Profile DCW-3. This site has a very shallow silty clay loam soil over weathered shale.

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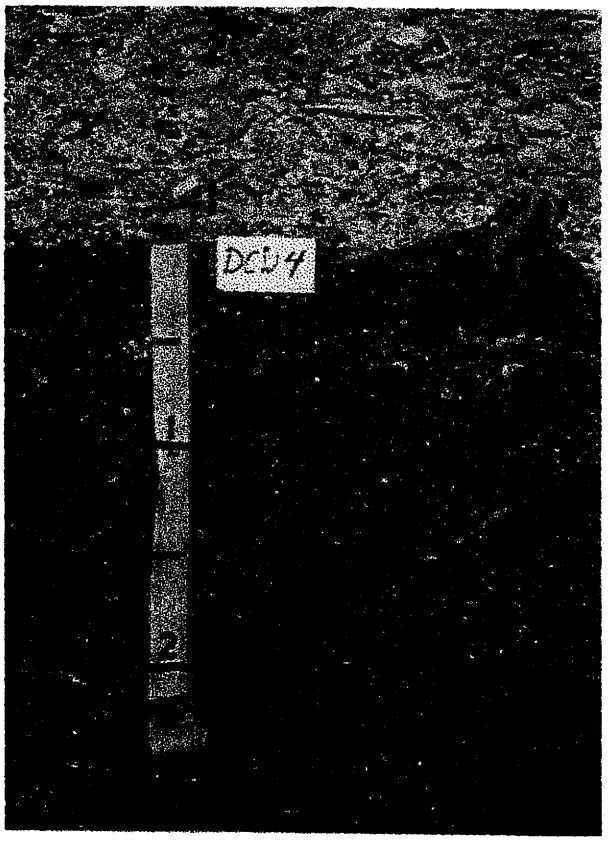

Soil Pit DCW-4 location and Soil Pit DCW-4. Extremely gravelly alluvium over shale at 24 inches

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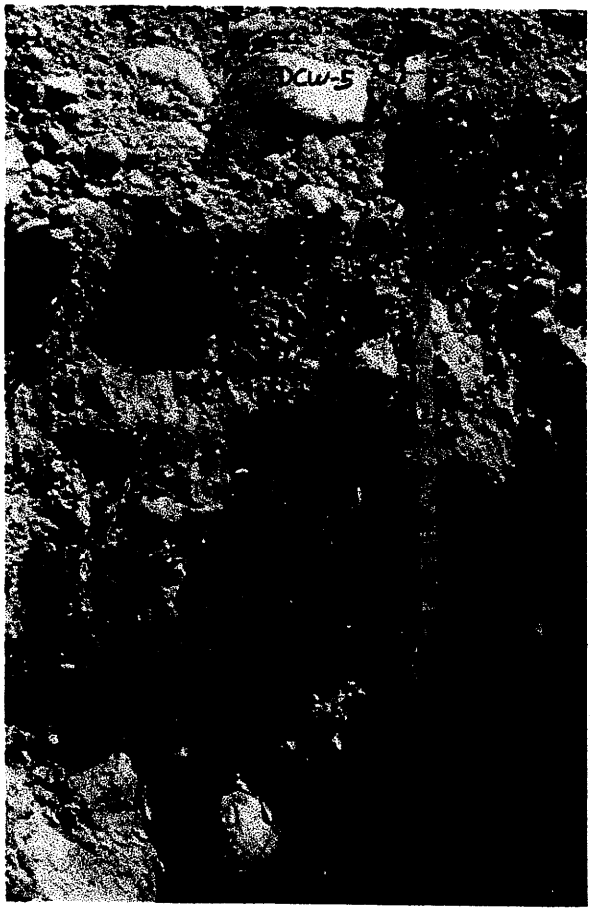

Site DCW-5 and Soil Profile DCW-5. This site is a cut slope. It is very deep stony alluvium. Shale was not encountered to a depth of about 100 inches.

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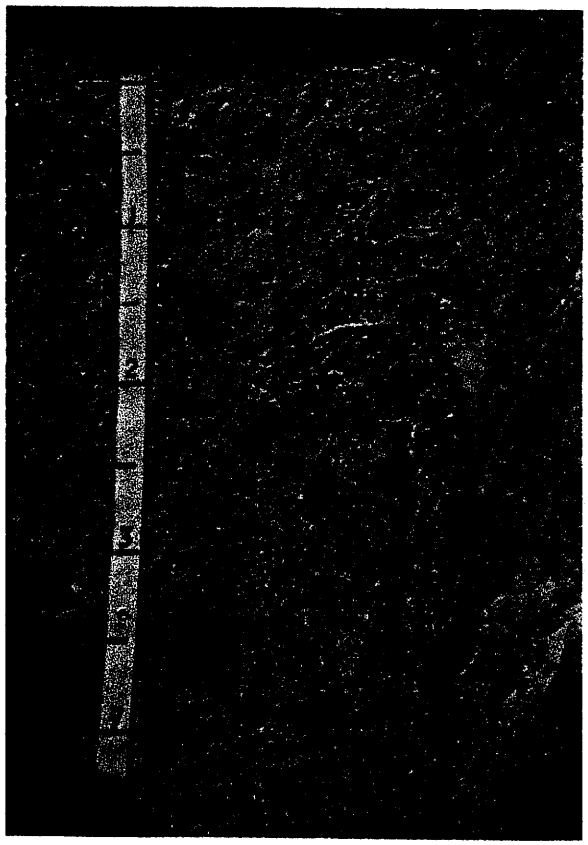

Soil Pit DCW-6 location and Soil Profile DCW-6. This site is along the west side of the area and is nearly free of rock fragments. Cobbly alluvium was encountered at about 72 inches.

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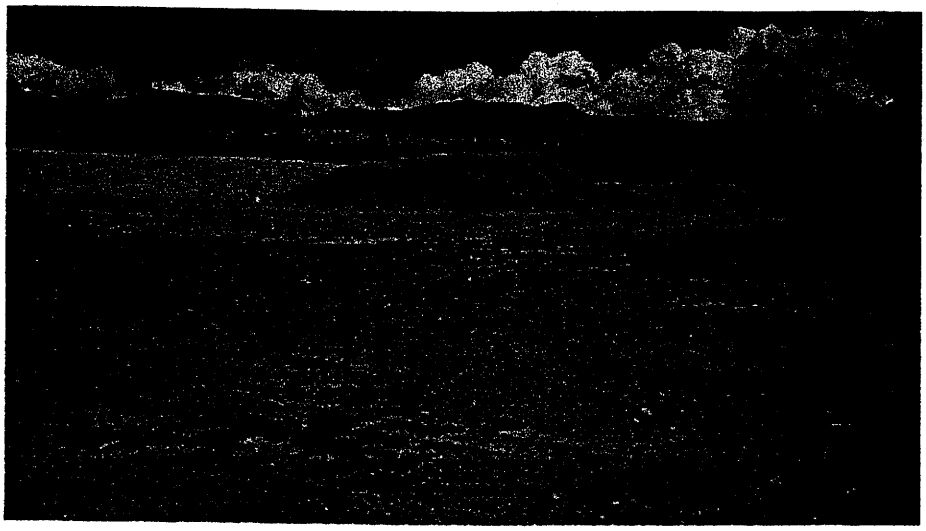

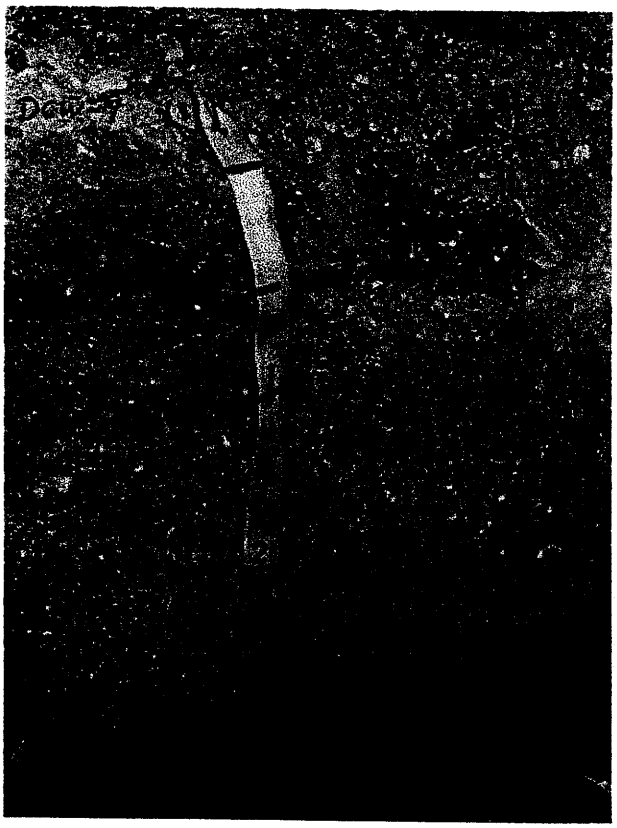

Soil Pit DCW-7 location and Soil Profile DCW-7. There is about 6 to 8 inches of waste coal material near the surface. The soil from 8 to 60 inches in depth is relatively low in rock fragment content. Cobbly alluvium is present at 60 to 72 inches.

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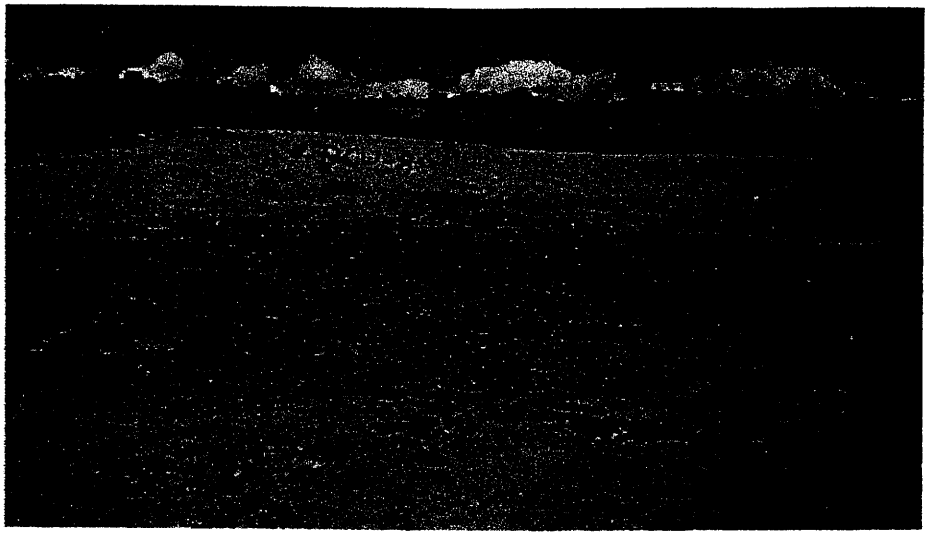
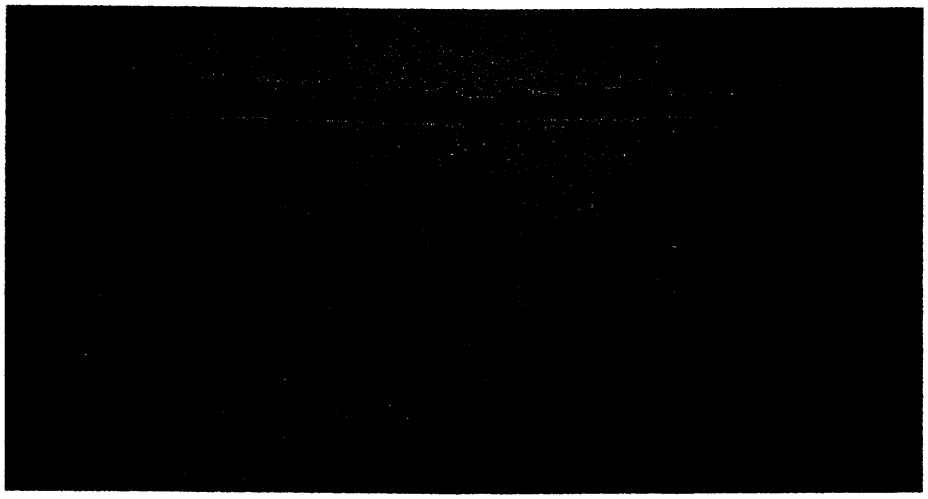


Soil Pit DCW-8 location. This is where some surface soil has been stored.



Soil Pit DCW-9 location at the north edge of the area. This site has a clay loam over weathered shale at 8 inches.

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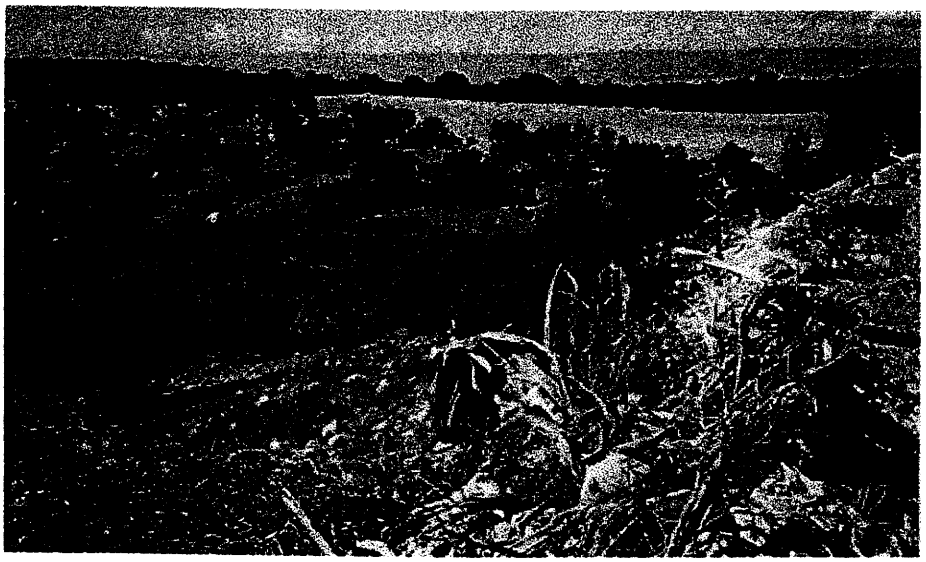
Soil pit DCW-10 location at the right side of the photograph. Possible sediment pond site.



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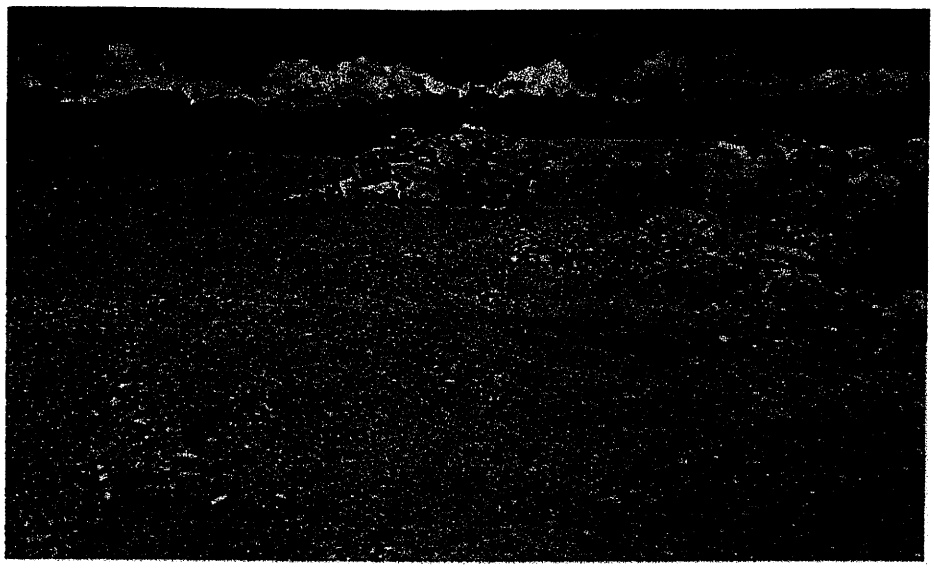
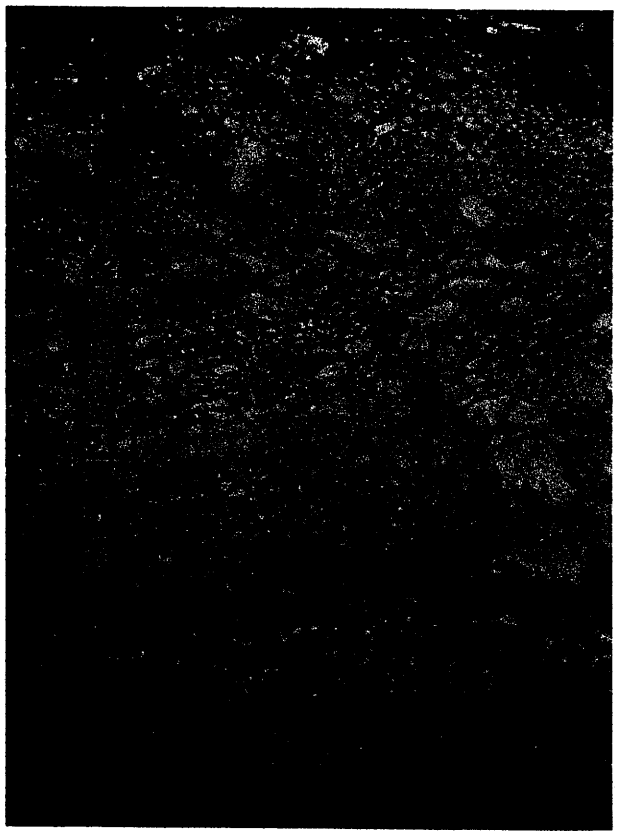


Pile of boulders stored on the site. Foreground is shallow over shale. Note erosional cut into the shale on the right.



Soil Profile noted on a cut slope along the northeast edge of the disturbed area. Gravelly alluvium is about 42 inches thick over weathered shale. Natural topsoil thickness is about six inches.

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APPENDIX S3

SOIL TESTING RESULTS DATA FROM INTER-MOUNTAIN LABORATORIES, INC.

DUGOUT CANYON MINE COAL WASTE DISPOSAL SITE

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Dugout Canyon Mine Coal Waste Pile Site
Soil Samples September 16, 1999, by Dan Larsen

Soil Pit #	Depth Sampled
DCW1	0 - 11"
DCW1	11 - 28"
DCW1	28 - 38"
DCW3	0 - 3"
DCW3	4 - 10"
DCW4	1 - 8"
DCW4	10 - 24"
DCW5	2 - 8"
DCW5	12 - 24"
DCW5	24 - 36"
DCW6	0 - 12"
DCW6	20 - 30"
DCW6	40 - 40"
DCW7	0 - 7"
DCW7	12 - 30"
DCW8	1 - 12"
DCW8	18 - 36"
DCW9	0 - 6"
DCW10	0 - 4"
DCW10	4 - 13"
DCW10	13 - 30"
DCW10	30 - 45"

Soil Descriptions (Summary)

DCW1	Moderately deep, gravelly alluvium over shale (shale at 38")
DCW2	Deep, gravelly alluvium. Shale not encountered to 93"
DCW3	Very shallow to shale. Weathered shale at 3"
DCW4	Moderately deep, gravelly alluvium over shale (shale at 24")
DCW5	Deep gravelly alluvium Representative of undisturbed soil
DCW6	Deep, non-gravelly soil over gravelly alluvium at 72"
DCW7	Gravelly alluvium, over more cobbly alluvium at 60"

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DCW8	Topsoil storage area. About 36" of salvaged soil over relatively stone free underlying soil.
DCW9	Very shallow over shale
DCS10	Deep alluvium, undisturbed site. Not part of gravel pit and not as gravelly.

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Inter-Mountain Laboratories, Inc.

1633 Terra Avenue
Sheridan, WY 82801

Canyon Fuel Company, LLC

Canyon Fuel

Client Project ID: Dugout Canyon Mine

Date Received: 09/24/99

Set #0199S13957

Report Date: 10/20/99

Lab Id	Sample Id	Depths inches ~~(Feet)~~	pH s.u.	Saturation %	EC @ 25°C mmhos/cm	Calcium meq/L	Magnesium meq/L	Sodium meq/L	SAR
199S13957	DCW 1	0 - 11	7.4	25.1	1.60	3.48	5.17	7.72	3.71
199S13958	DCW 1	11 - 28	7.3	26.1	2.12	5.53	8.72	9.24	3.46
199S13959	DCW 1	28 - 38	7.2	26.1	3.17	8.06	13.0	15.1	4.64
199S13960	DCW 3	0 - 3	7.6	32.3	0.68	1.31	2.31	2.95	2.19
199S13961	DCW 3	4 - 10	7.6	45.3	0.46	0.96	2.27	1.50	1.18
199S13962	DCW 4	1 - 8	7.6	24.3	0.83	1.30	3.21	4.26	2.84
199S13963	DCW 4	10 - 24	7.0	21.6	3.39	21.9	26.9	3.88	0.79
199S13964	DCW 5	2 - 8	7.2	35.3	0.38	2.55	0.70	0.69	0.54
199S13965	DCW 5	12 - 24	7.3	32.8	0.38	1.80	1.16	0.89	0.73
199S13966	DCW 5	24 - 36	7.8	24.7	0.46	0.95	3.01	0.94	0.67
199S13967	DCW 6	0 - 12	7.2	31.7	0.69	3.82	1.64	0.93	0.56
199S13968	DCW 6	20 - 30	7.6	36.0	0.38	1.12	1.59	1.08	0.93
199S13969	DCW 6	40 - 60	7.5	31.9	4.68	21.0	29.3	15.6	3.11
199S13970	DCW 7	0 - 7	7.4	30.2	0.43	1.84	1.43	1.10	0.86
199S13971	DCW 7	12 - 30	7.6	24.6	0.49	0.83	1.95	2.00	1.70
199S13972	DCW 8	1 - 12	7.0	29.8	3.09	21.0	15.4	5.91	1.38
199S13973	DCW 8	18 - 36	6.9	31.4	1.00	8.23	2.65	1.07	0.46
199S13974	DCW 9	0 - 6	7.5	36.8	1.93	4.12	4.23	12.3	6.03
199S13975	DCW 10	0 - 4	7.1	29.3	0.49	2.40	1.09	1.52	1.15
199S13976	DCW 10	4 - 13	7.3	27.0	0.73	3.02	1.22	2.42	1.66
199S13977	DCW 10	13 - 30	7.4	24.9	0.49	1.32	0.99	2.93	2.73
199S13978	DCW 10	30 - 45	7.7	27.8	0.50	0.88	1.94	2.54	2.15

Abbreviations for extractants: PE= Saturated Paste Extract, H20Sol= water soluble,AB-DTPA= Ammonium Bicarbonate-DTPA, AAO= Acid Ammonium Oxalate

Abbreviations used in acid base accounting: T.S.= Total Sulfur, AB= Acid Base, ABP= Acid Base Potential, PyrS= Pyritic Sulfur, Pyr+Org= Pyritic Sulfur + Organic Sulfur, Neutral. Pot.= Neutralization Potential

Miscellaneous Abbreviations: SAR= Sodium Adsorption Ratio, CEC= Cation Exchange Capacity, ESP= Exchangeable Sodium Percentage

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Lab Id	Sample Id	Depths inches ~~(Feet)~~	Sand %	Silt %	Clay %	Texture	Very Fine Sand %	1/3 Bar %	15 Bar %
199S13957	DCW 1	0 - 11	47.0	27.0	26.0	SANDY CLAY LOAM	7.90	12.1	5.3
199S13958	DCW 1	11 - 28	47.0	29.0	24.0	LOAM	6.60	13.0	5.3
199S13959	DCW 1	28 - 38	50.0	26.0	24.0	SANDY CLAY LOAM	6.20	13.0	5.1
199S13960	DCW 3	0 - 3	27.0	39.0	34.0	CLAY LOAM	12.4	15.4	7.5
199S13961	DCW 3	4 - 10	14.0	47.0	39.0	SILTY CLAY LOAM	8.20	22.0	14.0
199S13962	DCW 4	1 - 8	50.0	26.0	24.0	SANDY CLAY LOAM	6.90	12.3	4.5
199S13963	DCW 4	10 - 24	60.0	18.0	22.0	SANDY CLAY LOAM	3.50	12.0	4.0
199S13964	DCW 5	2 - 8	41.0	30.0	29.0	CLAY LOAM	9.30	19.0	8.0
199S13965	DCW 5	12 - 24	34.0	34.0	32.0	CLAY LOAM	8.40	21.4	7.4
199S13966	DCW 5	24 - 36	60.0	20.0	20.0	SANDY CLAY LOAM	8.90	13.0	4.0
199S13967	DCW 6	0 - 12	44.0	28.0	28.0	CLAY LOAM	14.6	20.0	8.1
199S13968	DCW 6	20 - 30	18.0	50.0	32.0	SILTY CLAY LOAM	11.2	22.0	13.2
199S13969	DCW 6	40 - 60	44.0	38.0	18.0	LOAM	30.2	15.0	4.0
199S13970	DCW 7	0 - 7	42.0	31 0	27.0	CLAY LOAM	12.1	17.4	9.0
199S13971	DCW 7	12 - 30	44.0	32.0	24.0	LOAM	12.4	15.0	6.0
199S13972	DCW 8	1 - 12	44.0	28.0	28.0	CLAY LOAM	9.80	16.0	7.0
199S13973	DCW 8	18 - 36	46.0	27.0	27.0	SANDY CLAY LOAM	9.50	16.0	7.3
199S13974	DCW 9	0 - 6	22.0	41.0	37.0	CLAY LOAM	10.5	22.2	12.1
199S13975	DCW 10	0 - 4	40.0	39.0	21.0	LOAM	15.9	17.1	5.1
199S13976	DCW 10	4 - 13	44.0	28.0	28.0	CLAY LOAM	15.2	13.0	6.7
199S13977	DCW 10	13 - 30	54.0	19.0	27.0	SANDY CLAY LOAM	6.30	14.4	7.0
199S13978	DCW 10	30 - 45	40.0	34.0	26.0	LOAM	13.2	17.3	8.0

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Lab Id	Sample Id	Depths inches ~~(Feet)~~	Boron ppm	Nitrogen Nitrate ppm	TKN %	AB-DTPA Selenium ppm	Phosphorus ppm	Organic Matter %
199S13957	DCW 1	0 - 11	0.29	0.82	0.05	0.02	0.50	0.6
199S13958	DCW 1	11 - 28	0.30	0.98	0.05	0.02	1.56	0.6
199S13959	DCW 1	28 - 38	0.25	2.46	0.05	0.02	0.64	1.0
199S13960	DCW 3	0 - 3	0.11	1.94	0.10	<0.02	1.71	0.9
199S13961	DCW 3	4 - 10	0.08	0.38	0.09	<0.02	0.37	1.0
199S13962	DCW 4	1 - 8	0.08	0.22	0.06	0.02	1.06	0.8
199S13963	DCW 4	10 - 24	0.06	0.84	0.06	0.02	0.14	0.2
199S13964	DCW 5	2 - 8	0.07	1.80	0.08	<0.02	0.45	1.6
199S13965	DCW 5	12 - 24	0.05	1.14	0.05	<0.02	0.56	1.1
199S13966	DCW 5	24 - 36	0.10	0.84	0.03	<0.02	1.61	0.5
199S13967	DCW 6	0 - 12	0.12	5.08	0.03	0.02	5.37	2.1
199S13968	DCW 6	20 - 30	0.08	2.04	0.04	<0.02	0.50	1.0
199S13969	DCW 6	40 - 60	0.50	0.18	<0.01	0.02	0.03	0.6
199S13970	DCW 7	0 - 7	0.14	0.40	0.14	0.02	1.14	4.5
199S13971	DCW 7	12 - 30	0.25	0.26	0.03	0.02	0.37	0.4
199S13972	DCW 8	1 - 12	0.11	0.56	0.04	<0.02	0.93	1.0
199S13973	DCW 8	18 - 36	0.08	0.20	0.11	0.02	5.26	3.1
199S13974	DCW 9	0 - 6	0.12	5.00	0.07	0.02	0.85	1.0
199S13975	DCW 10	0 - 4	0.08	2.56	0.12	<0.02	7.58	1.7
199S13976	DCW 10	4 - 13	0.09	1.10	0.07	<0.02	<0.01	1.5
199S13977	DCW 10	13 - 30	0.09	0.66	0.04	<0.02	1.66	1.0
199S13978	DCW 10	30 - 45	0.20	0.40	0.05	<0.02	0.85	0.9

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Report Date: 10/20/99

Lab Id	Sample Id	Depths inches ~~(Feet)~~	TOC %	Total Sulfur %	T.S. AB t/1000t	Neutral. Pot. t/1000t	T.S. ABP t/1000t	CO3 %
199S13957	DCW 1	0 - 11	3.0	0.13	4.06	190	186	17.7
199S13958	DCW 1	11 - 28	2.9	0.02	0.62	183	183	17.2
199S13959	DCW 1	28 - 38	2.8	0.01	0.31	190	190	18.2
199S13960	DCW 3	0 - 3	3.6	0.01	0.31	164	164	15.7
199S13961	DCW 3	4 - 10	4.8	0.01	0.31	161	161	16.2
199S13962	DCW 4	1 - 8	2.6	0.01	0.31	185	185	18.5
199S13963	DCW 4	10 - 24	2.4	0.03	0.94	225	224	21.8
199S13964	DCW 5	2 - 8	4.2	<0.01	0.00	249	249	23.6
199S13965	DCW 5	12 - 24	3.9	<0.01	0.00	282	282	26.9
199S13966	DCW 5	24 - 36	2.4	0.01	0.31	156	156	16.7
199S13967	DCW 6	0 - 12	5.5	0.01	0.31	219	219	21.8
199S13968	DCW 6	20 - 30	4.5	<0.01	0.00	225	225	21.8
199S13969	DCW 6	40 - 60	2.2	0.26	8.12	139	131	14.6
199S13970	DCW 7	0 - 7	8.9	0.07	2.19	92.2	90.0	9.3
199S13971	DCW 7	12 - 30	3.8	<0.01	0.00	191	191	19.4
199S13972	DCW 8	1 - 12	3.7	0.02	0.62	182	181	19.3
199S13973	DCW 8	18 - 36	4.9	<0.01	0.00	170	170	18.5
199S13974	DCW 9	0 - 6	4.7	0.01	0.31	281	281	26.7
199S13975	DCW 10	0 - 4	3.5	<0.01	0.00	112	112	10.9
199S13976	DCW 10	4 - 13	3.7	<0.01	0.00	143	143	13.1
199S13977	DCW 10	13 - 30	3.2	0.01	0.31	189	189	19.5
199S13978	DCW 10	30 - 45	3.3	<0.01	0.00	163	163	15.9

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Lab Id	Sample Id	Depths inches (~~Feet~~)	pH s.u.	Saturation %	EC @ 25°C mmhos/cm	Calcium meq/L	Magnesium meq/L	Sodium meq/L	SAR
199S13961	DCW 3	4 - 10	7.6	45.3	0.46	0.96	2.27	1.50	1.18
199S13961D	DCW 3	4 - 10	7.6	45.9	0.57	1.14	2.61	2.03	1.49
199S13975	DCW 10	0 - 4	7.1	29.3	0.49	2.40	1.09	1.52	1.15
199S13975D	DCW 10	0 - 4	7.1	29.1	0.57	3.04	1.29	1.46	0.99

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Lab Id	Sample Id	Depths inches (~~Feet~~)	Sand %	Silt %	Clay %	Texture	Very Fine Sand %	1/3 Bar %	15 Bar %
199S13961	DCW 3	4 - 10	14.0	47.0	39.0	SILTY CLAY LOAM	8.20	22.0	14.0
199S13961D	DCW 3	4 - 10	14.0	48.0	38.0	SILTY CLAY LOAM	9.00	22.0	13.2
199S13975	DCW 10	0 - 4	40.0	39.0	21.0	LOAM	15.9	17.1	5.1
199S13975D	DCW 10	0 - 4	41.0	39.0	20.0	LOAM	17.0	16.0	5.1

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Lab Id	Sample Id	Depths inches (~~Feet~~)	Boron ppm	Nitrogen Nitrate ppm	TKN %	AB-DTPA Selenium ppm	Phosphorus ppm	Organic Matter %
199S13961	DCW 3	4 - 10	0.08	0.38	0.09	<0.02	0.37	1.0
199S13961D	DCW 3	4 - 10	0.07	0.36	0.12	<0.02	0.50	1.1
199S13975	DCW 10	0 - 4	0.08	2.56	0.12	<0.02	7.58	1.7
199S13975D	DCW 10	0 - 4	0.09	2.48	0.11	<0.02	7.73	1.8

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Lab Id	Sample Id	Depths inches ~~(Feet)~~	TOC %	Total Sulfur %	T.S. AB t/1000t	Neutral. Pot. t/1000t	T.S. ABP t/1000t	CO3 %
199S13961	DCW 3	4 - 10	4.8	0.01	0.31	161	161	16.2
199S13961D	DCW 3	4 - 10	4.5	0.01	0.31	158	158	15.4
199S13975	DCW 10	0 - 4	3.5	<0.01	0.00	112	112	10.9
199S13975D	DCW 10	0 - 4	3.5	<0.01	0.00	111	111	11.2

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Soils Lab Supervisor

APPENDIX S4

SOIL SUITABILITY CRITERIA

FROM: Utah State Division of Oil, Gas, and Mining "Guidelines for Management of Topsoil and Overburden for Underground and Surface Coal Mining", 1988

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Soil Suitability Criteria

UDOGM: Overburden Evaluation for Vegetative Root Zone; Table 2 (Leatherwood and Duce 1988)

Parameters	Good	Fair	Poor	Unacceptable
pH	6.1 - 8.2	5.1 - 6.1 8.2 - 8.4	4.5 - 5.0 8.5 - 9.0	less than 4.5 greater than 9.0
Ec mmhos/cm 25°C	0 - 2	2 - 8	8 - 5	greater than 15
Saturation %	25% - 80%		less than 25% greater than 80%	
Texture	sl, l, sil, scl, vfsl, fsl	sicl, sc, ls, lfs	slc, s, sc, c, cos, fs, vfs	g, vcos
SAR	0 - 4	5 - 10	10 - 12 Fine Texture 10 - 15 Coarse Texture	12 Fine Texture 15 Coarse Texture
Selenium	less than 0.1 mg/Kg			greater than 0.1 mg/Kg
Boron	less than 5.0 mg/Kg			greater than 5.0 mg/Kg
Acid/Base Potential	greater than -5 tons $CaCO_3$ / 1,000 tons material			less than -5 tons $CaCO_3$ / 1,000 tons material
% Coal fines	Undetermined at this time			
Available water capacity (in/in)	greater than 0.10	0.05 - 0.10	less than 0.05	
Rock Fragments (% volumes)				
3 inches	0 - 15	15 - 25	25 - 30	greater than 30
3 - 10 inches	0 - 15	15 - 25	25 - 30	greater than 30
10 inches	0 - 3	3 - 7	7 - 10	greater than 10

APPENDIX S5

Soil Map Unit and Taxonomic Unit Descriptions from the Soil Survey of Carbon Area, Utah, by the Natural Resources Conservation Service

Soil as mapped prior to disturbance at the proposed Dugout Canyon Mine Coal Waste Rock Site

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113—Strych very stony loam, 3 to 15 percent slopes. This very deep, well drained soil is on benches and outwash plains. It is in the mouths of canyons near Helper and Sunnyside and south of Pace Canyon and along the north fork of Gordon Creek, near Cedar Bench. This soil formed in glacial outwash and alluvium derived dominantly from sandstone and shale. Slopes are 300 to 400 feet long and are concave to convex. The present vegetation is mainly pinyon, Utah juniper, Salina wildrye, Indian ricegrass, black sagebrush, and birchleaf mountainmahogany. Elevation is 5,800 to 7,200 feet. The average annual precipitation is about 12 to 14 inches, the average annual air temperature is 45 to 47 degrees F, and the average freeze-free period is 100 to 120 days.

Typically, the surface layer is pinkish gray very stony loam about 5 inches thick. The next layer is light gray and very pale brown very stony loam about 42 inches thick. Below this to a depth of 60 inches or more is very pale brown very cobbly sandy loam. A layer of secondary calcium carbonate accumulation is at a depth of about 5 inches.

Included in this unit are about 15 percent Chupadera fine sandy loam and small areas of weakly developed soils that are similar to this Strych soil but have a cobbly surface layer, Atrac very fine sandy loam, and Hernandez family very fine sandy loam.

Permeability of this Strych soil is moderately rapid. Available water capacity is about 4.0 to 7.5 inches. Water supplying capacity is 4 to 7 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 1 to 3 percent. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used as rangeland, woodland, and wildlife habitat.

The potential vegetation on the Strych soil includes an overstory of pinyon and Utah juniper with a canopy of 30 percent. The understory vegetation is 45 percent grasses, 10 percent forbs, and 45 percent shrubs. Among the important plants are birchleaf mountainmahogany, black sagebrush, Salina wildrye, and needleandthread.

The site index for pinyon and Utah juniper is 65. Average yield is 9 cords of wood per acre. The potential for the production of posts or Christmas trees is good. Limitations for the harvesting of Christmas trees are slight.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, a planned grazing system, and proper location of water developments. If the pinyon and Utah juniper are thinned, the desirable plants present can be expected to increase for a short period before the pinyon and Utah juniper revegetate the unit. Suitable brush management practices include prescribed burning, chaining, and cutting.

The suitability of this unit for rangeland seeding is poor. The main limitation is the stoniness of the surface layer.

This map unit is in capability subclass VIIs, nonirrigated, and in the Upland Stony Loam (Pinyon-Utah Juniper) woodland site.

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50—Haverdad loam, moist, 1 to 5 percent slopes. This very deep, well drained soil is on alluvial fans and valley floors. It is in the areas of Clarks Valley, Gordon Creek, and Coal Creek and near Wattes. It formed in alluvium derived dominantly from sandstone and shale. Slopes are 300 to 400 feet long. The present vegetation is mainly big sagebrush, greasewood, blue grama, Indian ricegrass, and needleandthread. Elevation is 6,300 to 6,850 feet. The average annual precipitation is about 12 to 14 inches, the average annual air temperature is 45 to 47 degrees F, and the average freeze-free period is 100 to 120 days.

Typically, the surface layer is brown loam about 6 inches thick. The next layer is pale brown loam about 30 inches thick. Below this to a depth of 60 inches or more is pale brown fine sandy loam.

Included in this unit are 5 percent Glenberg family soils that have slopes of 3 to 6 percent and 5 percent soils that are similar to this Haverdad soil are colder.

Permeability of this Haverdad soil is moderate. Available water capacity is about 8.0 to 10.5 inches. Water supplying capacity is 6.5 to 8.0 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 1 to 3 percent. Runoff is slow, and the hazard of water erosion is moderate. Runoff, originating from adjacent areas, has resulted in the formation of gullies in some areas of this soil. The gullies are *U*-shaped, 5 to 10 feet deep, and in some areas 300 to 500 feet apart. The hazard of soil blowing is moderate.

This unit is used mainly as rangeland and wildlife habitat. A few areas are used for irrigated crops.

The potential plant community on the Haverdad soil is about 60 percent grasses, 10 percent forbs, and 30 percent shrubs. Among the important plants are western wheatgrass, basin big sagebrush, needleandthread, Indian ricegrass, and muttongrass. Dense stands of basin big sagebrush may develop with continuous overgrazing.

Practices needed to maintain or improve the vegetation include a planned grazing system, proper grazing use, and proper location of water developments. Brush management by prescribed burning, chemical spraying, or mechanical treatment can be used to improve deteriorated rangeland.

Seeding may be advisable if the plant community is in poor condition. Plants suitable for seeding include Russian wildrye, intermediate wheatgrass, Tegmar wheatgrass, pubescent wheatgrass, alfalfa, small burnet, prostrate kochia, and adapted native plants.

If areas of this unit are irrigated, suitable management practices include conservation cropping systems with rotations of alfalfa hay, small grain, and corn. To maintain production, crop residue should be incorporated into the soil and fertilizer should be applied.

Irrigation water can be applied by the sprinkler or flood method. Fields can be leveled.

This map unit is in capability unit IIe-2, irrigated, and in capability subclass VIe, nonirrigated. It is in the Upland Loam (Basin Big Sagebrush) range site.

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33—Gerst-Badland-Rubbleland complex, 15 to 50 percent slopes. This map unit is on the side slopes of mesas and fan terraces near Mohrland, northeast of Wellington, and northwest of East Carbon City. Elevation is 6,000 to 8,000 feet. The average annual precipitation is 12 to 14 inches, the average annual air temperature is 45 to 47 degrees F, and the average freeze-free period is 100 to 120 days.

This unit is 40 percent Gerst extremely stony loam, 15 to 50 percent slopes; 25 percent Badland; 20 percent Rubbleland; and 15 percent other soils and miscellaneous areas. 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 12 percent Strych very stony loam and small areas of Rock outcrop.

The Gerst soil is shallow and well drained. It formed in residuum and colluvium derived dominantly from sandstone and shale. Slopes are 100 to 200 feet long and are concave to convex. Typically, the surface layer is light brownish gray extremely stony loam about 7 inches thick. The underlying material to a depth of 19 inches is gray and light brownish gray channery silt loam over weathered shale. Depth to weathered shale ranges from 10 to 20 inches.

Permeability of the Gerst soil is moderately slow. Available water capacity is about 2 to 3 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 1 to 3. Runoff is rapid, and the hazard of water erosion is high.

Badland is steep or very steep, nearly barren areas of shale that are dissected by many intermittent drainageways. Some areas are interbedded with sandstone. Runoff is rapid to very rapid, and geologic erosion is active.

Rubbleland consists of areas covered by stones and boulders. It supports only sparse vegetation other than lichens.

This unit is used as wildlife habitat and rangeland.

The potential vegetation on the Gerst soil includes an overstory of pinyon and Utah juniper with a canopy of 15 percent. The understory vegetation is 40 percent grasses, 20 percent forbs, and 40 percent shrubs. Among the important plants are Salina wildrye, Indian ricegrass, birchleaf mountainmahogany, and Utah serviceberry.

The site index for Utah juniper and pinyon is 15 to 25. Average yield is 1 to 2 cords of wood per acre. The potential for the production of posts or Christmas trees is very poor. The limitation for the harvesting of wood products is moderate to severe because of the steepness of slope. If wood products are harvested, the slash should be left scattered on the surface to protect the soil from erosion.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, a planned grazing system, and proper location of water developments. For critical erosion control, small areas can be mechanically treated and seeded. It is not practical to revegetate large areas of rangeland because of the shallow soil depth and the hazard of erosion. Plants that may be suitable for critical area seedings are those native to the unit.

The Gerst soil is in capability subclass VIIs and in the Upland Shallow Clay Loam (Utah Juniper-Pinyon) woodland site. Badland is in capability subclass VIIIe, and Rubbleland is in capability subclass VIIIs. Badland and Rubbleland are not placed in a woodland site.

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Strych Series

The Strych series consists of very deep, well drained, moderately rapidly permeable soils on outwash plains, alluvial fans, toe slopes, fan terraces, and the sides of benches. These soils formed in colluvium, alluvium, and glacial outwash derived dominantly from sandstone and shale. Slope is 3 to 70 percent. Elevation is 5,300 to 7,500 feet. Average annual precipitation ranges from 8 to 14 inches, and average annual air temperature ranges from 45 to 47 degrees F.

These soils are loamy-skeletal, mixed, mesic Ustollic Calciorthids.

Typical pedon of Strych very stony loam, 3 to 15 percent slopes, about 2.5 miles southeast of Hiawatha, about 1,900 feet south and 2,300 feet west of the northeast corner of sec. 1, T. 16 S., R. 8 E.

A1—0 to 5 inches; pinkish gray (7.5YR 6/2) very stony loam, dark brown (7.5YR 4/2) moist; weak fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and many coarse roots; common very fine and few fine pores; 20 percent pebbles, 10 percent cobbles, and 15 percent stones; strongly calcareous; disseminated calcium carbonate; strongly alkaline (pH 8.6); gradual wavy boundary.

C1ca—5 to 17 inches; light gray (10YR 7/2) very stony loam, grayish brown (10YR 5/2) moist; massive; hard, friable, slightly sticky and slightly plastic; common fine and many coarse roots; few very fine pores; 10 percent pebbles, 15 percent cobbles, and 10 percent stones; strongly calcareous; veins of calcium carbonate; strongly alkaline (pH 8.6); gradual wavy boundary.

C2ca—17 to 47 inches; very pale brown (10YR 7/3) very stony loam, brown (10YR 5/3) moist; massive; hard, friable, slightly sticky and slightly plastic; few fine and medium roots; many very fine and few fine pores; 15 percent pebbles, 25 percent cobbles, and 20 percent stones; strongly calcareous; powdery soft masses of calcium carbonate; strongly alkaline (pH 8.8); gradual wavy boundary.

C3—47 to 60 inches; very pale brown (10YR 8/4) very cobbly sandy loam, light yellowish brown (10YR 6/4) moist; massive; slightly hard, very friable; few fine roots; few fine pores; 20 percent pebbles, 20 percent cobbles, and 5 percent stones; strongly calcareous; disseminated calcium carbonate; strongly alkaline (pH 8.8).

Secondary calcium carbonate is at a depth of 5 to 15 inches.

A horizon: Hue is 10YR or 7.5YR, and chroma is 2 to 4. Texture is very bouldery fine sandy loam, gravelly loam, or very stony loam. Calcium carbonate equivalent is 15 to 20 percent. Reaction is moderately alkaline or strongly alkaline.

Cca horizon: Value is 6 or 7 when dry, and chroma is 2 to 4. Texture is very stony sandy loam or very stony loam. Calcium carbonate equivalent is 25 to 40 percent.

C horizon: Hue is 7.5YR or 10YR, value is 6 to 8 when dry and 4 to 6 when moist, and chroma is 2 to 4. Texture is very cobbly sandy loam or very stony sandy loam. Calcium carbonate equivalent is 16 to 20 percent. Reaction is moderately alkaline or strongly alkaline.

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Guben Series

The Guben series consists of very deep, well drained, moderately permeable soils on canyonsides and mountain slopes. These soils formed in colluvium derived dominantly from sandstone and shale. Slope is 15 to 75 percent. Elevation is 5,000 to 9,500 feet. Average annual precipitation ranges from 14 to 20 inches, and average annual air temperature ranges from 38 to 45 degrees F.

These soils are loamy-skeletal, mixed Typic Calciborolls.

Typical pedon of Guben extremely bouldery loam in an area of Cabba family-Guben-Rock outcrop complex, in Prickly Pear Canyon, about 1,200 feet south and 2,000 feet east of the northwest corner of sec. 14, T. 12 S., R. 15 E.

O1—0.5 inch to 0; pine needles and grasses.

A1—0 to 7 inches; grayish brown (10YR 5/2) extremely bouldery loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, slightly sticky and slightly plastic; common very fine, fine, medium, and coarse roots; 15 percent pebbles, 10 percent cobbles, 5 percent stones, and 10 percent boulders; moderately calcareous; disseminated calcium carbonate; moderately alkaline (pH 8.2); clear wavy boundary.

B2—7 to 15 inches; pale brown (10YR 6/3) very stony loam, dark brown (10YR 3/3) moist; weak fine subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; common very fine, fine, medium, and coarse roots; 10 percent pebbles, 15 percent cobbles, and 20 percent stones; moderately calcareous; disseminated calcium carbonate; moderately alkaline (pH 8.4); clear wavy boundary.

