Alton Coal Development, LLC
463 North 100 West, Suite 1
Cedar City, Utah 84720
Phone (435) 867-5311 Fax (435) 867-1192

August 2, 2018

Daron R. Haddock
Coal Program Manager
Oil, Gas & Mining
1594 West North Temple, Suite 1210
Salt Lake City, UT 84114-5801

Subject: **LBA Block 1, Alton Coal Development, LLC, Coal Hollow Mine, Kane County, Utah, C/025/0005**

Dear Mr. Haddock,

Alton Coal Development, LLC (ACD) is submitting enclosed amendment to the MRP in "Draft" form for permitting of the anticipated Federal coal lease. LBA Block 1 includes coal located wholly within the permit area of the South Private Lease (SPL) of the Coal Hollow Mine. The plan includes the backfill of Pit 10 containing the current underground facilities.

Changes to the MRP associated with this amendment have been uploaded to the DOGM's server for review. Upon approval, 2 (two) clean hard copies of the certified drawing for insertion into the MRP will be submitted. Please do not hesitate to contact me if you have any questions 435-691-1551.

Sincerely

B. Kirk Nicholes
Environmental Specialist

APPLICATION FOR COAL PERMIT PROCESSING

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

Permittee: Alton Coal Development, LLC
Mine: Coal Hollow Mine **Permit Number:** C/025/0005
Title: LBA Block 1

Description, Include reason for application and timing required to implement:
Initial permitting of federal coal contained in SPL

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

☐ Yes ☒ No 1. Change in the size of the Permit Area? Acres: _____ Disturbed Area: _____ ☐ increase ☐ decrease.
☐ Yes ☒ No 2. Is the application submitted as a result of a Division Order? DO# _____
☐ Yes ☒ No 3. Does the application include operations outside a previously identified Cumulative Hydrologic Impact Area?
☐ Yes ☒ No 4. Does the application include operations in hydrologic basins other than as currently approved?
☐ Yes ☒ No 5. Does the application result from cancellation, reduction or increase of insurance or reclamation bond?
☐ Yes ☒ No 6. Does the application require or include public notice publication?
☐ Yes ☒ No 7. Does the application require or include ownership, control, right-of-entry, or compliance information?
☐ Yes ☒ No 8. Is proposed activity within 100 feet of a public road or cemetery or 300 feet of an occupied dwelling?
☐ Yes ☒ No 9. Is the application submitted as a result of a Violation? NOV # _____
☐ Yes ☒ No 10. Is the application submitted as a result of other laws or regulations or policies?
Explain: _____
☐ Yes ☒ No 11. Does the application affect the surface landowner or change the post mining land use?
☐ Yes ☒ No 12. Does the application require or include underground design or mine sequence and timing? (Modification of R2P2)
☐ Yes ☒ No 13. Does the application require or include collection and reporting of any baseline information?
☒ Yes ☐ No 14. Could the application have any effect on wildlife or vegetation outside the current disturbed area?
☒ Yes ☐ No 15. Does the application require or include soil removal, storage or placement?
☒ Yes ☐ No 16. Does the application require or include vegetation monitoring, removal or revegetation activities?
☒ Yes ☐ No 17. Does the application require or include construction, modification, or removal of surface facilities?
☒ Yes ☐ No 18. Does the application require or include water monitoring, sediment or drainage control measures?
☒ Yes ☐ No 19. Does the application require or include certified designs, maps or calculation?
☐ Yes ☒ No 20. Does the application require or include subsidence control or monitoring?
☒ Yes ☐ No 21. Have reclamation costs for bonding been provided?
☐ Yes ☒ No 22. Does the application involve a perennial stream, a stream buffer zone or discharges to a stream?
☐ Yes ☒ No 23. Does the application affect permits issued by other agencies or permits issued to other entities?
☐ Yes ☒ No 24. Does the application include confidential information and is it clearly marked and separated in the plan?