C1ca—15 to 30 inches; very pale brown (10YR 7/3) very stony loam, pale brown (10YR 6/3) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots and few fine, medium, and coarse roots; few very fine and fine pores; 10 percent pebbles, 20 percent cobbles, 20 percent stones, and 5 percent boulders; strongly calcareous; disseminated calcium carbonate; strongly alkaline (pH 8.6); clear smooth boundary.

C2—30 to 60 inches; light yellowish brown (10YR 6/4) very stony loam, brown (10YR 5/3) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine, fine, and medium roots; few very fine and medium pores and common fine pores; 10 percent pebbles, 20 percent cobbles, 25 percent stones, and 5 percent boulders; moderately calcareous; disseminated calcium carbonate; strongly alkaline (pH 9.0).

The mollic epipedon is 7 to 10 inches thick. The solu is 15 to 24 inches thick. The particle-size control sectio is 35 to 60 percent rock fragments. Secondary calcium carbonate is at a depth of 11 to 24 inches.

A horizon: Value is 4 or 5 when dry, and chroma is 2 or 3. Texture is extremely bouldery loam, extremely stony loam, or extremely bouldery fine sandy loam. Reaction is mildly alkaline or moderately alkaline. Calcium carbonate equivalent is 11 to 19 percent.

B horizon: Hue is 10YR or 7.5YR, value is 5 or 6 whe dry and 3 or 4 when moist, and chroma is 2 to 4. Textur is very stony loam or very cobbly loam. Clay content is 17 to 22 percent. Rock fragment content is 35 to 55 percent. Reaction is mildly alkaline or moderately alkaline. Calcium carbonate equivalent is 20 to 25 percent.

Cca horizon: Hue is 7.5YR or 10YR, value is 6 or 7 when dry and 5 or 6 when moist, and chroma is 2 to 4. Texture is very stony loam or very cobbly fine sandy loam. Clay content is 17 to 25 percent. Rock fragment content is 35 to 60 percent. Reaction is moderately alkaline or strongly alkaline. Calcium carbonate equivalent is 20 to 38 percent.

C horizon: Texture is very stony loam or very cobbly fine sandy loam. Clay content is 17 to 24 percent. Reaction is moderately alkaline or strongly alkaline. Calcium carbonate equivalent is 19 to 30 percent.

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Haverdad Series

The Haverdad series consists of very deep, well drained, moderately permeable soils on alluvial fans, fan terraces, and valley floors. These soils formed in stratified alluvium derived dominantly from sandstone and shale. Slope is 1 to 8 percent. Elevation is 5,500 to 6,900 feet. Average annual precipitation ranges from 8 to 14 inches, and average annual air temperature ranges from 45 to 49 degrees F.

These soils are fine-loamy, mixed (calcareous), mesic Ustic Torrifluvents.

Typical pedon of Haverdad loam, 1 to 8 percent slopes, about 6 miles northeast of Wellington, about 2,900 feet west and 2,300 feet south of the northeast corner of sec. 18, T. 14 S., R. 12 E.

A1—0 to 3 inches; light brownish gray (10YR 6/2) loam, dark grayish brown (10YR 4/2) moist; weak thin platy structure parting to weak fine granular; slightly hard, friable, slightly sticky and slightly plastic; few fine, medium, and coarse roots; many very fine and few fine vesicular pores; moderately calcareous; disseminated calcium carbonate; moderately alkaline (pH 8.4); clear wavy boundary.

C1—3 to 10 inches; pale brown (10YR 6/3) loam, brown (10YR 4/3) moist; weak medium subangular blocky structure; hard, friable, slightly sticky and plastic; few fine, medium, and coarse roots; common very fine and fine pores; moderately calcareous; disseminated calcium carbonate; moderately alkaline (pH 8.4); clear wavy boundary.

C2—10 to 17 inches; light yellowish brown (10YR 6/4) loam, yellowish brown (10YR 5/4) moist; weak medium subangular blocky structure; hard, friable, slightly sticky and plastic; few fine roots; common very fine and fine pores; moderately calcareous; disseminated calcium carbonate; moderately alkaline (pH 8.2); clear wavy boundary.

C3—17 to 46 inches; pale brown (10YR 6/3) clay loam, yellowish brown (10YR 5/4) moist; massive; very hard, firm, sticky and plastic; few fine roots; common very fine pores; moderately calcareous; disseminated calcium carbonate; moderately alkaline (pH 8.2); clear wavy boundary.

C4—46 to 60 inches; pale brown (10YR 6/3) loam, yellowish brown (10YR 5/4) moist; massive; very hard, friable, slightly sticky and plastic; few very fine roots; common very fine pores; moderately calcareous; disseminated calcium carbonate; moderately alkaline (pH 8.2).

A horizon: Value is 5 or 6 when dry, and chroma is 2 or 3.

C horizon: Value is 4 or 5 when moist, and chroma is 3 or 4. Texture is fine sandy loam, loam, clay loam, or sandy clay loam. Clay content is 14 to 30 percent. Reaction is moderately alkaline or strongly alkaline.

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Hernandez Family

The Hernandez family consists of very deep, well drained, moderately permeable soils on fan terraces. These soils formed in alluvium derived from sandstone and shale. Slope is 1 to 8 percent. Elevation is 5,600 to 7,100 feet. Average annual precipitation is 10 to 14 inches, and average annual air temperature is 45 to 49 degrees F.

These soils are fine-loamy, mixed, mesic Ustollic Calciorthids.

Reference pedon of Hernandez family, 3 to 8 percent slopes, about 4.5 miles northwest of Sunnyside Junction, about 1,000 feet south and 800 feet east of the northwest corner of sec. 19, T. 14 S., R. 12 E.

A1—0 to 3 inches; brown (7.5YR 5/4) loam, dark brown (7.5YR 4/2) moist; weak fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine, common fine, and few medium roots; many fine and few medium pores; moderately calcareous; disseminated calcium carbonate; moderately alkaline (pH 8.2); abrupt smooth boundary.

B2—3 to 14 inches; brown (7.5YR 5/4) loam, dark brown (7.5YR 4/2) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine, fine, and medium roots; common fine and few medium pores; moderately calcareous; disseminated calcium carbonate; moderately alkaline (pH 8.4); clear smooth boundary.

C1ca—14 to 39 inches; light brown (7.5YR 6/4) loam, brown (7.5YR 5/4) moist; moderate medium subangular blocky structure; hard, firm, slightly sticky and plastic; few very fine and fine roots; common fine and few medium pores; strongly calcareous; thin coatings of calcium carbonate on faces of peds; strongly alkaline (pH 8.8); gradual wavy boundary.

C2ca—39 to 60 inches; pink (7.5YR 7/4) loam, brown (7.5YR 5/4) moist; massive; hard, firm, slightly sticky and plastic; few very fine and fine roots; common fine and few medium pores; strongly calcareous; thin coatings of calcium carbonate on faces of peds; strongly alkaline (pH 9.0).

Secondary calcium carbonate is at a depth of 9 to 17 inches.

A horizon: Hue is 7.5YR or 10YR, value is 5 or 6 when dry, and chroma is 2 to 4. Texture is loam or very fine sandy loam.

B horizon: Hue is 7.5YR or 10YR, value is 5 or 6 when dry and 4 or 5 when moist, and chroma is 2 to 4.

Cca horizon: Hue is 7.5YR or 10YR, value is 6 to 8 when dry and 5 to 7 when moist, and chroma is 3 or 4. Calcium carbonate equivalent is 15 to 35 percent.

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SOILS REPORT

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APPENDIX S5

Soil Map Unit and Taxonomic Unit Descriptions from the Soil Survey of Carbon Area, Utah, by the Natural Resources Conservation Service

Soil as mapped prior to disturbance at the proposed Dugout Canyon Mine Coal Waste Rock Site

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Gullied land consists of eroded areas. The gullies are V-shaped, 6 to 12 feet deep, and 400 to 500 feet apart. Runoff from adjacent areas is concentrated in the gullies.

This unit is used as rangeland and wildlife habitat.

The potential plant community on the Frandsen soil is 60 percent grasses, 10 percent forbs, and 30 percent shrubs. Among the important plants are Salina wildrye, Letterman needlegrass, 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 unit for grazing is good.

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

The Frandsen soil is in capability subclass VIe, nonirrigated, and in the Mountain Loam (Saline Wildrye) range site. Gullied land is in capability subclass VIIIe. It is not placed in a range site.

33—Gerst-Badland-Rubbleland complex, 15 to 50 percent slopes. This map unit is on the side slopes of mesas and fan terraces near Mohrland, northeast of Wellington, and northwest of East Carbon City. Elevation is 6,000 to 8,000 feet. The average annual precipitation is 12 to 14 inches, the average annual air temperature is 45 to 47 degrees F, and the average freeze-free period is 100 to 120 days.

This unit is 40 percent Gerst extremely stony loam, 15 to 50 percent slopes; 25 percent Badland; 20 percent Rubbleland; and 15 percent other soils and miscellaneous areas. 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 12 percent Strych very stony loam and small areas of Rock outcrop.

The Gerst soil is shallow and well drained. It formed in residuum and colluvium derived dominantly from sandstone and shale. Slopes are 100 to 200 feet long and are concave to convex. Typically, the surface layer is light brownish gray extremely stony loam about 7 inches thick. The underlying material to a depth of 19 inches is gray and light brownish gray channery silt loam over weathered shale. Depth to weathered shale ranges from 10 to 20 inches.

Permeability of the Gerst soil is moderately slow. Available water capacity is about 2 to 3 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 1 to 3. Runoff is rapid, and the hazard of water erosion is high.

Badland is steep or very steep, nearly barren areas of shale that are dissected by many intermittent drainageways. Some areas are interbedded with sandstone. Runoff is rapid to very rapid, and geologic erosion is active.

Rubbleland consists of areas covered by stones and boulders. It supports only sparse vegetation other than lichens.

This unit is used as wildlife habitat and rangeland.

The potential vegetation on the Gerst soil includes an overstory of pinyon and Utah juniper with a canopy of 15 percent. The understory vegetation is 40 percent grasses, 20 percent forbs, and 40 percent shrubs. Among the important plants are Salina wildrye, Indian ricegrass, birchleaf mountainmahogany, and Utah serviceberry.

The site index for Utah juniper and pinyon is 15 to 25. Average yield is 1 to 2 cords of wood per acre. The potential for the production of posts or Christmas trees is very poor. The limitation for the harvesting of wood products is moderate to severe because of the steepness of slope. If wood products are harvested, the slash should be left scattered on the surface to protect the soil from erosion.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, a planned grazing system, and proper location of water developments. For critical erosion control, small areas can be mechanically treated and seeded. It is not practical to revegetate large areas of rangeland because of the shallow soil depth and the hazard of erosion. Plants that may be suitable for critical area seedings are those native to the unit.

The Gerst soil is in capability subclass VIIs and in the Upland Shallow Clay Loam (Utah Juniper-Pinyon) woodland site. Badland is in capability subclass VIIIe, and Rubbleland is in capability subclass VIIIs. Badland and Rubbleland are not placed in a woodland site.

34—Gerst-Badland-Rubbleland complex, 50 to 70 percent slopes. This map unit is on benches and mountain slopes. It is north of Wattis and southeast of Mohrland. Slopes are 100 to 300 feet long and are concave to convex. The present vegetation is mainly Salina wildrye, Indian ricegrass, daisy, skeleton locoweed, shadscale, black sagebrush, and birchleaf mountainmahogany. Elevation is 6,200 to 7,200 feet. The average annual precipitation is about 12 to 14 inches, the average annual air temperature is 45 to 47 degrees F, and the average freeze-free period is 100 to 120 days.

This unit is 45 percent Gerst extremely stony loam, 50 to 70 percent slopes, eroded; 25 percent Badland; 20 percent Rubbleland; and 10 percent other soils and miscellaneous areas. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

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mainly Salina wildrye, eriogonum, birchleaf mountainmahogany, and yellowbrush.

Typically, the surface layer is brown extremely stony loam 3 inches thick. The underlying material to a depth of 26 inches is pale brown very cobbly loam over sandstone. Sandstone is at a depth of 20 to 40 inches.

Permeability of the Pathead soil is moderate. Available water capacity is about 1 to 2 inches. Water supplying capacity is 3.5 to 5.5 inches. Effective rooting depth is 20 to 40 inches. The organic matter content of the surface layer is 1 to 3 percent. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used as rangeland, wildlife habitat, and recreation areas.

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

Management practices that maintain or improve the rangeland vegetation include proper grazing use, a planned grazing system, and proper location of water developments.

It is not practical to revegetate large areas of this soil because of the stoniness of the soil. 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, intermediate wheatgrass, orchardgrass, smooth brome, ladak alfalfa, lewis flax, small burnet, and yellow sweetclover.

The potential plant community on the Pathead soil is 60 percent grasses, 15 percent forbs, and 25 percent shrubs. Among the important plants are Salina wildrye, bluegrasses, and snowberry.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, a planned grazing system, and proper location of water developments.

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

This map unit is in capability subclass VIIs, nonirrigated. The Guben soil is in the Mountain Stony Loam (Browse) range site. The Pathead soil is in the Mountain Shallow Loam (Saline Wildrye) range site.

47—Guben-Rock outcrop complex. This map unit is on mountain slopes. It is in the Book Cliffs, north of Helper and west of the Green River. Slopes are 50 to 80 percent, 100 to 200 feet long, and plane to convex. The present vegetation is mainly Douglas-fir, serviceberry, birchleaf mountainmahogany, mockorange, and western wheatgrass. Elevation ranges from 5,000 to 9,500 feet but is dominantly 6,000 to 7,500 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 Guben extremely bouldery fine sandy loam, 50 to 80 percent slopes; 20 percent Rock outcrop, and 25 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 12 percent Midfork family soils in concave areas and 10 percent Comodore very stony fine sandy loam, moist, intermingled throughout the unit. Also included are small areas of Perma family soils that have slopes of 60 to 80 percent.

The Guben soil is very deep and well drained. It formed in colluvium derived dominantly from sandstone and shale. Typically, the surface is covered with a mat of partially decomposed needles, twigs, and leaves about 0.5 inch thick. The surface layer is brown extremely bouldery fine sandy loam about 7 inches thick. The subsoil is brown very stony loam about 17 inches thick. The substratum to a depth of 60 inches or more is light brown very stony loam.

Permeability of the Guben soil is moderate. Available water capacity is about 3.5 to 5.0 inches. Water supplying capacity is 8.5 to 12.0 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 3 to 5 percent. Runoff is moderate, and the hazard of water erosion is slight.

Rock outcrop consists of areas of exposed bedrock, dominantly interbedded sandstone and shale. It occurs as ledges.

This unit is used as rangeland, wildlife habitat, woodland, and recreation areas.

The potential vegetation on the Guben soil includes an overstory of Rocky Mountain Douglas-fir and pinyon with a canopy of 50 percent. The understory vegetation is 40 percent grasses, 15 percent forbs, and 45 percent shrubs. Among the important plants are Salina wildrye, wheatgrass, birchleaf mountainmahogany, and snowberry.

This unit is severely limited for harvesting wood products because of the steepness of slope, the hazard of erosion, and stones and boulders on the surface.

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

The Guben soil is in capability subclass VIIe, nonirrigated, and in the Mountain Very Steep Stony Loam (Douglas-fir) woodland site. Rock outcrop is in capability subclass VIIIs. It is not placed in a woodland site.

48—Haverdad loam, 1 to 8 percent slopes. This very deep, well drained soil is on alluvial fans and valley floors. It is in Clarks Valley, in an area near East Carbon City, in the area west of Helper, and in the Coal Creek area. It formed in alluvium derived dominantly from sandstone and shale. Slopes are 200 to 300 feet long and are concave to convex. The present vegetation in most areas is mainly Wyoming big sagebrush, blue grama, winterfat, and bottlebrush squirreltail. Elevation is

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5,500 to 6,200 feet. The average annual precipitation is 10 to 12 inches, the average annual air temperature is 47 to 49 degrees F, and the average freeze-free period is 110 to 135 days.

Typically, the surface layer is light brownish gray loam about 3 inches thick. The underlying layer to a depth of 60 inches or more is pale brown and light yellowish brown loam and clay loam.

Included in this unit are about 5 percent Ravola loam, alkali; 5 percent Glenberg family soils, 3 to 6 percent slopes; and small areas of Billings silty clay loam and Haverdad loam, alkali, 0 to 3 percent slopes, eroded. Also included are some areas of soils that are very strongly alkali.

Permeability of this Haverdad soil is moderate. Available water capacity is about 9 to 11 inches. Water supplying capacity is 6 to 7 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 1 to 3 percent. Runoff is slow, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate.

This unit is used mainly as rangeland and wildlife habitat. It is also used for irrigated crops.

The potential plant community on the Haverdad soil is 50 percent grasses, 10 percent forbs, and 40 percent shrubs. Among the important plants are Indian ricegrass, galleta, needleandthread, Wyoming big sagebrush, and winterfat. If a large percentage of the potential plant community is removed, Utah juniper and pinyon may invade.

If the desirable forage plants are mostly depleted, brush management and rangeland 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 unit for rangeland seeding is fair. The main limitation is the low annual precipitation. Plants suitable for seeding include adapted native plants, Russian wildrye, crested wheatgrass, and prostrate kochia.

If areas of this unit are irrigated, suitable management practices to maintain or improve these areas include conservation cropping systems with a rotation of hay or pasture and small grain. Crop residue should be kept on the surface of the soil. Pasture management that incorporates use of a rotation grazing system is best.

Sprinkler irrigation systems provide the best erosion control and the ability to apply irrigation water evenly to the fields. Flood irrigation can also be used if erosion is controlled.

This map unit is in capability unit IIIe-2, irrigated, and capability subclass VIe, nonirrigated. It is in the Semidesert Loam (Wyoming Big Sagebrush) range site.

49—Haverdad loam, alkali, 0 to 3 percent slopes. This very deep, well drained soil is on fan terraces, alluvial fans, and valley floors. It is in Clarks Valley and in small areas near East Carbon City, Wellington, and Hiawatha. It formed in alluvium derived dominantly from sandstone and shale. Slopes are 100 to 300 feet long and are concave to convex. The vegetation in areas not cultivated is mainly greasewood, pricklypear, shadscale, big sagebrush, galleta, and Russian-thistle. Elevation is 5,600 to 6,200 feet. The average annual precipitation is 8 to 10 inches, the average annual air temperature is 47 to 49 degrees F, and the average freeze-free period is 110 to 140 days.

Typically, the surface layer is light yellowish brown loam 7 inches thick. The underlying layer to a depth of 60 inches or more is light yellowish brown, stratified loam, sandy clay loam, and fine sandy loam. The soil is strongly alkali below a depth of 17 inches.

Included in this unit are about 5 percent Glenberg family soils, 3 to 6 percent slopes, and 5 percent Haverdad loam, 1 to 8 percent slopes.

Permeability of this Haverdad soil is moderate. Available water capacity is about 7.5 to 11.5 inches. Water supplying capacity is 5 to 6 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 1 to 2 percent. Runoff is slow, and the hazard of water erosion is moderate. Runoff, originating from adjacent areas, has resulted in the formation of gullies in some areas of this soil. The gullies are *U*-shaped, are 10 to 15 feet deep, and in some areas are 100 to 1,000 feet apart. The hazard of soil blowing is moderate.

Most areas of this unit are used as rangeland and wildlife habitat. A few areas are used for irrigated crops during years of high precipitation in winter.

The potential plant community on the Haverdad soil is 60 percent grasses, 10 percent forbs, and 30 percent shrubs. Among the important plants are alkali sacaton, galleta, seepweed, and black greasewood.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, a planned grazing system, and proper location of water developments. Severe drought may adversely affect the production of the perennial vegetation. Partial or total removal of livestock from the range may be necessary.

It is not practical to revegetate large areas because of the low annual precipitation and the content of alkali in the soil. For critical erosion control, small areas can be mechanically treated and seeded. Plants that may be suitable for critical area seedings are adapted native plants, prostrate kochia, and Russian wildrye.

If this unit is irrigated, suitable management practices to maintain and improve the pasture and hayland include irrigation water management, rotation grazing, and occasional seeding.

Areas that are irrigated are usually planted to salt and alkali tolerant grasses. The flood or sprinkler irrigation method is suitable. Yields are generally low. The high content of salt in the soil makes reclamation impractical.

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This map unit is in capability unit IVe-28, irrigated, and in capability subclass VIIs, nonirrigated. It is in the Alkali Flat range site.

50—Haverdad loam, moist, 1 to 5 percent slopes. This very deep, well drained soil is on alluvial fans and valley floors. It is in the areas of Clarks Valley, Gordon Creek, and Coal Creek and near Wattes. It formed in alluvium derived dominantly from sandstone and shale. Slopes are 300 to 400 feet long. The present vegetation is mainly big sagebrush, greasewood, blue grama, Indian ricegrass, and needleandthread. Elevation is 6,300 to 6,850 feet. The average annual precipitation is about 12 to 14 inches, the average annual air temperature is 45 to 47 degrees F, and the average freeze-free period is 100 to 120 days.

Typically, the surface layer is brown loam about 6 inches thick. The next layer is pale brown loam about 30 inches thick. Below this to a depth of 60 inches or more is pale brown fine sandy loam.

Included in this unit are 5 percent Glenberg family soils that have slopes of 3 to 6 percent and 5 percent soils that are similar to this Haverdad soil are colder.

Permeability of this Haverdad soil is moderate. Available water capacity is about 8.0 to 10.5 inches. Water supplying capacity is 6.5 to 8.0 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 1 to 3 percent. Runoff is slow, and the hazard of water erosion is moderate. Runoff, originating from adjacent areas, has resulted in the formation of gullies in some areas of this soil. The gullies are *U*-shaped, 5 to 10 feet deep, and in some areas 300 to 500 feet apart. The hazard of soil blowing is moderate.

This unit is used mainly as rangeland and wildlife habitat. A few areas are used for irrigated crops.

The potential plant community on the Haverdad soil is about 60 percent grasses, 10 percent forbs, and 30 percent shrubs. Among the important plants are western wheatgrass, basin big sagebrush, needleandthread, Indian ricegrass, and muttongrass. Dense stands of basin big sagebrush may develop with continuous overgrazing.

Practices needed to maintain or improve the vegetation include a planned grazing system, proper grazing use, and proper location of water developments. Brush management by prescribed burning, chemical spraying, or mechanical treatment can be used to improve deteriorated rangeland.

Seeding may be advisable if the plant community is in poor condition. Plants suitable for seeding include Russian wildrye, intermediate wheatgrass, Tegmar wheatgrass, pubescent wheatgrass, alfalfa, small burnet, prostrate kochia, and adapted native plants.

If areas of this unit are irrigated, suitable management practices include conservation cropping systems with rotations of alfalfa hay, small grain, and corn. To maintain production, crop residue should be incorporated into the soil and fertilizer should be applied.

Irrigation water can be applied by the sprinkler or flood method. Fields can be leveled.

This map unit is in capability unit IIe-2, irrigated, and in capability subclass VIe, nonirrigated. It is in the Upland Loam (Basin Big Sagebrush) range site.

51—Hernandez family, 1 to 3 percent slopes. This very deep, well drained soil is on fan terraces. It is in Clark Valley, near Sunnyside, Helper, and Hiawatha. It formed in alluvium derived dominantly from sandstone and shale. Slopes are 300 to 400 feet long, and some are concave to convex. The vegetation in most areas not cultivated is mainly big sagebrush, yellowbrush, galleta, Indian ricegrass, and blue grama. Elevation is 5,600 to 6,500 feet. The average annual precipitation is 10 to 12 inches, the average annual air temperature is 47 to 49 degrees F, and the average freeze-free period is 110 to 135 days.

Typically, the surface layer is brown loam 3 inches thick. The subsoil is brown loam 11 inches thick. The substratum to a depth of 60 inches or more is light brown or pink loam.

Included in this unit are about 10 percent Strych very stony loam, dry, on erratically located stone bars; 5 percent soils that are similar to this Hernandez family soil but are moderately deep and are on side slopes; and 5 percent Haverdad loam along drainageways.

Permeability of this Hernandez family soil is moderate. Available water capacity is about 9.0 to 10.5 inches. Water supplying capacity is 5.5 to 6.5 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 1 to 3 percent. Runoff is slow, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate.

This unit is used mainly as rangeland and wildlife habitat. A few areas are used for irrigated crops.

The potential plant community on the Hernandez family soil is 50 percent grasses, 10 percent forbs, and 40 percent shrubs. Among the important plants are Indian ricegrass, galleta, Wyoming big sagebrush, and winterfat. If a large percentage of the potential plant community is removed, Utah juniper and pinyon may invade.

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 unit for rangeland seeding is fair. The main limitation is the low annual precipitation. Plants suitable for seeding include adapted native plants, Russian wildrye, crested wheatgrass, and prostrate kochia.

If areas of this unit are irrigated, suitable management practices include a conservation cropping system with rotations of alfalfa hay, small grain, and corn. To

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Most areas of this unit are used as rangeland and wildlife habitat. A few areas are used for irrigated crops and urban development.

The potential plant community on the Mivida soil is 60 percent grasses, 10 percent forbs, and 30 percent shrubs. Among the important plants are Indian ricegrass, needleandthread, galleta, and fourwing saltbush.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, a planned grazing system, and proper location of water developments. If the desirable forage plants are mostly depleted, brush management and rangeland 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 unit for rangeland seeding is fair. The main limitation is the low annual precipitation. Plants suitable for seeding include adapted native plants and crested wheatgrass.

If areas of this unit are irrigated, suitable management practices include conservation cropping systems and irrigation water management. Crop management includes rotations of alfalfa, small grain, and corn; maintenance of crop residue on the surface of the soil to reduce soil blowing; and application of fertilizer to maintain crop yields.

Sprinkler irrigation is best suited to this unit. Use of this method helps to prevent loss of water and plant nutrients through deep percolation.

This map unit is in capability unit IIIe-24, irrigated, and in capability subclass VIIe, nonirrigated. It is in the Semidesert Sandy Loam range site.

66—Mivida gravelly fine sandy loam, 3 to 8 percent slopes. This very deep, well drained soil is on benches, mesas, and fan terraces. It is northeast of Wellington and north of Clark Valley. It formed in alluvium derived dominantly from sandstone and shale. Slopes are 300 to 400 feet long and are concave to convex. The present vegetation in most areas is mainly pinyon, Utah juniper, blue grama, and Indian ricegrass. Elevation is 5,900 to 6,600 feet. The average annual precipitation is 12 to 14 inches, the average annual air temperature is 45 to 47 degrees F, and the average freeze-free period is 100 to 120 days.

Typically, the surface layer is brown gravelly fine sandy loam 4 inches thick. The subsoil is pink fine sandy loam 11 inches thick. The upper 29 inches of the substratum is pinkish white and pink fine sandy loam. The lower part to a depth of 60 inches or more is pink very cobbly fine sandy loam.

Included in this unit are about 5 percent Strych very stony loam on outwash plains; 5 percent Haverdad loam, moist, in drainageways; and 5 percent Gerst soils on canyonsides.

Permeability of this Mivida soil is moderately rapid. Available water capacity is about 6 to 7 inches. Water supplying capacity is 6.5 to 8.0 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 1 to 2 percent. Runoff is slow, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate.

This unit is used as rangeland and wildlife habitat.

The potential plant community on the Mivida soil is 35 percent grasses, 10 percent forbs, and 55 percent shrubs. Among the important plants are basin big sagebrush, fourwing saltbush, Indian ricegrass, and western wheatgrass.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, a planned grazing system, and proper location of water developments. If the desirable forage plants are mostly depleted, brush management and broadcast seeding can be used to improve the rangeland vegetation. Suitable brush management practices include prescribed burning, chemical spraying, chaining, and railing.

The suitability of this unit for rangeland seeding is good. The main limitation is the content of pebbles and cobbles in the soil, which interferes with plowing and drilling. Plants suitable for seeding include those native to the unit, crested wheatgrass, Russian wildrye, fourwing saltbush, pubescent wheatgrass, ladak alfalfa, and small burnet.

This map unit is in capability subclass VIe, nonirrigated. It is in the Upland Loam (Basin Big Sagebrush) range site.

67—Mivida very stony fine sandy loam, 1 to 3 percent slopes. This very deep, well drained soil is on fan terraces south of East Carbon City. It formed in alluvium derived dominantly from sandstone and shale. Slopes are 300 to 500 feet long and are concave. The present vegetation is mainly galleta, Indian ricegrass, fourwing saltbush, and blue grama. Elevation is 5,500 to 6,500 feet. The average annual precipitation is about 10 to 12 inches, the average annual air temperature is 47 to 49 degrees F, and the average freeze-free period is 110 to 135 days.

Typically, the surface layer is brown very stony fine sandy loam about 4 inches thick. The subsoil is pink fine sandy loam about 11 inches thick. The upper 32 inches of the substratum is pinkish white and pink fine sandy loam, and the lower part to a depth of 60 inches or more is pink very cobbly fine sandy loam. A layer of secondary calcium carbonate accumulation is at a depth of about 15 inches.

Included in this unit are about 10 percent Hernandez family soils and 5 percent Glenberg family soils.

Permeability of this Mivida soil is moderately rapid. Available water capacity is about 6 to 7 inches. Water supplying capacity is 5.0 to 6.5 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 1 to 2 percent. Runoff is slow, and the hazard of water erosion is moderate.

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subangular blocky structure; hard, firm, slightly sticky and plastic; few fine and medium roots; many medium pores; moderately calcareous; moderately alkaline (pH 8.0); gradual wavy boundary.

C1ca—12 to 20 inches; pale brown (10YR 6/3) clay loam, brown (10YR 4/3) moist; moderate medium subangular blocky structure; hard, very firm, sticky and plastic; few fine and medium roots; few fine pores; strongly calcareous; fine nodules of calcium carbonate; moderately alkaline (pH 8.3); gradual wavy boundary.

C2ca—20 to 32 inches; very pale brown (10YR 8/3) sandy clay loam, very pale brown (10YR 7/3) moist; massive; hard, firm, slightly sticky and slightly plastic; few fine and medium roots; few fine pores; very strongly calcareous; fine nodules of calcium carbonate; moderately alkaline (pH 8.2); diffuse wavy boundary.

C3ca—32 to 48 inches; pale brown (10YR 6/3) gravelly sandy loam, brown (10YR 5/3) moist; massive; slightly hard, very friable, slightly plastic; few fine roots; few fine pores; strongly calcareous; moderately alkaline (pH 7.9); gradual wavy boundary.

IIC4—48 to 64 inches; light yellowish brown (10YR 6/4) very gravelly sandy loam, yellowish brown (10YR 5/4) moist; massive; soft, very friable, slightly plastic; few fine roots; strongly calcareous; moderately alkaline (pH 8.4)

Secondary calcium carbonate is at a depth of 10 to 20 inches. Calcium carbonate equivalent is 15 to 40 percent.

A horizon: Value is 5 to 7 when dry and 4 or 5 when moist, and chroma is 2 or 3.

C horizon: Hue is 7.5YR or 10YR, value is 5 to 8 when dry and 4 to 7 when moist, and chroma is 3 or 4. Texture is clay loam or sandy clay loam above a depth of 32 inches and is gravelly sandy loam or very gravelly sandy loam below this depth.

Mivida Series

The Mivida series consists of very deep, well drained, moderately rapidly permeable soils on benches, mesas, and fan terraces. These soils formed in alluvium derived from sandstone and shale. Slope is 1 to 8 percent. Elevation is 5,400 to 6,600 feet. Average annual precipitation is 8 to 14 inches, and average annual air temperature is 45 to 49 degrees F.

These soils are coarse-loamy, mixed, mesic Ustollic Calciorthids.

Typical pedon of Mivida gravelly fine sandy loam, 3 to 8 percent slopes, about 5 miles northeast of Wellington, about 1,300 feet south and 1,350 feet east of the northwest corner of sec. 18, T. 14 S., R. 12 E.

A1—0 to 4 inches; brown (7.5YR 5/4) gravelly fine sandy loam, dark brown (7.5YR 4/4) moist; weak fine subangular blocky structure parting to weak fine granular; soft, friable; few fine, medium, and coarse roots; common very fine and fine pores and few medium pores; 15 percent pebbles and 5 percent cobbles; slightly calcareous; disseminated calcium carbonate; moderately alkaline (pH 8.2); clear smooth boundary.

B2—4 to 15 inches; pink (7.5YR 7/4) fine sandy loam, brown (7.5YR 5/4) moist; weak medium subangular blocky structure; soft, friable, slightly sticky; few fine, medium, and coarse roots; common fine and medium pores; 10 percent pebbles; moderately calcareous; disseminated calcium carbonate; moderately alkaline (pH 8.4); clear smooth boundary.

C1ca—15 to 24 inches; pinkish white (7.5YR 8/2) fine sandy loam, pink (7.5YR 7/4) moist; moderate medium subangular blocky structure; hard, friable; few fine, medium, and coarse roots; common fine pores; 10 percent pebbles; strongly calcareous; coatings of calcium carbonate on the underside of pebbles; strongly alkaline (pH 8.6); clear wavy boundary.

C2—24 to 44 inches; pink (7.5YR 7/4) fine sandy loam, light brown (7.5YR 6/4) moist; weak coarse subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few fine and medium roots; few fine pores; 10 percent pebbles; strongly calcareous; disseminated calcium carbonate; moderately alkaline (pH 8.4); abrupt smooth boundary.

IIC3—44 to 60 inches; pink (7.5YR 7/4) very cobbly fine sandy loam, reddish yellow (7.5YR 6/6) moist; massive; soft, friable, slightly sticky and slightly plastic; few fine roots; 25 percent pebbles, 15 percent cobbles, and 10 percent stones; strongly calcareous; disseminated calcium carbonate; strongly alkaline (pH 8.6).

A horizon: Texture is very fine sandy loam, gravelly fine sandy loam, or very stony fine sandy loam.

B2 horizon: Value is 6 or 7 when dry. The horizon is 0 to 10 percent pebbles and 0 to 5 percent stones.

Cca horizon: Value is 6 to 8 when dry and 5 to 7 when moist, and chroma is 2 to 4. The horizon is 5 to 10 percent pebbles and 0 to 5 percent cobbles. Calcium carbonate equivalent is 20 to 40 percent.

IIC horizon: The horizon is 15 to 25 percent pebbles and 15 to 20 percent cobbles.

Moffat Series

The Moffat series consists of very deep, well drained, moderately rapidly permeable soils on alluvial fans and benches. These soils formed in alluvium derived from

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LEGEND PLATE

A Shallow soils on shale and exposed shale
B Moderately deep gravelly soil materials over shale
C Deep gravelly soils; subsoil materials
D Deep nongravelly soils
E Deep gravelly soils, mixed surface and subsoils; some coal
F Deep relatively nongravelly; salvaged soils
G Mixed woody material and gravelly soils
H Deep, relatively nongravelly alluvial soils; undisturbed
I Deep gravelly soils; strych like
J Shallow and moderately deep soils over shale; undisturbed
K Boulders
L Gravel pile
M Shallow soils over shale and moderately deep gravelly soils
⊙ DCW1 - DCW10 Backhoe pit and soil description locations

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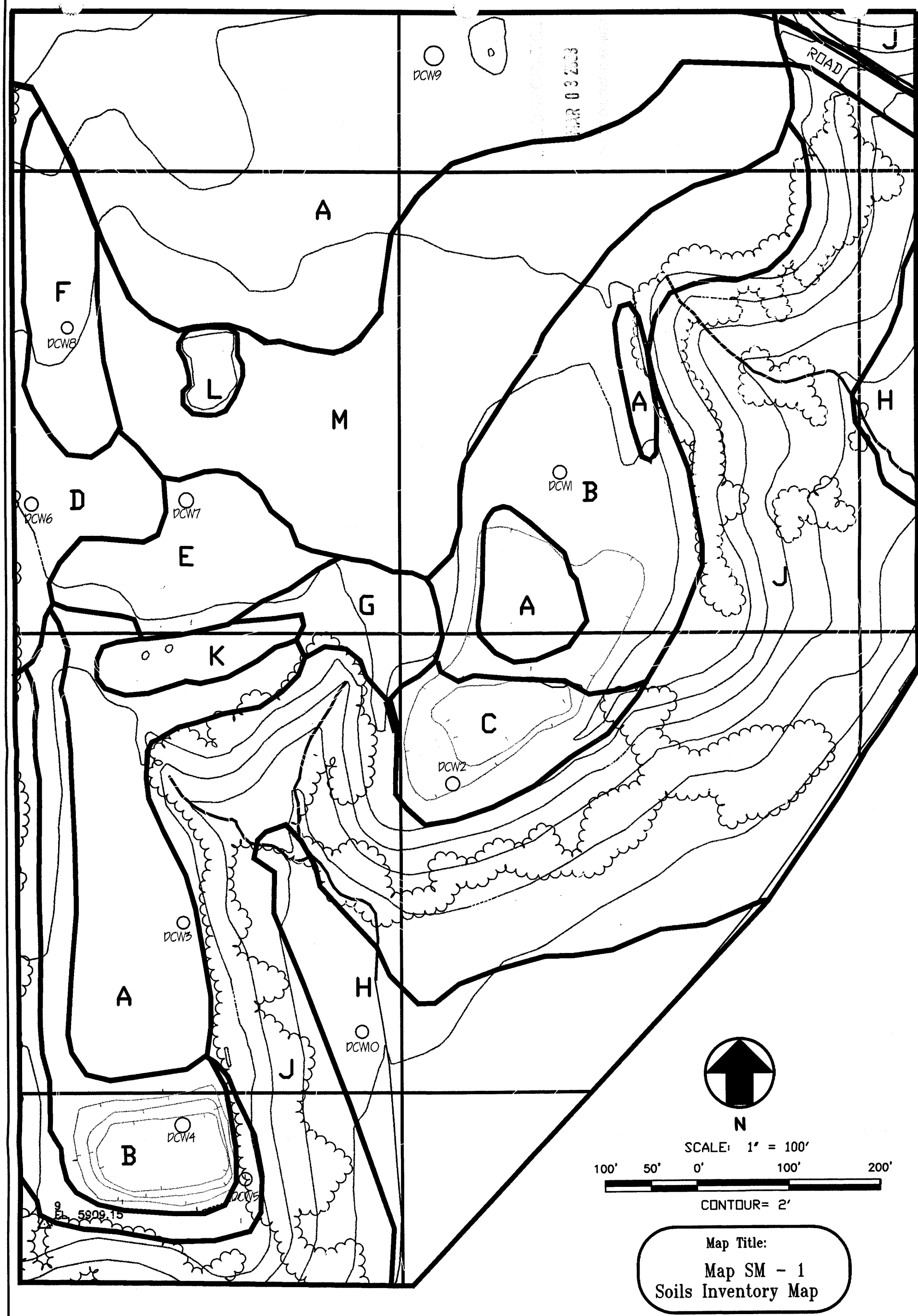

Additional Map Information:
Metadata for this map is available upon request and can be obtained through E.I.S. This map has been formatted using State Plane Coordinates with units of feet. Drill-hole site information provided by Jay Marshall, Utah Registered Engineer, degree of accuracy cannot be ascertained.

Legend
See LEGEND PLATE

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CLIENT: Canyon Fuel Company
Dugout Canyon Waste Rock Site

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DATE: DEC. 14, 1999

SCALE: AS SHOWN

ACAD REF:
CARBON/ c:\dugout/ soils\of2

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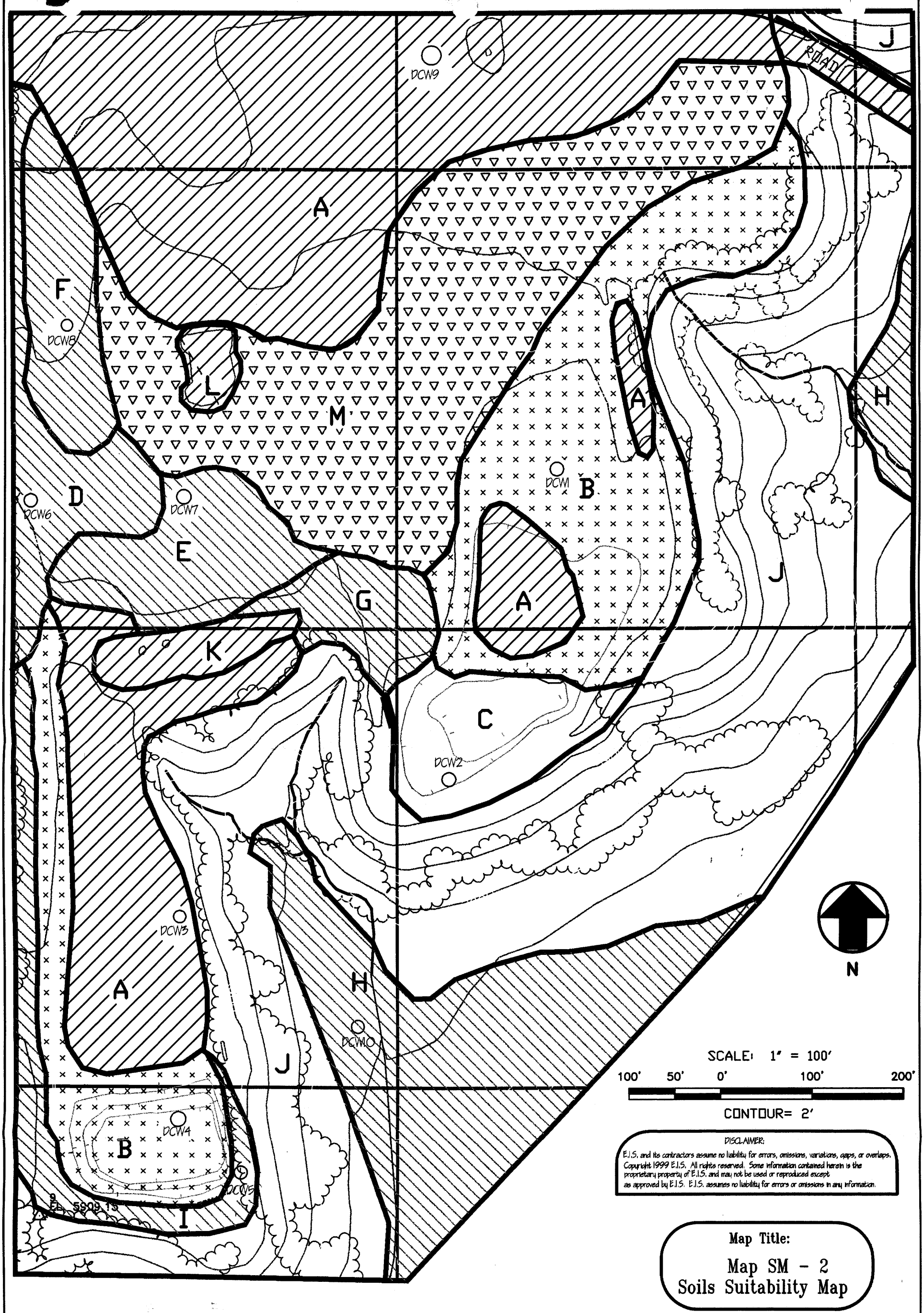

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Map Title:

Map SM - 2
Soils Suitability Map

Additional Map Information:

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Estimated Salvageable Soil Thickness in Inches

- 0" - 4"
- 4" - 20"
- 20" - 40"
- 40" - 100"
- 6" - 40"

CLIENT: Canyon Fuel Company
Dugout Canyon Waste Rock Site

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DATE: DEC. 15, 1999

SCALE: AS SHOWN

ACAD REF: CARBON/ dugout/ soilsloff2

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Base map and some additional information provided by Bechtel Construction.

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April 21, 2003

To: **Vicky Miller, Environmental Specialist**
Canyon Fuel Company
Soldier Creek Mine
P.O. Box 1029
Wellington, Utah 84542

From: Daniel M. Larsen, Soil Scientist
EIS Environmental & Engineering Consulting
31 North Main Street
Helper, Utah 84526

RE: Soil Salvage, Dugout Canyon Mine Refuse Site

During the period from March 5th through March 12th, 2003 I provided technical assistance for soil salvage at the Dugout Canyon Mine refuse site in response to your request. My participation in the project was coordinated with you and Kenneth Payne of Canyon Fuel Company, LLC.

The project site is located about six miles south of the Dugout Canyon Mine facilities site and consists of a previously disturbed area that was used as a gravel source (a gravel pit) for road construction. I had previously conducted a soil inventory and assessment of the site to determine the quality of soil resources and potential for topsoil recovery to aid in future reclamation of the site.

Soil salvage plans and objectives were discussed at the beginning of work on March 5th. Salvage included both subsoil and topsoil, with two separate stockpiles. The subsoil materials were typically high in gravel content and low in organic matter. Some fine textured material was also included where subsoil was removed down to weathered shale that underlies the gravelly material. Topsoil included soils with a higher organic matter content and less sand, gravel, or clay. The topsoil was mostly the soil material overlying the gravel deposits that had been pushed aside during the development of the gravel pit. Much of the topsoil had a high content of woody debris from on-site vegetation.

Most of the topsoil came from the "G" and "F" soil units noted on the soils map, with lesser amounts from soil units "E" and "D". Subsoil material was salvaged from soil units "A", "B", "C", and "M".

The work was conducted by Nielson Construction Company using two scrapers, a dozer, and a grader. The scraper capacity was about 30 cubic yards per load. An estimate of about 9,000 cubic yards of topsoil and 5,000 cubic yards of subsoil was recovered. Measurements of the piles are needed to accurately quantify these volumes.

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Dugout Canyon Mine Refuse Site
Soil Salvage Photographs
March 5-12, 2003

1. Sign at site location.

2. Equipment used for soil salvage. Removing topsoil in soil unit "G".

3. Salvaging topsoil in soil unit "G" showing equipment and topsoil materials.

4. Excessively woody materials encountered in soil unit "G". About 6 to 8 feet of soil had been removed from this site. It is located at the upper end of the drainage ditch leading to the sediment pond.

5. Materials encountered in soil unit "E". Up to about 12 inches is all that was recovered when very mixed and stony material was encountered.

6. Materials encountered in soil unit "E". Less than 12 inches of topsoil was removed.

7. Removing topsoil material from soil unit "F" and dumping a scraper load of soil in the topsoil pile.

8. Topsoil materials in soil unit "F".

9. The topsoil pile on March 7, 2003.

10. The topsoil pile on March 11, 2003.

11. The refuse disposal site after soil salvage and surface shaping. View looking north.

12. A view looking northwest from the south edge of the coal waste disposal site. The topsoil pile is on the left behind the white vehicle and the subsoil pile is just right of the scrapers near the right edge of the photograph.

13. A photograph taken on April 8, 2003 showing the topsoil pile with a roughened, pitted surface and a berm around the pile.