Please attach three (3) review copies of the application. If the mine is on or adjacent to Forest Service land please submit four (4) 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.

B. Kirk Nicholes	Environmental Specialist	08/02/2018	B. Kirk Nicholes
Print Name	Position	Date	Signature (Right-click above choose certify then have notary sign below)

Subscribed and sworn to before me this 2 day of August, 2018

Notary Public: Sherrie Prisbrey, state of Utah.

My commission Expires: 9/26/2019
Commission Number: 685027
Address: 377 N Main St
City: Cedar City State: Ut Zip: 84721

} ss:

SHERRIE PRISBREY
Notary Public
State of Utah
Comm. No. 685027
My Comm. Expires Sep 26, 2019

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

Form DOGM- C1 (Revised December 10, 2007)

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

Permittee: Alton Coal Development, LLC
Mine: Coal Hollow Mine **Permit Number:** C/025/0005
Title: LBA Block 1

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	Chapter 1, TOC
☐ Add	☒ Replace	☐ Remove	Chapter 1, Text
☐ Add	☒ Replace	☐ Remove	Chapter 2, Text
☐ Add	☒ Replace	☐ Remove	Chapter 2, Drawing 2-1
☐ Add	☒ Replace	☐ Remove	Chapter 2, Drawing 2-2
☐ Add	☒ Replace	☐ Remove	Chapter 3, Drawing 3-7
☐ Add	☒ Replace	☐ Remove	Chapter 5, Text
☐ Add	☒ Replace	☐ Remove	Chapter 5, Appendix 5-2
☐ Add	☒ Replace	☐ Remove	Chapter 5, Drawing 5-1
☐ Add	☒ Replace	☐ Remove	Chapter 5, Drawing 5-2
☐ Add	☒ Replace	☐ Remove	Chapter 5, Drawing 5-3
☐ Add	☒ Replace	☐ Remove	Chapter 5, Drawing 5-3A
☐ Add	☒ Replace	☐ Remove	Chapter 5, Drawing 5-9
☐ Add	☒ Replace	☐ Remove	Chapter 5, Drawing 5-10
☐ Add	☒ Replace	☐ Remove	Chapter 5, Drawing 5-13
☐ Add	☒ Replace	☐ Remove	Chapter 5, Drawing 5-14
☐ Add	☒ Replace	☐ Remove	Chapter 5, Drawing 5-15
☐ Add	☒ Replace	☐ Remove	Chapter 5, Drawing 5-16
☐ Add	☒ Replace	☐ Remove	Chapter 5, Drawing 5-17
☐ Add	☒ Replace	☐ Remove	Chapter 5, Drawing 5-18
☐ Add	☒ Replace	☐ Remove	Chapter 5, Drawing 5-19
☐ Add	☒ Replace	☐ Remove	Chapter 5, Drawing 5-22
☐ Add	☒ Replace	☐ Remove	Chapter 5, Drawing 5-23
☐ Add	☒ Replace	☐ Remove	Chapter 5, Drawing 5-25
☐ Add	☒ Replace	☐ Remove	Chapter 5, Drawing 5-26
☐ Add	☒ Replace	☐ Remove	Chapter 5, Drawing 5-27
☐ Add	☒ Replace	☐ Remove	Chapter 5, Drawing 5-30
☐ Add	☒ Replace	☐ Remove	Chapter 5, Drawing 5-33

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

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

Permittee: Alton Coal Development, LLC
Mine: Coal Hollow Mine **Permit Number:** C/025/0005
Title: LBA Block 1