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CANYON FUEL COMPANY, LLC
DUGOUT CANYON MINE

6955 South Union Park Center, Suite 540
Midvale, Utah 84047
Tel. No. 801-569-4700

MSHA REFUSE PILE 1211-UT-09-01890-01
MSHA DUGOUT CANYON NO. 42-01890
ACT/007/039

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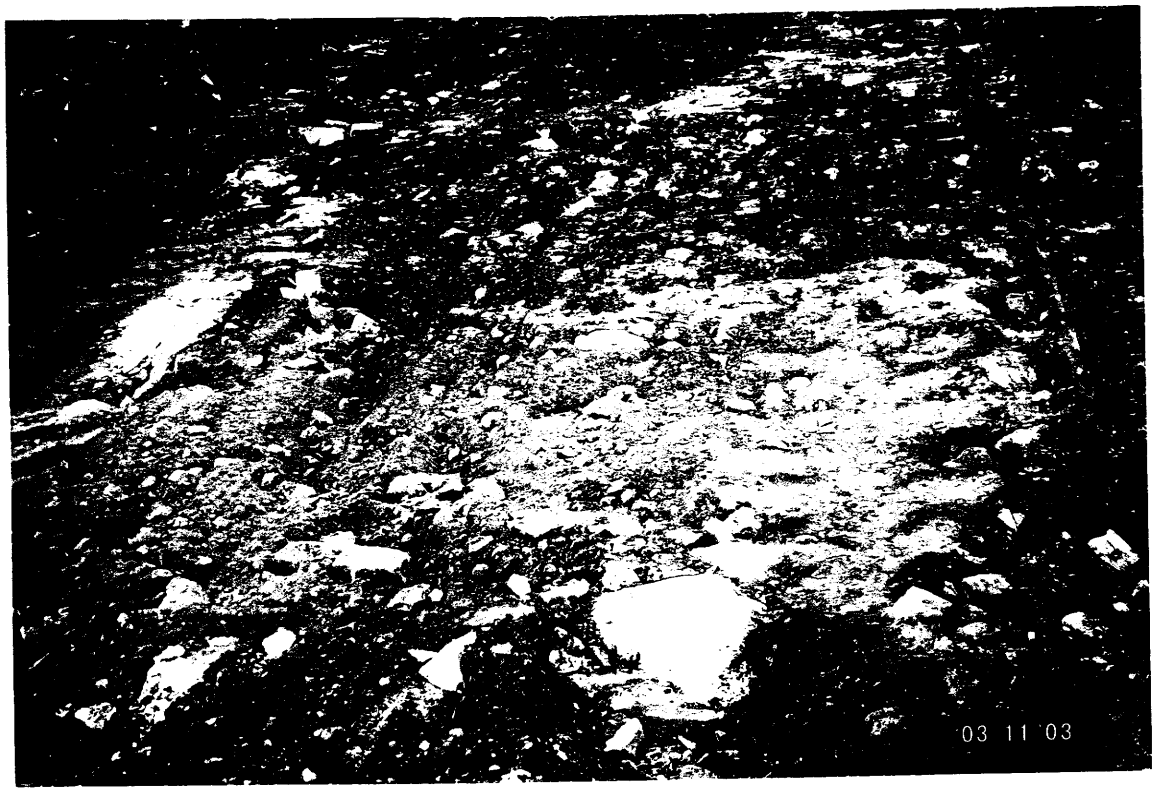

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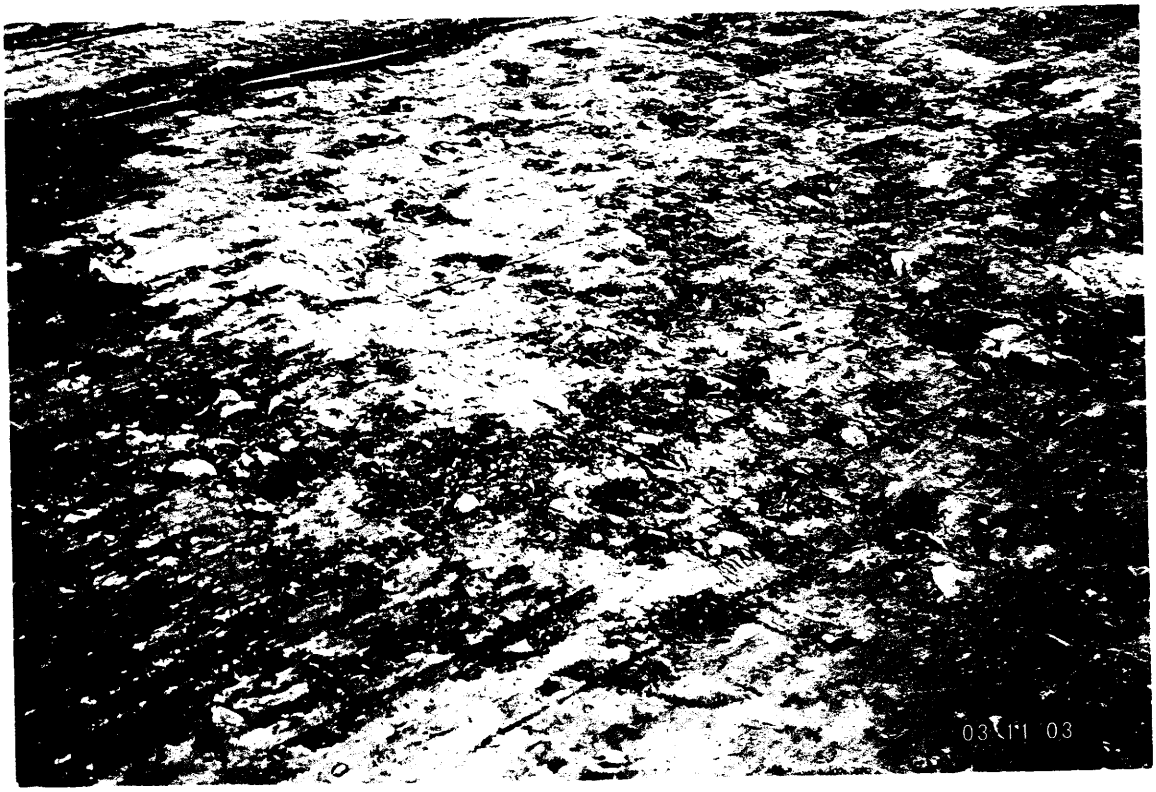

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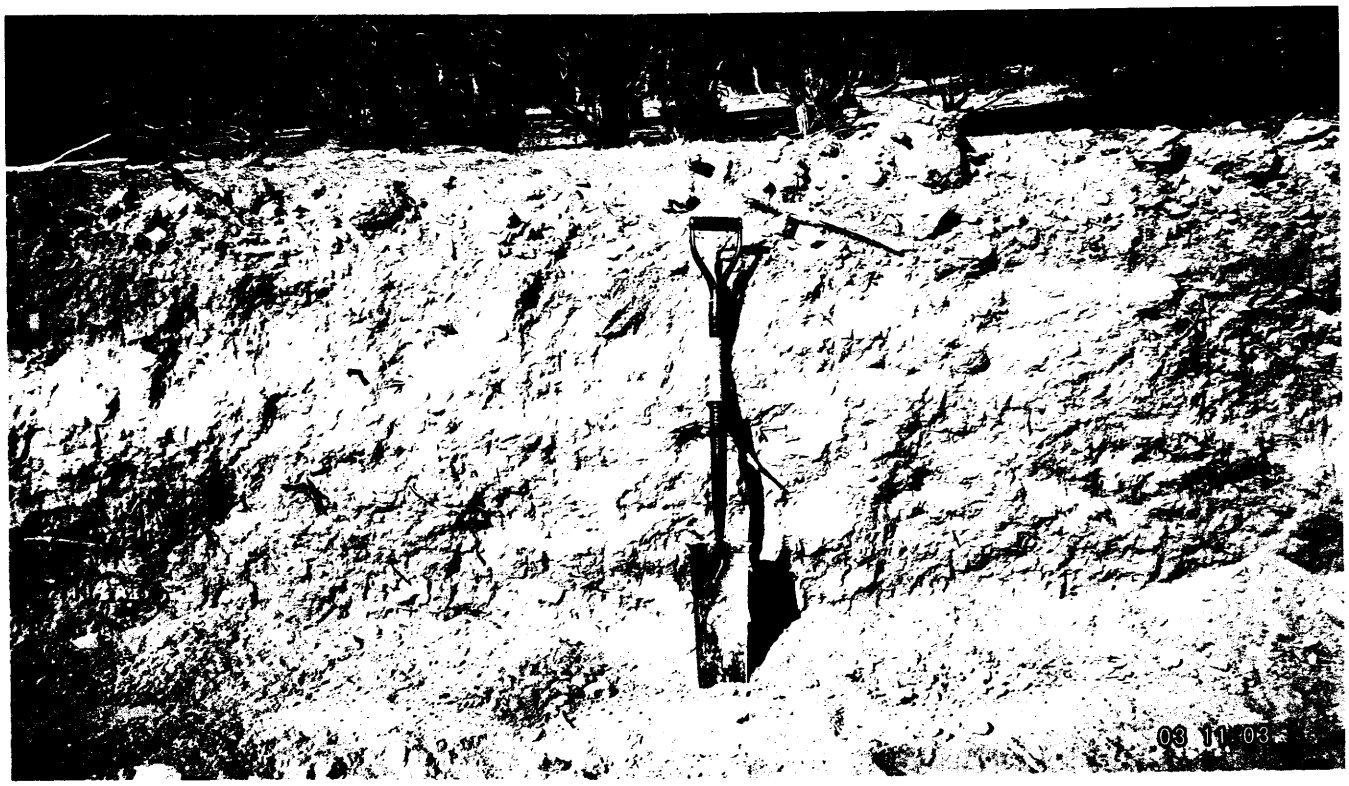

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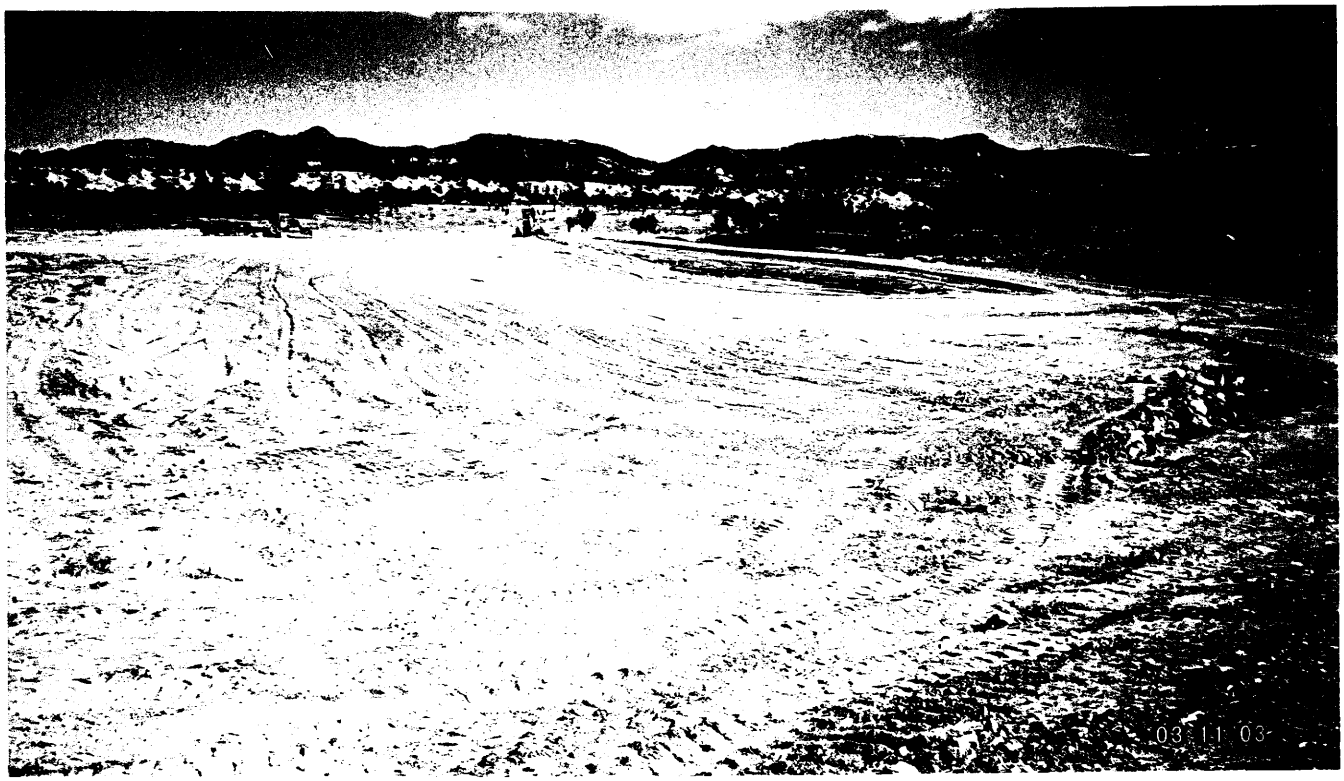

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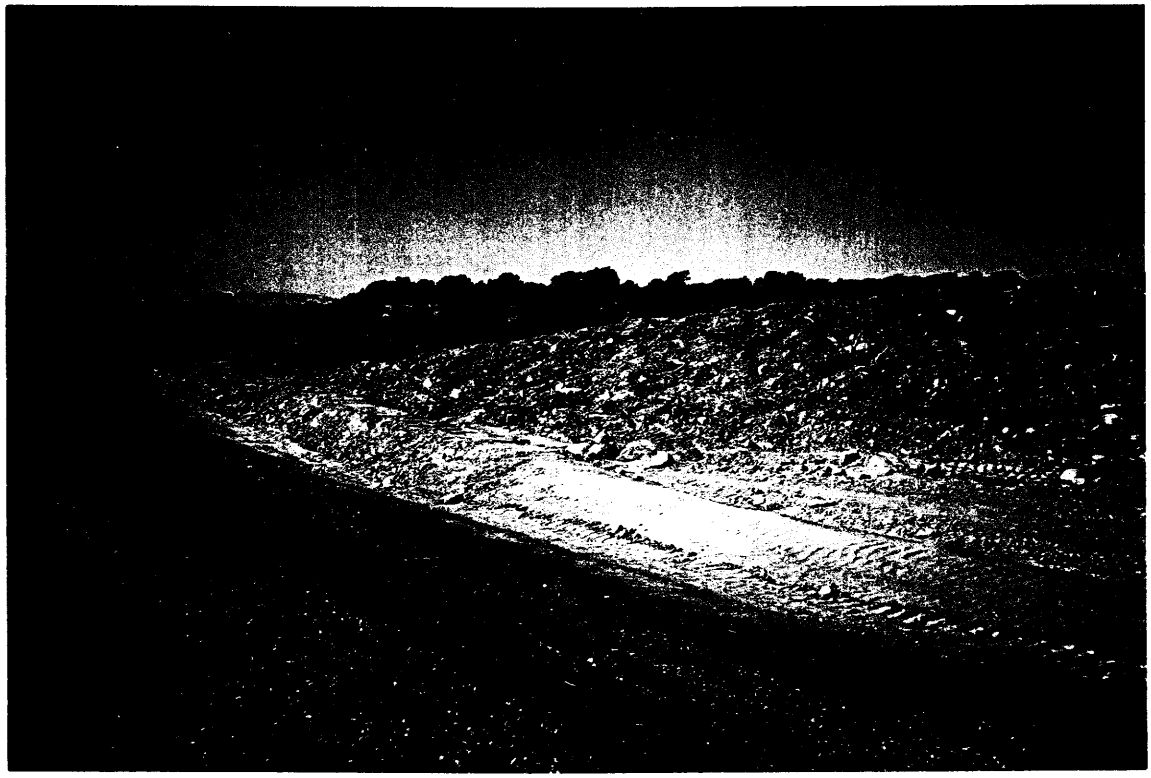

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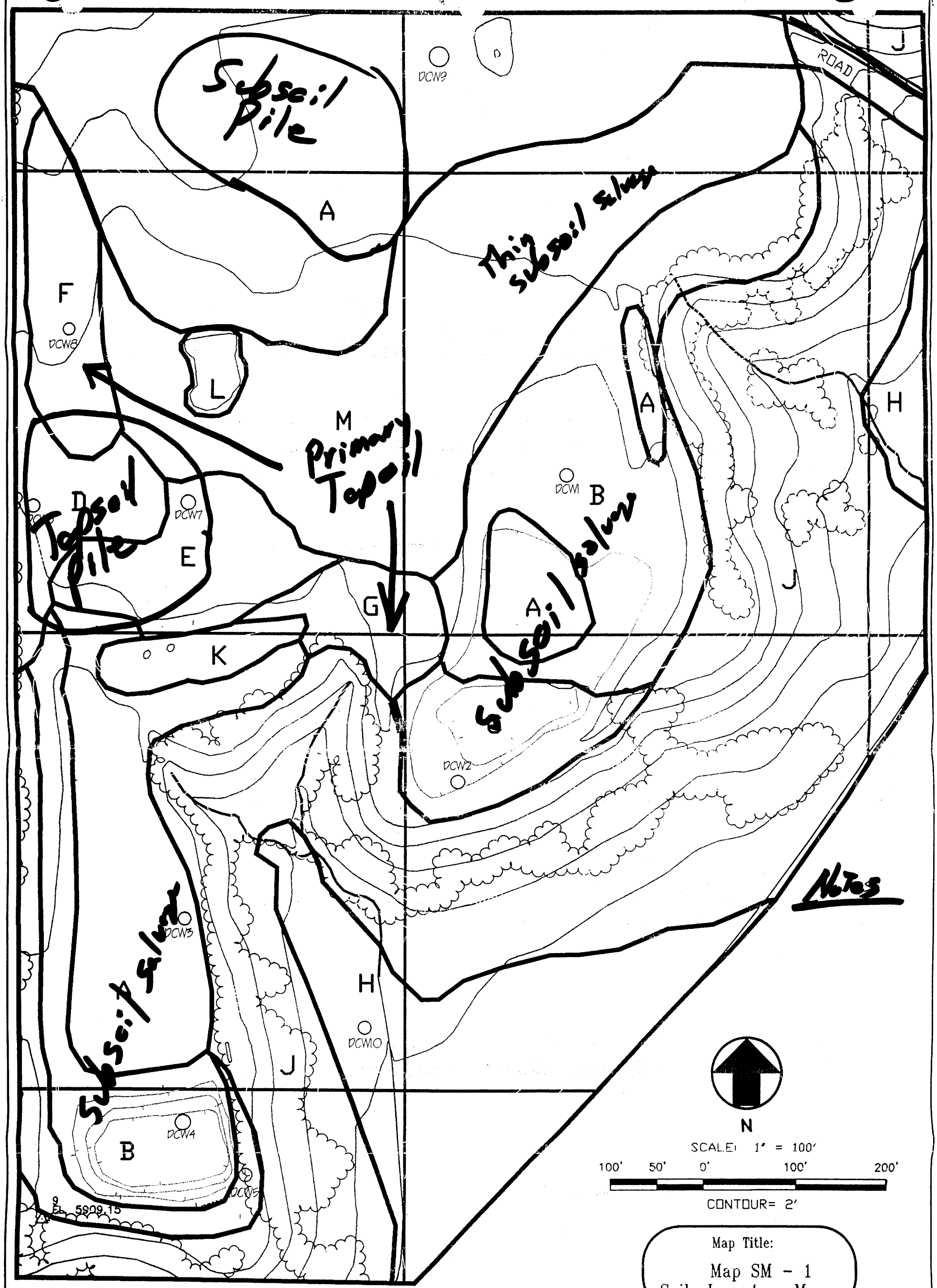

Map Title:

Map SM - 1
Soils Inventory Map

Additional Map Information:
Metadata for this map is available upon request and can be obtained through E.I.S. This map has been formatted using State Plane Coordinates with units of feet. Drill-hole site information provided by Jay Marshall, Utah Registered Engineer, degree of accuracy cannot be ascertained.

Legend
See LEGEND PLATE

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CLIENT: Canyon Fuel Company
Dugout Canyon Waste Rock Site

VIEWING TERMS: This map and the information therein may not be distributed or reproduced without the knowledge and consent of E.I.S.

ACAD REF:

DATE: DEC. 14, 1999

SCALE: AS SHOWN

DESIGNED BY:
EIS
91 N. Main St.
Helper, UT 84526
(801) 472-9984
eis.cpi@castlenet.com
CD / Draftsperson: D. Jensen
Base map and some additional information provided by Rockford Engineering

JUL 16 2003

Soil Resources and Soil Salvage
Dugout Canyon Mine
Refuse Site Spillway

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

By: Daniel M. Larsen
Soil Scientist
Environmental Industrial Services
31 North Main Street
Helper, UT 84526

4/11/03

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Soil Resources and Soil Salvage
Dugout Canyon Mine Refuse Site Spillway

Introduction

This report is to provide documentation of information on the soil resources and soil salvage activities at the spillway site below the sediment pond at the Dugout Canyon Mine Refuse (coal waste) pit in Carbon County, Utah. The project is an extension at the south end of the area included in the "Soil Resources Inventory and Assessment, Dugout Canyon Mine Coal Waste Rock Site, Carbon County, Utah", December, 1999. Soil Inventory and sampling was conducted on February 18th; and soil salvage was conducted on April 7, 8, and 9, 2003. The spillway is about 220 feet in length and 15 feet wide.

Soil Resources

Soils were inspected by use of a spade and hand auger at various spots at the spillway location. Three soil descriptions were taken and identified as DCW-11, DCW-12, and DCW-13. The soils are compatible with soil units "J" and "H" as identified on the soil map for Dugout Canyon Mine, RA Plate 2-1, revised 01/07/03. The map must be revised to show the "H" soil unit in the south corner of the map, which involves about one-half of the spillway alignment.

The soils correlate with the slope character and vegetation. The upper portion (soil unit "J") has slopes of 15 - 30 percent and supports Utah juniper. The surface is cobbley to stoney. Soil textures are sandy loam to loam to a depth of about 6 - 24 inches at which depth weathered shale is present. Soil description DCW-12 and DCW-13 were recorded along this portion of the slope. The surface 6 to10 inches is considered suitable topsoil. Subsoils consist of materials high in carbonates and rock fragments or weathered shale.

At the lower portion of the spillway the soils are formed from more recent alluvium derived from sandstone and shale. Slopes are about 5 percent and the vegetation consists of greasewood, saltbrush and prickly pear cactus. The surface soils are relatively low in rock fragments and have a sandy loam texture. At about 16 to 20 inches the soils are higher in carbonates and rock fragments. These subsoils are hard and light colored. Soil description DCW-11 was taken about 15 feet up slope from the drainage at the end of the spillway.

Soil Sampling and Testing

Soil samples were taken from representative soil layers and placed in one gallon size plastic bags. Four samples were selected and submitted to Inter-Mountain Laboratories, Sheridan, Wyoming for analysis of parameters recommended by the Utah State Division of Oil, Gas, and Mining. These included:

DCW-11, 0-8 inches, in soil unit "H"
DCW-11, 10-20 inches, in soil unit "H:
DCW-12, 0-5 inches, in soil unit "J"
DCW- 13, 0-8 inches, in soil unit "J"

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The soil test results did not reveal any unsuitable features or qualities in the material

tested. The soil analysis report provided by Inter-Mountain Laboratories and the suitability guidelines may be referred to for details. In general the surface soils rated good for reclamation soil materials. Subsoils not tested were noted as having high carbonates, rock fragments, or weathered shale.

Soil Salvage

Soil salvage was conducted by Nielson Construction Company utilizing a trackhoe excavator and a dump truck beginning on April 7, and ending on April 9, 2003.

The site was initially cleared of juniper trees and stones to access the lower portion of the spillway location by the equipment. Excavation of soils began at the lower end of the spillway at the natural drainage and proceeded up slope. In soil unit "H" about 16 - 20 inches of soil was salvaged as topsoil. Subsoil was identified by its lighter color, hardness, and higher gravel content. Total depth of excavation was about 3 - 4 feet. On soil unit "J" on the upper half of the spillway, the topsoil ranged from about 6 - 12 inches in thickness. This included the brown and very dark brown soil that was underlain by subsoil identified by high carbonates, shaley structure, or very stony material. Weathered shale was encountered within 20 inches over most of this slope.

At the completion of topsoil salvage about 15 truck loads of topsoil had been recovered with an estimated volume of about 125 - 150 cubic yards. Subsoil salvage had not been completed at the time that I left the project on April 9th, but up to that time it appeared that 15 loads of subsoil had been recovered. Soils were hauled to the designated topsoil and subsoil piles in the northwest portion of the refuse site project area.

Daniel M. Larsen
Soil Scientist
EIS

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Canyon Fuel Company., LLC
Dugout Canyon Mine
Refuse Site - Spillway

Soils Map

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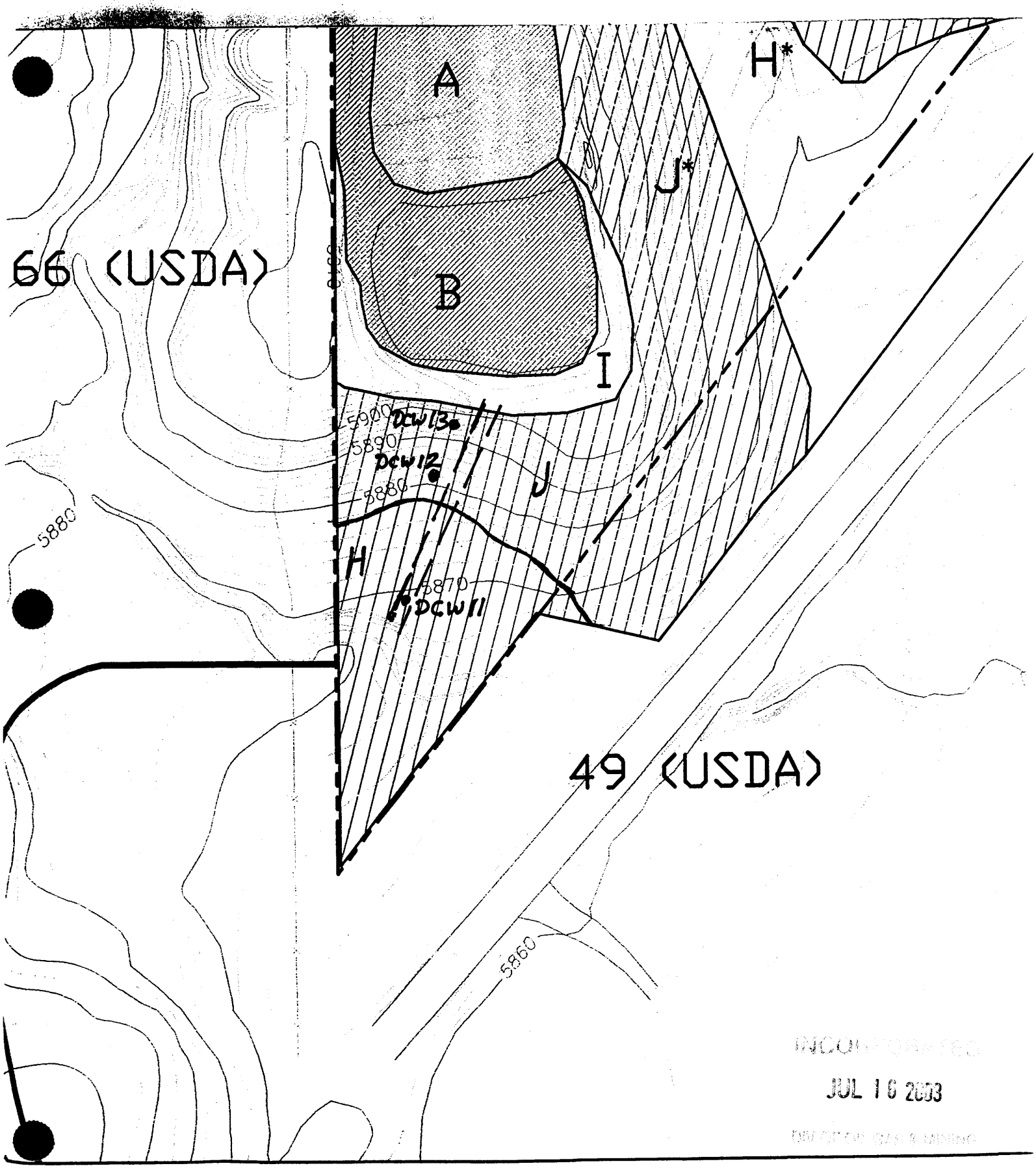

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Canyon Fuel Company., LLC
Dugout Canyon Mine
Refuse Site - Spillway

Soil Analysis Report

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DIV OF OIL GAS & MINING

Canyon Fuel Company, LLC
Soldier/Dugout Canyon Mines
P.O. Box 1029
Wellington, Utah 84501 42

(435) 637-6360
Fax (435) 637-0109

FACSIMILE TRANSMITTAL

DATE: 3/28/03 No. Of Pages (Including Cover Sheet) 4

TO: DAN LARSEN

COMPANY: EIS

FROM: Vicky Miller

REMARKS: WASTE ROCK SITE
LAB DATA SHEETS

Note: Soil area notations have been revised (corrected) from original data sheets. "H" & "J"

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JUL 16 2003

Inter-Mountain Laboratories, Inc.

Report ID: 010302030

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

MAR 31 2003

1633 Terra Avenue
Sheridan, WY 82801

Client Project ID: Topsoil
Date Received: 02/24/03

Set #0103S02030
Report Date: 03/26/03

Lab Id	Sample Id	Depths (Inches)	pH s.u.	Saturation %	EC @ 25°C mmhos/cm	Calcium meq/L	Magnesium meq/L	Sodium meq/L	SAR	Sand %	Silt %	Clay %	Texture
0103S02030	DCW-11 Area "H"	0 - 8	7.5	26.0	0.58	3.49	0.96	1.10	0.74	63.0	25.0	12.0	SANDY LOAM
0103S02031	DCW-11 Area "H"	10 - 20	7.6	27.1	0.41	1.77	0.90	1.21	1.05	63.0	19.0	18.0	SANDY LOAM
0103S02032	DCW-12 Area "J"	0 - 5	7.6	28.0	0.44	2.90	0.72	0.71	0.53	69.0	15.0	16.0	SANDY LOAM
0103S02033	DCW-13 Area "J"	0 - 8	7.6	35.4	0.40	2.84	0.73	0.72	0.54	65.0	14.0	21.0	SANDY CLAY LOAM

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JUL 18 2003

These results only apply to the samples tested.

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

Reviewed By: _____
Joey Sheeley, Soils Lab Supervisor

Inter·Mount Laboratories, Inc.

Report ID: 010302030

1633 Terra Avenue
Sheridan, WY 82801

Soil Analysis Report

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

Client Project ID: Topsoil
Date Received: 02/24/03

Set #0103S02030
Report Date: 03/26/03

Lab Id	Sample Id	Depths (Inches)	TOC %	Total Sulfur %	T.S. AB t/1000t	Neutral. Pot. t/1000t	T.S. ABP t/1000t	CO3 %	Organic Matter %
0103S02030	DCW-11 Area "H"	0 - 8	0.1	0.02	0.62	116	115	11.5	1.4
0103S02031	DCW-11 Area "H"	10 - 20	<0.1	0.01	0.31	131	131	11.9	0.8
0103S02032	DCW-12 Area "J"	0 - 5	<0.1	0.11	3.44	140	136	12.1	1.9
0103S02033	DCW-13 Area "J"	0 - 8	0.6	0.02	0.62	151	150	15.1	2.5

These results only apply to the samples tested.

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

Reviewed By: _____
Joey Sheeley, Soils Lab Supervisor

Inter·Mountain Laboratories, Inc.

Report ID: 010302030

1633 Terra Avenue
Sheridan, WY 82801

Soil Analysis Report

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

Client Project ID: Topsoil
Date Received: 02/24/03

Set #0103S02030
Report Date: 03/26/03

Lab Id	Sample Id	Depths (Inches)	Boron ppm	Nitrogen Nitrate ppm	TKN %	Phosphorus ppm	Selenium ppm
0103S02030	DCW-11 Area "~~J~~" H	0 - 8	0.26	1.24	0.24	4.99	<0.02
0103S02031	DCW-11 Area "~~J~~" H	10 - 20	0.31	0.52	0.13	1.20	<0.02
0103S02032	DCW-12 Area "J"	0 - 5	0.21	1.32	0.09	2.04	<0.02
0103S02033	DCW-13 Area "~~H~~" J	0 - 8	0.23	1.56	0.12	3.26	<0.02

JUL 16 2003

These results only apply to the samples tested.

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

Reviewed By: _____
Joey Sheeley, Soils Lab Supervisor

**Soil Suitability for Topsoil Evaluation

Parameters	Good	Fair	Poor	Unacceptable
pH	6.1 - 8.2	5.1 – 6.1 8.2 – 8.4	4.5 – 5.0 8.5 – 9.0	less than 4.5 greater than 9.0
EC mmhos/cm 25° C	0 – 2	2 - 8	8 - /5	greater than 15
Saturation %	25% - 80%		less than 25% greater than 80%	
Texture	sl, l, sil, scl, vfsl, fsl	cl, sicl, sc, ls, lfs	sic, s, sc, c, cos, fs, vfs	g, vcos
SAR	0 - 5	5 - 10	10 – 12 fine texture 10 – 15 coarse texture	>12 fine texture >15 coarse texture
Selenium	less than 0.1 mg/kg			greater than 0.1 mg/kg
Boron	less than 5.0 mg/kg			greater than 5.0 mg/kg
Acid/Base Potential	greater then –5 tons CaCo3 1,000 tons material			less than –5 tons CaCo3 1,000 tons material
% Coal Fine (Total Organic Carbon)	<10%			>10%
Available water capacity (in/in)	Greater than 0.10	0.05 – 0.10	less than 0.05	
Rock Fragments (% volumes) 3 inches 3-10 inches 10 inches	 0 - 15 0 - 15 0 - 3	 15 - 25 15 – 25 3 - 7	 25 - 30 25 - 30 7 – 10	 greater than 30 greater than 30 greater than 10
Carbonates %	<15	15 - 30	>30	
Erodibility K-factor	<0.37		>0.37	

02/25/02

**Revised table prepared by D. Larsen, EIS, based on Utah State Division of Oil, Gas and Mining Guidelines. Tentative guidelines, pending UDOGM revised soil management guidelines.

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Canyon Fuel Company., LLC
Dugout Canyon Mine
Refuse Site - Spillway

Soil Description Forms

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SCS-SOILS-232G
REV. 12-70
FILE CODE SOILS-11

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL DESCRIPTION
Carbon Co. UT

Soil type Map Unit H

File No. DCW-11

Area Dugout Canyon Mine - Refuse Site Spillway | Date D. Larsen 2-18-03 | Stop No. 1

Classification Hernandez Family

Location About 15 feet from the drainage which the spillway will go into Sec 18, T14S, R12

N. veg. (or crop) Greasewood, prickly pear cactus, saltbush, fairly sparse veg. | Climate Ustic / Mesic near aridic

Parent material Alluvium

Physiography Alluvial valley fill, slight fan

Relief Gentle slope, single	Drainage Well drained	Salt or alkali SAR ≈ 1.0
Elevation 5870'	Gr. water —	Stoniness nonstony
Slope 5%	Moisture	
Aspect S	Root distrib. Roots present to about 40"	% Clay * 18
Erosion Slight	% Coarse fragments *	% Coarser than V.F.S. *

Permeability Moderate

Additional notes

Subsoils and underlying materials are clayey (shale) or gravelly, cobbly
Shale observed in drainage at about 3 feet (in depth) just above spillway location ≈ 20'

Very high in carbonates below 20 inches
% gravel in subsoil varies from about 20 to 40%
Samples DCW-11, 0-8" sent to lab.
DCW-11, 10-20" "

GROUND COVER (%)	RANGE	AVERAGE
Gravel 2MM-3"		15
Cobble 3-10"		—
Stone 10-24"		—
Boulder >24"		—
Vegetation		5
Litter		25
Bare		55

* Control section average

Horizon	Depth	Color Dry	Color Moist	Texture	Structure	Consistence Dry	Consistence Moist	Consistence Wet	Reaction	Boundary	% Rock Fragments	Root Distribution	
A	0-8	10YR 5/3 Brown	10YR 3/4-4/4 Dark yellowish brown	Sandy loam	wfgr	So	FR	SS SP	em 7.5	gs	10g	c VF-m	(common very fine medi
Bw	8-20	10YR 6/3 Pale brown	10YR 4/4-5/4 Dark yellowish br-yellowish brown	Sandy loam	wfsbk	So-SH	FR	SS SP	es 7.6	cw	10g	cf	
BK1	20-30	10YR 7/3 Very pale brown	10YR 5/4 Yellowish brown	Gravelly Sandy loam	-	H	VFI	SS SP	ev 7.6	gw	25g 10co	ff	(few fine)
BK2	30-40	10YR 8/2 Very pale brown	2.5Y 5/2 Grayish brown	Very gravelly loam	OM	H some VH	VFI		ev 7.6		30g 5co	ff	

g = gravel
co = cobble

SCS-SOILS-232G
REV. 12-70
FILE CODE SOILS-11

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL DESCRIPTION

Carbon Co., Utah
Soil type Map Unit J

File No. DCW-12

Area Dugout Canyon Mine - Refuse Site Spillway | Date D. Larsen 2-18-03 | Stop No. 2

Classification Gerst | Sec. 18, T14S, R12E

Location About midway on spillway location near the toe of the slope, edge of juniper

N. veg. (or crop) Utah juniper | Climate Ustic/Aridic

Parent material Coarse alluvium mostly from sandstone over shale | Mesic

Physiography Toeslope of a pediment (alluvial bench)

Relief mod. sloping, slightly concave	Drainage Well drained	Salt or alkali SAR < 1
Elevation 5882	Gr. water —	Stoniness Very cobbly
Slope 15-20%	Moisture	
Aspect South	Root distrib. Mostly in upper 8"	% Clay* 16%
Erosion slight to moderate	% Coarse fragments* 20%	% Coarser than V.F.S.*

Permeability Mod/slow

Additional notes

Old alluvium from a pediment surface over Mancos shale
Thin topsoil
Cobbly surface

Some of the shale in this area is high in very fine sand -

GROUND COVER (%)	RANGE	AVERAGE
Gravel 2MM-3"		20
Cobble 3-10"		35
Stone 10-24"		-
Boulder >24"		-
Vegetation		10
Litter		20
Bare		15

Sample DCW-12, 0-5" sent to lab.

* Control section average

Horizon	Depth	Color Dry	Color Moist	Texture	Structure	Consistence Dry	Consistence Moist	Consistence Wet	Reaction	Boundary	% Rock Fragments	Root Distribution	
A	0-5	Brown 10YR 5/3	Dark brown - Dark yellowish br. 10YR 3/4 - 3/3	sandy loam	wfgr	so	fr	SS/sp	es 7.6	cw	10 gr 10 co	cfm	
BC	5-8	Light brownish gray 10YR 6/2	Dark grayish brown 10YR 4/2	sandy clay loam	wfsbk	sh-s	fi	s/p	7.6	cw	25% shale fragments	cfm	
CR	8-12+	weathered gray shale with streaks of carbonates		clay loam		sh	fi					ff	

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SCS-SOILS-232G
REV. 12-70
FILE CODE SOILS-11

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL DESCRIPTION
Carbon County, UT

Soil type Map Unit J

File No. DCW-13

Area Dugout Canyon Mine, Refuse Site Spillway | Date D. Larsen 2-18-03 | Stop No. 3

Classification Stryck like - moderately deep

Location About 15 feet below upper edge of sediment pond site Sec 18, T14S, R12E

N. veg. (or crop) Utah juniper | Climate Ustic / Mesic Near aridic

Parent material Coarse alluvium over Mancos shale

Physiography Edge of a pediment

Relief Steep	Drainage Well drained	Salt or alkali SAR <1
Elevation 5896	Gr. water —	Stoniness Very stony
Slope 25-30%	Moisture Moist	
Aspect South	Root distrib. Mostly in upper 8"	% Clay* 20%
Erosion Slight	% Coarse fragments* 50%	% Coarser than V.F.S.*

Permeability Moderate

Additional notes Very stony surface
Shale estimated to be bottom near 24"
Pit Location was about 20 feet west of final spillway location - Actual location had less stones at surface
Upper 8" composited and sent to lab for Testing DCW-13, 0-8"

GROUND COVER (%)	RANGE	AVERAGE
Gravel 2MM-3"		10
Cobble 3-10"		20
Stone 10-24"		20
Boulder >24"		5
Vegetation		10
Litter		25
Bare		10

* Control section average

Horizon	Depth	Color Dry	Color Moist	Texture	Structure	Consistence Dry	Consistence Moist	Consistence Wet	Reaction	Boundary	% Rock Fragments	Root Distribution
A	0-4	Brown 10YR 5/3	Very dark grayish brown - dk brown 10YR 3/2 - 3/3	SL	WFGR	SO	FR	SS/SP	7.5	CW	10g 15c 20s	cf-m
Bw or Bk1	4-8	Pale brown 10YR 6/3	Dark yellowish brown 10YR 4/4	SCL	WFSBK	SH	FR	S/P	7.6	gw	10g 15c 20s	cf-m
Bk2	8-18	Pale brown - Vr pale brown 10YR 6/3 - 7/3	Yellowish brown - dark yellowish br 10YR 5/4 - 4/4	SCL	MFSBK	SH	FI	S/P	7.6	gw	10g 15c 30s	ff-m
Bk3	18-22	Slightly lighter due to more carbonates		SCL	MFSBK	H	FI	S/P	7.6		10g 15c 35s	ff

Some shale fragments

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Canyon Fuel Company., LLC
Dugout Canyon Mine
Refuse Site - Spillway

Soil Resource and Soil Salvage Photographs

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Soil Resource and Soil Salvage Photographs for the Dugout Canyon Mine Refuse Site Spillway Project - April 2003

1. The spillway site from the natural drainage at the south end and looking up slope. The spade is at the location of soil description DCW-11 in soil unit "H".

2. The soil profile exposed by the trackhoe at the location of soil description DCW-11. About 18-20 inches of topsoil material overlies a hard subsoil that is high in carbonates and is more gravelly than the surface material.

3. A view from the top of the slope looking down along the spillway location.

4. Soil profile DCW-12, taken at the top of the slope in soil unit "J" to the right of the juniper stump.

5. Soil profile DCW-12 taken about 20 feet west of the spillway location at the upper part of the slope in soil unit "J".

6. Soil pit and site condition at soil description DCW-13 location.

7. The edge of the sediment pond showing the initial cut made for the spillway.

8. The trackhoe clearing surface rock and trees at the upper part of the spillway. 04/07/03

9. Beginning soil salvage at the lower end of the spillway in soil unit "H" near the natural drainage. Soil unit "J" is on the slope with the junipers. 04/07/03

10. View of the spillway after topsoil was salvaged. Subsoil had been removed at the lower end but not on the upper portion. 04/09/03

11. A cut along the upper portion of the slope showing shallow depth to weathered shale. About 10 - 12 inches of topsoil was recovered.