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	Chapter 5, Drawing 5-34
☐ Add	☒ Replace	☐ Remove	Chapter 5, Drawing 5-35
☐ Add	☒ Replace	☐ Remove	Chapter 5, Drawing 5-36
☐ Add	☒ Replace	☐ Remove	Chapter 5, Drawing 5-37
☐ Add	☒ Replace	☐ Remove	Chapter 5, Drawing 5-37A
☐ Add	☒ Replace	☐ Remove	Chapter 5, Drawing 5-38
☐ Add	☒ Replace	☐ Remove	Chapter 7, Text
☐ Add	☒ Replace	☐ Remove	Chapter 8, Text
☐ Add	☒ Replace	☐ Remove	Chapter 8, Appendix 8-1
☐ Add	☒ Replace	☐ Remove	Chapter 8, Appendix 8-2
☐ Add	☒ Replace	☐ Remove	Volume 9 (Confidential) Appendix 1-2 TOC
☒ Add	☐ Replace	☐ Remove	Volume 9 (Confidential) Appendix 1-2 Exhibit 18
☐ Add	☒ Replace	☐ Remove	Chapter 1, Appendix 1-10
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Any other specific or special instruction required for insertion of this proposal into the Mining and Reclamation Plan.	**Received by Oil, Gas & Mining**

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R645-301-100

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110 LEGAL, FINANCIAL, COMPLIANCE, and RELATED INFORMATION

110 INTRODUCTION

Alton Coal Development, LLC is submitting a Mining and Reclamation Plan for the Coal Hollow Project to the Utah Division of Oil, Gas and Mining pursuant to rules governing coal mine permitting at R645-301-100 et seq. Permit Area Base Drawing – Drawing 1-1. Following is the legal descriptions of the permit areas for the Coal Hollow Mine and the North Private Lease.

Coal Hollow Mine Legal Description

TOWNSHIP 39 SOUTH-RANGE 05 WEST. SLB&M
Section 30: All of Section Lot #l (NW ¼ NW ¼); NE ¼ NW ¼ ; N ½ NE ¼ ; ALSO: BEGINNING 3.50 chains West of the East Quarter corner of Said Section 30, and running South 34° 34' West 22.64 chains of the l/16 section line; thence West 2.64 chains to the Southwest comer of NE ¼ SE ¼ of Said Section 30; thence North 40.00 chains; thence East 20.00 chains; thence South 14.69 chains; thence southwesterly to the point of beginning...containing 2l7.64 acres, more or less.

TOWNSHIP 39 SOUTH-RANGE 05 WEST. SLB&M
Section 29: BEGINNING at the Northwest corner of Said Section 29, and running thence South 34.69 chains; thence North 33°22' East 35.50 chains; thence North 40° West 0.58 chains; thence North 37°30' East 12.30 chains; thence West 22.23 chains to the point of beginning...containing 36.04 acres, more or less.

TOWNSHIP 39 SOUTH-RANGE 05 WEST. SLB&M
Section 19: SW ¼ SE ¼ , E ½ SE ¼., SE ¼ NE ¼ ...containing 160.0 acres, more or less.

TOWNSHIP 39 SOUTH.RANGE 05 WEST. SLB&M
Section 20: SW ¼ ...containing 160.00 acres, more or less.

TOWNSHIP 39 SOUTH-RANGE 05 WEST. SLB&M
Section 30: BEGINNING at a point 5.3 I chains North of the E ¼ corner of Said Section 30, and running thence South 45.31 chains; thence West 20.00 chains; thence North 20.00 chains; thence East 2.64 chains; thence North 34° 34' East 22.64 chains to the l/16 section line; thence North 33° 22' East to the point of beginning…containing 61.96 acres, more or less.

TOWNSHIP 39 SOUTH-RANGE 05 WEST, SLB&M

Section 29: BEGINNING at the Northeast Corner of the Northwest Quarter of Said Section 29, and running thence South 14.97 chains; thence West 73 degrees North, 12.41 chains; thence South 36 degrees 45 minutes West to the Quarter Section Line of Section 29; thence South 36 degrees 45 minutes West 15.61 chains; thence South 5.20 chains to the center section line of Section 29; thence South 20.0 chains; thence West 10.96 chains to the west section line of Section 29; thence North 20.0 chains to the Quarter Section Corner of Section 29; thence North 25.31 chains; thence North 33 degrees 22 minutes East 35.50 chains; thence in a Northwesterly direction 2 rods; thence North 37 degrees 30 minutes East 12.30 chains to the North Section Line of Section 29; thence East 17.77 chains to the point of beginning…containing 85.88 acres, more or less.