12. The upper portion of the spillway showing where photo 11 was taken. Soils are cobbley over shale.

13. Topsoil from the spillway was placed at the north end of the refuse site topsoil pile.

14. Subsoil from the spillway was placed along the west side of the refuse site subsoil pile.

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JUL 16 2003

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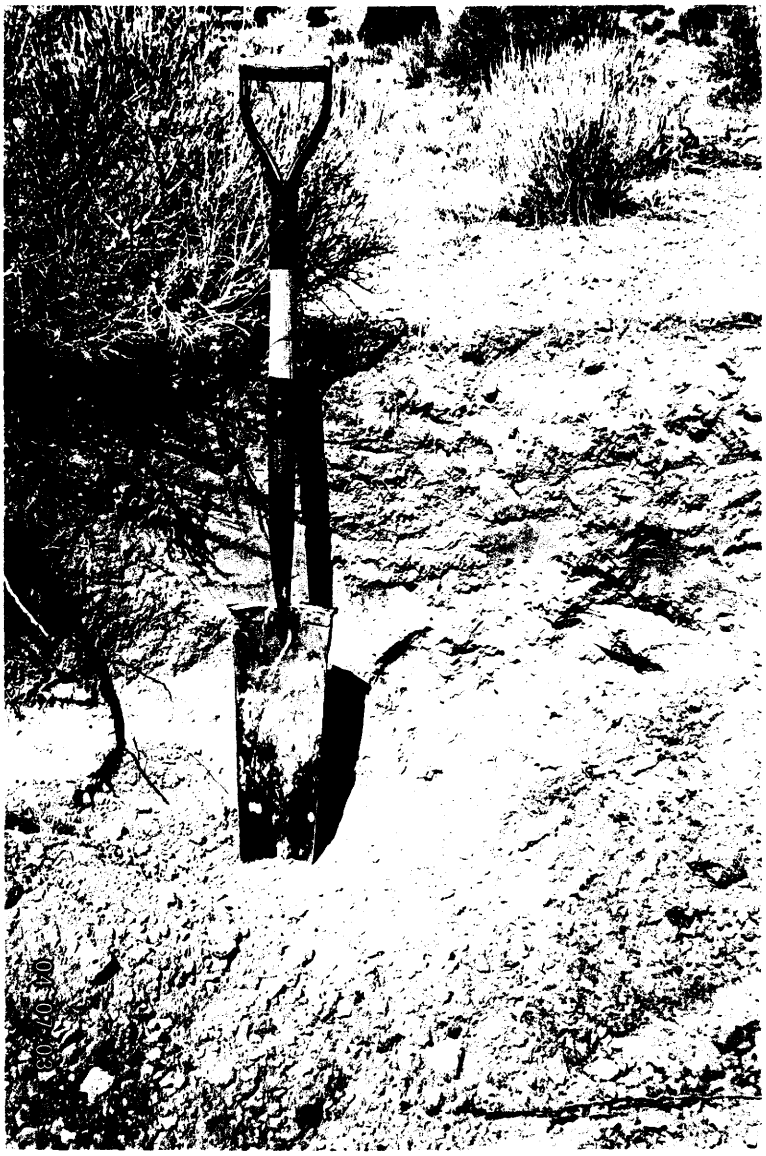

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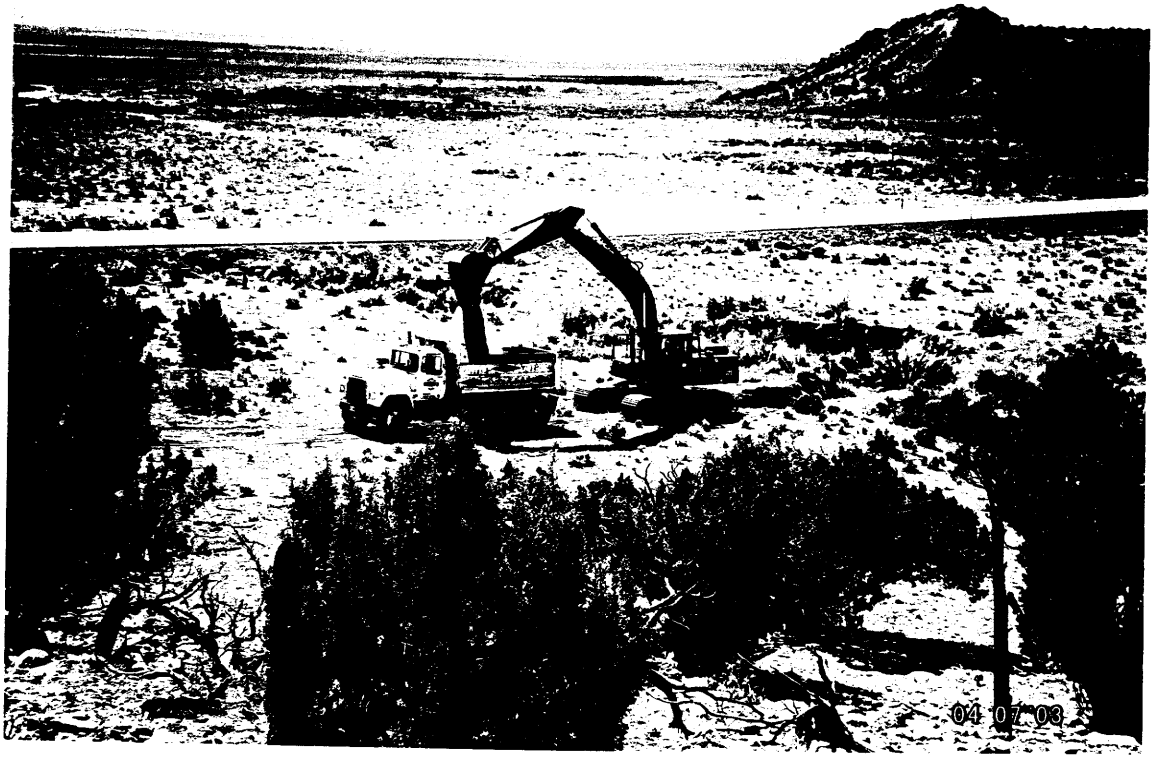

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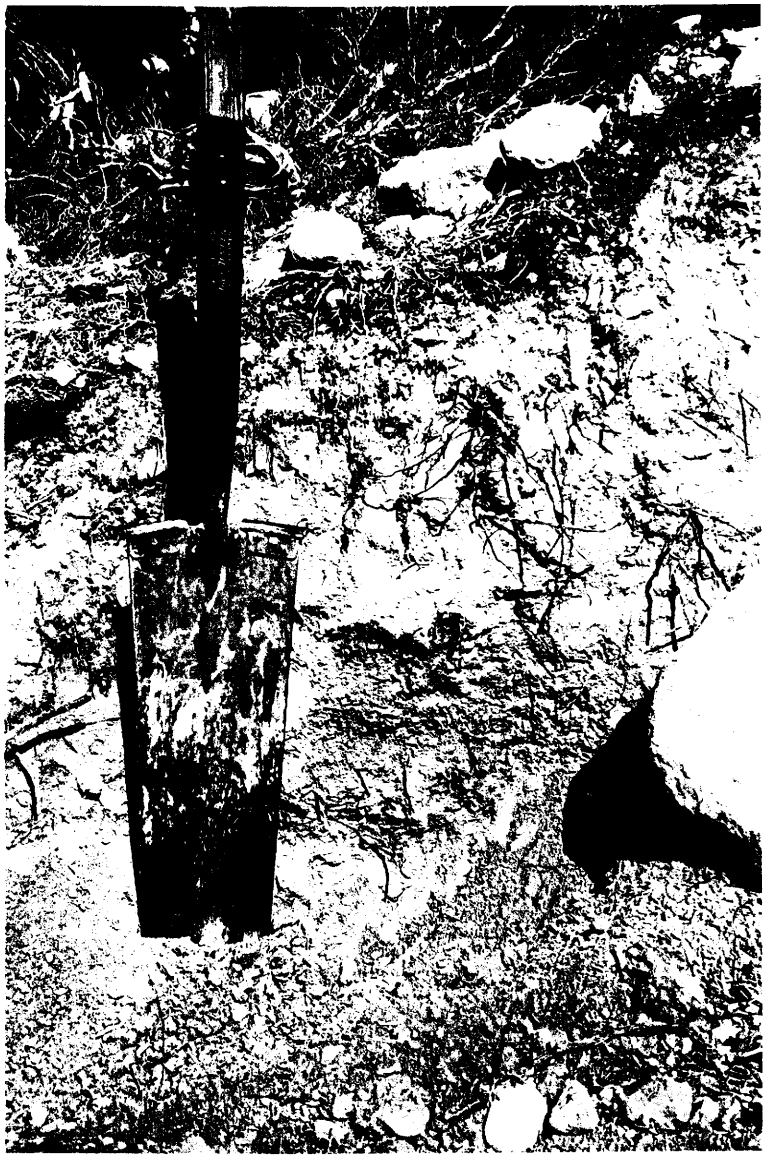
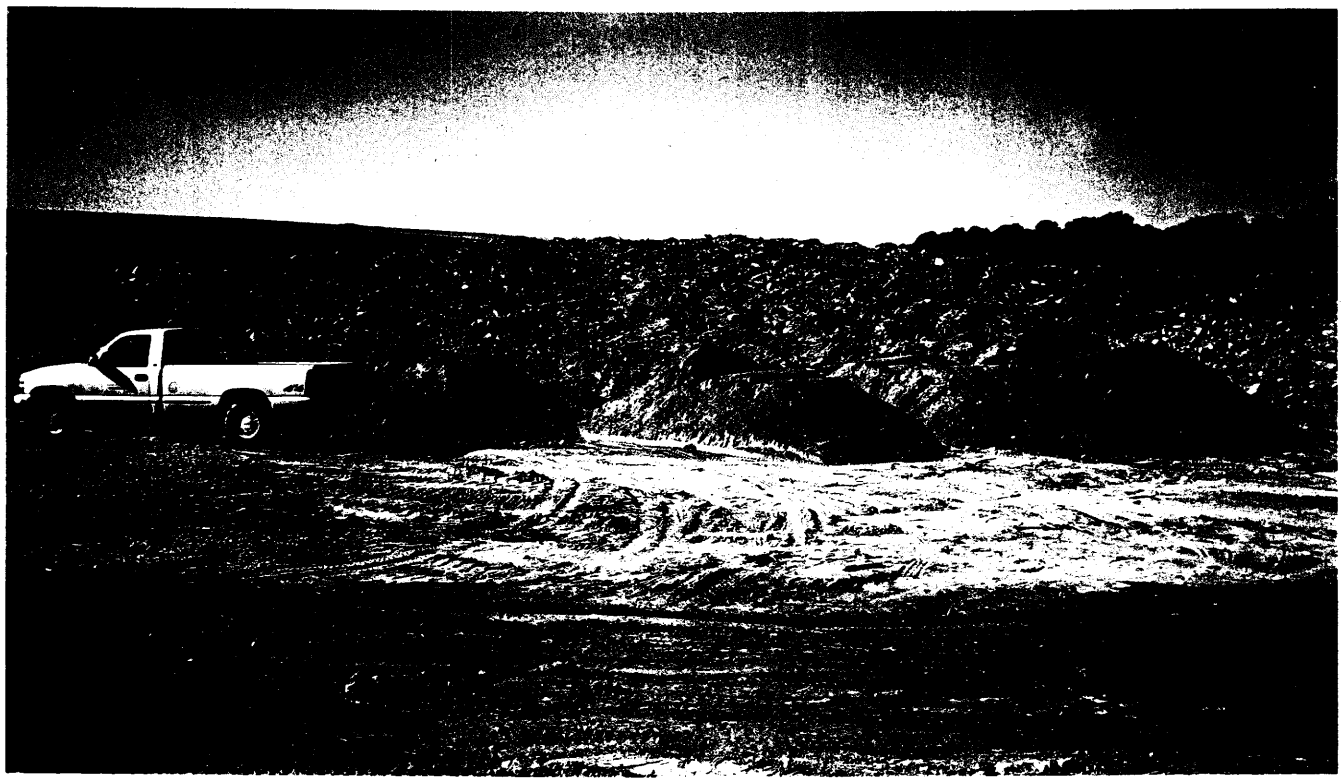
JUL 16 2003



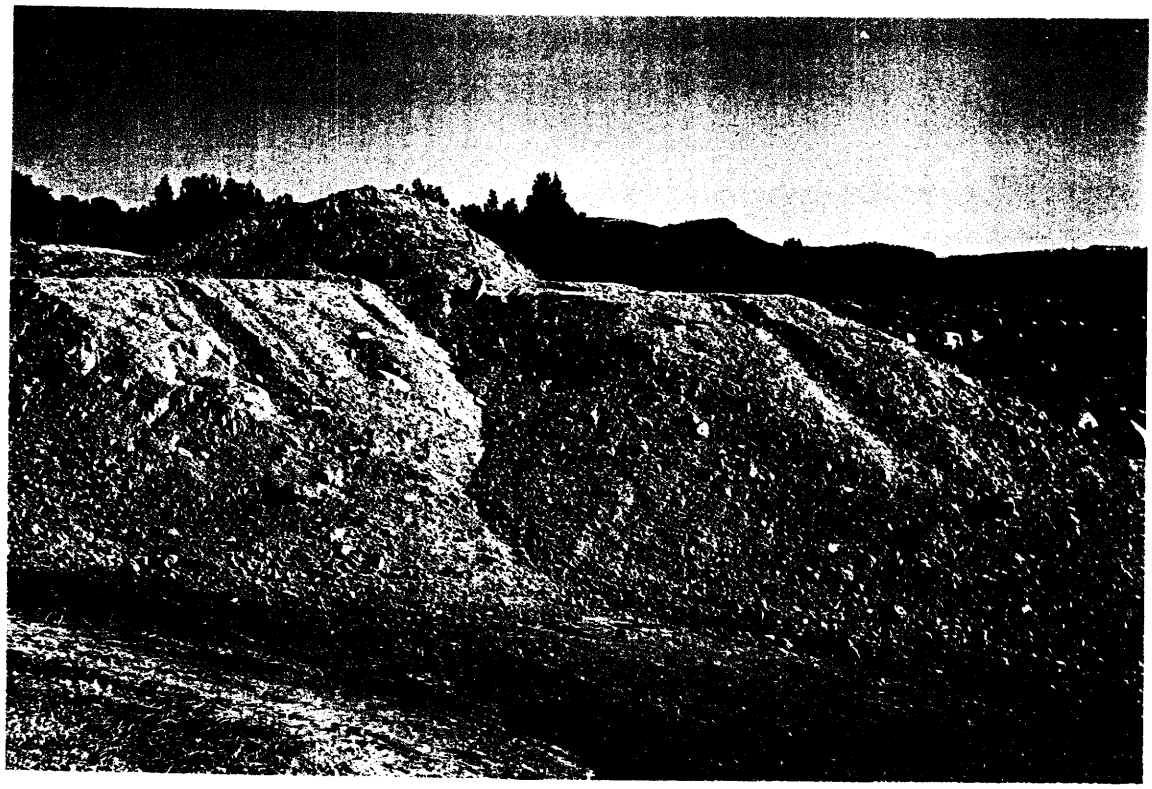
-11-

JUL 16 2003

-12-



-13



-14-

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SOIL SALVAGE FIELD NOTES

Field Notes
-D.L.

Spillway

4/7/03 24.5 mi Clear and no snow

Lv office @ 7:30

Meet at site with Ken Payne CFC

Parke Killpack + Steve ? Oldroyd
Nielson Construction

Cut about 4' at drainage
≈ 2' up slope ≈ 12' wide

talk to Steve (track hoe operator on soil salvage
- take down to the shale or hard, whitish colored subsoil
- some high carbonate subsoil will be mixed with better "topsoil"
this soil has root in it and it is not worth trying to separate as subsoil"

≈ 9:00 Steve dug out keyway at spillway + cleared spillway
location of large rocks + tree (Vanspur)
dug out tree with track hoe excavator

10:00 waiting for truck to load topsoil
- Used Trackhoe excavator to dig spillway + load

- Haul to existing topsoil piles
+ subsoil as encountered

11:00 Dump truck arrived

Hauled 4 loads up to noon (lunch break

1:00 Vicky stopped by - Checked on progress at topsoil pile
1:05 Truck dumping

2:15 Removing subsoil ~~[illegible]~~ in H-unit

[illegible]

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4/7/03

3:40 –

Talk to Steve, Park, & Ken

pump Truck broke down

removing subsoil at lower end

leave for the day

Topsoil 8 load
subsoil

4/8/03 Leave here at 7:45

Drop off film at Wal-Mart

8:30 Putting rock in lower part of spillway – South end

Want to maintain upper "road way" integrity + do some work below

9:30 Hauled a load of subsoil

Looks like 8 loads of topsoil have been dumped

subsoil 11

9:45 another load of subsoil

Colors, & Textures

Lv @ 11:00

Return 1:35 Talk with Vicky Miller on project

Working on subsoil, Lv @ 3:00

To office @ 3:30

4/9 Lv office @ 7:45

Working on subsoil then up slope for topsoil

finish topsoil at ≈ 11:00

some subsoil got to salvage

Lv @ 11:00

220' x ≈ 15' ≈ 18" Ts on lower 100' Ave

≈ 8-10" on upper 100'

≈ 15 loads of topsoil

+ 15 of subsoil

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RA ATTACHMENT 2-2

SOIL VOLUME CALCULATIONS

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RA ATTACHMENT 2-2

SOIL VOLUME CALCULATIONS

REGISTERED PROFESSIONAL ENGINEER
1-23-06
No. 189797
LAYNE D.
JENSEN
STATE OF UTAH

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Reclamation Soil Thickness
Dugout Refuse Pile Site

The Refuse Pile is to be covered with 1 foot of equally blended coal waste and subsoil, approximately 2.6 feet of subsoil and approximately 0.4 feet of topsoil, to obtain a total depth of cover on the pile of 4 feet. The volumes of subsoil and topsoil needed to cover the pile are discussed below.

Area covered by the refuse pile = 516,552 ft^2

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

Slope area = 368,950 ft^2
Area of flatter space on top of the pile = 147,602 ft^2
Adjusted slope area = 1.118 x 368,950 ft^2 = 412,486 ft^2
Adjusted surface area of the pile to be covered = 560,088 ft^2

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

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

Available Cover Material

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

Topsoil Stockpile volume = 7,298 CY
Subsoil Stockpile volume = 6,508 CY
Berm volume = 2,686 CY

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

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

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

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

Total available cover material = 31,156 CY

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

The mixing of coal waste and subsoil, to produce the first foot of cover for the refuse pile, will occur only if the coal waste has been demonstrated through sampling and analysis to not be acid or toxic forming. Otherwise the entire 4 feet of cover material will be composed of subsoil and topsoil.

Volume of cover material needing to be imported = 82,976 – 41,528 = 41,448 CY

Summary of Volumes

Volume of material needed to obtain 4 feet of cover = 82,976 CY
Total cover material available at the site = 31,156 CY
Vol. of coal waste blended with sub-soil to produce the first foot of cover = 10,372 CY
Vol. of subsoil blended with coal waste to produce the first foot of cover = 10,372 CY
Volume of subsoil and topsoil needed to cover the pile = 72,604 CY
Volume of cover material to be imported from borrow site = 41,448 CY

Soil/Waste Rock Mixing Procedure

Depending on conditions there are many ways that the imported soil and coal waste can be effectively mixed. Examples of methods that may be used are:

1. Mixing with a tractor mounted tiller or similar equipment. On flatter areas of the pile a 6-inch layer of soil will be spread on the surface and then tilled with the coal waste to a depth of 12-inches. This tilled material may be left in place and the additional 3-feet of soil placed on top or the mixed material may be pushed onto the slopes as the initial 12'inches of soil cover;

2. Mixing with an excavator or front end loader. Equal amounts of soil and coal waste will be dumped on the surface of the pile and mixed together using an excavator or front end loader. A dozer will then push the mixture onto the surface of the pile in a 12-inch layer;

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3. Loading equal amounts of coal waste and soil into a dump truck. Trucks hauling soil to the site can be loaded with an equal amount of coal waste. Mixing will occur as the material is being loaded as well as when the load is dumped. Additional mixing will occur when the mixture is pushed out over the pile by a dozer; and

4. Mixing with a dozer. A 6-inch layer of soil can be spread on the surface of the pile and then a dozer will push the soil and 6-inches of coal waste into a pile. The rolling action of the material in front of the dozer blade will mix the soil and coal waste. Additional mixing will occur as the material is pushed back out in a 12-inch layer.

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RA ATTACHMENT 2-3
SOIL BORROW AREA

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SOIL INVENTORY AND ASSESSMENT
SOIL BORROW AREA
DUGOUT CANYON MINE
CARBON COUNTY, UTAH

Prepared For:
CANYON FUEL COMPANY, LLC
PO BOX 1029
WELLINGTON, UTAH 84526

Prepared By:
Daniel M. Larsen
Professional Soil Scientist

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1. Introduction and Setting
2. Procedures
3. Soil Resources
    - Soil Inventory Results
    - Soil Testing Results
4. Soil Suitability Assessment

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Appendix A Site Map and Soil Pit Locations
Appendix B Soil Analysis Report
Appendix C Soil Suitability Ratings
Appendix D Soil Profile Descriptions and Carbon Area Soil Survey Mapping Information
Appendix E Photographs of Site and Soil Profiles

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1. Introduction and Setting

The soil inventory and assessment was conducted to evaluate a site proposed as a soil borrow area for the reclamation of Dugout Canyon Mine's refuse pile. The site is located in Section 17, Township 13 South, Range 12 East (Appendix A). The site is approximately 20 acres in size and photographs of the site have been included in Appendix E.

The site is in an alluvial fan valley fill position with relatively gentle slopes at an elevation of approximately 5800 feet. Slopes are 3 to 5 percent with a fairly smooth surface that has been dissected by gullies.

Typical vegetation includes Indian Rice Grass, Shadscale, Sagebrush and various other species. Annual precipitation is estimated at 8 inches and the average annual air temperature is 48 degrees Fahrenheit.

2. Procedures

Field work was conducted the first week of October, 2005. Spot checks were made by the use of a spade, hand soil auger, and observation of soils in erosional cuts such as gullies. Nine locations were selected for backhoe pits to obtain soil samples and allow soil descriptions. Each site was marked with a flagged stake and identified by SB-1 through SB-9. The soil pits were dug by Scamp Excavation on October 5, 2005. The pits were described and sampled by Dan Larsen, Soil Scientist on October 5th and 6th. Samples were submitted to Intermountain Laboratories, Inc., of Sheridan, Wyoming for testing of selected parameters required by the Utah Division of Oil, Gas and Mining (UDOGM). The soils were rated for suitability based on UDOGM Guidelines.

3. Soil Resources

The site has been mapped as "Ravola loam, 1 to 6 percent slopes, eroded" (Soil Map Unit 91) in the Soil Survey of the Carbon Area, Utah by the USDA, Soil Conservation Service, issued 1988. Ravola soils are very deep, well drained, and moderately permeable. They are classified as fine-silty, mixed, active, calcareous, mesic Typic Torrifluvents.

A copy of the order three level of mapping, a description of soil map Unit 91 and an official series description of the Ravola soil are included in Appendix D for reference. This soil map unit in not considered as prime farmland and the soils are listed as being fair for use as topsoil.

<u>Soil Inventory Results</u>

The soils on the site are fairly uniform in characteristics and would typically classify as the Ravola soil series. Of the nine soil profiles described there were only minor differences. The site is at the upper elevation limits of the Ravola series and there is a trend toward the Hernandez soil series which has a calcic horizon (more carbonates) and the particle size class is fine-loamy instead of fine silty.

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For soil mapping purposes the site is basically one unit except for gullies which would reduce or eliminate the amount of soil available. The soils have formed in very deep (greater than 60 inches) alluvium derived from sandstone and shale. The most common texture is loam; however the amount of very fine sand dominates the total sand fraction and gives these soils characteristics similar to silt loam and yields a particle size class of fine-silty. A contrasting layer of soil about 4 to 8 inches, having more sand and fine gravel is present over much of the area at a depth of 38 to 45 inches.

The soils typically have brown to light grayish brown colors. The profiles show little change in color although the surface is slightly darker and the subsoils are lighter due to increases in carbonates and lower organic matter. They are generally low in soil organic matter and lack the dark colors typical of topsoil developed in moister environments.

Soil structure is typically fine granular and platy at the surface and becomes more blocky or massive with depth. The soils are moderately permeable and have a moderately high to high soil erodibility. The erosion hazard of the site is favored by the low degree of slope. Detailed soil descriptions are presented in Appendix D.

Soil Testing Results

The soil analytical results from Intermountain Laboratories are presented in Appendix B. A copy of the analytical results were used to record the suitability ratings for the soil samples. The suitability ratings are contained in Appendix C.

A summary of the analytical results is given below for suitability parameters.

PH - Ranged from 7.6 to 8.4, rated good to fair

Saturation % - Ranged from 23.8 to 46.4%, all rated good except for sample SB-8, 39 - 47" which rated poor due to a sandy layer

Electrical Conductivity - Ranged from 0.22 to 12.2 dS/m
Above 30 inches all samples were less than 4.0 dS/m
Nine subsoil samples were between 4.0 and 8.0 giving a rating of fair
Two samples had Electrical Conductivity greater than 8.0:
SB-6 - 48 - 68" = 8.38 dS/m
SB-9 - 36 - 72" = 12.3 dS/m

Sodium Adsorption Ratio (SAR) - Ranged from 0.18 to 11.9, the majority of the samples were below 4.0. Ten samples were rated fair with readings of between 4.0 and 10. Sample SB-9, 36-72" (11.9) had a poor rating

Texture - Laboratory analysis resulted in a particle size distribution yielding textures of loam and sandy loam except for one sample which barely fell into a silty clay loam class. Sandy loam

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and loam rate as good for topsoil. The very fine sand is commonly 70 to 90 percent of the total sand content. Very fine sand plus silt is commonly about 65 to 75 percent of the overall soil matrix (mostly fine-silty). Clay content ranges from 12 to 28 percent. Rock fragments are generally less than 5 percent.

Available Water Capacity (AWC) - Ranged from 7.6 to 19.8 percent
Seven samples were between 7.6 and 10 percent with a fair rating
All other samples rated as good (>10%)

Acid/Base Potential - Ranged from 127 to 197 tons/1000 tons, all ratings are acceptable

Boron - Ranged from 0.12 to 1.14 ppm, all rated acceptable

Selenium - Ranged from less than 0.02 to 0.28 ppm
Samples SB-1, 54 to 78 inches and SB-5, 56 to 68 inches were rated unacceptable
Samples SB-1, 32 to 54 inches and SB-8, 47 to 72 inches were near unacceptable

Total Organic Carbon (TOC) - Ranged from less than 0.1 percent to 1.4 percent. All rated good at less then 10%, but show overall low organic matter content for topsoil

%$CaCO^3$ - Based on the acid base potential it is estimated that carbonates are about 10 to 20 percent, rating good to fair.

4. Soil Suitability Assessment

The area is fairly uniform for soil salvage, except where gullies are present. Rating the soils for suitability for use in reclamation was based on Table 4, "Soil and Spoil Suitability/Unsuitability Evaluation " in Guidelines for Management of Topsoil and Overburden, R645-301-200 Soils, State of Utah, Department of Natural Resources, Division of Oil, Gas and Mining, draft June 2003.

The most suitable soils are in the upper 18 to 36 inches of the borrow area soils although the overall rating would be fair to poor based on a moderately high to high soil erodability factor. Estimates give a K-factor (soil erodiblility) of about 0.37 to 0.43. A K-factor of 0.37 is considered "fair" and greater than 0.37 is considered "poor".

In the upper 36 inches of the samples, six of the soil profiles had pH ranging from 8.2 to 8.4 (fair rating). Several samples rated fair due to moderately high EC, SAR and carbonates and low available water capacity.

Below 36 inches some soil samples rated poor in factors including low saturated percentage, high EC and high SAR. Two samples (SB-1 and SB-5) had unacceptable levels of selenium below a depth of about 54 inches.

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APPENDIX A

Site Map
Soil Pit Locations

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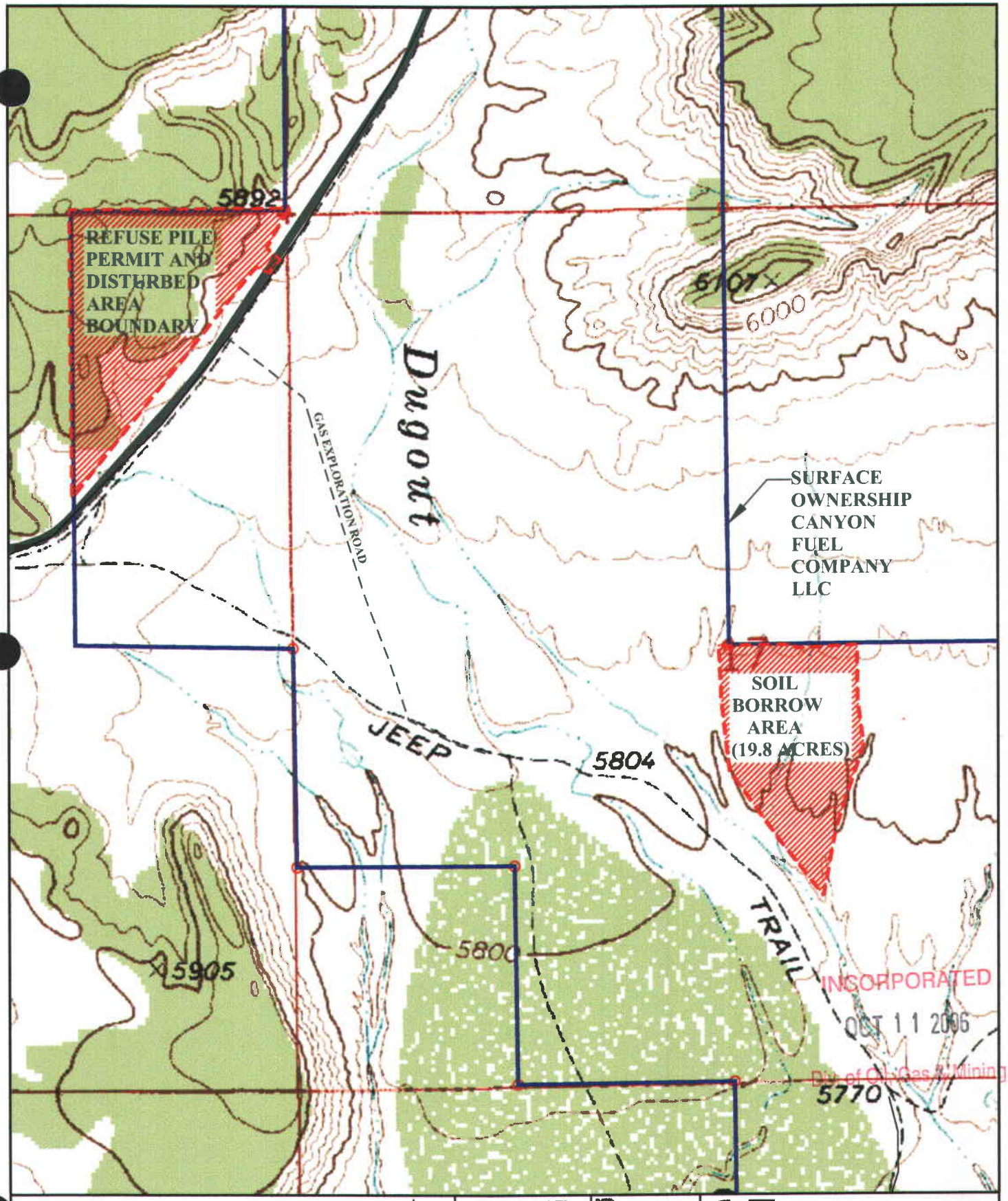


SOIL BORROW AREA IS LOCATED IN SECTION 17, T14S R12E

REVISIONS OR UP-DATES			DATE: 1-19-06	
NO.	DATE	BY	DESIGNED BY:	
			DRAWN BY:	SC
			CHECKED BY:	
			SCALE: 1"=800'	

FILENAME: Y:\SAM\CAD\SURFACE\SOIL BORROW AREA WASTEROCKAREA

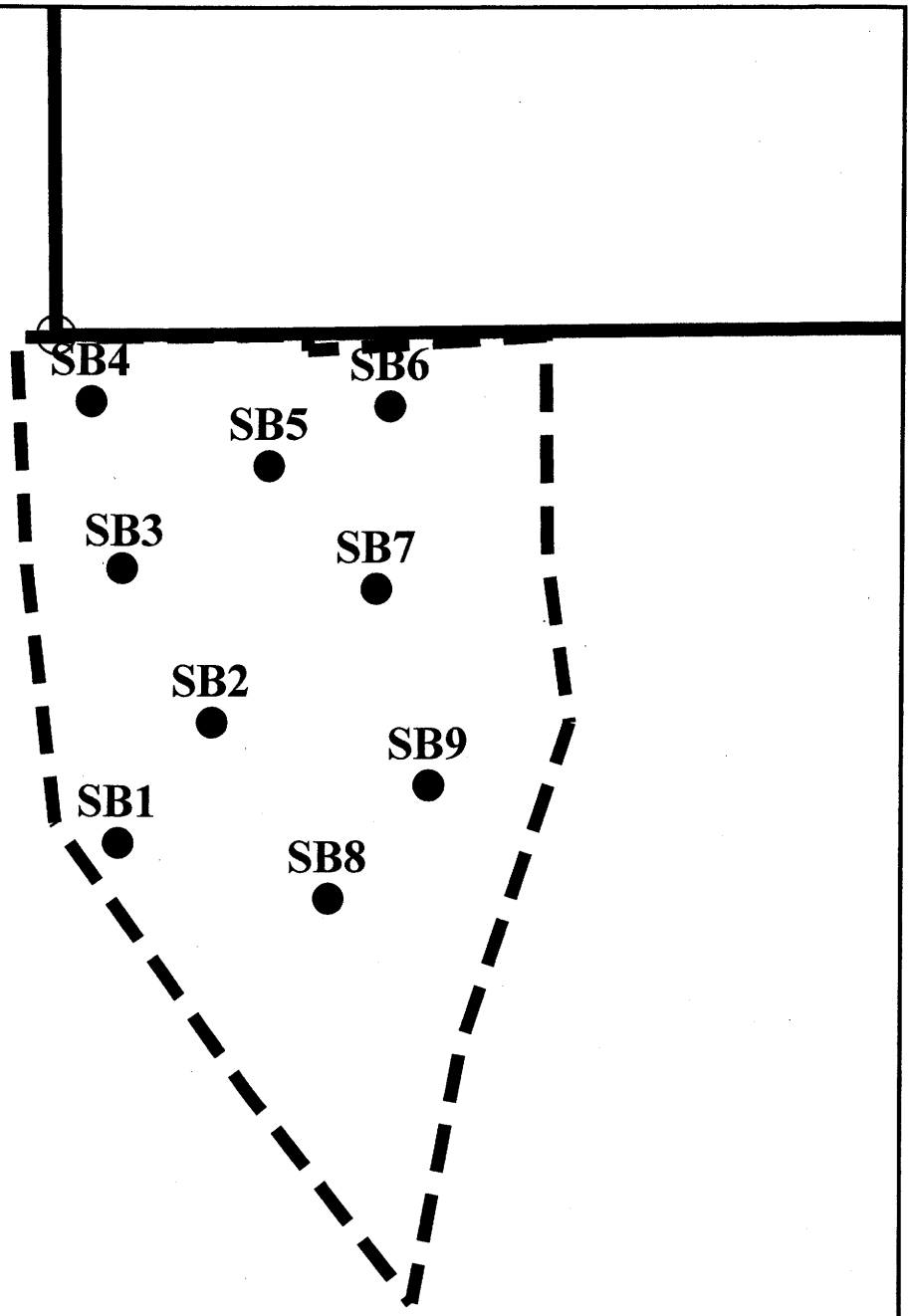
Canyon Fuel Company, LLC
Dugout Canyon Mine

SOIL BORROW AREA
FIGURE 1
RA ATTACHMENT 2-3

P.O BOX 1029
WELLINGTON, UTAH 84542

DRAWING OR MAP NUMBER

SOIL BORROW AREA



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SOIL BORROW AREA IS LOCATED IN SECTION 17, T14S R12E

REVISIONS OR UP-DATES			DATE: 1-19-06	
NO.	DATE	BY	DESIGNED BY:	
			DRAWN BY:	SC
			CHECKED BY:	
			SCALE: 1"=300'	

FILENAME: Y:\SAM\CAD\SURFACE\SOIL BORROW AREA WASTEROCKAREA FIG2

Canyon Fuel Company, LLC
Dugout Canyon Mine

BORROW AREA, SOIL PIT LOCATIONS

P.O BOX 1029
WELLINGTON, UTAH 84542

DRAWING OR MAP NUMBER

APPENDIX B

Soil Analysis Report

INCORPORATED
OCT 11 2006
Div. of Oil, Gas & Mining

Inter-Mountain Laboratories, Inc.

Report ID: 010509502

1633 Terra Avenue
Sheridan, WY 82801

REC'D DEC - 5 2005

OCT 11 2005

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

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

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

Lab Id	Sample Id	Depths (Inches)	pH s.u.	Saturation %	EC @ 25°C dS/m	Calcium meq/L	Magnesium meq/L	Sodium meq/L	SAR	Sand %	Silt %	Clay %	Texture
0105S09502	SB-1	0 - 5	7.6	33.1	0.38	2.64	0.93	0.24	0.18	33.0	45.0	22.0	LOAM
0105S09503	SB-1	5 - 13	7.8	37.3	0.33	1.34	0.71	1.19	1.17	26.0	48.0	26.0	LOAM
0105S09504	SB-1	13 - 32	7.9	40.4	2.12	7.85	5.07	10.7	4.20	37.0	41.0	22.0	LOAM
0105S09505	SB-1	32 - 54	7.6	37.9	4.83	25.8	16.9	17.5	3.78	36.0	38.0	26.0	LOAM
0105S09506	SB-1	54 - 78	7.7	35.5	4.00	20.6	24.0	9.25	1.96	42.0	42.0	16.0	LOAM
0105S09507	SB-2	0 - 8	7.7	31.4	0.39	3.15	0.67	0.33	0.24	47.0	37.0	16.0	LOAM
0105S09508	SB-2	8 - 15	7.7	29.7	0.30	2.89	0.73	0.26	0.20	50.0	30.0	20.0	LOAM
0105S09509	SB-2	15 - 26	7.8	30.2	0.22	1.57	0.42	0.46	0.46	43.0	37.0	20.0	LOAM
0105S09510	SB-2	26 - 48	7.7	46.4	0.83	6.30	1.51	1.01	0.51	14.0	58.0	28.0	SILTY CLAY LOA
0105S09511	SB-2	48 - 70	7.7	43.6	3.43	21.5	21.3	5.68	1.23	19.0	55.0	26.0	SILT LOAM
0105S09512	SB-3	0 - 6	7.8	30.6	0.46	3.03	1.20	0.27	0.19	40.0	42.0	18.0	LOAM
0105S09513	SB-3	6 - 18	7.9	35.9	0.33	1.54	0.91	1.00	0.91	35.0	39.0	26.0	LOAM
0105S09514	SB-3	18 - 38	8.2	38.0	1.05	1.81	0.92	7.50	6.42	36.0	42.0	22.0	LOAM
0105S09515	SB-3	38 - 45	7.8	25.0	4.19	19.5	10.7	24.7	6.36	72.0	15.0	13.0	SANDY LOAM
0105S09516	SB-3	45 - 72	7.6	33.4	2.46	12.5	7.17	5.25	1.67	40.0	41.0	19.0	LOAM
0105S09517	SB-4	0 - 5	7.8	36.6	0.42	2.14	0.82	0.71	0.58	30.0	44.0	26.0	LOAM
0105S09518	SB-4	5 - 18	8.2	32.5	0.35	1.00	0.47	1.87	2.18	43.0	37.0	20.0	LOAM
0105S09519	SB-4	18 - 31	8.4	36.0	0.63	0.96	0.54	4.36	5.04	38.0	41.0	21.0	LOAM
0105S09520	SB-4	31 - 44	7.9	26.3	4.52	19.1	22.5	17.0	3.72	70.0	14.0	16.0	SANDY LOAM
0105S09521	SB-4	44 - 64	7.7	33.4	4.57	21.7	18.3	16.1	3.59	42.0	38.0	20.0	LOAM
0105S09522	SB-5	0 - 12	7.9	28.0	0.30	1.98	0.68	0.47	0.41	50.0	32.0	18.0	LOAM
0105S09523	SB-5	12 - 30	8.3	35.3	0.59	1.04	0.65	4.06	4.42	31.0	47.0	22.0	LOAM
0105S09524	SB-5	30 - 56	7.8	36.2	5.65	21.9	19.3	24.3	5.35	39.0	37.0	24.0	LOAM
0105S09525	SB-5	56 - 68	7.9	32.8	5.39	21.4	29.3	18.9	3.75	44.0	38.0	18.0	LOAM
0105S09526	SB-6	0 - 8	8.0	32.0	0.67	2.12	1.03	2.51	2.00	48.0	36.0	16.0	LOAM
0105S09527	SB-6	8 - 17	8.3	31.5	0.53	1.23	0.50	3.74	4.02	52.0	30.0	18.0	SANDY LOAM
0105S09528	SB-6	17 - 29	8.2	31.3	0.42	0.96	0.37	2.96	3.63	38.0	38.0	24.0	LOAM

These results only apply to the samples tested.

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

Reviewed: Joey Shepley
Joey Shepley, Soils Lab Supervisor

Inter-Mountain Laboratories, Inc.

Report ID: 010509502

1633 Terra Avenue
Sheridan, WY 82801

OCT 11 2005

Soil Analysis Report

Canyon Fuel Co

Dugout Mine -Canyon Fuel

P.O. Box 1029

Wellington, UT 84542

Client Project ID: Dugout Canyon

Date Received: 10/12/05

Set #0105S09502

Report Date: 11/28/05

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

These results only apply to the samples tested.

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

Review Joey Shepley

Joey Shepley, Soils Lab Supervisor

Inter-Mountain Laboratories, Inc.

1633 Terra Avenue
Sheridan, WY 82801

OCT 11 2006

Report ID: 010509502

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

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

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

Lab Id	Sample Id	Depths (Inches)	Boron ppm	Nitrogen Nitrate ppm	TKN %	Selenium ppm	Available Sodium meq/100g	Exchangeable Sodium meq/100g
0105S09502	SB-1	0 - 5	0.24	1.22	0.09	<0.02	0.10	0.09
0105S09503	SB-1	5 - 13	0.45	0.26	0.13	<0.02	0.26	0.22
0105S09504	SB-1	13 - 32	0.67	0.02	0.08	<0.02	1.24	0.81
0105S09505	SB-1	32 - 54	0.55	0.36	0.09	0.14	1.51	0.85
0105S09506	SB-1	54 - 78	0.41	1.70	0.06	0.16	0.73	0.40
0105S09507	SB-2	0 - 8	0.12	0.90	0.08	<0.02	0.09	0.08
0105S09508	SB-2	8 - 15	0.17	0.40	0.09	<0.02	0.08	0.07
0105S09509	SB-2	15 - 26	0.12	0.24	0.06	<0.02	0.13	0.12
0105S09510	SB-2	26 - 48	0.26	0.16	0.09	<0.02	0.22	0.17
0105S09511	SB-2	48 - 70	1.14	0.26	0.05	0.10	0.60	0.35
0105S09512	SB-3	0 - 6	0.19	3.34	0.06	<0.02	0.08	0.07
0105S09513	SB-3	6 - 18	0.29	0.18	0.08	<0.02	0.39	0.35
0105S09514	SB-3	18 - 38	0.31	0.78	0.08	<0.02	1.61	1.33
0105S09515	SB-3	38 - 45	0.22	3.02	0.07	0.02	1.34	0.72
0105S09516	SB-3	45 - 72	0.23	0.94	0.04	0.02	0.50	0.32
0105S09517	SB-4	0 - 5	0.18	2.46	0.09	<0.02	0.16	0.13
0105S09518	SB-4	5 - 18	0.32	0.32	0.07	<0.02	0.52	0.46
0105S09519	SB-4	18 - 31	0.33	0.18	0.10	<0.02	1.27	1.11
0105S09520	SB-4	31 - 44	0.43	0.40	0.06	0.04	1.05	0.60
0105S09521	SB-4	44 - 64	0.25	0.32	0.06	0.02	1.26	0.72
0105S09522	SB-5	0 - 12	0.24	0.42	0.04	<0.02	0.10	0.09
0105S09523	SB-5	12 - 30	0.32	<0.02	0.08	<0.02	1.10	0.96
0105S09524	SB-5	30 - 56	0.60	0.18	0.05	0.04	2.02	1.14
0105S09525	SB-5	56 - 68	0.51	0.24	0.04	0.28	1.34	0.72
0105S09526	SB-6	0 - 8	0.25	0.76	0.06	<0.02	0.38	0.30
0105S09527	SB-6	8 - 17	0.31	0.28	0.06	<0.02	0.80	0.68
0105S09528	SB-6	17 - 29	0.25	0.10	0.05	<0.02	0.95	0.86

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Miscellaneous Abbreviations: SAR= Sodium Adsorption Ratio, CEC= Cation Exchange Capacity, ESP= Exchangeable Sodium Percentage

Review: Joey Shepley
Joey Shepley, Soils Lab Supervisor

Inter-Mountain Laboratories, Inc.

Report ID: 010509502

1633 Terra Avenue
Sheridan, WY 82801

OCT 11 2006

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

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

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

Lab Id	Sample Id	Depths (Inches)	pH s.u.	Saturation %	EC @ 25°C dS/m	Calcium meq/L	Magnesium meq/L	Sodium meq/L	SAR	Sand %	Silt %	Clay %	Texture
0105S09529	SB-6	29 - 48	7.9	36.8	4.51	19.6	13.3	23.7	5.86	39.0	39.0	22.0	LOAM
0105S09530	SB-6	48 - 68	7.9	33.9	8.38	20.9	48.8	42.4	7.19	39.0	37.0	24.0	LOAM
0105S09531	SB-7	0 - 3	7.9	29.6	0.80	4.46	1.41	1.44	0.84	49.0	38.0	13.0	LOAM
0105S09532	SB-7	3 - 8	8.0	31.1	0.30	1.56	0.64	0.54	0.52	40.0	40.0	20.0	LOAM
0105S09533	SB-7	8 - 23	8.2	29.7	0.41	1.15	0.59	2.13	2.28	39.0	43.0	18.0	LOAM
0105S09534	SB-7	23 - 50	8.0	25.6	4.76	15.8	12.1	29.6	7.93	63.0	19.0	18.0	SANDY LOAM
0105S09535	SB-7	50 - 72	7.8	33.5	5.85	18.8	24.0	30.7	6.64	40.0	36.0	24.0	LOAM
0105S09536	SB-8	0 - 8	7.8	29.0	0.36	2.49	1.01	0.54	0.41	48.0	32.0	20.0	LOAM
0105S09537	SB-8	8 - 16	8.0	31.3	0.28	1.73	0.76	0.44	0.39	43.0	38.0	19.0	LOAM
0105S09538	SB-8	16 - 39	7.8	37.5	2.24	18.9	9.22	3.04	0.81	35.0	41.0	24.0	LOAM
0105S09539	SB-8	39 - 47	7.7	23.8	2.75	21.0	10.7	5.66	1.42	69.0	19.0	12.0	SANDY LOAM
0105S09540	SB-8	47 - 72	7.6	36.9	3.06	22.4	10.9	6.64	1.63	34.0	40.0	26.0	LOAM
0105S09541	SB-9	0 - 7	7.9	38.5	0.37	2.37	0.91	0.43	0.34	30.0	44.0	26.0	LOAM
0105S09542	SB-9	7 - 20	8.3	39.0	0.33	0.90	0.49	2.05	2.46	31.0	47.0	22.0	LOAM
0105S09543	SB-9	20 - 36	8.3	36.3	1.90	2.12	2.91	11.3	7.12	32.0	48.0	20.0	LOAM
0105S09544	SB-9	36 - 72	8.3	34.0	12.2	16.9	63.2	75.5	11.9	42.0	37.0	21.0	LOAM

These results only apply to the samples tested.

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

Reviewed: Joey Shelley
Joey Shelley, Soils Lab Supervisor

Inter-Mountain Laboratories, Inc.

Report ID: 010509502

1633 Terra Avenue
Sheridan, WY 82801

OCT 11 2006

Soil Analysis Report

Canyon Fuel Co

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

Client Project ID: Dugout Canyon

Date Received: 10/12/05

Set #0105S09502

Report Date: 11/28/05

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

These results only apply to the samples tested.

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

Reviewed: Joey Shepley

Joey Shepley, Soils Lab Supervisor

Inter-Mountain Laboratories, Inc.

Report ID: 010509502

1633 Terra Avenue
Sheridan, WY 82801

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Soil Analysis Report

Canyon Fuel Co

Dugout Mine -Canyon Fuel

P.O. Box 1029

Wellington, UT 84542

Client Project ID: Dugout Canyon

Date Received: 10/12/05

Set #0105S09502

Report Date: 11/28/05

Lab Id	Sample Id	Depths (Inches)	Boron ppm	Nitrogen Nitrate ppm	TKN %	Selenium ppm	Available Sodium meq/100g	Exchangeable Sodium meq/100g
0105S09529	SB-6	29 - 48	0.65	0.18	0.07	<0.02	2.08	1.21
0105S09530	SB-6	48 - 68	0.59	0.48	0.05	0.04	2.86	1.42
0105S09531	SB-7	0 - 3	0.24	8.10	0.08	<0.02	0.15	0.11
0105S09532	SB-7	3 - 8	0.23	2.04	0.06	<0.02	0.12	0.10
0105S09533	SB-7	8 - 23	0.30	0.40	0.08	<0.02	0.40	0.34
0105S09534	SB-7	23 - 50	0.30	1.12	0.04	0.02	1.71	0.95
0105S09535	SB-7	50 - 72	0.16	2.24	0.01	<0.02	2.45	1.42
0105S09536	SB-8	0 - 8	0.13	0.74	0.05	<0.02	0.07	0.05
0105S09537	SB-8	8 - 16	0.23	0.22	0.06	<0.02	0.12	0.11
0105S09538	SB-8	16 - 39	0.38	<0.02	0.06	<0.02	0.35	0.24
0105S09539	SB-8	39 - 47	0.13	1.04	0.06	0.02	0.36	0.23
0105S09540	SB-8	47 - 72	0.27	0.50	0.04	0.14	0.64	0.39
0105S09541	SB-9	0 - 7	0.29	1.32	0.09	<0.02	0.11	0.09
0105S09542	SB-9	7 - 20	0.35	<0.02	0.07	<0.02	0.54	0.46
0105S09543	SB-9	20 - 36	0.24	0.08	0.10	0.02	1.79	1.38
0105S09544	SB-9	36 - 72	0.31	0.34	0.05	0.10	5.61	3.04

These results only apply to the samples tested.

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

Review: Joey Shepley

Joey Shepley, Soils Lab Supervisor

Inter-Mountain Laboratories, Inc.

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Soil Analysis Report

Canyon Fuel Co

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

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

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

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

These results only apply to the samples tested.

Abbreviations for extractants: PE= Saturated Paste Extract, H20Sol= water soluble,AB-DTPA= Ammonium Bicarbonate-DTPA, AAO= Acid Ammonium Oxalate
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Reviewed: Joey Shepley
Joey Shepley, Soils Lab Supervisor

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Client Project ID: Dugout Canyon

Set #0105S09502

Date Received: 10/12/05

Report Date: 11/28/05

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

These results only apply to the samples tested.

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Miscellaneous Abbreviations: SAR= Sodium Adsorption Ratio, CEC= Cation Exchange Capacity, ESP= Exchangeable Sodium Percentage

Reviewed by: Joey Shepley
Joey Shepley, Soils Lab Supervisor

Inter-Mountain Laboratories, Inc.

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Set #0105S09502
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Lab Id	Sample Id	Depths (Inches)	Boron ppm	Nitrogen Nitrate ppm	TKN %	Selenium ppm	Available Sodium meq/100g	Exchangeable Sodium meq/100g
0105S09524	SB-5	30 - 56	0.60	0.18	0.05	0.04	2.02	1.14
0105S09524D	SB-5	30 - 56	0.57	0.18	0.05	0.04	2.00	1.08
0105S09536	SB-8	0 - 8	0.13	0.74	0.05	<0.02	0.07	0.05
0105S09536D	SB-8	0 - 8	0.14	0.74	0.05	<0.02	0.07	0.06
0105S09538	SB-8	16 - 39	0.38	<0.02	0.06	<0.02	0.35	0.24
0105S09538D	SB-8	16 - 39	0.39	<0.02	0.06	<0.02	0.35	0.22
0105S09541	SB-9	0 - 7	0.29	1.32	0.09	<0.02	0.11	0.09
0105S09541D	SB-9	0 - 7	0.28	1.34	<0.01	<0.02	0.11	0.10

These results only apply to the samples tested.