This legal description is for the permit area (721 acres) of the Coal Hollow Mine

North Private Lease Legal Description

The following described lands located in Kane County, Utah within Sec. 12 &13, T39S, R6W and within Sec. 7 &18, T39S, R5W:

Beginning S 58^0 16’ 29” W a distance of 1,920.87 ‘ from Section Corner 7-18-12-13, T39S, R5 R6W;thence N 89°29'27\ W a distance of 823.81'; thence S 00°00'38\ E a distance of 1313.93'; thence S 65°46'32\ E a distance of 479.40'; thence S 89°44'30\ E a distance of 1861.86'; thence S 54°58'33\ E a distance of 226.53'; thence S 89°45'07\ E a distance of 1235.50'; thence N 00°41'09\ E a distance of 1322.97'; thence N 00°41'09\ E a distance of 1322.97'; thence S 89°30'20\ E a distance of 241.42'; thence N 00°51'49\ E a distance of 1323.52'; thence N 89°22'59\ W a distance of 249.30'; thence N 89°56'02\ W a distance of 2923.34'; thence S 00°24'59\ W a distance of 2326.09'; which is the point of beginning, having an area of 12,877,780.47 square feet, or **295.633 acres**

112 IDENTIFICATION OF INTERESTS

112.100 Business Entity

Applicant, Alton Coal, LLC, is a limited liability company duly organized and validly existing under the laws of the State of Nevada, and authorized to conduct business under the laws of the State of Utah.

112.200 Names, address, telephone number, and employer identification number of:

112.210 **Applicant:**

Alton Coal Development, LLC
463 N. 100 W, Suite 1
Cedar City, UT 84721
Telephone (435) 867- 5331
EIN: 42-1655092

112.220 Resident Agent for **Applicant**:

B. Kirk Nicholes
463 N. 100 W., Suite 1
Cedar City, Utah 84721
(435) 867-5331

112.230 Person who will pay the Abandoned Mine and Reclamation Fee:

Robert C. Nead, Jr.

112.300 Ownership and Control Information

Description of Ownership and Chart showing the "Family Tree" for Alton Coal Development, LLC, attached in Appendix 1-10

112.310 **Applicant:**

Members Holding Ten Percent (10%) or more of Ownership of Applicant:

James Wayland
2841 Capistrano Way
Naples, FL 34105

SH Coal Investment, LLC
2375 Cambridge Rd.
Coshocton, Ohio 43818
EIN: 27-3192975

Owners of SH Coal Investment, LLC:

SH Coal Investment, LLC, is a Delaware limited liability company, which is a wholly owned company of Sleepy Hollow Mineral Investors, LLC, which is a Delaware limited liability company.

Sleepy Hollow Mineral Investors, LLC 100%
P.O. Box 1058
Coshocton, Ohio 43812
EIN: 27-3192842

Sleepy Hollow Mineral Investors, LLC, is owned as follows:

Charles Ungurean 50%
2375 Cambridge Road
Coshocton, Ohio 43812

Thomas Ungurean 50%
1690 Sleepy Hollow Drive
Coshocton, Ohio 43812

Managers and Officers of **Applicant**:

James Wayland – Manager

Larry Johnson – President for Operations
463 N. 100 W., Suite 1
Cedar City, Utah 84721
(435) 867-5331

Social Security numbers of Alton Coal Development, LLC's individual member, manager and officer and for Charles Ungurean and Thomas Ungurean provided in "CONFIDENTIAL BINDER" Appendix 1-1

112.320 Relationship to the **Applicant**

Ownership:

James Wayland	25.5%
SH Coal Investment, LLC	49.0%

Control:

James Wayland	Manager
Larry Johnson	President of Operations

SH Coal Investment, LLC (Owner) and Sleepy Hollow Mineral Investors, LLC:

Charles Ungurean	Manager
Thomas Ungurean	Manager

112.330 Title and Date of Position

Applicant:

James Wayland Manager
September 9, 2004 (begin date)

Larry Johnson President of Operations
February 1, 2011 (begin date)

Robert C. Nead, Jr.
Person in charge of payments pursuant to R645-300-147
September 9, 2004 (begin date)

SH Coal Investments, LLC	Owner
Sleepy Hollow Mineral Investors, LLC	Manager of SH Coal Investments, LLC

August 2, 2010 (begin date)
Sleepy Hollow Mineral Investors, LLC
Charles Ungurean Manager
August 2, 2010 (begin date)
Thomas Ungurean Manager
August 2, 2010 (begin date)

112.340. Ownership or control of Other Coal Mining and Reclamation Operations

Applicant:

With the exception of Charles Ungurean and Thomas Ungurean, neither Alton Coal Development, LLC nor its manager or members has owned or controlled other coal mining or reclamation operations. *See* attached Appendix 1-10 for listing of Ungurean's operations.

112.350 Application Number – Other Pending Coal Mining and Reclamation Operations

Applicant:

With the exception of Charles Ungurean and Thomas Ungurean, neither, Alton Coal Development, LLC nor its manager or members has owned or controlled other coal mining or reclamation operations. The Ungurean's operations are described at Appendix 1-10.

112.400 Coal Mining and Reclamation Operations Owned or Controlled

Applicant:

With the exception of Charles Ungurean and Thomas Ungurean, neither, Alton Coal Development, LLC nor its manager or members has owned or controlled other coal mining or reclamation operations. The Ungurean's operations are described at Appendix 1-10.

112.410 Coal Mining and Reclamation Operations Owned or Controlled by Managers or Members of Alton Coal Development, LLC

Applicant:

With the exception of Charles Ungurean and Thomas Ungurean, neither, Alton Coal Development, LLC nor its manager or members has owned or controlled other coal mining or reclamation operations. The Ungurean's operations are described at Appendix 1-10.

112.420 Ownership and Control Relationship of Managers and Members of Alton Coal Development, LLC

Relationship to the **Applicant**

Applicant:

James Wayland Manager
September 9, 2004 (begin date)

Larry Johnson President of Operations
February 1, 2011 (begin date)

Robert C. Nead, Jr.
Person in charge of payments pursuant to R645-300-147
September 9, 2004 (begin date)
SH Coal Investments, LLC Owner

Sleepy Hollow Mineral Investors, LLC Manager of SH Coal Investment, LLC
August 2, 2010 (begin date)
Sleepy Hollow Mineral Investors, LLC
Charles Ungurean Manager
August 2, 2010 (begin date)
Thomas Ungurean Manager
August 2, 2010 (begin date)

112.500 Legal or Equitable Owner of the Surface and Mineral Properties

The legal and equitable owners of the properties to be affected by this mining operation during the duration of the permit period along with legal descriptions are included in this section. Surface and coal ownership are also shown on Drawings 1-3 and 1-4. The following table is a summary of the ownership within the Permit boundary.

Coal Hollow Permit Area Ownership (Acres)**				
	Fee	Federal	State	Total
Surface	721	0	0	721
Coal*	521	200	0	721
Total				
Note*: Federal minerals located within the Permit area are not planned for mining as part of this application. These areas have been included as part of the LBA application described in 112.800. Note**: Acreages are approximate based on legal descriptions				

The legal description for lands included within the Permit Boundary is provided below for each surface owner.