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

Reviewed by: Joey Shepley
Joey Shepley, Soils Lab Supervisor

APPENDIX C

Soil Suitability Ratings

INCORPORATED
OCT 11 2006

Table 4. Soil and Spoil Suitability/Unsuitability Evaluation

CRITERIA	GOOD	FAIR	POOR	UNACCEPTABLE
Saturation %	25 to 55	≥56 - 80	<25 >80	
pH	6.5 to 8.2	6.0 to 6.4 8.2 to 8.5	5.5 to 6.0 8.6 to 9.0	< 5.5 > 9.0
EC (mS/cm 25°C)	0 to 4	4 to 8	8 to 15	> 15
SAR [a,b]	0 to 4	5 to 10	10 to 14	> 14
%$CaCO_3$	<15	15 - 30	>30	
Texture [c]	sl, l, sil, scl, vfsl, fsl	c, sicl, sc, ls, lfs	sic, s, sc, c, cos, fs, vfs	g, vcos
Total Organic Carbon	<10%			10%
Available Water Capacity[d]	> 0.10 moderate	0.05 to 0.10 low	< 0.05 very low	
K factor[e]	< 0.37	0.37	> 0.37	

[a] For clay textured soils unacceptable is SAR >14. For sandy textured soils unacceptable is >20.

[b] For most Western soils, the SAR to ESP relationship is usually 1:1, up to ESP ≈ 20. If SAR>20, then determine ESP. (Evangelou, 2000.)

[c] s=sand, l= loam, si= silt, c= clay, v= very, f= fine, co=coarse, g=gravel

[d] Available Water Capacity is adjusted for texture and SAR.

[e] K factor recommendations from the USDA Soil Conservation Service.1978. National Soils Handbook Notice 24. (3/31/78). NSH Part II –403.6(a). For Prime Farmland soils, the K factor times the percent slope should be a value of five or less for minimal erosion hazard.

Table 9. Acidity/Toxicity Evaluation

PARAMETERS	UNACCEPTABLE LEVELS
Soluble Selenium	≥ 0.15 mg/kg [1] ≥0.10 mg/kg [2,3]
Available Boron	≥5.0 mg/kg
Acid/Base Potential	≤ 0 tons $CaCO_3$ /1000 tons overburden

[1] unacceptable level for the rooting zone (top four feet of fill) and/or ephemeral drainages with 100 year flood plains, top 4 feet fill

[2] unacceptable level for the top 4 feet of fill in surface-water impoundments.

[3] unacceptable level for intermittent/perennial drainages including 100 year flood plains

Ref: Guidelines for Management of Topsoil and Overburden, R645-301-200 SOILS, Utah Division of Oil, Gas and Mining, Draft June 2003

INCORPORATED

OCT 11 2006

r·Mountain Laboratories, Inc.

ort ID: 010509502

1633 Terra Avenue
Sheridan, WY 82801

OCT 11 2006

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

Copy with suitability notes

Ratings are good for selected parameters unless noted as Fair, poor, or unacceptable

nt Project ID: Dugout Canyon
Received: 10/12/05

Set #0105S09502
Report Date: 11/17/05

d	Sample Id	Depths (Inches)	pH s.u.	Saturation %	EC @ 25°C dS/m	Calcium meq/L	Magnesium meq/L	Sodium meq/L	SAR	Sand %	Silt %	Clay %	Texture
)9502	SB-1	0 - 5	7.6	33.1	0.38	2.64	0.93	0.24	0.18	33.0	45.0	22.0	LOAM
)9503	SB-1	5 - 13	7.8	37.3	0.33	1.34	0.71	1.19	1.17	26.0	48.0	26.0	LOAM
)9504	SB-1	13 - 32	7.9	40.4	2.12	7.85	5.07	10.7	4.20 F	37.0	41.0	22.0	LOAM
)9505	SB-1	32 - 54	7.6	37.9	4.83 F	25.8	16.9	17.5	3.78	36.0	38.0	26.0	LOAM
)9506	SB-1	54 - 78	7.7	35.5	4.00 F	20.6	24.0	9.25	1.96	42.0	42.0	16.0	LOAM
)9507	SB-2	0 - 8	7.7	31.4	0.39	3.15	0.67	0.33	0.24	47.0	37.0	16.0	LOAM
)9508	SB-2	8 - 15	7.7	29.7	0.30	2.89	0.73	0.26	0.20	50.0	30.0	20.0	LOAM
)9509	SB-2	15 - 26	7.8	30.2	0.22	1.57	0.42	0.46	0.46	43.0	37.0	20.0	LOAM
)9510	SB-2	26 - 48	7.7	46.4	0.83	6.30	1.51	1.01	0.51	14.0	58.0	28.0	SILTY CLAY LOAM (F)
)9511	SB-2	48 - 70	7.7	43.6	3.43	21.5	21.3	5.68	1.23	19.0	55.0	26.0	SILT LOAM
)9512	SB-3	0 - 6	7.8	30.6	0.46	3.03	1.20	0.27	0.19	40.0	42.0	18.0	LOAM
)9513	SB-3	6 - 18	7.9	35.9	0.33	1.54	0.91	1.00	0.91	35.0	39.0	26.0	LOAM
)9514	SB-3	18 - 38	8.2 F	38.0	1.05	1.81	0.92	7.50	6.42 F	36.0	42.0	22.0	LOAM
)9515	SB-3	38 - 45	7.8	25.0	4.19 F	19.5	10.7	24.7	6.36 F	72.0	15.0	13.0	SANDY LOAM
)9516	SB-3	45 - 72	7.6	33.4	2.46	12.5	7.17	5.25	1.67	40.0	41.0	19.0	LOAM
)9517	SB-4	0 - 5	7.8	36.6	0.42	2.14	0.82	0.71	0.58	30.0	44.0	26.0	LOAM
)9518	SB-4	5 - 18	8.2 F	32.5	0.35	1.00	0.47	1.87	2.18	43.0	37.0	20.0	LOAM
)9519	SB-4	18 - 31	8.4 F	36.0	0.63	0.96	0.54	4.36	5.04 F	38.0	41.0	21.0	LOAM
)9520	SB-4	31 - 44	7.9	26.3	4.52 F	19.1	22.5	17.0	3.72	70.0	14.0	16.0	SANDY LOAM
)9521	SB-4	44 - 64	7.7	33.4	4.57 F	21.7	18.3	16.1	3.59	42.0	38.0	20.0	LOAM
)9522	SB-5	0 - 12	7.9	28.0	0.30	1.98	0.68	0.47	0.41	50.0	32.0	18.0	LOAM
)9523	SB-5	12 - 30	8.3 F	35.3	0.59	1.04	0.65	4.06	4.42	31.0	47.0	22.0	LOAM
)9524	SB-5	30 - 56	7.8	36.2	5.65 F	21.9	19.3	24.3	5.35 F	39.0	37.0	24.0	LOAM
)9525	SB-5	56 - 68	7.9	32.8	5.39 F	21.4	29.3	18.9	3.75	44.0	38.0	18.0	LOAM
)9526	SB-6	0 - 8	8.0	32.0	0.87	2.12	1.03	2.51	2.00	48.0	36.0	16.0	LOAM
)9527	SB-6	8 - 17	8.3 F	31.5	0.53	1.23	0.50	3.74	4.02	52.0	30.0	18.0	SANDY LOAM
)9528	SB-6	17 - 29	8.2 F	31.3	0.42	0.96	0.37	2.96	3.63	38.0	38.0	24.0	LOAM

results only apply to the samples tested. All Good 6.5-8.1 = Good; 8.2-8.5 = Fair; <4 = Good; 4 to 8 = Fair; <4 = Good; 5 to 10 = Fair; L + SL = Good; SCL = Fair

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

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Joey Shelley, Soils Lab Supervisor

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nt Project ID: Dugout Canyon
Received: 10/12/05

Set #0105S09502
Report Date: 11/17/05

AWC = FC - WP

vfs acts like silt
very fine sand content is high

d	Sample Id	Depths (Inches)	Very Fine Sand %	Field Capacity %	Avail Water Cap %	Wilt Point %	TOC %	Total Sulfur %	T.S. AB t/1000t	Neutral. Pot. t/1000t	T.S. ABP t/1000t	Very fine sand + silt %	Total sand minus vfs %	Particle size Class
09502	SB-1	0 - 5	20.9	23.1	11.4	9.5	0.3	<0.01	0.00	157	157	65.9	12.1	Fine silty
09503	SB-1	5 - 13	23.2	25.4	12.6	12.8	0.3	0.01	0.31	167	166	71.2	2.8	Fine silty
09504	SB-1	13 - 32	28.6	23.9	11.2	12.7	<0.1	<0.01	0.00	148	148	69.6	8.4	Fine silty
09505	SB-1	32 - 54	27.6	24.8	12.4	12.4	0.2	0.44	13.7	141	127	65.2	8.4	Fine silty
09506	SB-1	54 - 78	33.2	26.1	19.8	6.3	<0.1	0.01	0.31	154	153	75.2	8.8	Coarse silty
09507	SB-2	0 - 8	28.2	21.6	15.1	6.5	0.3	<0.01	0.00	136	136	65.2	18.8	Fine silty
09508	SB-2	8 - 15	23.6	17.2	9.6 F	7.6	<0.1	0.01	0.31	146	145	53.6	26.4	Fine loamy
09509	SB-2	15 - 26	29.4	21.8	14.3	7.5	0.6	0.01	0.31	146	145	66.4	13.6	Fine silty
09510	SB-2	26 - 48	13.4	29.4	13.3	16.1	0.9	0.01	0.31	180	180	71.4	0.6	Fine silty
09511	SB-2	48 - 70	15.6	26.9	13.5	13.4	<0.1	0.30	9.37	163	154	70.6	3.4	Fine silty
09512	SB-3	0 - 6	23.0	23.2	14.5	8.7	1.4	0.01	0.31	148	148	65.0	17.0	Fine loamy
09513	SB-3	6 - 18	24.3	22.8	12.2	10.6	0.2	<0.01	0.00	164	164	63.3	10.7	Fine silty
09514	SB-3	18 - 38	24.8	21.0	9.7 F	11.3	0.3	0.01	0.31	146	146	66.8	11.2	Fine silty
09515	SB-3	38 - 45	15.5	13.1	7.9 F	5.2	<0.1	<0.01	0.00	181	181	30.5	56.5	Coarse loamy
09516	SB-3	45 - 72	24.5	24.5	17.0	7.5	0.2	0.01	0.31	159	158	65.5	15.5	Fine loamy
09517	SB-4	0 - 5	21.9	24.8	13.4	11.4	0.3	0.01	0.31	164	164	65.9	8.1	Fine silty
09518	SB-4	5 - 18	22.7	23.0	13.6	9.4	0.3	<0.01	0.00	165	165	59.7	20.3	Fine loamy
09519	SB-4	18 - 31	26.7	22.2	10.7	11.5	0.2	<0.01	0.00	155	155	67.7	11.3	Fine silty
09520	SB-4	31 - 44	13.5	17.3	11.4	5.9	<0.1	<0.01	0.00	184	184	27.5	56.5	Coarse loamy
09521	SB-4	44 - 64	28.2	25.0	16.4	8.6	0.2	<0.01	0.00	154	154	66.2	13.8	Fine silty
09522	SB-5	0 - 12	24.1	19.0	11.7	7.3	0.3	0.01	0.31	165	165	56.1	25.9	Fine loamy
09523	SB-5	12 - 30	21.5	22.9	12.9	10.0	0.3	0.01	0.31	144	144	68.5	9.5	Fine silty
09524	SB-5	30 - 56	25.4	24.3	13.3	11.0	0.2	0.36	11.2	155	144	62.4	13.6	Fine silty
09525	SB-5	56 - 68	28.8	23.3	14.6	8.7	0.1	0.32	10.0	139	129	66.8	15.2	Fine loamy
09526	SB-6	0 - 8	31.3	20.0	11.2	8.8	0.4	0.01	0.31	166	165	67.3	16.7	Coarse loamy
09527	SB-6	8 - 17	28.7	17.4	8.4 F	9.0	0.4	<0.01	0.00	158	158	58.7	23.3	Fine loamy/c.l.
09528	SB-6	17 - 29	21.1	19.1	7.8 F	11.3	0.2	0.02	0.62	155	154	59.1	16.9	Fine loamy

results only apply to the samples tested.

>10% = Good
5 to 10% = Fair
<10% = Good

All acceptable

iations for extractants: PE= Saturated Paste Extract, H20Sol= water soluble,AB-DTPA= Ammonium Bicarbonate-DTPA, AAO= Acid Ammonium Oxalate
iations used in acid base accounting: T.S.= Total Sulfur, AB= Acid Base, ABP= Acid Base Potential, PyrS= Pyritic Sulfur, Pyr+Org= Pyritic Sulfur + Organic Sulfur, Neut. Pot.= Neutralization Potential
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Joe Shelley, Soils Lab Supervisor

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P.O. Box 1029

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it Project ID: Dugout Canyon

Received: 10/12/05

Set #0105S09502

Report Date: 11/17/05

d	Sample Id	Depths (Inches)	Boron ppm	Nitrogen Nitrate ppm	TKN %	Selenium ppm	Available Sodium meq/100g	Exchangeable Sodium meq/100g
)9502	SB-1	0 - 5	0.24	1.22	0.09	<0.02	0.10	0.09
)9503	SB-1	5 - 13	0.45	0.26	0.13	<0.02	0.26	0.22
)9504	SB-1	13 - 32	0.67	0.02	0.08	<0.02	1.24	0.81
)9505	SB-1	32 - 54	0.55	0.36	0.09	high 0.14	1.51	0.85
)9506	SB-1	54 - 78	0.41	1.70	0.06	0.16 *U	0.73	0.40
)9507	SB-2	0 - 8	0.12	0.90	0.08	<0.02	0.09	0.08
)9508	SB-2	8 - 15	0.17	0.40	0.09	<0.02	0.08	0.07
)9509	SB-2	15 - 26	0.12	0.24	0.06	<0.02	0.13	0.12
)9510	SB-2	26 - 48	0.26	0.16	0.09	<0.02	0.22	0.17
)9511	SB-2	48 - 70	1.14	0.26	0.05	0.10	0.60	0.35
)9512	SB-3	0 - 6	0.19	3.34	0.06	<0.02	0.08	0.07
)9513	SB-3	6 - 18	0.29	0.18	0.08	<0.02	0.39	0.35
)9514	SB-3	18 - 38	0.31	0.78	0.08	<0.02	1.61	1.33
)9515	SB-3	38 - 45	0.22	3.02	0.07	0.02	1.34	0.72
)9516	SB-3	45 - 72	0.23	0.94	0.04	0.02	0.50	0.32
)9517	SB-4	0 - 5	0.18	2.46	0.09	<0.02	0.16	0.13
)9518	SB-4	5 - 18	0.32	0.32	0.07	<0.02	0.52	0.46
)9519	SB-4	18 - 31	0.33	0.18	0.10	<0.02	1.27	1.11
)9520	SB-4	31 - 44	0.43	0.40	0.06	0.04	1.05	0.60
)9521	SB-4	44 - 64	0.25	0.32	0.06	0.02	1.26	0.72
)9522	SB-5	0 - 12	0.24	0.42	0.04	<0.02	0.10	0.09
)9523	SB-5	12 - 30	0.32	<0.02	0.08	<0.02	1.10	0.96
)9524	SB-5	30 - 56	0.60	0.18	0.05	0.04	2.02	1.14
)9525	SB-5	56 - 68	0.51	0.24	0.04	0.28 *U	1.34	0.72
)9526	SB-6	0 - 8	0.25	0.76	0.06	<0.02	0.38	0.30
)9527	SB-6	8 - 17	0.31	0.28	0.06	<0.02	0.80	0.68
)9528	SB-6	17 - 29	0.25	0.10	0.05	<0.02	0.95	0.86

results only apply to the samples tested. All acceptable @ < 5.0

*U= Unacceptable > 0.15

riations for extractants: PE= Saturated Paste Extract, H20Sol= water soluble,AB-DTPA= Ammonium Bicarbonate-DTPA, AAO= Acid Ammonium Oxalate

riations used in acid base accounting: T.S.= Total Sulfur, AB= Acid Base, ABP= Acid Base Potential, PyrS= Pyritic Sulfur, Pyr+Org= Pyritic Sulfur + Organic Sulfur, Neut. Pot.= Neutralization Potential

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Soils Lab Supervisor

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Received: 10/12/05

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i	Sample Id	Depths (Inches)	pH s.u.	Saturation %	EC @ 25°C dS/m	Calcium meq/L	Magnesium meq/L	Sodium meq/L	SAR	Sand %	Silt %	Clay %	Texture
9529	SB-6	29 - 48	7.9	36.8	4.51 F	19.6	13.3	23.7	5.86 F	39.0	39.0	22.0	LOAM
9530	SB-6	48 - 68	7.9	33.9	8.38 P*	20.9	48.8	42.4	7.19 F	39.0	37.0	24.0	LOAM
9531	SB-7	0 - 3	7.9	29.6	0.80	4.46	1.41	1.44	0.84	49.0	38.0	13.0	LOAM
9532	SB-7	3 - 8	8.0	31.1	0.30	1.56	0.64	0.54	0.52	40.0	40.0	20.0	LOAM
9533	SB-7	8 - 23	8.2 F	29.7	0.41	1.15	0.59	2.13	2.28	39.0	43.0	18.0	LOAM
9534	SB-7	23 - 50	8.0	25.6	4.76 F	15.8	12.1	29.6	7.93 F	63.0	19.0	18.0	SANDY LOAM
9535	SB-7	50 - 72	7.8	33.5	5.85 F	18.8	24.0	30.7	6.64 F	40.0	36.0	24.0	LOAM
9536	SB-8	0 - 8	7.8	29.0	0.36	2.49	1.01	0.54	0.41	48.0	32.0	20.0	LOAM
9537	SB-8	8 - 16	8.0	31.3	0.28	1.73	0.76	0.44	0.39	43.0	38.0	19.0	LOAM
9538	SB-8	16 - 39	7.8	37.5	2.24	18.9	9.22	3.04	0.81	35.0	41.0	24.0	LOAM
9539	SB-8	39 - 47	7.7	23.8 P*	2.75	21.0	10.7	5.66	1.42	69.0	19.0	12.0	SANDY LOAM
9540	SB-8	47 - 72	7.6	36.9	3.06	22.4	10.9	6.64	1.63	34.0	40.0	26.0	LOAM
9541	SB-9	0 - 7	7.9	38.5	0.37	2.37	0.91	0.43	0.34	30.0	44.0	26.0	LOAM
9542	SB-9	7 - 20	8.3 F	39.0	0.33	0.90	0.49	2.05	2.46	31.0	47.0	22.0	LOAM
9543	SB-9	20 - 36	8.3 F	36.3	1.90	2.12	2.91	11.3	7.12 F	32.0	48.0	20.0	LOAM
9544	SB-9	36 - 72	8.3 F	34.0	12.2 P*	16.9	63.2	75.5	11.9 P*	42.0	37.0	21.0	LOAM

6.5 To 8.1 = Good
8.2 To 8.5 = Fair

< 4 = Good
4 To 8 = Fair
8 To 15 = Poor

< 4 = Good
5 To 10 = Fair
10 To 14 = Poor

L + SL = Good

Saturation %
< 25 = Poor
25 To 55 Is Good

esults only apply to the samples tested.

ations for extractants: PE= Saturated Paste Extract, H20Sol= water soluble,AB-DTPA= Ammonium Bicarbonate-DTPA, AAO= Acid Ammonium Oxalate
ations used in acid base accounting: T.S.= Total Sulfur, AB= Acid Base, ABP= Acid Base Potential, PyrS= Pyritic Sulfur, Pyr+Org= Pyritic Sulfur + Organic Sulfur, Neut. Pot.= Neutralization Potential
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ı	Sample Id	Depths (Inches)	Very Fine Sand %	Field Capacity %	Avail. Water Cap %	Wilt Point %	TOC %	Total Sulfur %	T.S. AB t/1000t	Neutral. Pot. t/1000t	T.S. ABP t/1000t	Very Fine Sand + Silt %	Total Sand - VFS %	Particle Size Class
9529	SB-6	29 - 48	24.9	23.6	11.0	12.6	0.2	0.12	3.75	127	124	63.9	14.1	Fine silty
9530	SB-6	48 - 68	23.9	24.2	13.1	11.1	0.2	0.28	8.75	143	134	60.9	15.1	Fine loamy
9531	SB-7	0 - 3	30.8	20.8	13.9	6.9	0.5	0.01	0.31	153	153	68.8	18.2	Coarse loamy
9532	SB-7	3 - 8	26.2	21.9	11.6	10.3	0.3	0.01	0.31	163	162	66.2	15.4	Coarse loamy
9533	SB-7	8 - 23	24.6	21.2	11.8	9.4	0.3	0.01	0.31	168	168	67.6	14.4	Fine silty
9534	SB-7	23 - 50	12.4	15.1	7.6 F	7.5	<0.1	<0.01	0.00	197	197	31.4	50.6	Coarse loamy /FL at boarder
9535	SB-7	50 - 72	21.0	21.6	10.5	11.1	0.2	0.02	0.62	141	140	57.0	19.0	Fine loamy
9536	SB-8	0 - 8	27.8	21.1	12.2	8.9	1.2	<0.01	0.00	168	168	59.8	20.2	Fine loamy
9537	SB-8	8 - 16	28.1	23.2	13.3	9.9	0.3	0.01	0.31	155	155	66.1	14.9	Fine silty
9538	SB-8	16 - 39	26.9	25.3	13.0	12.3	0.3	0.01	0.31	139	139	67.9	8.1	Fine silty
9539	SB-8	39 - 47	16.1	14.5	8.7 F	5.8	<0.1	0.03	0.94	195	194	35.1	52.9	Coarse loamy
9540	SB-8	47 - 72	24.3	26.3	14.5	11.8	0.3	0.02	0.62	146	145	64.3	9.7	Fine silty
9541	SB-9	0 - 7	21.0	24.3	12.1	12.2	0.4	<0.01	0.00	153	153	65.0	9.0	Fine silty
9542	SB-9	7 - 20	21.4	23.4	10.3	13.1	0.3	0.01	0.31	163	162	68.4	9.6	Fine silty
9543	SB-9	20 - 36	21.3	22.9	10.8	12.1	<0.1	<0.01	0.00	162	162	69.3	10.7	Fine silty
9544	SB-9	36 - 72	23.1	22.5	11.3	11.2	0.1	0.33	10.3	150	139	60.1	13.9	Fine silty

Very fine sand is a high proportion of the total sand in most of these soils It is grouped with silt for many interpretations

AWC
>10% = Good
5 to 10% = Fair

All acceptable
> 0

·esults only apply to the samples tested.

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

ved By: Joey Sheeley

Inc[illegible]ov, Soils Lab Supervisor

·Mountain Laboratories, Inc.

ort ID: 010509502

1633 Terra Avenue
Sheridan, WY 82801

OCT 11 2005

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

t Project ID: Dugout Canyon
Received: 10/12/05

Set #0105S09502
Report Date: 11/17/05

I	Sample Id	Depths (Inches)	Boron ppm	Nitrogen Nitrate ppm	TKN %	Selenium ppm	Available Sodium meq/100g	Exchangeable Sodium meq/100g
9529	SB-6	29 - 48	0.65	0.18	0.07	<0.02	2.08	1.21
9530	SB-6	48 - 68	0.59	0.48	0.05	0.04	2.86	1.42
9531	SB-7	0 - 3	0.24	8.10	0.08	<0.02	0.15	0.11
9532	SB-7	3 - 8	0.23	2.04	0.06	<0.02	0.12	0.10
9533	SB-7	8 - 23	0.30	0.40	0.08	<0.02	0.40	0.34
9534	SB-7	23 - 50	0.30	1.12	0.04	0.02	1.71	0.95
9535	SB-7	50 - 72	0.16	2.24	0.01	<0.02	2.45	1.42
9536	SB-8	0 - 8	0.13	0.74	0.05	<0.02	0.07	0.05
9537	SB-8	8 - 16	0.23	0.22	0.06	<0.02	0.12	0.11
9538	SB-8	16 - 39	0.38	<0.02	0.06	<0.02	0.35	0.24
9539	SB-8	39 - 47	0.13	1.04	0.06	0.02	0.36	0.23
9540	SB-8	47 - 72	0.27	0.50	0.04	0.14 ✓	0.64	0.39
9541	SB-9	0 - 7	0.29	1.32	0.09	<0.02	0.11	0.09
9542	SB-9	7 - 20	0.35	<0.02	0.07	<0.02	0.54	0.46
9543	SB-9	20 - 36	0.24	0.08	0.10	0.02	1.79	1.38
9544	SB-9	36 - 72	0.31	0.34	0.05	0.10	5.61	3.04

All acceptable @ < 5.0

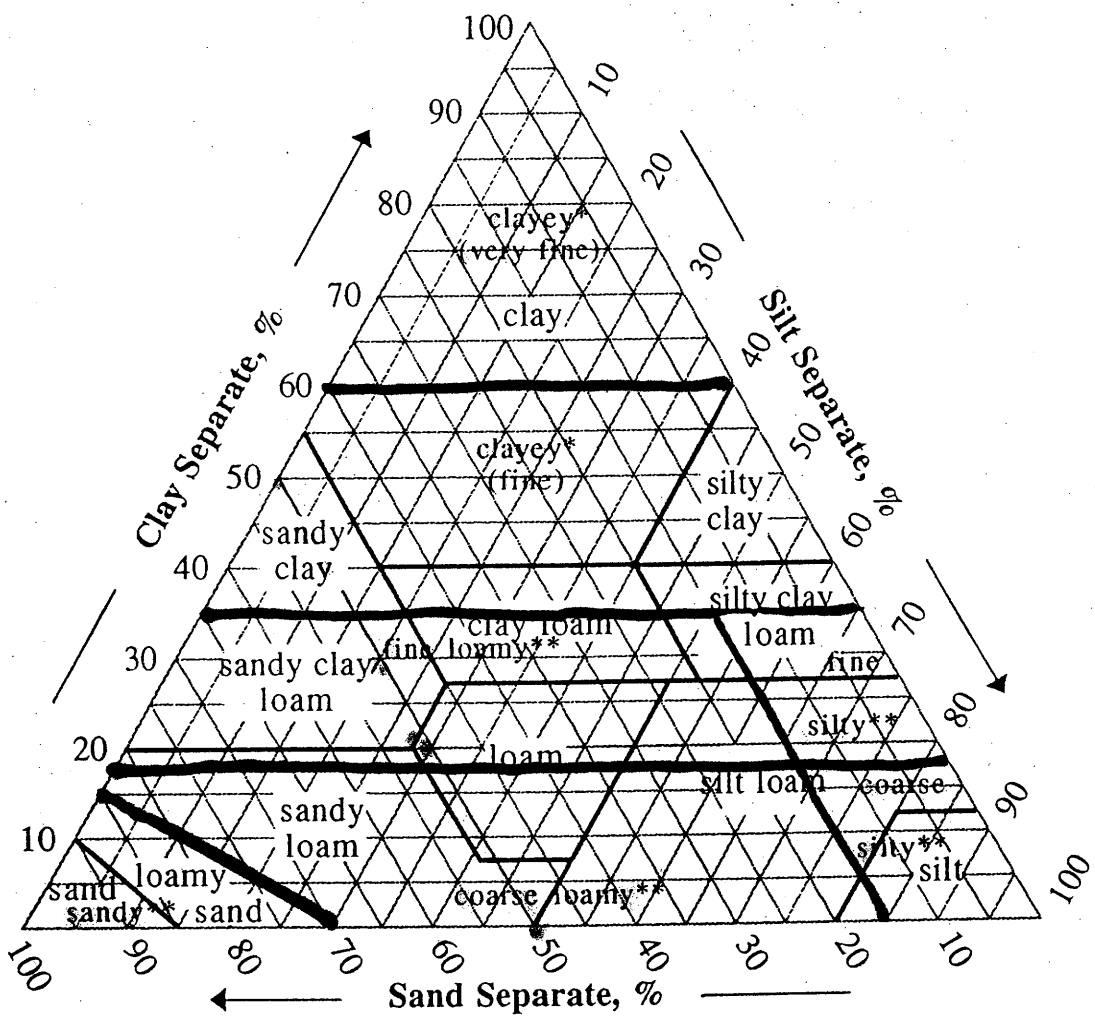
.014 is high but not unacceptable U = > 0.15

esults only apply to the samples tested.

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

ed By: Joey Shelley
Joey [illegible] Soils Lab Supervisor

GUIDE FOR TEXTURAL CLASSIFICATION IN SOIL FAMILIES



* Clay-size carbonate is treated as silt.

** Very fine sand (0.05 - 0.1 is treated as silt for family groupings; coarse fragments are considered the equivalent of coarse sand in the boundary between the silty and loamy classes.

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COMPARISON OF PARTICLE SIZE SCALES

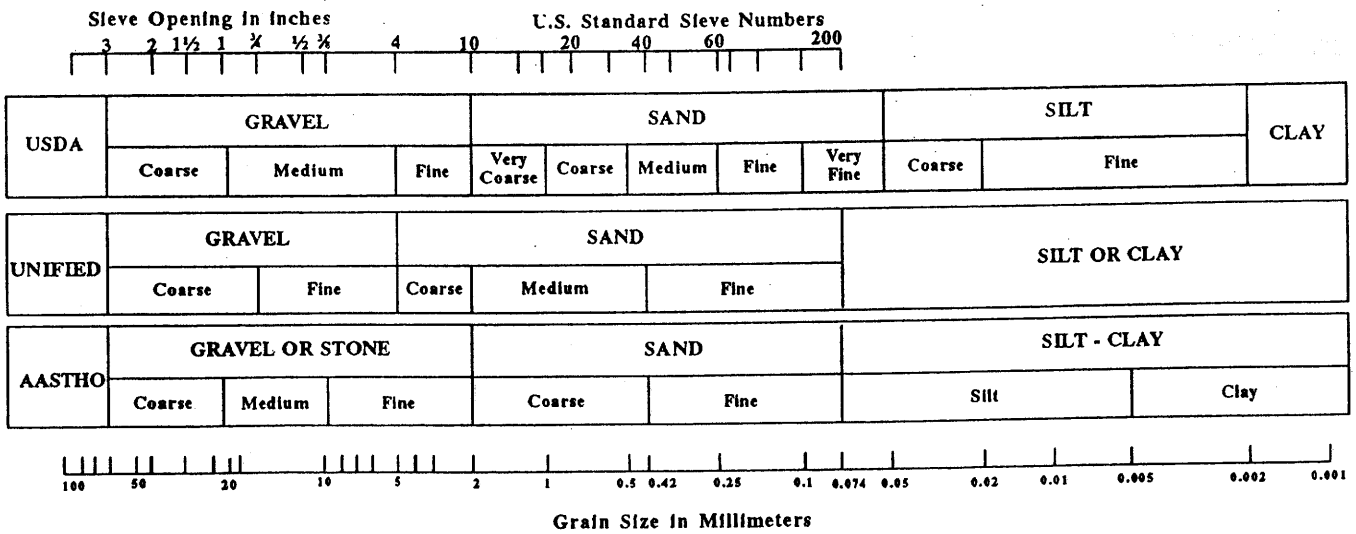
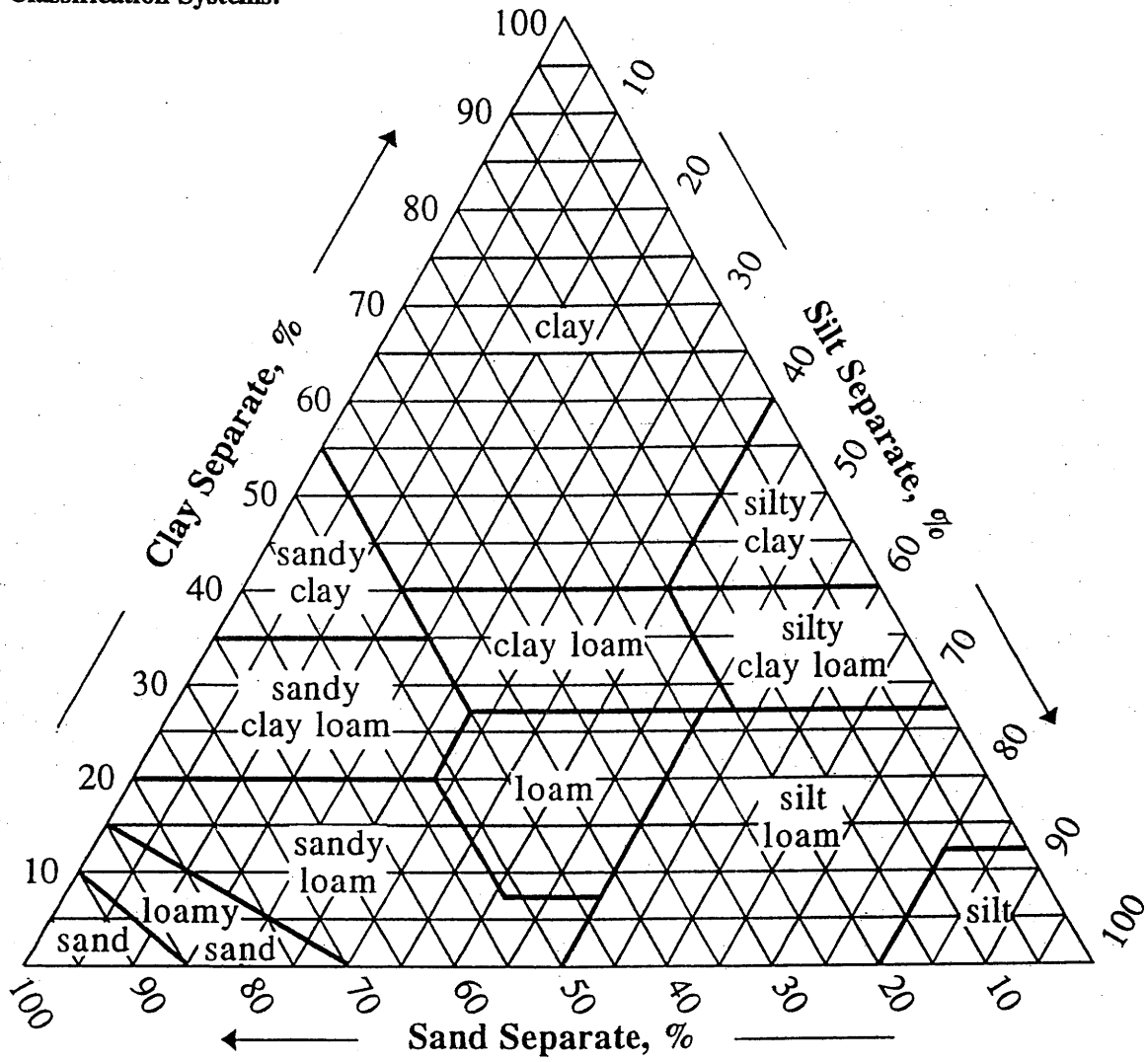
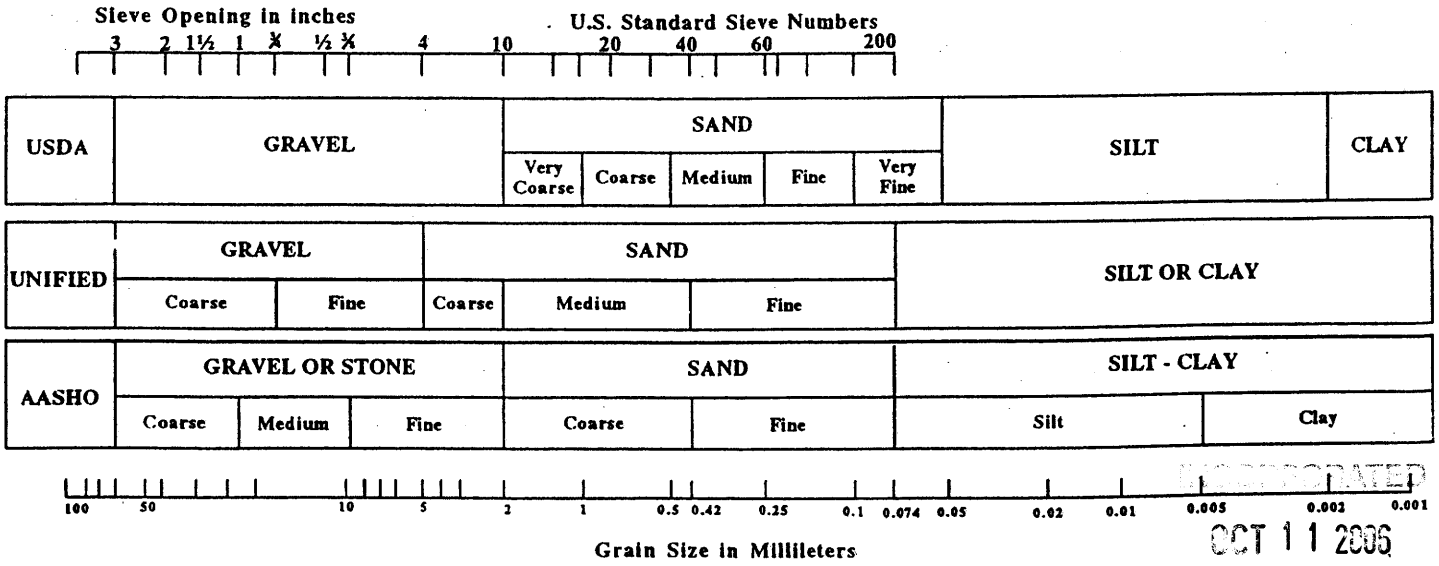


Exhibit 618-8 Texture Triangle and Particle-Size Limits of AASHTO, USDA, and Unified Classification Systems.



COMPARISON OF PARTICLE SIZE SCALES



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APPENDIX D

Soil Profile Descriptions
Carbon Area Soil Survey Mapping Information

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Field Soil Profile Description Notations

This is a guide to assist in understanding the notations on the soil description forms. These are not all inclusive but are meant to apply to common situations in the mountains and foothills of central Utah.

Horizon:

Standard letter designations used for soil layers. Commonly used designations are:

A	Surface layer usually of dark color due to accumulation of organic matter; topsoil.
B	Altered soil layer, often associated with subsoil.
	BT – Increase in clay
	BK – Increase in carbonates
	BW – Color or structure change
C	Relatively unaltered parent materials from which the soils have formed.
R	Hard bedrock; as sandstone
CR	Soft bedrock; as shale

A "B" horizon may have dark colors and have high to moderate amounts of organic matter but be designated as a "B" horizon due to soil changes as noted above.

Depth:

Depth interval of the soil layer. Usually expressed in inches unless noted otherwise.

Color:

Dry and moist colors are based on the Munsell Soil Color Chart and give the hue, value, and chroma. Connotative color descriptions may be added.

Texture:

Texture and texture modifier abbreviations

S	Sand	SCL	Sandy	CB	Cobbly	GR.	Gravely
LS	Loamy Sand	CL	Clay Loam	CBV	Very Cobbly	GRV	Very Gravely
SL	Sandy Loam	SICL	Silty Clay Loam	CBX	Extremely Cobbly	GRX	Extremely Gravel
L	Loam	SIC	Silty Clay	CN	Channery	SH	Shaley
SIL	Silt Loam	C	Clay	CNV	Very Channery		
SI	Silt			CNX	Extremely Channery		

Structure:

Grade		Size		Type	
W	Weak	VF	Very Fine	PL	Platy
M	Moderate	F	Fine	GR	Granular
S	Strong	M	Medium	SBK	Subangular Blocky
		CO	Coarse	ABK	Angular Blocky
		VCO	Very Course	PR	Prismatic
				W	Weak Massive
				S	Strong Massive
				SG	Single Grained

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Consistency:

Dry		Moist		Wet	
LO	Loose	LO	Loose	NS	Non Sticky
SO	Soft	VFR	Very Friable	SS	Slightly Sticky
SH	Slightly Hard	FR	Friable	S	Sticky
H	Hard	FI	Firm	VS	Very Sticky
VH	Very Hard	VFI	Very Firm	NP	Non Plastic
EH	Extremely Hard	EFI	Extremely Firm	SP	Slightly Plastic
				P	Plastic
				VP	Very Plastic

Reaction:

Effervescence (10% HCL)		pH	Reaction Class
		5.1 – 5.5	Strongly Acid
		5.6 – 6.0	Moderately Acid
EO	Non-Effervescent	6.1 – 6.5	Slightly Acid
SE	Slightly Effervescent	6.6 – 7.3	Neutral
EM	Moderately Effervescent	7.4 – 7.8	Mildly Alkaline
ES	Strongly Effervescent	7.9 – 8.4	Moderately Alkaline
EV	Violently Effervescent	8.5 – 9.0	Strongly Alkaline
		> 9.0	Very Strongly Alkaline

Horizon Boundaries:

Distinctness

A Abrupt (<2 cm thick)
C Clear (2 to 5 cm thick)
G Gradual (5 to 15 cm thick)
D Diffuse (>15 cm thick)

Topography

S Smooth (the boundary is a plane with few or no irregularities)
W Wavy (the boundary has undulations in which depressions are wider than they are deep).
I Irregular (the boundary has pockets that are deeper than they are wide)
B Broken (at least one of the horizons or layers separated by the boundary is discontinuous and the boundary is interrupted).

Rock Fragments: Expressed in percent by volume by size.

GR	Gravel	BL	Boulders
CB	Cobbles	CN	Channers
ST	Stones	FL	Flagstone

Roots: Roots are described in terms of quantity and size. Quantity is given first followed by the size class.

Quantity		Size	
F	Few	VF	Very Fine
C	Common	F	Fine
M	Many	M	Medium
		CO	Course

Quantity classes of roots are defined in terms of numbers of each size per unit area. One (1) square centimeter for very fine and fine roots and one (1) square decimeter for medium and coarse roots.

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Few:	Less than 1 per unit area of the specified size
Common:	1 to 5 per unit area of the specified size
Many:	more than 5 per unit area of the specified size

The size classes are:

Very Fine:	Less than 1 mm in diameter
Fine:	1 to 2 mm in diameter
Medium:	2 to 5 mm in diameter
Coarse:	5 mm or larger in diameter

Roots larger than 10 mm in diameter may be described separately.

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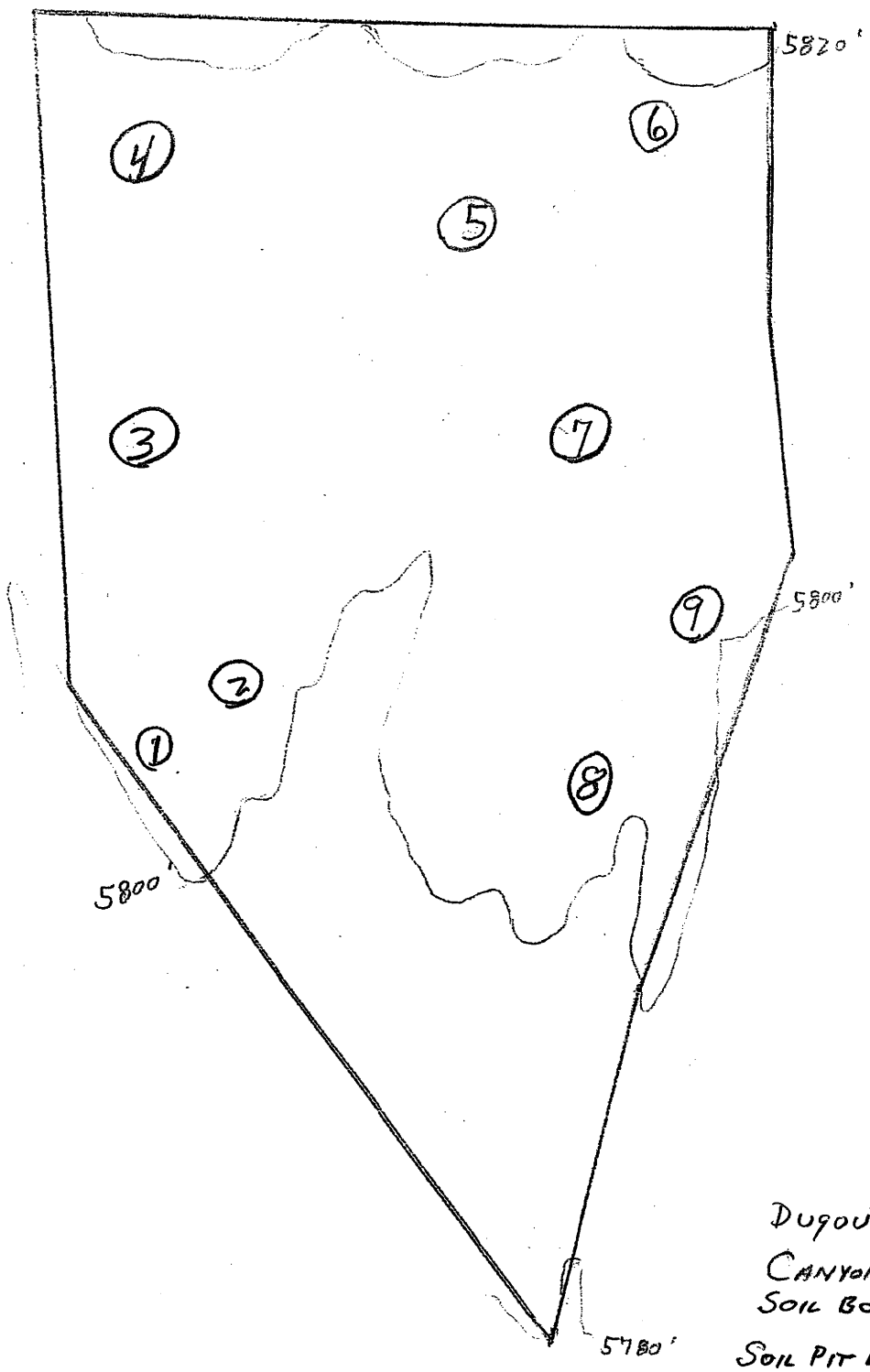

Dugout Canyon Mine
Canyon Fuel Co.
Soil Borrow Site
Soil Pit Locations

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Div. of Oil, Gas & Mining

SCS-SOILS-232G

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL DESCRIPTION Dugout Soil Borrow

Soil type Ravola Carbon Area M.U. 91

File No. SB1

Area Dugout Mine Soil Borrow Site Carbon Co., UT | Date 10/5/05 | By: D. Larsen | Stop No.