SURFACE OWNERSHIP:

Owner/Lessor:

C. Burton Pugh
533 N 650 E
Lindon, Utah 84042-1567
801-785-6220

Lessee:

Alton Coal Development, LLC

Legal Description (C. Burton Pugh Property):

TOWNSHIP 39 SOUTH-RANGE 05 WEST, SLB&M
Section 30: All of Section Lot #1 (NW¼ NW¼); NE¼ NW¼ ; N½ NE¼ ; ALSO: BEGINNING 3.50 chains West of the East Quarter corner of Said Section 30, and running South 34˚ 34' West 22.64 chains to the 1/16 section line; thence West 2.64 chains to the Southwest corner of NE¼ SE¼ of Said Section 30; thence North 40.00 chains; thence East 20.00

chains; thence South 14.69 chains; thence southwesterly to the point of beginning.

….containing 217.64 acres, more or less.

TOWNSHIP 39 SOUTH-RANGE 05 WEST, SLB&M
Section 29: BEGINNING at the Northwest corner of Said Section 29, and running thence South 34.69 chains; thence North 33˚22' East 35.50 chains; thence North 40˚ West 0.58 chains; thence North 37˚30' East 12.30 chains; thence West 22.23 chains to the point of beginning.

….containing 36.04 acres, more or less.

TOWNSHIP 39 SOUTH-RANGE 05 WEST, SLB&M
Section 19: SW¼SE¼, E½SE¼, SE¼NE¼

….containing 160.0 acres, more or less

TOWNSHIP 39 SOUTH-RANGE 05 WEST, SLB&M
Section 20: SW¼

….containing 160.0 acres, more or less

COAL OWNERSHIP:

Owner/Lessor:

C. Burton Pugh
533 N 650 E
Lindon, Utah 84042-1567
801-785-6220

Roger M. Pugh
140 South 100 West
Kanab, UT 84741

Mark and Margaret Moyers
9397 Avanyu Drive
Pleasant Grove, UT 84062

Department of the Interior,
Bureau of Land Management
District and Regional Office
Salt Lake City, Utah

Lessee:

Alton Coal Development, LLC

SURFACE OWNERSHIP:

Owner/Lessor:

Alecia Swapp Dame Trust
Through Richard Dame, Trustee
1620 Georgia Ave.
Boulder City, NV 89005
702-293-4773

Lessee:

Alton Coal Development, LLC

Legal Description (Alecia Dame Swapp Trust):

TOWNSHIP 39 SOUTH-RANGE 05 WEST, SLB&M
Section 30: BEGINNING at a point 5.31 chains North of the E¼ corner of Said Section 30, and running thence South 45.31 chains; thence West 20.00 chains; thence North 20.00 chains; thence East 2.64 chains; thence North 34˚ 34’ East 22.64 chains to the 1/16 section line; thence North 33˚ 22’ East to the point of beginning.

….containing 61.96 acres, more or less.

The following description is an addition to the original permit and constitutes an Incidental Boundary Change(IBC) as shown on Drawing 1-1. Coal contained in the IBC will be mined by highwall mining, no surface mining may take place on the leased premises.

TOWNSHIP 39 SOUTH-RANGE 05 WEST, SLB&M
Section 29: BEGINNING at the Northeast Corner of the Northwest Quarter of Section 29, Township 39 South, Range 5 West, Salt lake Base and Meridian and running thence South 14.97 chains; thence West 73 degrees North, 12.41 chains; thence South 36 degrees 45 minutes West to the Quarter Section Line of Section 29, Township 39 South, Range 5 West, Salt Lake Base and Meridian; thence South 36 degrees 45 minutes West 15.61 chains; thence South 5.20 chains to the center section line of Section 29, Township 29 South, Range 5 West, Salt lake Base and meridian; thence South 20.0 chains; thence West 10.96 chains to the west section line of Section 29, Township 39 South, Range 5 West, Salt lake Base meridian; thence North 20.0 chains to the Quarter Section Corner of Section 29, Township 39 South, Range 5 West, Salt Lake Base and meridian; thence North 25.31 chains; thence North 33 degrees 22 minutes East 35.50 chains; thence in a Northwesterly direction 2 rods; thence North 37 degrees 30 minutes East 12.30 chains to the North Section Line of Section 29, Township 39 South, Range 5 West, Salt Lake Base meridian; thence East 17.77 chains to the point of beginning.