Classification Fine-silty, mixed, active, calcareous, mesic Typic Torrifluvent

Location SB1, SE corner S17, T14S, R12E

N. veg. (or crop) Sagebrush, Indian vinegars, salt bush | Climate Aridic Mesic

Parent material Alluvium

Physiography Alluvial fan, bottom (Clark Valley)

Relief Gentle | Drainage Well drained | Salt or alkali

Elevation about 5800 feet | Gr. water | Stoniness

Slope 4% | Moisture Mostly dry

Aspect South | Root distrib. | % Clay *

Erosion Gullied | % Coarse fragments * | % Coarser than V.F.S. *

Permeability Moderate

Additional notes

Sterling Miller Backhoe operator (Scamp Excavation)

12-36" many cicada casts (holes)

Samples SB1 0-5
5-13
13-32
32-54
54-78

Some columnar structure in B-horizon

* Control section average

Horizon	Depth inches	Color Dry	Color Moist	Texture	Structure	Consistence Dry	Consistence Moist	Consistence Wet	Reaction Lab pH	Boundary	% Rock Fragments	Root Distribution	Carbonates
A1	0-5	pale brown 2.5Y 6/3 to	2.5Y 4/3-5/3 light olive brown	* Loam	MFGR	SO	FR	S/P	es 7.6	CW	<5% few small gravel	many fine	-
AB	5-10	10YR 6/3 light yellowish brown	2.5Y 5/3	Loam	WM SBK	SH	FR-FI	S/P	es 7.8	CW	"	Common fine + med.	-
BK1	10-13			Loam	MM SBK	H	FI	S/P	es 7.8	gw	"	"	few light patches
BK2	13-32	No obs. dif. except for light spots		Loam		H	VFI	S/P	ev 7.9	gw	"	Common to few fine-med	common light patches
BK3	32-54	Appears to be highest in carbonates (36-48)	2.5YR 5/3 to 10YR 4/4	Loam-SICL	SM SBK	VH	VFI	VS/P	ev 7.6	gw	"	very few	Abundant white patches
BK4	54-72			Loam	MM SBK			S/P	ev 7.7	CW		"	common
BC	72-80	light yellowish br. 10YR 6/4	10YR 5/4-2.5Y 5/3	Loam	OM				es			0	not observed

* Loam texture is similar to silt loam

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SOIL CONSERVATION SERVICE

SOIL DESCRIPTION

Soil type Ravola

File No. SB2

Area Dugout Mine Soil Borrow Carbon Co. UT | Date 10/5/05 | By: D. Larsen | Stop No.

Classification

Location SB2, SE center S17, T14S, R12E

N. veg. (or crop) Sagebrush (black?), snakeweed, Indian ricegrass | Climate Aridic Mesic

Parent material Alluvium

Physiography Fan, Alluvial

Relief Gentle	Drainage well drained	Salt or alkali
Elevation About 5810 feet	Gr. water	Stoniness
Slope 3-5%	Moisture	
Aspect South	Root distrib.	% Clay *
Erosion Severe in area Slight at pit site	% Coarse fragments *	% Coarser than V.F.S. *
Permeability Med.		

Additional notes Backhoe pit SB2

Sampled 0-8
8-15
15-26
26-48
48-70

* Control section average

Horizon	Depth inches	Color Dry	Color Moist	Texture	Structure	Consistence Dry	Consistence Moist	Consistence Wet	Reaction	Boundary	% Rock Fragments	Root Distribution	whitish particles Carbonates	Channels
A1	0-3	10YR 6/3-4/5	2.5Y 4/3-5/3 slightly towards 10YR	LOAM	WFPL-WFGR	SO	VFR	SS/SP	es 7.7	CS	5gr	Many fine-v.f. m		
A2	3-8	2.5Y 5/3	"	LOAM	WF-M GR	SO	FR	SS/SP	7.7	CW	10% gr in spots	"		
AB	8-15	"	"	LOAM	WFGR WFSBK	SH	FR-FI	SS/SP	7.7	CW	2-15 gr	Common f-m		
BK1	15-26	2.5Y 6/3	2.5Y 4/3	LOAM	WMSBK-om	SH-H	FI	S/P	7.8	gw	<2	Few-common f-m	Few	
BK2	26-48	2.5Y 5/3 to 2.5Y 8/1	2.5Y 4/2 6/3 mixed patches (white	SILTY CLAY LOAM	MMSBK	H	FI	S/P	7.7	CW	<2	Few	Many	Carbonate concretions
BK3	48-76	"	"	SILT LOAM	MM SBK	H	VFI	S/P	7.7				Abundant	

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U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL DESCRIPTION

Soil type

File No. SB3

Area Dugout Mine Soil Borrow Site Carbon Co, UT | Date 10/5/05 | By: D Larsen | Stop No. 3

Classification

Location SB3 west side S17, T14S, R12E

N. veg. (or crop) Saltbush, Indian ricegrass, prickly pear, sage, etc | Climate Aridic Mesic

Parent material Alluvium from sandstone and shale

Physiography Alluvial fan, valley (Clarks Valley)

Relief Gentle | Drainage Well drained | Salt or alkali

Elevation About 5815' | Gr. water | Stoniness

Slope 3-5% | Moisture Dry Throughout

Aspect South | Root distrib. | % Clay *

Erosion Moderate. | % Coarse fragments * | % Coarser than V.F.S. *

Permeability Moderate

Additional notes

Samples: 0-6
SB3 6-18
18-38
38-45 gravelly
45-72

Less carbonate patches
Than in SB1 and SB2

* Control section average

Horizon	Depth inches	Color Dry	Color Moist	Texture	Structure	Consistence Dry	Consistence Moist	Consistence Wet	Reaction Lab pH	Boundary	% Rock Fragments	Root Distribution	Carbonates
A	0-6	2.5Y 6/3	2.5Y 4/3	LOAM	WFPL upper 3" WFGR	SO	FR	SS/SP	es 7.8	cw	<5% gr	Common fine v. fine	
BK1	6-18	"	2.5Y 5/3	LOAM	MMSBK OM	SH-H	FI	S/P	es 7.9	gw	"		common pale spot *
BK2	18-38	2.5Y 6/3	2.5Y 5/3-5/4	LOAM	"	VH	VFI	S/P	es 8.2	cs	"		common 2.5Y 7/2
BK3	38-45	gravelly layer		SANDY LOAM	SG	L	FR	SO/PO	es 7.8	cs	60% Gr	Few f	Des.
BK4	45-74	2.5Y 5/3-6/3	2.5Y 4/3	LOAM	MMSBK OM	H	VFI	S/P	es 7.6		<5% gr		Few Mostly without light spots

*Not as white as some pedons

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U.S. DEPARTMENT OF AGRICULTUR
SOIL CONSERVATION SERVICE

SOIL DESCRIPTION

Soil type

File No. SB4

Area Dugout Canyon Mine Soil Borrow Site | Date 9/5/05 | By: D. Larsen | Stop No.

Classification

Location NW Corner of The Site

N. veg. (or crop) Saltbush, Indian rice grass, prickly pear, sage | Climate Aridic Mesic

Parent material Alluvium from sandstone and shale

Physiography Alluvial fan, valley

Relief Gently sloping | Drainage Well drained | Salt or alkali

Elevation 5815' | Gr. water | Stoniness

Slope 3-5% | Moisture Dry

Aspect South | Root distrib. To about 50" No restrictions | % Clay *

Erosion Moderate, surface | % Coarse fragments * | % Coarser than V.F.S. *

Permeability Moderate

Additional notes Many cicada casts, mostly at 20 to 30 inches

Samples SB4 0-5
5-18
18-31
31-44
44-64

* Control section average

Horizon	Depth inches	Color Dry	Color Moist	Texture	Structure	Consistence Dry	Consistence Moist	Consistence Wet	Reaction Lab.	Boundary	% Rock Fragments	Root Distribution	Carbonates	
A	0-5	2.5Y 6/3	2.5Y 5/3 - 4/3	* LOAM	WF PLATY + WFGR	SO	FR	SS/SP	7.8	CS	<5 Gr	many vf-m		
AB	5-18			LOAM	MM SBK	SH-H	FI	S/P	8.2	gw	5 Gr spot to 20%	common f-m		
BK	18-31			LOAM	MM SBK	VH	VFI	S/P	8.4	CW	<5 Gr	few fine	Few light patches	
BKC1	31-44			Gr-SANDY LOAM	SG-OM	SH	FR	SO/PO	7.9	CW	50 GR <3/4"	very few	+ carbonates on gravel	
BKC2	44-64			LOAM	WM SBK-OM	VH	VFI	S/P	7.7	gw	<5 GR	last at 50"	Few	
C	64-76	2.5Y 5/3 - 6/3	2.5Y 4/3	LOAM	(massive) OM	H	VFI	S/P			<5 GR			

* Field Texture is more like silt loam

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U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL DESCRIPTION

Soil type NRCS M.V. 91 Ravola

File No. SB5

Area Dugout Canyon Mine Soil Borrow Site Carbon Co. UT | Date 10/5/05 | By: D. Larsen | Stop No.

Classification

Location North central portion of site — S17, T14S, R12E

N. veg. (or crop) Shadescale, Indian ricegrass etc. | Climate

Parent material Alluvium from sandstone and shale

Physiography Alluvial Fan; valley

Relief Gentle | Drainage well drained | Salt or alkali

Elevation ≈ 5815 FT | Gr. water | Stoniness

Slope 3-5% | Moisture

Aspect South | Root distrib. | % Clay *

Erosion Moderate | % Coarse fragments * | % Coarser than V.F.S. *

Permeability Moderate

Additional notes

Samples: SB5 0-12" (mixed A-horizons)
12-30"
30-56"
56-68"

@ 5:50PM - Low light for colors

* Control section average

Horizon	Depth inches	Color Dry	Color Moist	Texture	Structure	Consistence Dry	Consistence Moist	Consistence Wet	Reaction (10% HCl) Lab pH	Boundary	% Rock Fragments	Root Distribution	Carbonates	
A1	0-3	2.5Y 6/3	2.5Y 5/3	LOAM	WPGR-WFPL	SO	FR	S/P	es 7.9	CW	5GR	MANY VF-F		
A2	3-8	10YR 6/2	10YR 5/2-4/2	LOAM	MMPL → MMSBK	SH	FI	S/P	es 7.9	CW	5GR	Common VF-M		
A3	8-12	fine gravel and sandy layer 10YR 5/2	10YR 4/2	SANDY LOAM	WPGR-OSGR	SO-LO	FR	SS/SP	es 7.9	CW	40GR fine	Common VF-M		
BK1	12-30	10YR 6/2	10YR 4/3-5/3	LOAM	MM SBK	H	VFI	S/P	es 8.3	GW	25 GR	Common F	1/4 1-1/2" Common Patches	
BK2	30-56	10YR 6/2 spots of 2.5Y 8/1	10YR 4/3	LOAM	SMSBK	VH	VFI	S/P	es 7.8	GW	"	V. Few F	Many at 30-54"	
BK3	56-68	less carbonates and more sand		LOAM	WMSBK to OM			S/P	es 7.9	GW	"	"		
BC	68-78	10YR 5/4-6/4	10YR 4/4	LOAM	OM (Massive)	H	FI	S/P	es 7.8		"			

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U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Canyon Fuel Co.

SOIL DESCRIPTION

Soil type Carbon Co., UT

File No. SB6

Area Dugout Canyon Mine Soil Borrow Site | Date 10/6/05 | By: D. Larsen | Stop No.

Classification

Location Northeast corner of site S17, T14S, R12E

N. veg. (or crop) Shadescale, Indian ricegrass, black sage | Climate Arid to Mesic

Parent material Alluvium from sandstone and shale

Physiography. Alluvial fan, valley (Clark Valley)

Relief Gently sloping	Drainage	Salt or alkali
Elevation About 5820'	Gr. water	Stoniness
Slope 3-5%	Moisture	
Aspect South	Root distrib.	% Clay *
Erosion Moderate	% Coarse fragments *	% Coarser than V.F.S. *

Permeability Moderate

Additional notes

Samples: SB6 0-8"
8-17
17-29
29-48
48-68

High proportion of very fine sand in the sand component

* Control section average

Horizon	Depth Inches	Color Dry	Color Moist	Texture	Structure	Consistence Dry	Consistence Moist	Consistence Wet	Reaction	Boundary	% Rock Fragments	Root Distribution	Carbonates white	Notes
A1	0-4	2.5Y 5/2-6/3	2.5Y 4/3	LOAM	MFGR MFPL	SO	FR	SS/SP	es 8.0	CS	<5GR	Many fine		
A2	4-8		10YR 5/2-4/3	LOAM	MMPL	SH	FI-FR	S/P	8.0	CW	"	Common f-m		
BK1	8-17		10YR 5/3-4/3	SANDY LOAM	WMSBK	H	FI	SS/SP	8.3	GW	"	Com. f-m	Few	Many pores
BK2	17-29		2.5Y 5/3 10YR 5/4	LOAM	M-S MSBK	VH	VFI	S/P	7.9	CW-GW	"	Few	Common	
BK3	29-48		10YR 4/4-5/4	LOAM	SMSBK	VH	VFI	S/P	7.9	GW	"		Many	
BKC	48-80		10YR 5/4	LOAM	WMSBK OM	H	FI	S/P	7.9		"		Few to Com.	

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U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL DESCRIPTION

Soil type Bawola | File No. SB7

Area Dugout Canyon Mine Soil/Borrow Site, Carbon Co, UT | Date 6/6/05 | By: D. Larsen | Stop No.

Classification

Location NE Center portion of site S17, R14S, T12E

N. veg. (or crop) Shadscale, Indian rice grass | Climate Aridic Mesic

Parent material Alluvium from sandstone and shale

Physiography Alluvial fan, valley (Clark Valley)

Relief Gentle slope | Drainage Well drained | Salt or alkali

Elevation ~ 5810 | Gr. water | Stoniness

Slope 3-5 | Moisture

Aspect South | Root distrib. | % Clay *

Erosion Moderate | % Coarse fragments * | % Coarser than V.F.S. *

Permeability Moderate

Additional notes

Samples: SB7 0-3"
3-8"
8-23
23-50
50-72

Fair for Topsoil to 23".

* Control section average

Horizon	Depth inches	Color Dry	Color Moist	Texture	Structure	Consistence Dry	Consistence Moist	Consistence Wet	Reaction Lab. pH	Boundary	% Rock Fragments	Root Distribution	Carbonates	
A1	0-3	2.5Y 6/2 - 6/3	2.5Y 5/3 - 10YR 4/3	LOAM	WFGR	SO	FR	SS/SP	all es 7.9	CS	<5 GR	Common vf-f		
AB	3-8	2.5Y 6/3	2.5Y 4/3 - 10YR 4/3	LOAM	WMPL	SH	FR	S/P	8.0	CW	"	Common vf-m		
BK1	8-23	2.5Y 6/2 - 6/3	2.5Y 5/3 - 4/2	LOAM	OM	H	FI	S/P	8.2	CW	"	Few to common f-m	Few white patches	
BK2	23-56		10YR 4/4 - 2.5Y 4/3	(GRSL) SANDY LOAM	SG Banded	H	FI	SS/SP	8.0	CW	50 GR <2"	Few fine	Common	
BK3	50-72		2.5Y 4/2 - 4/3	LOAM	OM → MMSBK	H	VFI	S/P	7.8	CW	5 GR	V.F.	Common	
BC	72-78		2.5Y 4/3	(GRL) LOAM	OM	H	FI	SS/SP S/P	7.8		40 GR		Few	

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SOIL DESCRIPTION

Soil type

File No. SB8

Area Dugout Canyon Mine Soil Borrow Site Carbon Co, UT | Date 10/6/05 | By: D. Larsen | Stop No.

Classification

Location East side S17, T14S, R12E

N. veg. (or crop) Shadascale Indian rice grass, etc. | Climate Aridic Mesic

Parent material Alluvium from sandstone and shale

Physiography Alluvial fan, valley

Relief Gentle slope | Drainage Well drained | Salt or alkali

Elevation 5800 feet | Gr. water | Stoniness

Slope About 3% | Moisture

Aspect South | Root distrib. | % Clay* ≈ 24%

Erosion Moderate - gullies near | % Coarse fragments* mostly < 5% | % Coarser than V.F.S.*

Permeability Moderate 8" layer of v. gravelly soil

Additional notes

Samples: SB8 0-8"
8-16"
16-39"
39-47 (gravelly)
47-72

* Control section average

Horizon	Depth inches	Color Dry	Color Moist	Texture	Structure	Consistence Dry	Consistence Moist	Consistence Wet	e 10% HCl Reaction Lab. pH	Boundary	% Rock Fragments	Root Distribution	Carbonates
A1	0-4	2.5Y 6/2	2.5Y 5/3	20% c LOAM	WFGR + WFPL	SO	FR	S/P	es 7.8	CW	<5GR	common to many VF-m	
A2	4-8	2.5Y 6/3	2.5Y 5/3	LOAM	MMPL	SH	SFI		7.8	CW	"	"	
AB	8-16	"	"	LOAM	WMSBK	H	FI		8.0	GW	"	Common F-m	Few faint patches
BK1	16-28	"	"	24% c LOAM	MMSBK	VH	VFI		7.8	GW	"	Few	Few to common
BK2	28-39		2.5Y 4/3-5/3	LOAM	MMSBK	VH	VFI		7.8	AS	"		Common patches + streaks
BK3	39-47	gravelly layer		VGR SANDY LOAM	OM-SGR	SH-L	FR-FI	SS/SP	7.7	AD Disc.	50GR	V. Few	"
BK4-BT	47-73		2.5Y 4/3-5/3	26% c LOAM *	MCABK	VH	VFI		7.6		5GR		Common distinct small patches
C	73-83		slightly browner 10YR 4/4	LOAM	OM → WMSBK	H	FR				<5GR		

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U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL DESCRIPTION

Soil type

File No. SB9

Area Dugout Canyon Mine Soil Borrow Site, Carbon Co., UT | Date 10/6/05 | By: D. Larsen | Stop No.

Classification

Location East edge near center of site S17, T14S, R12E

N. veg. (or crop) Shadescale, Indian ricegrass, blacksage | Climate Arid to Mesic

Parent material Alluvium from sandstone and shale

Physiography Alluvial fan, valley (Clark Valley - NW corner)

Relief Gentle | Drainage Well drained | Salt or alkali

Elevation About 5800 ft. | Gr. water | Stoniness

Slope 3% - 5% | Moisture Mostly dry - slightly moist at 36-50"

Aspect South | Root distrib. Mostly upper 36" High carb. | % Clay *

Erosion Moderate (gullies nearby) | % Coarse fragments | % Coarser than V.F.S. *

Permeability Moderate

Additional notes

Samples: SB9 0-7"
7-20"
20-36"
36-84"

Many cicada casts at 15 to 30"

* Control section average

Horizon	Depth inches	Color Dry	Color Moist	Texture	Structure	Consistence Dry	Consistence Moist	Consistence Wet	Reaction	Boundary	% Rock Fragments	Root Distribution	Carbonates
A	0-7	2.5Y 5/2	2.5Y 4/2	26%c LOAM	WFGR + WMPL	SO-SH	FR	S/P	es 7.9	CS	<5% GR	Common To many VF-M	
AB	7-20	2.5Y 6/3 - 10YR 6/2	10YR 4/4 - 2.5Y 4/2	LOAM	MF-M SBK	H	FI	S/P	8.3	GS	"	Common F-M	
BK1	20-36	2.5Y 6/3	2.5Y 4/2	LOAM	MMSBK	VH	FI	S/P	8.3	GW	"	Few Fine	Few Faint patches
BK2	36-84	10YR 6/3	2.5Y 4/2 - 10YR 5/3	21%c LOAM	MMSBK OM	VH	FI	S/P	8.3		"	V. Few	Abundant prominant white patches and streaks

60-70% si + vfs

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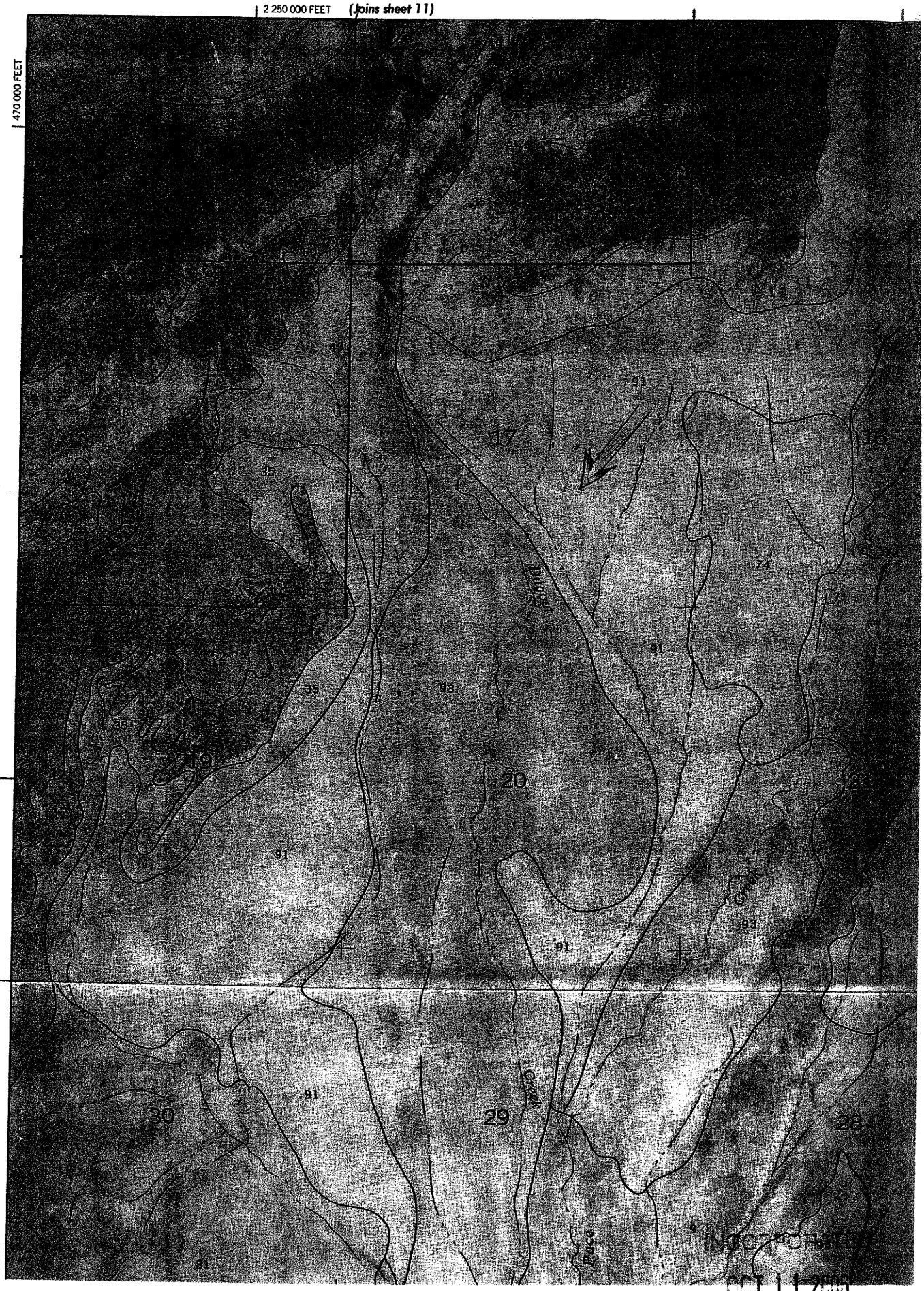

Carbon Area Soil Survey

Topsoil Borrow Area

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The potential plant community on the Ravola soil is 50 percent grasses, 10 percent forbs, and 40 percent shrubs. Among the important plants are galleta, Indian ricegrass, shadscale, and winterfat.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, a planned grazing system, and proper location of water developments. Severe drought may adversely affect the production of the perennial vegetation. Partial or total removal of livestock from the range may be necessary.

It is not practical to revegetate large areas of this unit because of the low annual precipitation. For critical erosion control, small areas can be mechanically treated and seeded. Native plants are suitable for critical area seedings.

If areas of this unit are irrigated, suitable management practices used to maintain or improve the area include conservation cropping systems with rotations of alfalfa hay, small grain, and corn. To maintain production, crop residue should be incorporated into the soil and fertilizer should be applied.

Irrigation water can be applied by the sprinkler or flood method. Fields can be leveled.

This map unit is in capability unit IIe-2, irrigated, and in capability subclass VIIe, nonirrigated. It is in the Desert Loam range site.

91—Ravola loam, 1 to 6 percent slopes, eroded. This very deep, well drained soil is on alluvial fans and narrow valley floors. It extends from Helper to Wellington and south to the Carbon-Emery county line. It formed in alluvium derived dominantly from sandstone and shale. Slopes are dominantly 3 to 6 percent, 100 to 300 feet long, and concave to convex. The vegetation in areas not cultivated is mainly galleta, shadscale, and some greasewood. Elevation is 5,300 to 6,000 feet. The average annual precipitation is 6 to 8 inches, the average annual air temperature is 48 to 50 degrees F, and the average freeze-free period is 115 to 140 days.

Typically, the surface layer is light brownish gray loam about 2 inches thick. The next layer is light brownish gray loam about 21 inches thick. Below this to a depth of 60 inches or more is light brownish gray silt loam.

Included in this unit are about 5 percent Billings silty clay loam, 5 percent Killpack clay loam, and small areas of Persayo loam. Also included are small areas of Ravola loam, 1 to 3 percent slopes.

Permeability of this Ravola soil is moderate. Available water capacity is about 7.5 to 10.5 inches. The water supplying capacity is 4 to 5 inches in areas not irrigated. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 1 to 3 percent. Runoff is medium, and the hazard of water erosion is moderate. Runoff from adjacent areas has formed gullies in some areas of this soil. The gullies are *V*-shaped, are 4 to 8 feet deep, and in some areas are 100 to 400 feet apart. The hazard of soil blowing is moderate.

This unit is used mainly as rangeland and wildlife habitat. It is also used for irrigated crops and for homesite and urban development.

The potential plant community on the Ravola soil is 50 percent grasses, 10 percent forbs, and 40 percent shrubs. Among the important plants are galleta, Indian ricegrass, shadscale, and winterfat.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, a planned grazing system, and proper location of water developments. Severe drought may adversely affect the production of the perennial vegetation. Partial or total removal of livestock from the range may be necessary.

It is not practical to revegetate large areas of this unit because of the low annual precipitation. For critical erosion control, small areas can be mechanically treated and seeded. Plants that may be suitable for critical area seedings are adapted native plants.

If areas of this unit are irrigated, suitable management practices include conservation cropping systems with rotations of hay or pasture and small grain. Crop residue should be kept on the surface of the soil. Pasture management that incorporates use of a rotation grazing system is best.

Sprinkler irrigation systems provide the best erosion control and the ability to apply irrigation water evenly to the fields. Flood irrigation can also be used if erosion is controlled.

This map unit is in capability unit IIIe-2, irrigated, and in capability subclass VIIe, nonirrigated. It is in the Desert Loam range site.

92—Ravola-Gullied land complex. This map unit is on alluvial fans and dissected narrow valley floors. It is widely distributed throughout the survey area. Some of the larger areas are along Drunkards Wash, Coal Creek, Miller Creek, Gordon Creek, and Soldier Creek. Slopes are 1 to 6 percent. Elevation is 5,300 to 6,000 feet. The average annual precipitation is 6 to 8 inches, the average annual air temperature is 48 to 50 degrees F, and the average freeze-free period is 115 to 140 days.

This unit is 70 percent Ravola loam, 1 to 6 percent slopes, eroded; 20 percent Gullied land; and 10 percent other soils. The Ravola soil is generally on valley floors, and the Gullied land is adjacent to the washes on the bottom of valleys. 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 is about 10 percent Green River silt loam on the bottom of washes. Also included are small areas of Killpack clay loam near the adjacent shale hills.

The Ravola soil is very deep and well drained. It formed in alluvium derived dominantly from shale and sandstone. Slopes are 50 to 150 feet long and are concave to convex. The present vegetation in most areas is mainly shadscale, halogeton, winterfat, yellow

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LOCATION RAVOLA UT+NM CO

Established Series
Rev. RLM/DKR/SSP/WWJ
03/2005

RAVOLA SERIES

The Ravola series consists of very deep, well drained soils that formed in alluvium derived from shale, siltstone, and sandstone. Ravola soils are on alluvial fans and flood plains. Slopes range from 0 to 10 percent. Mean annual precipitation is about 7 inches and the mean annual temperature is about 50 degrees F.

TAXONOMIC CLASS: Fine-silty, mixed, active, calcareous, mesic Typic Torrifluvents

TYPICAL PEDON: Ravola loam under cultivation. (Colors are for dry soil unless otherwise noted.)

Ap1--0 to 6 inches; light brownish gray (2.5Y 6/2) loam, dark grayish brown (2.5Y 4/2) moist; weak coarse subangular blocky structure parting to weak fine subangular blocky; slightly hard, friable, slightly plastic; many fine roots, few coarse roots; common fine and medium pores; strongly effervescent; slightly alkaline (pH 7.8); clear smooth boundary. (2 to 6 inches thick)

Ap2--6 to 9 inches; light brownish gray (2.5Y 6/2) loam, dark grayish brown (2.5Y 4/2) moist; strongly compacted plowpan layer; weak coarse subangular blocky structure parting to weak coarse granular; hard, friable, slightly sticky and slightly plastic; many fine roots; common fine pores; few medium pores; strongly effervescent; slightly alkaline (pH 7.7); clear smooth boundary. (0 to 3 inches thick).

C1--9 to 18 inches; light brownish gray (2.5Y 6/2) loam, dark grayish brown (2.5Y 4/2) moist; weak thin platy structure parting to weak very thin platy; hard, friable, slightly sticky and slightly plastic; few coarse and many fine roots; many medium and common fine pores, strongly effervescent; slightly alkaline (pH 7.7); gradual wavy boundary. (9 to 24 inches thick)

C2--18 to 45 inches; light brownish gray (2.5Y 6/2) loam, dark grayish brown (2.5Y 4/2) moist; weak coarse subangular blocky structure parting to weak medium granular; slightly hard, friable, slightly sticky and slightly plastic; few medium and many fine roots; common medium pores; strongly effervescent; moderately alkaline (pH 7.9); gradual irregular boundary. (6 to 30 inches thick)

C3--45 to 60 inches; light brownish gray (2.5Y 6/2) loam, dark grayish brown (2.5Y 4/2) moist; massive; soft, very friable; few fine roots; few fine pores; strongly effervescent; moderately alkaline (pH 7.9).

TYPE LOCATION: Emery County, Utah; about 1 1/2 miles south and 1/2 mile east of Huntington; located about 2,000 feet west and 600 feet north of the southeast corner of sec. 31, T. 17 S., R. 9 E.

RANGE IN CHARACTERISTICS:
Mean annual soil temperature: 49 to 56 degrees F
Particle-size control section: 18 to 27 percent clay and less than 15 percent sand coarser than very fine sand

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A horizon:
Hue: 10YR to 5Y
Value: 5 to 7 dry, 4 or 5 moist
Chroma: 2 or 4 dry or moist
Texture: loam, clay loam, very fine sandy loam, or silt loam
Calcium carbonate equivalent: 5 to 25 percent
Reaction: slightly to strongly alkaline

C horizon:
Hue: 10YR to 5Y
Value: 5 to 7 dry, 4 or 5 moist
Chroma: 2 to 4 dry or moist
Texture: stratified loamy sand to clay loam
Calcium carbonate equivalent: 5 to 25 percent
Reaction: slightly to strongly alkaline

COMPETING SERIES: This is the Billings series. Billings soils have particle-size control sections with 27 to 35 percent clay, and gypsum nodules below the series control section.

GEOGRAPHIC SETTING:
Parent material: alluvium derived from shale, siltstone, and sandstone
Landform: alluvial fans and flood plains
Slopes: 0 to 10 percent
Elevation: 4,500 to 6,000 feet
Mean annual temperature: 47 to 56 degrees F
Mean annual precipitation: 5 to 11 inches
Frost-free period: 110 to 160 days

GEOGRAPHICALLY ASSOCIATED SOILS: These are the competing Billings soils and the Hunting, Killpack, Mayfield, Saltair, and Skumpah soils. Hunting soils have mottles and a water table at depths between 20 and 40 inches. Killpack soils have a paralithic contact between 20 and 40 inches. Mayfield soils have carbonatic mineralogy. Saltair soils contain calcic horizons. Skumpah soils have a natric horizon. are poorly drained

DRAINAGE AND PERMEABILITY: well drained, negligible to medium runoff, moderate or moderately slow permeability. These soils are subject to occasional brief flooding following high intensity summer thunderstorms.

USE AND VEGETATION: Irrigated areas are used for growing small grains, corn, sugar beets, alfalfa, and pasture. Potential vegetation is shadscale, greasewood, Indian ricegrass, and galleta.

DISTRIBUTION AND EXTENT: Eastern Utah, northwest New Mexico and western Colorado. LRR D, MLRA 28A, 34, 35, 37. This series is of large extent.

MLRA OFFICE RESPONSIBLE: Lakewood, Colorado

SERIES ESTABLISHED: Emery and Grand Counties, Utah. 1940. Green River Soil Conservation District.

REMARKS: Diagnostic horizons and features recognized in this pedon are:

Ochric epipedon: The zone from 0 to 9 inches. (Ap1 and Ap2)

Classified according to Soil Taxonomy Second Edition, 1999

ADDITIONAL DATA: Lab sampled by NSSL in New Mexico. Pedon number S86NM-045-014.

National Cooperative Soil Survey
U.S.A.

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Hernandez Family

The Hernandez family consists of very deep, well drained, moderately permeable soils on fan terraces. These soils formed in alluvium derived from sandstone and shale. Slope is 1 to 8 percent. Elevation is 5,600 to 7,100 feet. Average annual precipitation is 10 to 14 inches, and average annual air temperature is 45 to 49 degrees F.

These soils are fine-loamy, mixed, superactive mesic ~~Ustollic~~ Ustic ~~Calciorthids~~. Haplocalcids.

Reference pedon of Hernandez family, 3 to 8 percent slopes, about 4.5 miles northwest of Sunnyside Junction, about 1,000 feet south and 800 feet east of the northwest corner of sec. 19, T. 14 S., R. 12 E.

A1—0 to 3 inches; brown (7.5YR 5/4) loam, dark brown (7.5YR 4/2) moist; weak fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine, common fine, and few medium roots; many fine and few medium pores; moderately calcareous; disseminated calcium carbonate; moderately alkaline (pH 8.2); abrupt smooth boundary.

B2—3 to 14 inches; brown (7.5YR 5/4) loam, dark brown (7.5YR 4/2) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine, fine, and medium roots; common fine and few medium pores; moderately calcareous; disseminated calcium carbonate; moderately alkaline (pH 8.4); clear smooth boundary.

C1ca—14 to 39 inches; light brown (7.5YR 6/4) loam, brown (7.5YR 5/4) moist; moderate medium subangular blocky structure; hard, firm, slightly sticky and plastic; few very fine and fine roots; common fine and few medium pores; strongly calcareous; thin coatings of calcium carbonate on faces of peds; strongly alkaline (pH 8.8); gradual wavy boundary.

C2ca—39 to 60 inches; pink (7.5YR 7/4) loam, brown (7.5YR 5/4) moist; massive; hard, firm, slightly sticky and plastic; few very fine and fine roots; common fine and few medium pores; strongly calcareous; thin coatings of calcium carbonate on faces of peds; strongly alkaline (pH 9.0).

Secondary calcium carbonate is at a depth of 9 to 17 inches.

A horizon: Hue is 7.5YR or 10YR, value is 5 or 6 when dry, and chroma is 2 to 4. Texture is loam or very fine sandy loam.

B horizon: Hue is 7.5YR or 10YR, value is 5 or 6 when dry and 4 or 5 when moist, and chroma is 2 to 4.

Cca horizon: Hue is 7.5YR or 10YR, value is 6 to 8 when dry and 5 to 7 when moist, and chroma is 3 or 4. Calcium carbonate equivalent is 15 to 35 percent.

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APPENDIX E

Photographs of Site and Soil Profiles
Soil Pit Locations

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

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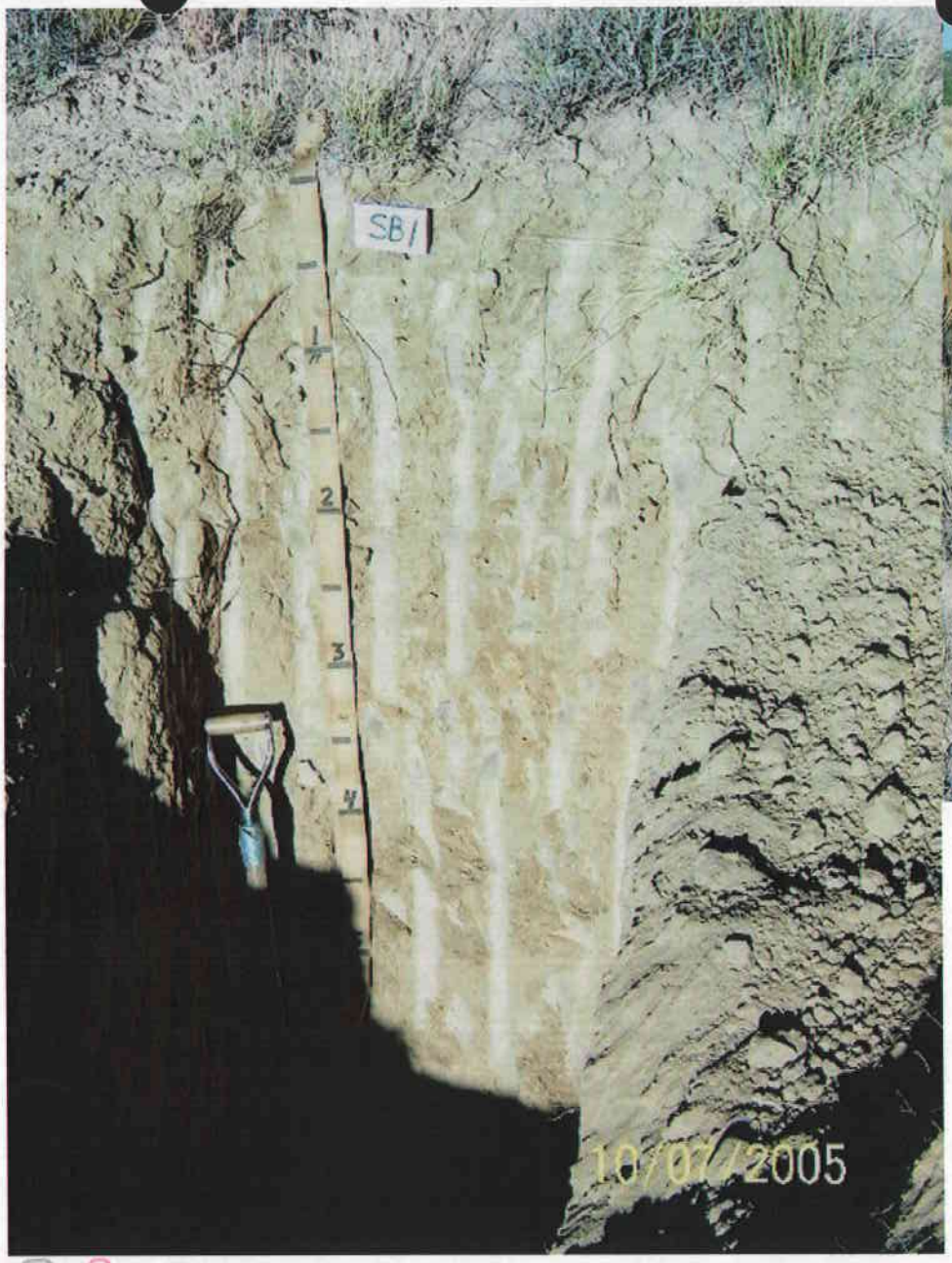

Soil Borrow Area – Sample Pit SB 1

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Soil Borrow Area – Sample Pit SB 2

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Soil Borrow Area – Sample Pit SB 3

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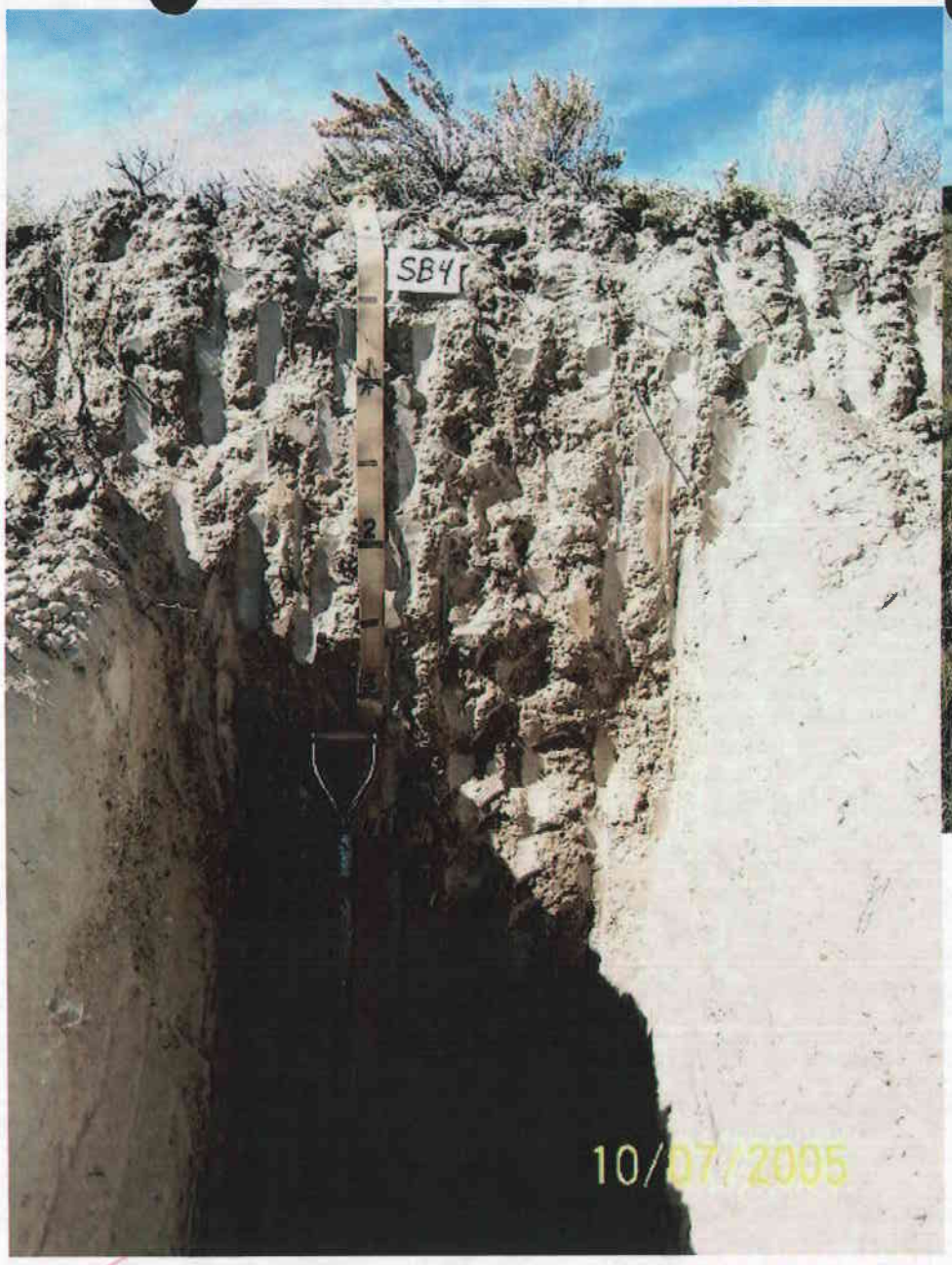

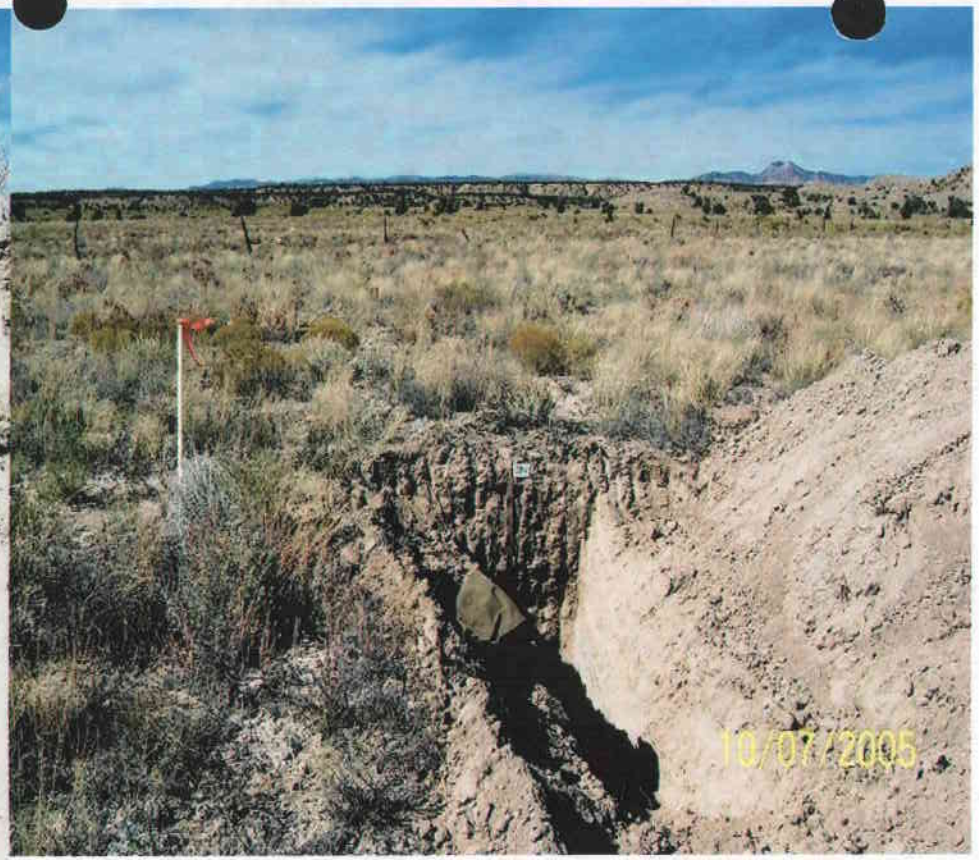

Soil Borrow Area – Sample Pit SB 4

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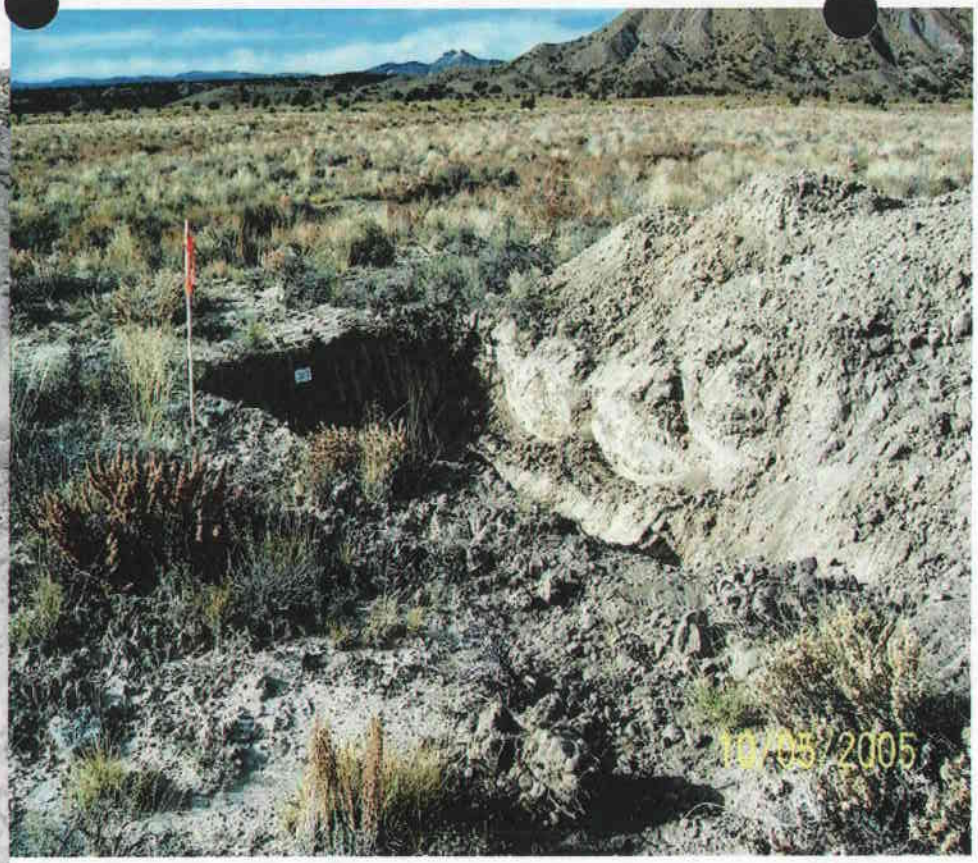

Soil Borrow Area – Sample Pit SB 5

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Soil Borrow Area – Sample Pit SB 6

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Soil Borrow Area – Sample Pit SB 7

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Soil Borrow Area – Sample Pit SB 8

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Soil Borrow Area – Sample Pit SB 9

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CHAPTER 3

BIOLOGY

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9/19/06 copy of
RA Figures / also
includes the Dugout
Reference Area map
Plate 3-1E
as additional map
For any changes that A RA,
Plate 3-1E must be changed

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CHAPTER 3
BIOLOGY

310 INTRODUCTION

This chapter presents a description of the biological resources found in the Dugout Canyon Refuse Pile and adjacent areas.

311 Vegetative, Fish and Wildlife Resources

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

312 Potential Impact to Vegetative, Fish and Wildlife Resources

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

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.

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320 ENVIRONMENTAL DESCRIPTION

321 Vegetation Information

This section contains the environmental descriptions of the vegetation for the refuse pile and adjacent areas.

321.100 Plant Communities Within the Proposed Permit Area

The site proposed for the refuse pile had been previously disturbed for the excavation of gravel. Most recently the gravel from the pit was used in the construction of the "Carbon County" Dugout Canyon Road (1998 - 1999). During May of 1998, the area designated for the refuse pile site construction was surveyed by Patricia Johnston and George S. Cook and determined to be a Black sagebrush/galleta grass and Pinyon - Juniper, semi-desert shallow loam site. George S. Cook of the NRCS surveyed the conditions and production of the area; his finding is defined in Section 321.200. The report and survey for the area are included in RA Attachment 3-1.

Vegetation communities of the permit area are discussed in the approved M&RP with the exception of the Sagebrush - Grass which is discussed below. Vegetation communities adjacent to the refuse pile site are shown on RA Figure 3-1. Photographs of the Refuse Pile area prior to the 1998 gravel mining are included in RA Attachment 3-1.

The grasses in the community include Salina wildrye and galleta grass. The dominant forb was buckwheat (Eriogonum).

<u>Sagebrush - Grass</u>

The sagebrush - grass vegetation type is a community found mingled within the pinyon - juniper communities primarily on south and east facing steep rocky slopes along the base of the Book Cliffs. In the area of the refuse pile this community is found on upland benches and flats.

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Sagebrush - grass is considered a transitional vegetation type and exhibits a greater abundance of perennial grasses than the pinyon-juniper vegetation type found within the area. In the area of the refuse pile the main grass species are Salina wildrye (Elymus salinus), Blue grama (Bouteloua gracilis), Fescue (Festuca octoflora) and galleta (Hilaria jamesii). The most abundant shrubs are black sagebrush (Artemisia nova arbuscula) and shadscale (Atriplex confertifolia). Some juniper and pinyon were recorded during the survey, however the forbs recorded were scarce in this community. The community plant cover averaged 36%, the cover being predominately grasses, with shrubs a close second.

321.200 Land Productivity Prior to Mining

The land productivity of the area to be disturbed by refuse storage activities was measured by George S. Cook prior to being disturbed for the excavation of gravel for the county road. Although the surveyed area shown on RA Figure 3-1 is larger than the refuse pile permit area, the vegetation throughout the survey area is similar.

To clarify the information provided in the June 8, 1998, letter from George S. Cook (RA Attachment 3-1), the two areas identified are the reference area and the refuse pile area. At the time of Mr. Cook's survey the refuse pile area was being surveyed as a potential borrow site thus the identifying title of "borrow area" in the letter. In addition, what we have currently chosen as the reference area was being investigated as the topsoil storage area for the borrow area and/or the Dugout Mine.

At the time of the survey, the production for the reference area was 460, with a potential of 500 and the production for the refuse pile was 500 with a potential of 550. Production was based on air-dry weight of total herbage produced per acre.

During September 2002 a second vegetation survey of the reference area was completed by Patrick Collins, Mt. Nebo Scientific, Inc. This survey represented an inventory of the reference area in the fourth year of drought conditions, whereas the survey done in 1998 does not represent drought conditions. The production number for the reference area was not reevaluated during the 2002 survey and the quantities will remain as inventoried in 1998.

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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 322.300 of the approved M&RP. There are no water sources within the refuse pile permitted area to support fish.

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. There are no water sources within the refuse pile permitted area to support fish.

322.200 Site-specific Resource Information

Eight permanent experimental and four permanent control wildlife transects were established in the permit and adjacent areas by UDWR in December 1979 (Appendix 3-2 of the approved M&RP). During 1995 - 1996 an environment assessment (EA) for a Carbon County Road Right-of-Way UTU-73293 was prepared by Environmental Industrial Services for the BLM. The road right-of-way borders the refuse pile site and the studies associated with the EA included land within 0.5 miles of the right-of-way, which included the refuse pile site.

Raptors. Raptor nest surveys were done in the general area by the UDWR 1995, 1997, 1998, and 1999. The 2002 survey included the area of the refuse pile site, no nests were found within the flight path. Refer to the 2002 Raptor Survey Dugout Canyon flight map (RA Attachment 3-2).

Two Ferruginous hawk nests were located in Section 8, Township 14 South and Range 12 East during a survey in 1998. One nest was located in the NW¼ and the other nest was located in the SW¼, neither nest is listed on the current UDWR database report. A golden eagle nest was located in the NE1/4 of Section 19. All three nests are over one-half a mile away from the refuse site and should not be affected by activities at the refuse site. A one-half mile area around the refuse pile permit area will be surveyed as part of the 2003 raptor survey and each year thereafter until 2008. In the six years of surveys by the DWR no raptor nests have been located within one-half mile of

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the refuse pile, therefore the survey will be considered finished with the 2008 survey. Refer to the approved M&RP and/or the Dugout Canyon annual reports for copies of other raptor surveys. Information pertaining to the 2002 surveys is included in RA Attachment 3-2.

Threatened and Endangered Plant and Wildlife Species. There are no known threatened and endangered plant and wildlife species within the area to be disturbed. A letter from the UDWR referencing the lack of federally listed threatened or endangered fish or wildlife species is included in Attachment 3-2. Due to the disturbed condition of the land associated with the extraction of gravel, T & E plant species are not likely to exist within the permit area. The refuse pile site does not support habitat for bats or fish.

Habitats of Unusually High Value. The refuse pile site is considered by the UDWR as high value winter range for elk and is considered deer critical winter range.

CFC will comply with the requirements of mitigation and eventual replacement of the resources which may be lost or disturbed during this mining operation, refer to Sections 331, 340, 350, and 762.100 of the approved M&RP and this amendment.

Due to the previous site disturbance for gravel excavation and lack of revegetation, the restoration of the vegetation planned, will be a benefit to the wildlife not previously available.

322.300 Fish and Wildlife Service Review

If requested, CFC 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

Maps are contained within the approved M&RP and this application.

323.100 Location and Boundary of Proposed Reference Area

A reference area has been designated for the refuse pile site, refer to RA Figure 3-1.

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323.200 Elevations and Locations of Monitoring Stations

Refer to the approved M&RP.

323.300 Facilities for Protection and Enhancement

Sections 333.300 and 358.500 of the approved M&RP contain additional discussion pertaining to protective measures to be taken by CFC in behalf of wildlife. CFC plans to enhance the site by seeding a previously disturbed gravel pit site, meeting a success standard associated with an undisturbed reference area and seedlings will be planted in addition to the seed mix.

323.400 Vegetation Type and Plant Communities

Vegetative types and plant communities are outlined on RA Figure 3-2 of this application and on Plates 3-1, 3-1A, 3-1B of the approved M&RP. RA Figure 3-2 shows vegetation types of the surrounding permit area and the area disturbed from the excavation of gravel (refer to fushia hatched lines). The vegetation survey information collected in 1998 was originally compiled in the preparation for using the currently proposed refuse pile site as a borrow area.

330 OPERATION PLAN

331 Measures Taken to Disturb the Smallest Practicable Area

The refuse pile site has been previously disturbed for the excavation of gravel. The gravel was mined by Nelson Construction and used in the construction of the Carbon County Dugout Canyon Road. Following the excavation work, the site was left in a disturbed condition. For the proposed refuse storage activities, only access structures and drainage controls required to maintain the refuse pile or satisfy environmental or safety requirements will be built.

Sections 341.200 describes the seed mixes to be used in final reclamation and interim reclamation. The interim seed mix will be planted to stabilize all areas not actively being utilized on the refuse pile site. The practice will continue until final reclamation grading begins.

332 Description of Anticipated Impacts of Subsidence

No subsidence will occur in this area, as no subsurface extraction will occur.

333 Plan to Minimize Disturbances and Adverse Impacts

Refer to the approved M&RP and to Sections 333.100 through 333.300 below.

333.100 Minimized Disturbance to Endangered or Threatened Species

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

333.200 Species and Habitats

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

333.300 Protective Measures

Refer to the approved M&RP.

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340 RECLAMATION PLAN

See the approved M&RP reclamation plan for additional discussion as specified in this amendment.

341 Revegetation

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.

341.100 Schedule and Timetable

The reclamation timetable and monitoring schedule are outlined in the approved M&RP. The monitoring outlined for the treatment areas is in Section 242.100.

341.200 Descriptions

Species and Amounts of Seed. The areas disturbed at the refuse pile site will be planted with one of the seed mixes listed below:

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Interim Seed Mix (Broadcast Quantities)

SPECIES	# pls/acre	# pls/ft^2
Indian ricegrass	3	11.16
Blue grama	2	33.24
Sheep fescue	2	24.33
Western wheatgrass	4	10.46
TOTAL	11	79.19

The interim seed mix will be used on the substitute topsoil and subsoil stockpiles and any other areas requiring stabilization prior to final reclamation.

Final Reclamation Seed Mix (Broadcast Quantities)

SPECIES	# pls/acre	# pls/ft^2
Grasses, Forbs, and Shrubs		
Galleta grass	4.0	13.77
Indian ricegrass	3.0	11.16
Bottlebrush squirreltail	1.0	4.40
Blue grama	1.0	16.62
Sheep fescue	1.5	12.17
Palmer penstemon	1.0	14.00
Scarlet Globemallow	0.5	5.74
Black sagebrush	1.0	22.26
Wyoming big sagebrush	0.3	17.21
Shadscale	1.0	1.49
TOTAL	14.3	119

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Bareroot Seedlings (200 each per acre)	
Shadscale*	
Black Sagebrush*	
TOTAL	400 per acre

* If available, otherwise substitutions or deletions will be made at the time of reclamation as determined jointly by UDOGM and the permittee.

Pinyon/ Juniper seed/seedlings have not been included in the seed mix or planting plan, but will be allowed to invade the area naturally.

Borrow Area - the Final Reclamation Seed Mix listed above will be planted at the borrow area, with the following exclusions, Palmer Penstemon, Shadscale seeds and no bareroot seedlings.

Method Used for Planting and Seeding. The refuse pile site will be permanently reclaimed section-by-section. Refer to Chapter 5, Sections 536 and 540 for a discussion of the sequence of the construction and contemporaneous reclamation of the refuse pile.

The area will be graded to final contours, and then ripped to relieve compaction. Ripping will be completed to a maximum depth of approximately 2 feet. Final ripping depths will be determined by the materials being ripped, to prevent incorporation of less desirable soil/rock into more productive materials.

Following ripping, stockpiled soil will be applied to the ripped surface and left in a extreme roughened state(pocked and gouged). Prior to seeding, one ton per acre of certified noxious weed free hay will be incorporated into the surface soils to assist in the reduction of wind and water erosion and provide organic matter. Except as noted all areas will be seeded the same.

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Soil samples will be collected and sent to the laboratory for analysis to determine if amendments are necessary. Soil nutrients are discussed further in Section 243. Nutrients will be applied in a single application. On slopes greater than 3:1, the rough, disturbed surface will be treated by traversing a dozer perpendicular to the slope contour to incorporate the nutrients.

All seeds will be broadcast and/or incorporated with a small amount of mulch and applied by hydroseeding equipment. Hydroseeding will be accomplished in two applications, the first being the application of the seed to the soil and the second an application of mulch and tackifier on top of the seed.

Since warm season grasses and cool season grasses are both being planted during the reclamation of the refuse pile area, seeding for final reclamation will be split, warm season grasses will be applied with hydroseeding equipment as described above. Cool season grasses will be broadcast in the late Fall without mulch or tackifier (Personal communication Jerriann Ernstsen, UDOGM, December 20, 2002). Refer to Section 354 for the timing for the seeding.

Mulching Techniques. Following warm season seeding, the seeded areas will be mulched with an organic mulching material. Organic mulch will be applied at the rate of 2000 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 and the approved M&RP.

341.300 Greenhouse Studies, Field Trials or Other Equivalent Studies

Refer to the approved M&RP. Refer to Section 242 for information pertaining to a study of contemporaneous reclamation treatments used to provide justification for the reduction of cover necessary to comply with regulation R645-301-553.252.

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342 Fish and Wildlife

Refer to the approved M&RP. There are no water sources within the refuse pile permitted area to support fish.

342.100 Enhancement Measures

No enhancements are planned other than those described in the approved M&RP.

342.200 Plants Used for Wildlife Habitat

Refer to the approved M&RP.

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 the wildlife of the area. Refer to the approved M&RP. There are no water sources within the refuse pile permitted area to support fish.

Ability to Support and Enhance. Refer to 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 at the present time.

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350 PERFORMANCE STANDARDS

351 General Requirements

CFC 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 performed contemporaneously with refuse storage operations. Two general areas will be contemporaneously reclaimed. These are the soil stockpile and outslope of the refuse pile, once it reaches final configuration. The soil storage area will receive interim seeding following the completion of soil stockpiling. The pile outslope will be covered with soil and seeded with the final vegetation seed mix.

A portion of the refuse pile will receive contemporaneous reclamation, the purpose will be to provide justification for the reduction of cover necessary to comply with regulation R645-301-553.252.

353 Revegetation: General Requirements

A vegetative cover will be established on all reclaimed areas to allow for the designated postmining land use of wildlife habitat and livestock grazing. Refer to Section 411 and the approved M&RP 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

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Native Species. The reclamation vegetative mixture will be comprised of species indigenous to the area and capable of achieving the postmining land use as approved by the Division. Diversity of species should allow ultimate utilization of plants by wildlife and domestic livestock.

The revegetative species will be purchased from suppliers who will certify their percentages of purity, germination, hard seed, and percentages of maximum weed seed content.

Extent of Cover. The vegetative cover will be at least equal in extent to the cover as determined by the reference area sampling as discussed in Section 341.200.

Stabilizing. The vegetative cover mixture is capable of stabilizing the soil surface 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 mixture purchased to revegetate the mine area will contain no poisonous or noxious plant as certified by the seed company(see Section 234.200). No species will be introduced in the area without being approved by the Division.

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353.300 Vegetative Exception

CFC does not require vegetative exception at this time.

353.400 Cropland

The permit area contains no land designated as cropland.

354 Revegetation: Timing

CFC will follow the recommended guidelines for revegetation and planting during the first normal period of favorable planting conditions following replacement of the plant-growth medium.

Since warm season grasses and cool season grasses are both being planted during the reclamation of the refuse pile area, seeding for final reclamation will be split, warm season grasses will be planted between the 1st of June and the 31st of July. Cool season grasses and the remainder of the seed mix (excluding warm season grasses) will be planted during the Fall months.

355 Revegetation: Mulching and Other Soil Stabilizing Practices

Refer to the approved M&RP.

356 Revegetation: Standards for Success

The standards for revegetation success are discussed in this section.

The success of the reclaimed area will be compared with the approved reference area (RA Figure 3-1). During initial 1998 sampling of cover and shrub density the areas compared as follows:

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1998 Survey	Refuse Pile Area Sagebrush/Grass	Reference Area Sagebrush/Grass
Ground Cover	40%	39%
NRCS Production	250 lbs/acre	500 lbs/acre
Shrub-Tree Density/Stocking	2788 stems/acre	5271 stems/acre

Although the areas are not identical, it should be noted that the refuse pile site had been disturbed prior to the initial sampling.

Vegetation cover (1998) of the Pinyon-Juniper on the site was found to be 26.3% and shrub density was 453 plants. The reference area sampled also included Pinyon-Juniper, but not in sufficient quantities to consider it a Pinyon-Juniper reference area. No reference area has been designated for the Pinyon-Juniper site.

The reference area was quantitatively sampled again during the 2002 growing season (RA Attachment 3-1, Mt. Nebo Scientific, Inc.). There are changes of community structure and species composition within the reference area, with the area of lower elevation being dominated by black sagebrush and the slightly higher elevation being dominated by pinyon pine and Utah juniper. These two plant communities have nearly equal distribution in the reference area. The data were combined to provide more meaningful and appropriate standards for final reclamation success.

During the 2002 survey of the reference area the total living cover was 35.30%, 11.80% was overstory cover and 23.50% was understory. Of the understory cover, 68.16% was comprised of woody species, while 2.38% were forbs, and 29.46% were grasses (RA Attachment 3-1, Mt. Nebo Scientific, Inc., Tables 1-A and 1-B).

The success criteria for cover, density and productivity will be determined based upon the values obtained from the reference area sampling.

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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 the refuse pile site compared to the extent of the cover of the reference area and the standards outlined in Section 353.

A reference area was chosen in association with the site's predominantly sagebrush/grass area, see Attachment 3-1. The vegetation studies of the area can be found in Attachment 3-1 to this chapter.

Sampling Techniques. CFC will comply with the standards for success, statistically valid sampling techniques for measuring success, and the approved methods outlined 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 or Pasture Land. The ground cover, stocking and production of living plants on the revegetated area will be at least equal to the reference area. Ground cover, production and

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stocking will be considered equal to the approved success standards when 90% of the success standard is accomplished.

Cropland. There is no area designated as cropland within the refuse pile area.

Fish and Wildlife Habitat. The success of revegetation for fish and wildlife habitat will be determined on the basis of tree and shrub stocking and vegetative ground cover. Minimum stocking and planting arrangements will be those approved by the Division after consultation with other responsible fish and wildlife agencies, on the basis of local and regional conditions. Cover success will not be less than that required to achieve the approved postmining land use.

There are no water sources within the refuse pile permitted area to support fish or their habitat.

Prior to bond release, trees and shrubs on the revegetated site will be healthy and 80% of the plants will have been in place for 60% (6 years) of the applicable minimum period of responsibility.

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

Previously Disturbed Areas. The site parallels the county road and has been used as livestock open range, wildlife habitat, and gravel excavation.

356.300 Siltation Structure Maintenance

Siltation structures will be maintained as discussed in the approved M&RP. For additional details on siltation structures, see Section 742 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 Sections 353 through 357.

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357 Revegetation: Extended Responsibility Period

CFC 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 the year after the disturbed area has been seeded.

357.200 Vegetative Parameters

Vegetation parameters will equal or exceed the approved success standard during the last 2 years of the responsibility period. The success standards are outlined in Section 356 of this amendment and the approved M&RP.

357.300 Husbandry Practices

CFC will comply with Division-approved husbandry practices which are normal conservation practices within the region of the mine. These practices may include disease, pest, and vermin control; and any pruning, reseeding, and transplanting required.

358 Protection of Fish, Wildlife and Related Environmental Values

CFC will minimize disturbances and adverse impacts on fish, wildlife, and their related environments as outlined in Section 333 of the approved M&RP. There are no water sources within the refuse pile permitted area to support fish. See Chapter 7 of the approved M&RP for methods to protect water sources in the area.

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358.100 Existence of Endangered or Threatened Species

Coal mine waste storage and associated operations will not be conducted where they might jeopardize the existence of any endangered or threatened species.

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 RA Attachment 3-3. A copy of the 2002 Raptor Survey map for the area associated with the refuse pile, compiled by the Division of Wildlife Resources is included in RA Attachment 3-2.

358.200 Bald and Golden Eagles

Refer to the approved M&RP.

358.300 Taking of Endangered or Threatened Species

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

358.400 Replacement of Wetland and Riparian Vegetation

The site contains no wetland or riparian vegetation.

358.500 Manmade Wildlife Protection Measure

Electric Power Lines. No utilities will exist at the refuse pile site (see Section 526.200).

Potential Barriers. The refuse pile site will be fenced and have a gated access.

Pond Protection. The sediment pond will contain no hazardous concentrations of toxic-forming material.

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REFERENCES:

Bureau of Land Management. 1996. Environmental Assessment for Carbon County Right-of-Way Application UTU-73293. Environmental Assessment No. UT-066-96-10

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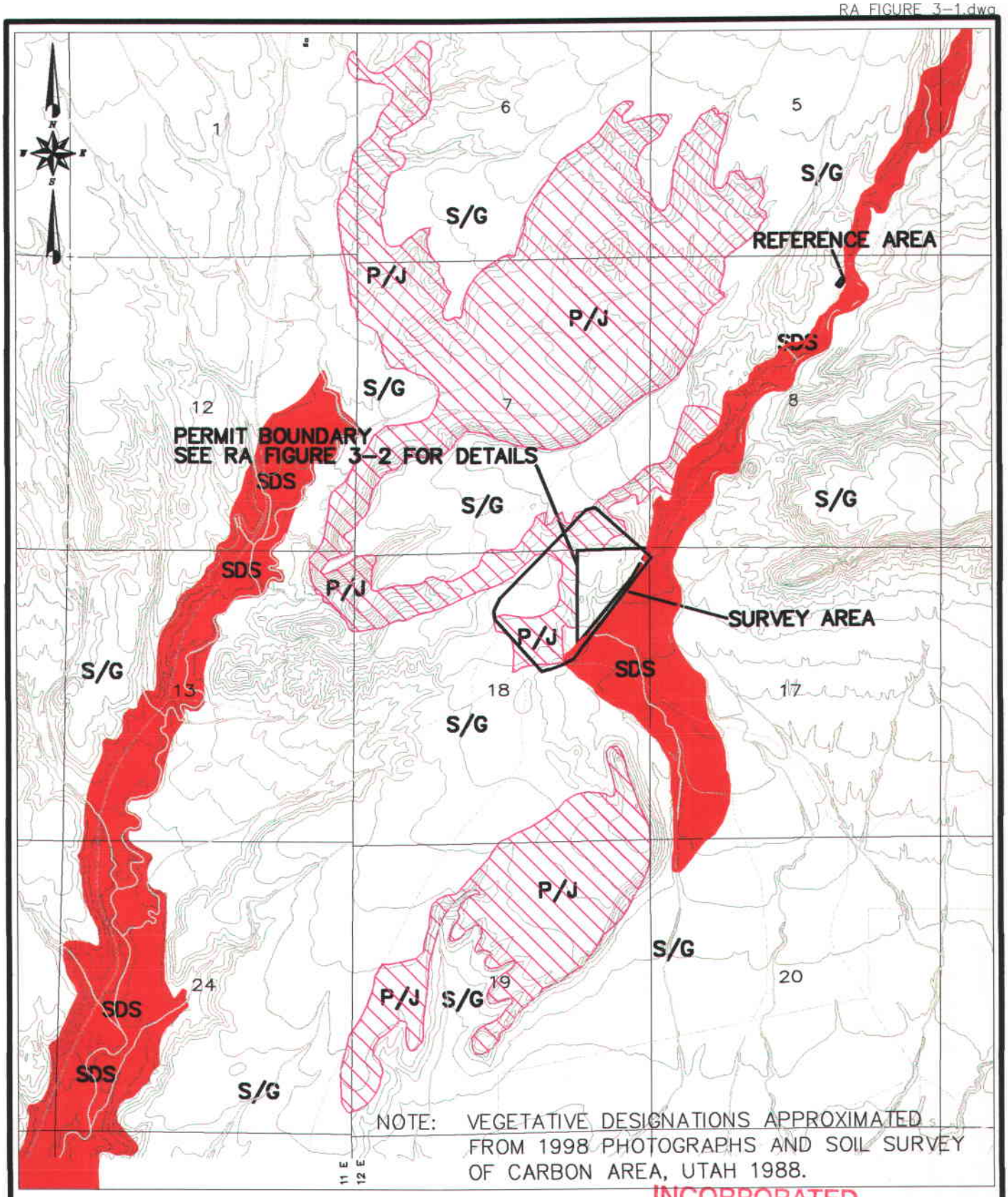

S/G – Sagebrush/Grass
P/J – Pinyon/Juniper
SDS – Salt Desert Shrub

0' 2500'

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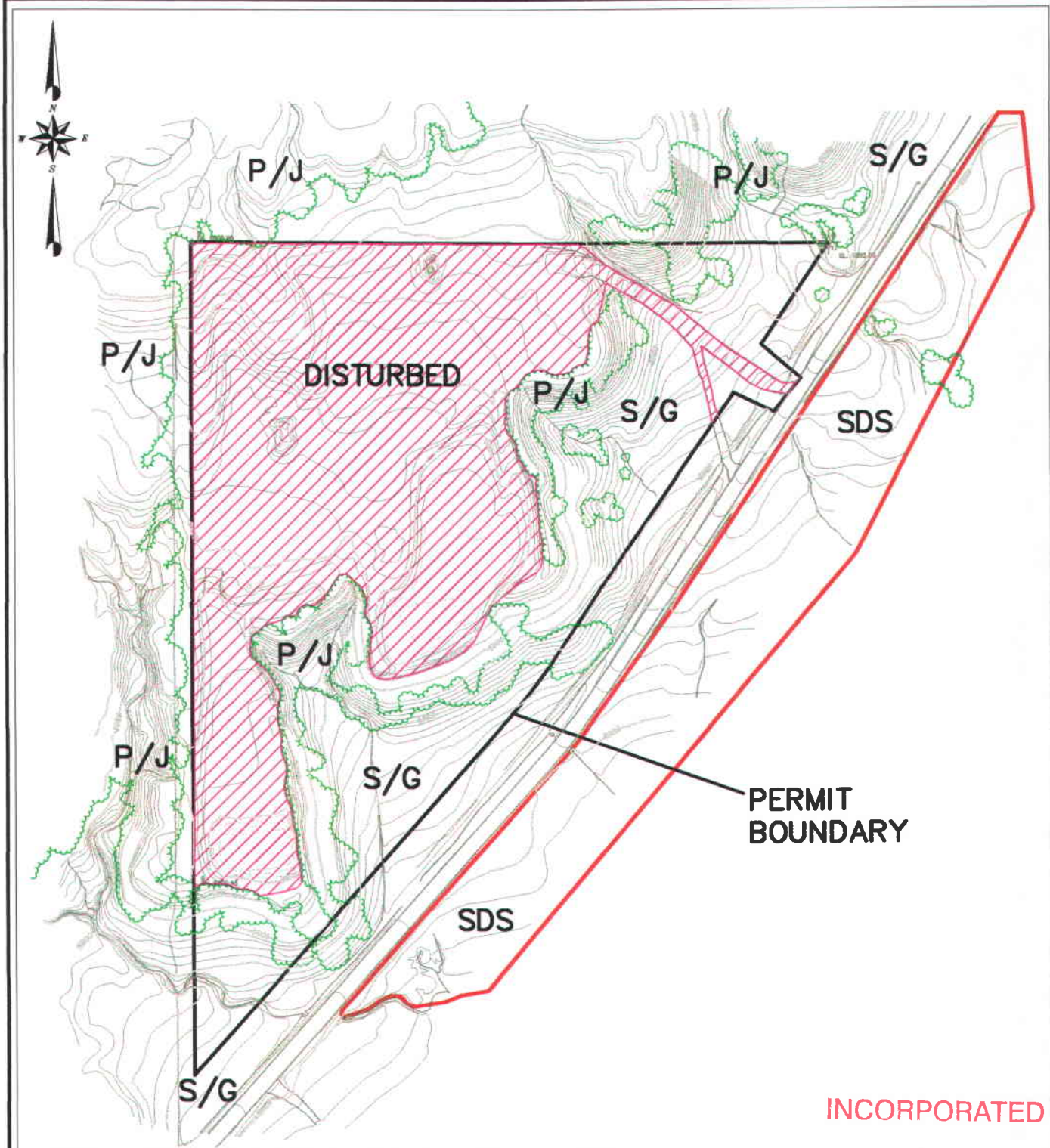
RA FIGURE 3-1. SURROUNDING REPRESENTATIVE VEGETATION COMMUNITIES.



NOTE: VEGETATIVE DESIGNATIONS APPROXIMATED FROM 1998 PHOTOGRAPHS, VISUAL OBSERVATION AND SOIL SURVEY OF CARBON AREA, UTAH 1988.

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S/G – Sagebrush/Grass
P/J – Pinyon/Juniper
SDS – Salt Desert Shrub
DISTURBED – Sparce Weeds

0' 300'

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RA FIGURE 3–2. VEGETATION AT SITE PRIOR TO MINING DISTURBANCE.

RA ATTACHMENT 3-1

VEGETATION DATA

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VEGETATION STUDY
REFUSE PILE AREA

Prepared by
Patricia K. Johnston

Prepared for
CANYON FUEL COMPANY, LLC
DUGOUT CANYON MINE

May 1998

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VEGETATION STUDY
REFUSE PILE AREA

A vegetation study was conducted by Patricia K. Johnston, Vegetation Specialist on behalf of EarthFax Engineering for Canyon Fuels Company, Dugout Canyon Mine, May, 1998. This study was conducted to establish plant community data associated with the Carbon County road area. The study within the area included the quantitative sampling of vegetative cover and the sampling of woody species density.

Vegetation sampling methods were designed in accordance with the February, 1992 Revised DOGM Vegetation Information Guidelines. The sampling methods are described below. Results and discussion of the study are presented as well.

Location of Sample Sites

Shrub density transects and lineal cover transects were located randomly within the proposed area. The area was mapped and plotted on a grid, which was numbered with an x and y axis. Random numbers were taken from a random number table which were used to plot the transect sites to be sampled. The direction of the sample was determined using random numbers based on 1-12 to represent a complete circle range of possible transect position. Each transect was considered to represent one sample. Statistical analysis was conducted in the field and double checked later for accuracy.

Samples were stratified between two distinct ecological plant communities that existed within the boundaries of the area. A separate set of cover data and shrub density data were generated for each distinct plant community. The distinct plant communities sampled were: Shallow Loam, Black Sagebrush and Pinyon-Juniper.

Quantitative Sample Types

The point-intercept method was used to sample cover. Points were observed every two feet along a transect 100 feet in length. Vegetation species, or presence of rock, litter, cryptogamic soil for bare ground was recorded at each point. Dead, mostly decayed organic matter that was still attached to the ground was counted as litter rather than as live vegetation. The fifty-point sample was then used to calculate percent cover statistics for the site.

Shrub and tree densities were estimated using a 0.05-acre macro-plot. All individual shrubs and trees rooted in the plots were counted.

Data Analysis

All data obtained from cover and density sampling were checked for completeness, and statistical information was generated.

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Cover Data

Overall vegetation cover for the proposed disturbed area were found to be (26.3% for the Pinyon-Juniper site and 40% for the black sage brush site). Annual species such as Bromus tectorum were not considered in this figure, though these species were sampled, due to the wide fluctuation possible on an annual basis.

Shrub Density Data

Shrub density within the proposed area of disturbance was found to be approximately 20.8 plants for the Pinyon-Juniper site and 128 plants for the black sage brush site(plants per macro-plot). Gutierrzia sarothrae was not considered a part of this sampling process due to the nature and growth form of this species, as it is generally considered a subshrub. In order to calculate woody plants per acre, presented figures need to be multiplied by 21.78.

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Refuse Pile Area
Habitat Type: Pinyon- Juniper
Percent Cover Data - Line Transects
May 1998

PLANT SPECIES	STAND							
	1	2	3	4	5	6	7	8
Trees								
Juniper osteosperma	-	4	10	20	-	4	8	18
Pinus edulis	2	-	-	8	-	-	-	2
Total Tree Cover	2	4	10	28	-	4	8	20
Shrubs and Subshrubs								
Artemisia arbuscula	2	2	-	2	-	-	-	-
Atriplex confertifolia	-	-	6	-	2	4	4	-
Gutierrezia sarothrae	2	-	-	-	2	-	2	-
Total Shrub Cover	4	2	6	2	4	4	6	-
Forbs								
Astragalus spp.	-	2	-	-	-	-	-	-
Aster spp.	-	-	-	-	-	-	2	-
Eriogonum spp.	-	-	-	-	-	-	-	-
Phlox hoodii	4	-	-	-	2	2	-	-
Unknown forb	-	-	-	-	-	-	-	-
Total Forb Cover	4	2	-	-	2	2	2	-
Graminoid								
Bouteloua gracilis	14	-	2	4	2	6	-	-
Bromus tectorum	-	-	20	-	2	12	-	-
Elymus salinus	-	10	10	-	4	2	-	-
Hilaria jamesii	6	-	8	-	-	4	-	-
Oryzopsis hymenoides	2	-	-	-	-	-	-	-
Sitanion hystrix	-	-	-	-	-	-	-	-
Total Graminoid Cover	22	10	40	4	8	24	-	-

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Refuse Pile Area
Habitat Type: Pinyon- Juniper
Percent Cover Data - Line Transects
May 1998

PLANT SPECIES	STAND							
	1	2	3	4	5	6	7	8
Total Vegetation Cover	32	18	56	34	14	34	16	20
Cryptogammic Soil	-	-	-	-	4	4	4	30
Litter	22	8	12	26	28	20	28	10
Bare Ground	22	38	16	28	48	20	38	28
Rock	24	36	16	12	6	22	14	12

INCORPORATED
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Refuse Pile Area
Habitat Type: Pinyon- Juniper
Percent Cover Data - Line Transects
May 1998

PLANT SPECIES	STAND							
	9	10	11	12	13	14	15	16
Trees								
Juniper osteosperma	36	8	-	-	-	10	14	8
Pinus edulis	-	10	-	10	-	8	14	-
Total Tree Cover	36	18	-	10	-	18	28	8
Shrubs and Subshrubs								
Artemisia arbuscula	-	-	-	2	4	-	-	-
Atriplex confertifolia	-	-	-	-	-	-	-	-
Gutierrezia sarothrae	-	-	-	-	-	-	-	-
Total Shrub Cover	-	-	-	2	4	-	-	-
Forbs								
Astragalus spp.	-	-	-	-	-	-	-	-
Aster spp.	-	-	-	-	-	-	-	-
Eriogonum spp.	-	-	-	-	-	-	2	-
Phlox hoodii	-	-	-	-	-	2	-	2
Unknown forb	-	-	22	-	10	-	-	
Total Forb Cover	-	-	22	-	10	2	2	2
Graminoid								
Bouteloua gracilis	-	6	-	-	-	-	-	16
Bromus tectorum	-	-	-	-	-	-	-	-
Elymus salinus	-	-	-	4	-	-	-	-
Hilaria jamesii	-	2	-	-	-	2	-	-
Oryzopsis hymenoides	-	-	-	-	-	-	-	-
Sitanion hystrix	-	2	-	-	-	-	-	-
Total Graminoid Cover	-	10	-	4	-	2	-	16

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Refuse Pile Area
Habitat Type: Pinyon- Juniper
Percent Cover Data - Line Transects
May 1998

PLANT SPECIES	STAND							
	9	10	11	12	13	14	15	16
Total Vegetation	36	28	22	16	14	22	30	26
Cryptogammic Soil	8	-	-	-	-	6	-	2
Litter	32	24	40	8	36	14	18	10
Bare Ground	24	26	24	30	46	34	40	40
Rock	-	22	14	46	4	24	12	22

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Refuse Pile Area
Habitat Type: Pinyon- Juniper
Percent Cover Data - Line Transects
May 1998

PLANT SPECIES	STAND			
	$\bar{X}$	Std.		
Trees				
Juniper osteosperma	12.1	11.1		
Pinus edulis	4.5	6.7		
Total Tree Cover	12.1	11.1		
Shrubs and Subshrubs				
Artemisia arbuscula	.8	1.2		
Atriplex confertifolia	1.0	1.9		
Gutierrezia sarothrae	.4	.8		
Total Shrub Cover	2.1	2.2		
Forbs				
Astragalus spp.	.1	.5		
Aster spp.	.1	.5		
Eriogonum spp.	.1	.5		
Phlox hoodii	.8	1.2		
Unknown forb	2.0	5.7		
Total Forb Cover	3.1	5.4		
Graminoid				
Bouteloua gracilis Blue grama	3.1	4.9		
Bromus tectorum	2.1	5.7		
Elymus salinus	1.9	3.5		
Hilaria jamesii	1.4	2.4		
Oryzopsis hymenoides	.1	.5		
Sitanion hystrix	.1	.5		
Total Graminoid Cover	8.8	11.2		
Total Vegetation Cover	26.3	10.6		

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Refuse Pile Area
Habitat Type: Semi-Desert Loam/Shallow Loam Black Sagebrush
Percent Cover Data - Line Transects
May 1998

PLANT SPECIES	STAND							
	1	2	3	4	5	6	7	8
Trees								
Juniper osteosperma	-	10	5	-	-	8	18	6
Pinus edulis	-	-	-	-	-	-	-	-
Total Tree Cover	-	10	5	-	-	8	18	6
Shrubs and Subshrubs								
Artemisia arbuscula	2	8	6	5	-	10	8	-
A. tridentata wyomingensis	-	-	-	4	10	-	-	-
Atriplex confertifolia	6	2	4	-	-	4	-	-
Chrysothamnus viscidiflorus	-	-	-	-	-	-	-	2
Eurotia lanata	-	-	-	4	-	-	-	-
Glossopetalon spp.	-	-	-	-	-	-	-	-
Gutierrezia sarothrae	-	-	-	-	8	-	2	-
Sarcobatus vermiculatus	-	-	-	-	-	-	-	-
Total Shrub Cover	8	10	10	13	18	14	10	2
Forbs								
Astragalus spp.	2	-	-	-	-	-	-	-
Halogeton glomeratus	-	-	-	-	-	-	-	-
Eriogonum spp.	-	4	-	-	-	-	-	-
Sphaeralcea spp.	-	-	-	2	-	-	-	-
Unknown forb	-	-	-	-	-	-	-	-
Total Forb Cover	2	4	-	2	-	-	-	-
Graminoid								
Bouteloua gracilis	6	2	-	6	-	2	10	-
Bromus tectorum	-	-	-	26	18	-	12	-
Elymus salinus	-	4	-	-	-	2	-	8

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Refuse Pile Area
Habitat Type: Semi-Desert Loam/Shallow Loam Black Sagebrush
Percent Cover Data - Line Transects
May 1998

PLANT SPECIES	STAND							
	1	2	3	4	5	6	7	8
Graminoid								
Festuca octoflora	-	-	-	11	8	2	-	-
Hilaria jamesii	16	-	-	2	18	-	2	2
Oryzopsis hymenoides	-	-	2	2	-	-	-	2
Sporobolus spp.	-	-	-	-	4	-	-	-
Sitanion hystrix	4	-	2	1	-	2	-	-
Total Graminoid Cover	26	6	4	48	48	8	24	12
Total Vegetation Cover	36	30	19	63	66	30	52	20
Cryptogammic Soil	22	-	-	2	10	6	6	-
Litter	12	4	4	16	10	10	6	12
Bare Ground	22	30	40	14	14	36	23	35
Rock	8	36	37	5	-	18	13	33

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Refuse Pile Area
Habitat Type: Semi-Desert Loam/Shallow Loam Black Sagebrush
Percent Cover Data - Line Transects
May, 1998

PLANT SPECIES	STAND							
	9	10	11	12	13	14	15	16
Trees								
Juniper osteosperma	-	-	4	-	-	-	2	2
Pinus edulis	2	-	-	-	-	-	-	-
Total Tree Cover	2	-	4	-	-	-	2	2
Shrubs and Subshrubs								
Artemisia arbuscula	18	26	-	4	-	16	8	-
A. tridentata wyomingensis	-	-	8	-	-	-	-	-
Atriplex confertifolia	-	8	2	6	4	4	-	-
Chrysothamnus viscidiflorus	-	-	-	-	-	-	-	-
Eurotia lanata	-	-	-	-	-	-	-	-
Glossopetalon spp.	-	-	-	-	-	-	-	-
Gutierrezia sarothrae	-	-	10	-	2	-	2	2
Sarcobatus vermiculatus	-	-	-	-	-	4	-	8
Total Shrub Cover	18	34	20	10	6	24	10	10
Forbs								
Astragalus spp.	-	-	-	-	-	-	-	-
Halogeton glomeratus	-	-	-	-	-	-	-	2
Erioginum spp.	-	-	-	-	-	-	-	-
Sphaeralcea spp.	-	-	-	-	-	-	-	-
Unknown forb	-	-	-	-	8	-	-	-
Total Forb Cover	-	-	-	-	8	-	-	2
Graminoid								
Bouteloua gracilis	-	4	-	-	-	-	2	-
Bromus tectorum	-	-	8	-	-	-	2	10
Elymus salinus	-	-	-	16	-	-	-	-

Refuse Pile Area
Habitat Type: Semi-Desert Loam/Shallow Loam Black Sagebrush
Percent Cover Data - Line Transects
May 1998

PLANT SPECIES	STAND							
	9	10	11	12	13	14	15	16
Graminoid								
Festuca octoflora	-	2	6	-	13	-	-	-
Hilaria jamesii	2	4	-	-	-	2	10	18
Oryzopsis hymenoides	-	-	-	-	2	2	-	-
Sporobolus spp.	-	-	4	-	-	-	-	-
Sitanion hystrix	-	-	-	-	-	1	2	2
Total Graminoid Cover	2	10	18	16	15	5	16	30
Total Vegetation Cover	22	44	42	26	29	29	28	44
Cryptogammic Soil	20	4	4	4	-	12	18	14
Litter	18	12	30	14	9	10	22	28
Bare Ground	16	36	18	32	44	34	24	4
Rock	24	4	6	24	18	15	8	10

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Refuse Pile Area
Habitat Type: Semi-Desert Loam/Shallow Loam Black Sagebrush
Percent Cover Data - Line Transects
May 1998

PLANT SPECIES	STAND				
	17	Std.	$\bar{x}$		
Trees					
Juniper osteosperma	1	4.8	3.3		
Pinus edulis	-	.5	0.1		
Total Tree Cover	1	4.8	3.4		
Shrubs and Subshrubs					
Artemisia arbuscula	9	7.2	7.1		
A. tridentata wyomingensis	-	3.0	1.3		
Atriplex confertifolia	4	2.5	2.6		
Chrysothamnus viscidiflorus	-	.5	.1		
Eurotia lanata	-	.9	.2		
Glossopetalon spp.	2	.5	.1		
Gutierrezia sarothrae	-	2.9	1.5		
Sarcobatus vermiculatus	-	2.0	.7		
Total Shrub Cover	15	7.2	13.1		
Forbs					
Astragalus spp.	-	.5	.1		
Halogeton glomeratus	-	.5	.1		
Eriogonum Spp.	-	.9	.2		
Sphaeralcea Spp.	-	.5	.1		
Unknown forb	-	1.9	.5		
Total Forb Cover	-	2.1	1.1		
Graminoid					
Bouteloua gracilis	-	2.9	1.9		
Bromus tectorum	-	7.6	4.5		
Elymus salinus	14	5.0	2.6		

Refuse Pile Area
Habitat Type: Semi-Desert Loam/Shallow Loam Black Sagebrush
Percent Cover Data - Line Transects
May 1998

PLANT SPECIES	STAND				
	17	Std.	$\bar{x}$		
Graminoid					
Festuca octoflora	-	4.1	2.5		
Hilaria jamesii	2	6.6	4.6		
Oryzopsis hymenoides	2	1.0	.7		
Sporobolus spp.	-	1.3	.5		
Sitanion hystrix	-	1.0	.8		
Total Graminoid Cover	18	13.3	18.0		
Total Vegetation Cover	34	13.6	36.5		
Cryptogammic Soil	1	-			
Litter	6	-			
Bare Ground	22	-			
Rock	38	-			

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Dugout Canyon Pre-Mining Inventory
Pile Reference Area
Percent Cover Data - Line Transects
May, 1998

PLANT SPECIES	STAND						
	9	10	11	12	13	14	15
Trees							
Juniper osteosperma	-	-	-	-	-	-	-
Pinus edulis	-	-	6	-	-	-	2
Total Tree Cover	-	-	6	-	-	-	2
Shrubs and Subshrubs							
Artemisia arbuscula	8	16	16	26	22	10	24
Atriplex confertifolia	8	-	2	-	2	10	8
Chrysothamnus viscidiflorus	-	-	-	-	-	-	-
Glossopetalon spp.	-	-	-	-	-	-	-
Gutierrezia sarothrae	-	-	-	-	2	4	-
Sarcobatus vermiculatus	-	-	-	6	2	-	-
Total Shrub Cover	16	16	18	32	28	24	32
Forbs							
Astragalus spp.	-	6	-	2	4	-	-
Brassica spp.	-	-	-	-	2	-	-
Plantago spp.	-	-	-	2	-	-	-
Unknown annual forb	-	-	-	-	-	-	-
Total Forb Cover	-	6	-	4	6	-	-
Graminoid							
Bouteloua gracilis	-	-	-	-	-	-	-
Bromus tectorum	-	-	-	-	-	-	-
Elymus salinus	-	-	-	-	2	-	2
Festuca octoflora	-	-	-	-	-	-	-
Hilaria jamesii	10	16	2	4	4	2	4
Oryzopsis hymenoides	-	14	-	-	-	-	-
Sitanion hystrix	6	-	2	4	-	4	-
Total Graminoid Cover	16	30	4	8	6	6	6

Dugout Canyon Pre-Mining Inventory
Pile Reference Area
Percent Cover Data - Line Transects
May, 1998

Total Vegetation Cover	32	52	28	44	40	30	40
Cryptogammic Soil	14	6	16	12	14	12	6
Litter	12	12	20	4	10	20	12
Bare Ground	34	28	20	36	8	12	30
Rock	8	2	16	4	28	26	12

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Dugout Canyon Pre-Mining Inventory
Pile Reference Area
Percent Cover Data - Line Transects
May, 1998

PLANT SPECIES	STAND							
	1	2	3	4	5	6	7	8
Trees								
Juniper osteosperma	-	2	-	-	-	-	-	-
Pinus edulis	-	-	-	-	-	-	-	-
Total Tree Cover	-	2	-	-	-	-	-	-
Shrubs and Subshrubs								
Artemisia arbuscula	26	12	14	18	4	22	20	20
Atriplex confertifolia	6	-	2	2	-	-	2	-
Chrysothamnus viscidiflorus	2	-	-	-	-	-	-	-
Glossopetalon spp.	-	-	-	-	-	-	2	-
Gutierrezia sarothrae	-	-	-	-	2	-	-	-
Sarcobatus vermiculatus	4	-	4	8	-	-	8	-
Total Shrub Cover	38	12	20	28	6	22	32	20
Forbs								
Astragalus spp.	2	4	2	14	-	4	12	6
Brassica spp.	-	-	-	-	-	-	-	-
Plantago spp.	-	-	-	-	6	-	-	10
Unknown annual forb	-	6	-	-	-	-	-	-
Total Forb Cover	2	10	2	14	6	4	12	16
Graminoid								
Bouteloua gracilis	-	-	-	-	-	-	-	-
Bromus tectorum	-	-	2	-	6	-	2	-
Elymus salinus	-	-	-	6	6	-	2	-
Festuca octoflora	-	-	-	-	8	-	-	-
Hilaria jamesii	-	10	20	2	18	12	2	6
Oryzopsis hymenoides	-	2	2	2	-	-	-	-
Sitanion hystrix	-	-	4	-	2	2	2	2
Total Graminoid Cover	-	12	28	10	40	14	8	8

Dugout Canyon Pre-Mining Inventory
Pile Reference Area
Percent Cover Data - Line Transects
May, 1998

Total Vegetation Cover	40	36	50	52	52	40	52	44
Cryptogammic Soil	6	8	14	6	10	14	14	36
Litter	6	8	6	2	10	8	8	4
Bare Ground	46	44	16	34	8	32	18	10
Rock	2	4	14	6	20	6	8	6

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Dugout Canyon Pre-Mining Inventory
Pile Reference Area
Shrub/Tree Density - Belt Transect
May, 1998

PLANT SPECIES	STAND							
	1	2	3	4	5	6	7	8
Trees								
Juniper osteosperma	-	1	2	-	-	-	3	-
Pinus edulis	-	1	2	-	-	-	-	-
Shrubs								
Artemisia arbuscula	162	189	257	182	184	209	208	225
Artemisia spinescens	-	2	-	-	-	-	-	4
Atriplex confertifolia	23	7	6	27	16	2	22	38
Chrysothamnus viscidiflorus	-	-	-	-	-	-	-	-
Glossopetalon spp.	-	-	2	-	-	-	-	-
Sarcobatus vermiculatus	11	6	4	13	19	-	20	10
Total Shrub/Tree Density	196	206	273	222	219	211	253	277

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Dugout Canyon Pre-Mining Inventory
Pile Reference Area
Shrub/Tree Density - Belt Transect
May, 1998

PLANT SPECIES	STAND						
	9	10	11	12	13	14	15
Trees							
Juniper osteosperma	2	-	3	-	-	4	-
Pinus edulis	-	-	2	-	-	9	-
Shrubs							
Artemisia arbuscula	197	211	211	205	236	236	215
Artemisia spinescens	-	-	-	-	12	-	-
Atriplex confertifolia	45	7	33	5	32	26	39
Chrysothamnus viscidiflorus	-	-	-	-	-	-	-
Glossopetalon spp.	4	-	1	-	-	-	2
Sarcobatus vermiculatus	13	4	2	9	5	3	15
Total Shrub/Tree Density	261	222	252	219	285	278	271

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United States
Department of
Agriculture

Natural Resources
Conservation
Service

P.O. Box 11350
Salt Lake City, UT 84147
Phone (801) 524-5064

April 16, 1996

David Steed
Ecologist/Consultant
4855 N. Spring Glen Rd.
Spring Glen, Utah 84526

Dear Mr. Steed:

We have evaluated your prime farmland request for the Dugout Road Project, Carbon County. We have determined that the area is excluded from all categories of important farmlands because there is no developed irrigation system on arid soils.

If we can be of further assistance, please call on us.

Mike Dameca for
WILLIAM BRODERSON
State Soil Scientist

NRCS-Utah: Commitment From the Ground Up!
The Natural Resources Conservation Service (NRCS),
formerly the Soil Conservation Service, is an agency of the
Department of Agriculture

USDA Natural Resources Conservation Service

350 North 400 East
Price, Utah 84501
801-637-0041

June 8, 1998

Vicki Bailey
7324 South Union Park Ave, Ste 100
Midvale, Utah 84047

Dear Ms. Bailey:

Here is the information on the two reference areas that you requested:

Previous assign to vendor	Current assign	Present Production	Potential Production	Condition
Top Soil Storage A	= Reference area	460	500	Mid Seral (fair)
Borrow Area	= Refuse pile	500	550	Mid Seral (fair)

If you have any further questions please feel free to call me at 435-637-0041. Thanks.

George S. Cook

George S. Cook
Range Conservationist

INCORPORATED
JUN 08 1998
DIV OF OIL GAS & MINING

RA ATTACHMENT 3-1

Photographs of Refuse Pile Area
Pre-1998 Gravel Mining Disturbance

MATCH LINE (A)

MATCH LINE (A)

LOOKING WEST

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LOOKING EAST

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RA ATTACHMENT 3-1

Mt. Nebo Scientific, Inc
2002 Reference Area Survery

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DUGOUT CANYON MINE
REFUSE PILE
VEGETATION REFERENCE AREA

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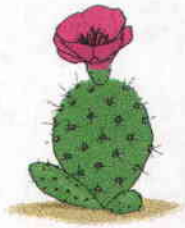

Prepared by

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

Patrick D. Collins, Ph.D.

for

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

January 2003

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DUGOUT CANYON MINE
REFUSE PILE
VEGETATION REFERENCE AREA

INTRODUCTION

Coal mining at the Dugout Canyon Mine has necessitated a need for an area to be permitted for refuse and waste material generated by the mining activities. Mine personnel have selected an area for that purpose. The surface ownership of the area belongs to Canyon Fuel Company, LLC. The vegetation of this Refuse Pile area was previously disturbed by gravel mining operations in 1998. The gravel contractors were hired by Carbon County to construct the Dugout Canyon Road. When the new Refuse Pile area has been filled to the design capacity, it will be necessary for the coal mine operators to reclaim the area. To be deemed successful, state regulations require that reclaimed areas meet specific vegetation standards.

One method of obtaining final revegetation success standards is to choose a natural, undisturbed plant community that closely resembles the community to be reclaimed. In the case of the Dugout Canyon Mine Refuse area, an approximation was made of a community that could have resembled the plant community of the Refuse area *prior to its disturbance by gravel operations*. This plant community, or "Reference Area", was chosen previously by representatives of Canyon Fuel Company and is located 1.2 miles northeast of the proposed Refuse Pile. It is approximately one acre in size. Each corner was marked with wooden stakes and blue flagging.

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The Reference Area was quantitatively sampled during the growing season of 2002. The purpose of this report is to provide Canyon Fuel Company with the results of the quantitative sampling. The data will ultimately be submitted to the State of Utah, Division of Oil, Gas & Mining (DOGM) for approval of the Reference Area to be used as standards for final revegetation success of the Refuse Pile for the Dugout Canyon Mine. At the time when it is appropriate to make comparisons with the reclaimed Refuse Pile, both the reclaimed area and the Reference Areas will be re-sampled and compared to each other by employing statistical analyses.

METHODS

Methodologies used herein were performed in accordance with the guidelines supplied by the State of Utah, Division of Oil, Gas and Mining (DOGM). Quantitative and qualitative data were taken on the vegetation of the plant community proposed to be used as a Reference Area for final revegetation standards. Sampling was conducted September 4, 2002.

There were changes in community structure and species composition within the proposed Reference Area. For example, the areas of slightly lower elevation were dominated by black sagebrush (*Artemisia nova*). As the elevation increased by a few feet, pinyon pine (*Pinus edulis*) and Utah Juniper (*Juniperus osteosperma*) became more common (see Color Photographs included in this report). These two plant communities had somewhat equal area in which they occupied within the Reference Area. The sample transect lines dissected both of these communities several times. Splitting them by reporting two complete data sets may have been

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counterproductive to the objectives of this report. The data were therefore "lumped" as to provide average measurements somewhat between the two communities (and other smaller communities between them), and to provide more meaningful and appropriate standards for final revegetation success.

Sampling Design and Transect/Quadrat Placement

Three long transect lines were placed within the boundaries of Reference Area. One transect line was placed from the southwest corner to the northeast corner of the Reference Area. The second transect was placed from the northwest corner to the southeast corner. The third transect was placed from the middle of the northern boundary line to the middle of the southern boundary. This placement technique was employed, and the transect data combined, to adequately sample the entire site as a whole. Once the transects were established, quadrat locations for sampling were chosen using random numbers from the transect lines with the objective to record data without preconceived bias.

Cover and Composition

Cover estimates were made using ocular methods with meter square quadrats. Species composition and relative frequencies were also assessed from the quadrats. Additional information recorded on the raw data sheets were: estimated precipitation, slope, exposure, grazing use, animal disturbance and other appropriate notes. Plant nomenclature follows "A Utah

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Flora" (Welsh et al., 1993).

Woody Species Density

Density of woody plant species for the Reference Area was estimated using the point-quarter method. In this method, random points were placed on the sample sites and measured into four quarters. The distances to the nearest woody plant species were then recorded in each quarter. The average point-to-individual distance was equal to the square root of the mean area per individual. The number of individuals per acre was the end results of the calculations.

Sample Size & Adequacy

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

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

where,

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

The values used for "t" and "d" insured that sample adequacy was met with 80% confidence within a 10% deviation from the true mean.

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Photographs

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

Raw Data

The raw data for cover have been summarized on a spreadsheet and were included in the Appendix of this report.

RESULTS

It should be noted that the year 2002 was the fourth year of drought conditions, and the plant communities show evidence of this pattern. Many leaves on the woody species did not sprout, probably as a survival strategy and for defense of the dry conditions. Morever, several of the warm season grasses such as galleta (*Hilaria jamesii*) appeared dormant when they should have been green and thriving during the time the sampling was conducted. Additionally, there were few annual or perennial forbs present in the quadrats. One would expect these species in these plant communities; presumably another survival tactic used by some plant species during drought conditions.

Quantitative sampling demonstrated that the total living cover for the Refuse Pile Reference Area

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was 35.30%; 11.80% of it was overstory cover and 23.50% was understory (Table 1-A). Of the understory cover, 68.16% of it was comprised of woody species, while 2.38% were forbs, and 29.46% were grasses (Table 1-B).

Woody species density measurements indicated that there were 2,794 individuals per acre (Table 1-C). Much of the density total was comprised of black sagebrush (*Artemisia nova*), but Utah Juniper (*Juniperus osteosperma*), pinyon pine (*Pinus edulis*) and shadscale (*Atriplex confertifolia*) were also important species.

Living cover by species and frequency data shown on Table 2 revealed the Reference Area to be dominated by the black sagebrush, Utah Juniper, pinyon pine, galleta, and Salina wildrye (*Elymus salinus*).

The data reported in this report should provide state regulators with sufficient information to be used in their decision as to accept or reject the proposed Dugout Canyon Refuse Pile Reference Area as standards for success for future final revegetation.

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TABLE 1: Dugout Mine - Summary of total cover (A), composition (B), and woody species density (C) for the Refuse Pile Reference Area.

A.

TOTAL COVER	% MEAN COVER	STANDARD DEVIATION	SAMPLE SIZE
Living Overstory (o)	11.80	18.65	50
Living Understory (u)	23.50	11.76	50
Litter	18.72	20.12	50
Bareground	19.70	15.11	50
Rock	38.08	20.53	50
Total Living (o+u)	35.30	17.13	50

B.

UNDERSTORY COMPOSITION	PERCENT	STANDARD DEVIATION	SAMPLE SIZE
Trees & Shrubs	68.16	35.59	50
Forbs	2.38	7.14	50
Grasses	29.46	33.81	50

C.

WOODY SPECIES DENSITY	NUMBER/ACRE
Artemisia tridentata	41.91
Artemisia nova	1732.27
Atriplex confertifolia	139.70
Eriogonum corymbosum	55.88
Gutierrezia sarothrae	82.83
Juniperus osteosperma	447.04
Opuntia polyacantha	27.94
Pinus edulis	265.43
TOTAL	2793.99

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TABLE 2: Dugout Mine - Species cover and frequency summary for the Refuse Pile Reference Area.

SPECIES	% MEAN COVER	STANDARD DEVIATION	SAMPLE SIZE	RELATIVE FREQUENCY
OVERSTORY				
Juniperus osteosperma	6.90	15.20	50	20.00
Pinus edulis	4.90	13.58	50	20.00
SHRUBS				
Artemisia nova	9.72	9.98	50	60.00
Atriplex confertifolia	2.00	6.71	50	10.00
Eriogonum corymbosum	0.20	1.40	50	2.00
Gutierrezia sarothrae	0.16	0.76	50	6.00
Juniperus osteosperma	1.76	4.79	50	18.00
Opuntia polyacantha	0.10	0.70	50	2.00
Pinus edulis	2.72	8.13	50	16.00
FORBS				
Cryptantha flava	0.02	0.14	50	2.00
Plantago patagonica	0.50	1.50	50	10.00
GRASSES				
Bromus tectorum	0.10	0.70	50	2.00
Elymus salinus	2.98	5.15	50	44.00
Hilaria jamesii	3.24	6.09	50	28.00

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Vegetation Reference Area - Dugout Canyon Mine Refuse Pile (1 of 2)

Vegetation Reference Area - Dugout Canyon Mine Refuse Pile (2 of 2)

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APPENDIX
(Raw Data)

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CANYON FUELS
Dugout Mine
Waste Rock Reference Area
Exposure: NSEW (All)
Slope: 7-13 deg.

Sample Date: 4 Sept 02	1.00	2.00	3.00	4.00	5.00	6.00	7.00
OVERSTORY							
Juniperus osteosperma	0.00	0.00	0.00	0.00	0.00	0.00	50.00
Pinus edulis	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UNDERSTORY							
SHRUBS							
Artemisia nova	20.00	15.00	10.00	20.00	15.00	15.00	5.00
Atriplex confertifolia	0.00	5.00	20.00	0.00	0.00	20.00	20.00
Eriogonum corymbosum	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gutierrezia sarothrae	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Juniperus osteosperma	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Opuntia polyacantha	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pinus edulis	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FORBS							
Cryptantha flava	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Plantago patagonica	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GRASSES							
Bromus tectorum	0.00	0.00	0.00	0.00	5.00	0.00	0.00
Elymus salinus	0.00	5.00	0.00	0.00	5.00	10.00	5.00
Hilaria jamesii	5.00	0.00	10.00	0.00	0.00	0.00	10.00
COVER							
Overstory	0.00	0.00	0.00	0.00	0.00	0.00	50.00
Understory	25.00	25.00	40.00	20.00	25.00	45.00	40.00
Litter	3.00	5.00	10.00	3.00	5.00	10.00	5.00
Bareground	50.00	40.00	30.00	50.00	50.00	30.00	40.00
Rock	22.00	30.00	20.00	27.00	20.00	15.00	15.00
% COMPOSITION							
Shrubs	80.00	80.00	75.00	100.00	60.00	77.78	62.50
Forbs	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grasses	20.00	20.00	25.00	0.00	40.00	22.22	37.50
Overstory + Understory	25.00	25.00	40.00	20.00	25.00	45.00	90.00

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8.00	9.00	10.00	11.00	12.00	13.00	14.00	15.00	16.00	17.00
0.00	0.00	0.00	0.00	0.00	0.00	15.00	0.00	0.00	0.00
0.00	0.00	0.00	5.00	35.00	25.00	0.00	0.00	0.00	50.00
0.00	30.00	20.00	22.00	0.00	10.00	0.00	25.00	15.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00
0.00	3.00	5.00	0.00	0.00	0.00	15.00	0.00	0.00	2.00
5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	10.00	0.00	0.00	0.00	3.00
0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	2.00	0.00	3.00	5.00	1.00	0.00	0.00	0.00	0.00
0.00	0.00	5.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	5.00	35.00	25.00	15.00	0.00	0.00	50.00
5.00	35.00	30.00	25.00	5.00	25.00	15.00	25.00	15.00	5.00
25.00	10.00	5.00	15.00	40.00	45.00	15.00	5.00	10.00	85.00
10.00	15.00	10.00	15.00	10.00	10.00	15.00	15.00	15.00	5.00
60.00	40.00	55.00	45.00	45.00	20.00	55.00	55.00	60.00	5.00
100.00	94.29	83.33	88.00	0.00	84.00	100.00	100.00	100.00	100.00
0.00	0.00	0.00	0.00	0.00	4.00	0.00	0.00	0.00	0.00
0.00	5.71	16.67	12.00	100.00	12.00	0.00	0.00	0.00	0.00
5.00	35.00	30.00	30.00	40.00	50.00	30.00	25.00	15.00	55.00

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18.00	19.00	20.00	21.00	22.00	23.00	24.00	25.00	26.00	27.00
40.00	20.00	0.00	30.00	60.00	0.00	0.00	30.00	0.00	30.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.00	0.00
0.00	20.00	0.00	0.00	0.00	0.00	15.00	4.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00
25.00	0.00	10.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	5.00	30.00	0.00	0.00	35.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	5.00	5.00	0.00	0.00	5.00	0.00	1.00	0.00	5.00
0.00	0.00	10.00	28.00	0.00	0.00	0.00	0.00	0.00	0.00
40.00	20.00	0.00	30.00	60.00	0.00	0.00	30.00	35.00	30.00
25.00	25.00	25.00	30.00	5.00	35.00	15.00	5.00	35.00	5.00
60.00	5.00	5.00	25.00	85.00	15.00	5.00	10.00	55.00	25.00
5.00	20.00	5.00	35.00	5.00	10.00	5.00	10.00	5.00	10.00
10.00	50.00	65.00	10.00	5.00	40.00	75.00	75.00	5.00	60.00
100.00	80.00	40.00	6.67	100.00	85.71	100.00	80.00	100.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	20.00	60.00	93.33	0.00	14.29	0.00	20.00	0.00	100.00
65.00	45.00	25.00	60.00	65.00	35.00	15.00	35.00	70.00	35.00

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28.00	29.00	30.00	31.00	32.00	33.00	34.00	35.00	36.00	37.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
35.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.00	0.00	0.00	0.00	10.00	5.00	30.00	15.00	0.00	10.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	5.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	5.00	5.00	0.00	0.00	0.00	5.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2.00	25.00	0.00	0.00	5.00	15.00	0.00	0.00	5.00	5.00
0.00	0.00	15.00	15.00	10.00	0.00	0.00	0.00	0.00	0.00
35.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5.00	25.00	15.00	15.00	30.00	25.00	35.00	25.00	40.00	20.00
30.00	10.00	15.00	20.00	10.00	10.00	10.00	5.00	10.00	10.00
10.00	50.00	15.00	15.00	15.00	25.00	30.00	65.00	40.00	20.00
55.00	15.00	55.00	50.00	45.00	40.00	25.00	5.00	10.00	50.00
60.00	0.00	0.00	0.00	33.33	20.00	100.00	100.00	87.50	50.00
0.00	0.00	0.00	0.00	16.67	20.00	0.00	0.00	0.00	25.00
40.00	100.00	100.00	100.00	50.00	60.00	0.00	0.00	12.50	25.00
40.00	25.00	15.00	15.00	30.00	25.00	35.00	25.00	40.00	20.00

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38.00	39.00	40.00	41.00	42.00	43.00	44.00	45.00	46.00	47.00
0.00	0.00	0.00	50.00	20.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	60.00	0.00	0.00	0.00	0.00
15.00	0.00	0.00	0.00	0.00	0.00	7.00	10.00	25.00	15.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00	0.00	0.00
0.00	0.00	0.00	15.00	0.00	0.00	8.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	13.00	0.00	0.00	5.00	0.00	35.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20.00	0.00	0.00	0.00	10.00	0.00	0.00	0.00	0.00	5.00
0.00	10.00	12.00	0.00	0.00	0.00	0.00	0.00	15.00	0.00
0.00	0.00	0.00	50.00	20.00	60.00	0.00	0.00	0.00	0.00
35.00	15.00	25.00	15.00	10.00	5.00	15.00	50.00	40.00	25.00
10.00	5.00	15.00	30.00	40.00	65.00	5.00	15.00	5.00	15.00
5.00	10.00	10.00	10.00	10.00	10.00	10.00	15.00	10.00	45.00
50.00	70.00	50.00	45.00	40.00	20.00	70.00	20.00	45.00	15.00
42.86	0.00	52.00	100.00	0.00	100.00	100.00	100.00	62.50	60.00
0.00	33.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.00
57.14	66.67	48.00	0.00	100.00	0.00	0.00	0.00	37.50	20.00
35.00	15.00	25.00	65.00	30.00	65.00	15.00	50.00	40.00	25.00

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CANYON FUELS
Dugout Mine
Waste Rock Reference Area
Exposure: NSEW (All)
Slope: 7-13 deg.
Sample Date: 4 Sept 02

48.00	49.00	50.00	Mean	SDev	Freq	
						OVERSTORY
0.00	0.00	0.00	6.90	15.20		*Juniperus osteosperma*
0.00	0.00	0.00	4.90	13.58		*Pinus edulis*
						UNDERSTORY
						SHRUBS
25.00	25.00	30.00	9.72	9.98	60.00	*Artemisia nova*
0.00	0.00	0.00	2.00	6.71	10.00	*Atriplex confertifolia*
0.00	0.00	0.00	0.20	1.40	2.00	*Eriogonum corymbosum*
0.00	0.00	0.00	0.16	0.76	6.00	*Gutierrezia sarothrae*
0.00	0.00	0.00	1.76	4.79	18.00	*Juniperus osteosperma*
0.00	0.00	0.00	0.10	0.70	2.00	*Opuntia polyacantha*
0.00	0.00	0.00	2.72	8.13	16.00	*Pinus edulis*
						FORBS
0.00	0.00	0.00	0.02	0.14	2.00	Cryptantha flava
0.00	0.00	0.00	0.50	1.50	10.00	Plantago patagonica
						GRASSES
0.00	0.00	0.00	0.10	0.70	2.00	*Bromus tectorum*
0.00	0.00	0.00	2.98	5.15	44.00	*Elymus salinus*
0.00	15.00	0.00	3.24	6.09	28.00	*Hilaria jamesii*
						COVER
0.00	0.00	0.00	11.80	18.65		Overstory
25.00	40.00	30.00	23.50	11.76		Understory
5.00	5.00	5.00	18.72	20.12		Litter
10.00	20.00	15.00	19.70	15.11		Bareground
60.00	35.00	50.00	38.08	20.53		Rock
						% COMPOSITION
100.00	62.50	100.00	68.16	35.59		Shrubs
0.00	0.00	0.00	2.38	7.14		Forbs
0.00	37.50	0.00	29.46	33.81		Grasses
25.00	40.00	30.00	35.30	17.13		Overstory + Understory

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FEB 05 2003
DIV OF OIL GAS & MINING

Dugout Canyon Mine
Waste Rock Amendment
C/007/039

RA Attachment 3-2

Moved to Confidential Binder - January 2005

Per Letter December 8, 2004, Mark Mesch, Acting Associate Director, Mining
Utah Division of Oil, Gas and Mining

INCORPORATED
AUG 0 9 2005
DIV OF OIL GAS & MINING

State of Utah
Department of Natural Resources
ROBERT L. MORGAN
Executive Director
Division of Oil, Gas & Mining
MARY ANN WRIGHT
Acting Division Director

OLENE S. WALKER
Governor
GAYLE F. McKEACHNIE
Lieutenant Governor

December 8, 2004

DEC 13 2004

Rick Olsen, General Manager
Canyon Fuel Company, LLC
P.O. Box 1029
Wellington, Utah 84542

Re: Confidential and Protected Information in MRP, Outgoing File

Dear Mr. Olsen:

The requirements for Confidentiality in the Utah Coal Program are outlined in R645-301-124.300. Confidential information is limited to:

124.310. Information that pertains only to the analysis of the chemical and physical properties of the coal to be mined, except information on components of such coal which are potentially toxic in the environment.

124. 320. Information required under section 40-10-10 of the Act that is authorized by that section to be held confidential and is not on public file pursuant to Utah law and that the applicant has request in writing to be held confidential: and

124.330. Information on the nature and location of archeological resources on public land and Indian land as required under the Archeological Resources Protection Act of 1979 (P.L. 96-95, 93 Stat. 721, 16 U.S. C. 470).

Additionally, according to the Government Records Access Management Act (GRAMA), the location of "historic, cultural or biological resources" must be "protected". The locations of raptors and threatened and endangered species must be "protected". Personal information is identified as a "private record" according to GRAMA (i.e. ownership information that contains social security numbers).

Therefore, we are requesting that confidential, protected and private information as identified above be removed from the currently approved MRP. A page clearly identifying what information was removed would be inserted into the MRP noting that the archeological information, for example, is in the Confidential MRP for that mine.

1594 West North Temple, Suite 1210, PO Box 145801, Salt Lake City, UT 84114-5801
telephone (801) 538-5340 • facsimile (801) 359-3940 • TTY (801) 538-7458 • *www.ogm.utah.gov*

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All of the confidential, protected and private information should be organized in the "Confidential" MRP volume (binder) by pages where it would be found in the approved MRP.

Please handle this administrative action by February 1, 2005. If you have any questions, please call Pamela Grubaugh-Littig (801) 538-5268 or Wayne Hedberg (801) 538-5286.

Sincerely,

Mark Mesch
Acting Associate Director, Mining

an
cc: Price Field Office
O:\TEAMS\Process Team\ConfidentialLetterOperator.doc

RA ATTACHMENT 3-3

T & E DATA

MAR 0 3 2003

RA ATTACHMENT 3-3

T & E DATA

MAR 0 3 2003

Carbon County, Utah
Plants and Wildlife
Federally Listed, Threatened, Endangered and Candidate Species
June 2002

Common Name	Scientific Name	Status	Habitat Present*
Plants			
Uinta Basin Hookless Cactus	Sclerocactus glaucus	T	No habitat available
Graham Beardtongue	Penstemon grahamii	C	No habitat available
Fish			
Humpback Chub	Gila cypha	E	No habitat available
Bonytail	Gila elegans	E	No habitat available
Colorado Pikeminnow	Ptychocheilus lucius	E	No habitat available
Razorback Sucker	Xyrauchen texanus	E	No habitat available
Birds			
Bald Eagle	Haliaeetus leucocephalus	T	No habitat available
Yellow-billed Cuckoo	Coccyzus americanus	C	No habitat available
Mexican Spotted Owl	Strix occidentalis lucida	T	No habitat available
Mammals			
Black-footed Ferret	Mustela nigripes	EX	Habitat available, but existence unconfirmed

* Habitat availability in Carbon County/Dugout Mine Site/Refuse Pile Site.

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

EX = Extirpated - An endangered taxon that it extirpated and considered by the U.S. Fish and Wildlife Service to no longer occur in Utah.

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

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

Source: Utah Division of Wildlife Resources data base - created 06/27/02

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Mammals		Status
Grizzly Bear	Ursus horribilis	EX
Fisher	Martes pennanti	EX
Gray Wolf	Canis lupus	EX
Black-footed Ferret	Mustela nigripes[1]	EN
Utah Prairie Dog	Gynomys parvidens[2]	T
Wolverine	Gulo gulo	T
Spotted Bat	Euderma maculatum	SP
Allen's Big-eared Bat	Idionycteris phyllotis	SD
Fringer Myotis	Myotis thysanodes	SD
Dwarf Shrew	Sorex nanus	SD
Desert Shrew	Notiosorex crawford	SD
Abert's Squirrel	Sciurus aberti navajo	SD
Belding Ground Squirrel	Spermophilus beldingi	SD
Thirteen-lined Ground Squirrel	Spermophilus tridecemlineatus	SD
Spotted Ground Squirrel	Spermophilus spilosoma	SD
Yellow Pine Chipmunk	Tamias amoenus	SD
Wyoming Ground Squirrel	Spermophilus elegans	SD
Rock Pocket Mouse	Chaetodipus intermedius	SD
Olive-backed Pocket Mouse	Perognathus fasciatus	SD
Merriam's Kangaroo Rat	Dipodomys merriami	SD
Chisel-toothed Kangaroo Rat	Dipodomys microps celsus	SD
Cactus Mouse	Peromyscus eremicus	SD
Southern Grasshopper Mouse	Onychomys torridus	SD
Marten	Martes americana	SD
Pika	Ochotona princeps	SD
Ringtail	Bassariscus astutus	SD
Northern Flying Squirrel	Glaucomys sabrinus	SD
Western Red Bat	Lasiurus blossevillii	SP/SD
Big Free-tailed Bat	Nyctinomops macrotis	SP/SD

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Brazilian Free-tailed Bat	Tadarida brasiliensis mexicana	SP/SD
Townsend's Big-eared Bat	Plecotus townsendii	SP/SD
Desert Kangaroo Rat	Dipodomys deserti	SP/SD
Northern Rock Mouse	Peromyscus nasutus	SP/SD
Stephen's Woodrat	Neotoma stephensi	SP/SD
Virgin River Montane Vole	Microtus ontanus rivularis	SP/SD
Mexican Vole	Microtus mexicannus	SP/SD
Northern River Otto	Lutra canadensis	SP/SD
North American Lynx	Felis lyns canadensis	SP/SD

Birds

Passenger Pigeon	Ectopistes migratorius	E
American Peregrine Falcon	Falco peregrinus anatum[1]	EN
Southern Willow Flycatcher	Empidonax traillii extimus[1]	EN
Bald Eagle	Haliaeetus leucocephalus[2]	T
Ferruginous Hawk	Buteo regalis	T
Yellow-billed Cuckoo	Coccuzus americanus occidentalis	T
Mexican Spotted Owl	Strix occidentalis lucida[2]	T
Northern Goshawk	Accipiter gentilis	SP
Swainson's Hawk	Buteo swainsoni	SP
Caspian Tern	Sterna caspia	SP
Black Tern	Chlidonias niger	SP
Burrowing Owl	Athene cunicularia	SP
Common Yellowthroat	Geothlypis trichas	SP
Short-eared Owl	Asio flammeus	SP
American White Pelican	Pelecanus erythrorhynchos	SD
California Condor	Gymnogyps californianus	SD
Osprey	Pandion haliaetur	SD
Sharp-tailed Grouse	Tympanuchus phasianellus columbianus	SD
Williamson's Sapsucker	Sphyrapicus thyroideus	SD

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Three-toed Woodpecker	Picoides tridactylus	SD
Sage Grouse	Centrocerus urophasianus	SP/SD
Mountain Plover	Charadrius montanus[3]	SP/SD
Long-bill Curlew	Numenius americanus	SP/SD
Black Swift	Cypseloides niger	SP/SD
Lewis' Woodpecker	Melanerpes lewis	SP/SD
Crissal Thrasher	Toxostoma crissale	SP/SD
Bell's Vireo	Vireo bellii	SP/SD
Blue Grosbeak	Guiraca caerulea	SP/SD
Grasshopper Sparrow	Ammodramus savannarum	SP/SD
Bobolink	Dolichonys oryzivorus	SP/SD

Fish

Utah Lake Sculpin	Cottus echinatus	E
Bonytail	Gila elegans[1]	EN
Colorado Squawfish	Ptychocheilus lucius[1]	EN
Humpback Chub	Gila cypha[1]	EN
Razorback Sucker	Xyrauchen texanus[1]	EN
Woundfin	Plagopterus argentissumus[1]	EN
Virgin River Chub	Gila seminuda[1]	EN
June Sucker	Chasmistes liorus[1]	EN
Lahontan Cutthroat Trout	Oncorhynchus clarki henshawi[2]	T
Roundtail Chub	Gila robusta	T
Leatherside Chub	Gila copei	SP
Flannelmouth Sucker	Catostomus latipinnis	SP
Bluehead Sucker	Catostomus discobolus	SP
Bonneville Cisco	Prosopium gemmiferun	SD
Bonneville Whitefish	Prosopuim spilonotus	SD
Bear Lake Whitefish	Prosopium abyssicola	SD

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Bear Lake Sculpin	Cottus extensus	SD
Desert Sucker	Catostomus clarki	SD
Colorado River Cutthroat Trout	Oncorhynchus clarki pleuriticus	C
Bonneville Cutthroat Trout	Oncorhynchus clarki utah	C
Virgin Spinedace	Lepidomeda mollispinis mollispinis	C
Least Chub	Iotichthys phlegethontis[3]	C

Reptiles and Amphibians

Banded Gila Monster	Heloderma suspectus cinctum	EN
Desert Tortoise	Gopherus agassizii[2]	EN
Utah Mountain Kingsnake	Lampropeltis pyromelana infralabialis	SP
Utah Milk Snake	Lampropeltis trangulum taylori	SP
Desert Iguana	Dipsosaurus dorsalis	SD
Utah Banded Gecko	Coleonyx variegatus utahensis	SD
Utah Night Lizard	Xantusia vigilis utahensis	SD
Desert Night Lizard	Xantusia vigilis vigilis	SD
Mojave Zebra-tailed Lizard	Callisaurus draconoides rhodostictus	SD
California Kingsnake	Lampropeltis getula californiae	SD
Southwestern Black-headed Snake	Tantilla hobartsmithi	SD
Desert Glossy Snake	Arizona elegans eburnata	SD
Painted Desert Glossy Snake	Arizona elegans philipi	SD
Sonora Lyre Snake	Trimorpodon biscutatus lambda	SD
Utah Blind Snake	Leptotyphlops humilis utahensis	SD
Mojave Patch-nosed Snake	Salvadora hexalepis mojavensis	SD
Southwestern Speckled Rattlesnake	Crotalus mitchellii pyrrhus	SD
Mojave Rattlesnake	Crotalus scutulatus scutulatus	SD
Mojave Desert Sidewinder	Crotalus cerastes cerastes	SD
Western Chuckwalla	Sauromalus obesus obesus	SP/SD

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February 1999 (Revised)

Glen Canyon Chuckwalla	Sauromalus obesus multiforaminatus	SP/SD
Many-lined Skink	Eumeces multivirgatus gaigeae	SP/SD
Plateau Striped Whiptail	Cnemidopherus velox	SP/SD
Great Plains Rat Snake	Elaphe guttata emoryi	SP/SD
Smooth Green Snake	Opheodrys vernalis	SP/SD
Relict Leopard Frog	Rana onca	E
Boreal Toad	Bufo boreas boreas[3]	SP
Arizona Toad	Bufo microscaphus microscaphus	SP
Lowland Leopard Frog	Rana yavapaiensis	SP
Pacific Chorus Frog	Pseudacris regilla	SD
Spotted Frog	Rana pretiosa[3]	C

Mollusk

Kanab Amber Snail	Oxyloma haydeni kanabensis[1]	E
Fish Spring Pond Snail	Stagnicola pilsbryi	E
Utah Valvata Snail	valvata utahensis[1]	E
California Floater	Anodota californiensis	T
Thickshell Pondsnail [Utah Band Snail]	Stanicola utahensis	T
Round Mouth valvata	Valvata humeralis	SP
Clinton Cave Snail	Pristiloma subrupicola	SD
Eureka Monuntainsnail	Oreohelix eurekensis eurekensis	SD
Lyrate Mountainsnail	Oreohelix haydeni haydeni	SD
Odgen Rocky Mountainsnail	Oreohelix perpherica wasatchensis[3]	SD
Wet-rock Physa [Zion Canyon Snail]	Physella sionis	SD
Yavapai Mountainsnail	Oreohelix yavapai	SD

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February 1999 (Revised)

Brian Head Mountainsnail	Oreohelix parowanensis	SD
Fat-whorled Pondsnail	Stagnicola bonnevillensis[3]	SP/SD
Utah Physa		
[Utah Bubble Snail]	Physella utahensis	SP/SD
Uinta Mountainsnail	Oreohelix eurekensis uinta	SP/SD
Desert Spring Snail	Pyrgulopsis deserta	SP/SD
Fish Lake Physa Snail	Physella microstriata	SP/SD

[1]Species is federally listed as Endangered
[2]Species is federally listed as Threatened
[3]Species is federally listed as Candidate

E - Extinct: Any wildlife species that has disappeared in the world.
EX - Extirpated: Any wildlife species that has disappeared from Utah since 1800.
EN - Endangered: Any wildlife species or subspecies which is threatened with extirpation from Utah or extinction resulting from very low or declining numbers, alteration and/or reduction of habitat, detrimental environmental changes, or any combination of the above. Continued long-term survival is unlikely without implementation of special measures.
T - Threatened: Any wildlife species or subspecies which is likely to an endangered species within the foreseeable future throughout all or a significant part of its range in Utah or the world.
SP - Special Concern: Any wildlife species or subspecies which has experienced a substantial decrease in population, distribution and/or habitat availability.
SD - Special Concern: Any wildfire species or subspecies which occurs in limited areas and/or numbers due to a restricted or specialized habitat.
SP/SD - Special Concern: Any wildlife species or subspecies which has both a declining population and a limited range.
C - Conservation: Any wildlife species or subspecies, except those species currently listed under the Endangered Species Act as Threatened or Endangered, that meets the state criteria of Endangered, Threatened or of Special Concern, but is currently receiving sufficient special management under a Conservation Agreement developed and/or implemented by the state to preclude its listing above. In the event that the conservation agreement is not implemented, the species will be elevated to appropriate category.

Utah Division of Wildlife Resources, 1596 West North Temple, Salt Lake City, Utah 84116-3195

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CHAPTER 4

LAND USE

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CHAPTER 4
LAND USE

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

Nielson Construction used the refuse pile site as a gravel pit during the construction of the Carbon County Dugout Canyon Road (1998 - 1999). In preceding years the area has been utilized as open range for livestock (being bordered on two sides by a BLM grazing allotment) and as wildlife habitat.

411.110 Land Use Map and Narrative

The land use map would have limited information, due to the size of the site and since the storage area is adjacent to the Dugout Canyon County Road, lands under the jurisdiction of the BLM, and lands owned by Canyon Fuel Company, LLC RA Figure 4-1 provides the necessary information and outlines the Soldier Canyon Grazing Allotment.

411.120 Land Capability

The major plant communities in the area are identified in Section 321. No cultivated lands lie within the permit boundary, due to the limiting terrain and lack of water for irrigation. Refer to Section 321.200 for forage production per acre.

411.130 Land Use Description

The BLM Soldier Canyon Grazing Allotment borders the site on the west and north sides. Seasonal use runs from November 16 to June 15 on a use/rest rotation for 835 AUM's. The flatter mesa tops and rolling terrain of the area receive grazing pressure because of easier movement by livestock and more available forage.

No industrial or municipal facilities are located on or immediately adjacent to the site. Farming of the area does not appear to have occurred in the past or is it likely to occur in the future due to the poor quality of the soil and lack of available water resources.

The land uses adjacent to the site currently include a transportation corridor, wildlife habitat and livestock range. Recreational use of the general area is limited to off-road vehicles and hunting activities because of fenced property, lack of trails, no improved properties and very limited water.

411.140 Cultural and Historic Resources Information

Cultural and historic literature and site evaluations of the area were performed by Senco-Phenix in 1996 and 1998. No Historic Registry sites were located. A copy of the reports is included in Attachment 4-1.

Cultural and Historic Resource Maps. There are no cemeteries, public parks, or units of the National System of Trails or the Wild and Scenic Rivers System located within the site boundary.

CFC agrees to notify the Division and SHPO of previously unidentified cultural resources discovered in the course of operations. CFC 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. CFC will also instruct its employees that it is a violation of federal and state laws to collect individual artifacts or to otherwise disturb cultural resources.

411.200 Previous Mining Activity

Activities associated with mining may have occurred on the site during the early 1900's. CFC has no knowledge of the removal of coal or other minerals.

412 Reclamation Plan

412.100 Postmining Land Use Plan

All uses of the land prior to coal mine waste storage and the capability of the land to support prior alternate uses will remain available throughout the life of the site except within the disturbed area boundary.

CFC intends the postmining land use to be wildlife habitat and livestock grazing. Final reclamation activities, such as grading and seeding as detailed within this submittal and the approved M&RP, will be completed in a manner to provide lands able to parallel the premining land use. In areas where surface disturbance will result from site construction operations, soil reclamation and revegetation will restore the areas to wildlife habitat capabilities.

The activities associated with the operation will follow accepted standards or proven techniques. Erosion hazards will be minimized and, where possible, eliminated. Reclamation will restore the land and vegetation to as near a natural and productive condition as possible.

Efforts to restore wildlife habitat and specific periods of habitation by wildlife species of the disturbed and adjacent area are discussed in Chapter 3 of the approved M&RP.

412.200 Land Owner or Surface Manager Comments

Canyon Fuel Company, LLC owns the land on which the refuse pile site is to be constructed.

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412.300 Suitability and Capability

The site will have fills containing excess spoils. The site will be suitable for reclamation and revegetation. The reclaimed site will be compatible with the surrounding topography and approved postmining land use. Refer to Chapter 5 for additional information pertaining to the storage of waste.

413 Performance Standards

The performance standards for the areas to be reclaimed for postmining land use are contained in this section.

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 land uses (see Chapters 2, 3, 5, and 7). The postmining roads are discussed in Section 542.600.

413.200 Determining Premining Uses of Land

Postmining land uses will be as stated in Section 412.

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.

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420 AIR QUALITY

421 Air Quality Standards

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

422 Compliance Efforts

Refer to the approved M&RP.

423 Monitoring Program

Refer to the approved M&RP.

424 Fugitive Control Plan for Production Rates Less than One Million Tons Per Year

Refer to the approved M&RP.

425 Additional Division Requirements

Refer to the approved M&RP.

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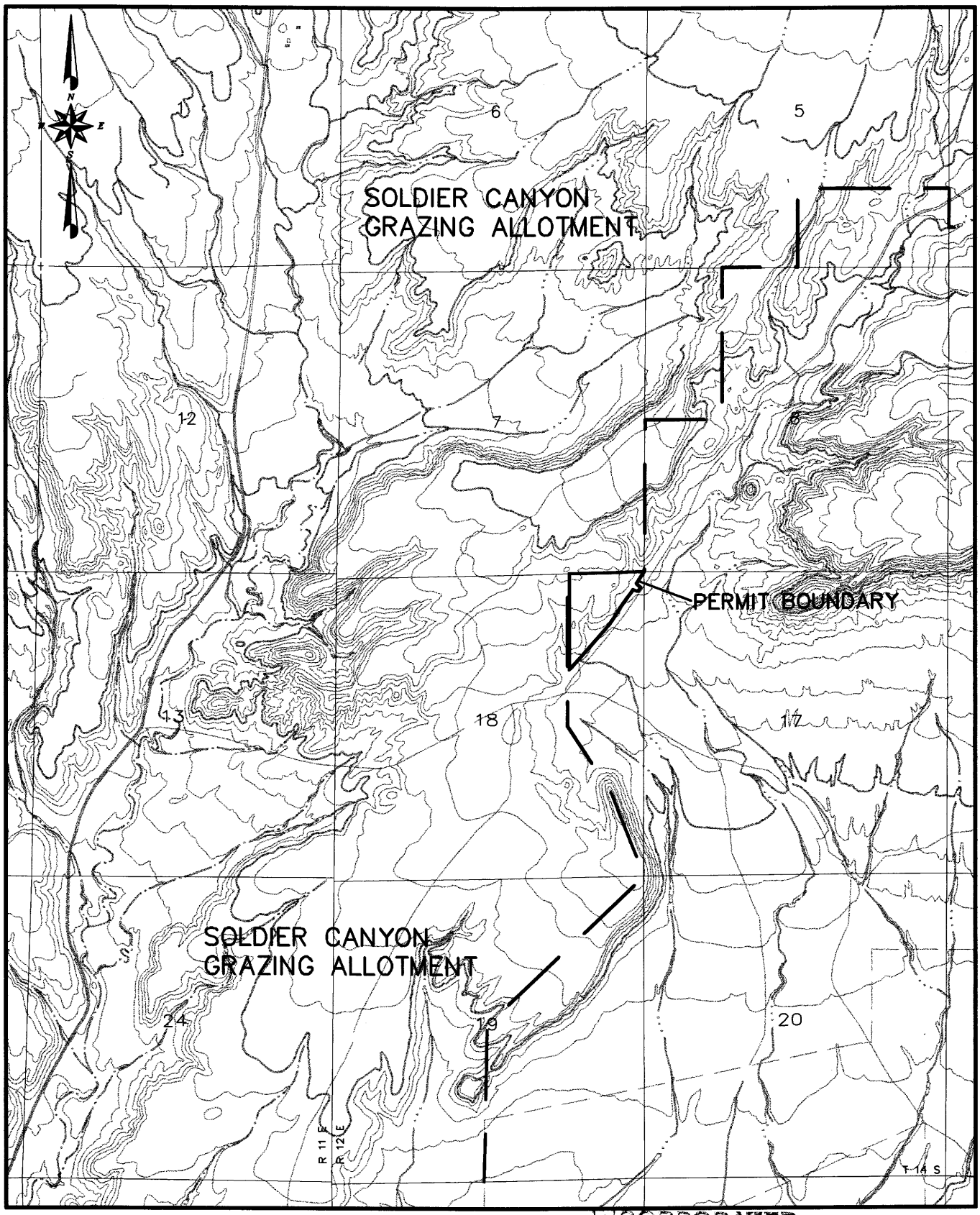

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EarthFax

RA FIGURE 4-1. LAND USE – GRAZING ALLOTMENT

Dugout Canyon Mine
Waste Rock Amendment
C/007/039

RA Attachment 4-1

Moved to Confidential Binder - January 2005

Per Letter December 8, 2004, Mark Mesch, Acting Associate Director, Mining
Utah Division of Oil, Gas and Mining

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AUG 0 9 2005
DIV OF OIL GAS & MINING

State of Utah

Department of
Natural Resources

ROBERT L. MORGAN
Executive Director

Division of
Oil, Gas & Mining

MARY ANN WRIGHT
Acting Division Director

OLENE S. WALKER
Governor

GAYLE F. McKEACHNIE
Lieutenant Governor

December 8, 2004

DEC 13 2004

Rick Olsen, General Manager
Canyon Fuel Company, LLC
P.O. Box 1029
Wellington, Utah 84542

Re: Confidential and Protected Information in MRP, Outgoing File

Dear Mr. Olsen:

The requirements for Confidentiality in the Utah Coal Program are outlined in R645-301-124.300. Confidential information is limited to:

124.310. Information that pertains only to the analysis of the chemical and physical properties of the coal to be mined, except information on components of such coal which are potentially toxic in the environment.

124. 320. Information required under section 40-10-10 of the Act that is authorized by that section to be held confidential and is not on public file pursuant to Utah law and that the applicant has request in writing to be held confidential: and

124.330. Information on the nature and location of archeological resources on public land and Indian land as required under the Archeological Resources Protection Act of 1979 (P.L. 96-95, 93 Stat. 721, 16 U.S. C. 470).

Additionally, according to the Government Records Access Management Act (GRAMA), the location of "historic, cultural or biological resources" must be "protected". The locations of raptors and threatened and endangered species must be "protected". Personal information is identified as a "private record" according to GRAMA (i.e. ownership information that contains social security numbers).

Therefore, we are requesting that confidential, protected and private information as identified above be removed from the currently approved MRP. A page clearly identifying what information was removed would be inserted into the MRP noting that the archeological information, for example, is in the Confidential MRP for that mine.

1594 West North Temple, Suite 1210, PO Box 145801, Salt Lake City, UT 84114-5801
telephone (801) 538-5340 • facsimile (801) 359-3940 • TTY (801) 538-7458 • *www.ogm.utah.gov*

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All of the confidential, protected and private information should be organized in the "Confidential" MRP volume (binder) by pages where it would be found in the approved MRP.

Please handle this administrative action by February 1, 2005. If you have any questions, please call Pamela Grubaugh-Littig (801) 538-5268 or Wayne Hedberg (801) 538-5286.

Sincerely,

Mark Mesch
Acting Associate Director, Mining

an
cc: Price Field Office
O:\TEAMS\Process Team\ConfidentialLetterOperator.doc