….containing 85.88 acres, more or less.

COAL OWNERSHIP:

Owner/Lessor:

Alecia Swapp Dame Trust
Through Richard Dame, Trustee
1620 Georgia Ave.
Boulder City, NV 89005
702-293-4773

Lessee:

Alton Coal Development, LLC

North Private Lease Permit Area Ownership (Acres)**				
	Fee	Federal	State	Total
Surface	296	0	0	296
Coal*	262	34	0	296
Total				
Note*: Federal minerals located within the Permit area are not planned for mining as part of this application. These areas have been included as part of the LBA application described in 112.800. Note**: Acreages are approximate based on legal descriptions				

The legal description for lands included within the Permit Boundary is provided below for each surface owner.

SURFACE OWNERSHIP:

Owner/Lessor:	*Lessee:*
Heaton Brothers, LLC P. O. Box 100008 Alton, Utah 84710	Alton Coal Development, LLC

Legal Description (Heaton Brothers, LLC Property Tract 9-6-13-1 & 9-6-12-5):

TOWNSHIP 39 SOUTH-RANGE 06 WEST, SLB&M
Section 13: E½NE¼: SW¼NE¼

….containing 120.0 acres, more or less.

TOWNSHIP 39 SOUTH-RANGE 06 WEST, SLB&M
Section 12: BEGINNING at a point 20 chains West and 10 chains North of the South East corner of said Section 12; thence North 10 chains, thence East 3 chains, thence South 10 chains, thence West 3 chains to the point of beginning.

….containing 3.00 acres, more or less.

COAL OWNERSHIP:

Owner/Lessor:	*Lessee:*
Heaton Brother, LLC P.O. Box 100008 Alton, Utah 84010	Alton Coal Development, LLC

SURFACE OWNERSHIP:

Owner/Lessor:	*Lessee:*
G. Ferril & Dorothy M. Heaton P.O. Box 100063 Alton, UT 84710	Alton Coal Development, LLC

Legal Description (G. Ferril & Dorothy M. Heaton Property Tract 9-6-12-1, 9-5-7-3A, 9-5-18-5):

TOWNSHIP 39 SOUTH-RANGE 06 WEST, SLB&M
Section 12: E½E½SE½SE½: BEGINNING at a Southeast corner of Said Section 12, and running thence West 5.00 chains; thence North 20.00 chains; thence East 5.00 chains; thence South 20.00 chains to the point of beginning.

….containing 10.00 acres, more or less.

TOWNSHIP 39 SOUTH-RANGE 05 WEST, SLB&M
Section 7: BEGINNING at a point Southwest corner Said Section 7, and running thence East 15.00 chains; thence North 20.00 chains; thence West 15.00 chains; thence South 20.00 chains to the point of beginning.

….containing 30.00 acres, more or less.

TOWNSHIP 39 SOUTH-RANGE 05 WEST, SLB&M
Section 18: BEGINNING at the Northwest corner of Said Section 18, and running thence East 15.00 chains; thence South 20.00 chains; thence West 15.00 chains; thence North 20.00 chains to the point of beginning.

….containing 30.00 acres, more or less

COAL OWNERSHIP:

Owner/Lessor:	*Lessee:*
Delbert R. Palmer P.O. Box 6 Orderville, Utah 84758-0006	Alton Coal Development, LLC
Elgin R. Palmer and 9670 Cove Avenue Pensacola, Florida 32534-1034	Alton Coal Development, LLC

SURFACE OWNERSHIP:

Owner/Lessor:	*Lessee:*
G. Ferril & Dorothy M. Heaton P.O. Box 100063 Alton, UT 84710	Alton Coal Development, LLC

Legal Description (G. Ferril & Dorothy M. Heaton Property Tract 9-5-18-3A):

TOWNSHIP 39 SOUTH-RANGE 05 WEST, SLB&M
Section 18: The SW¼NW¼ (Lot 2) of Said Section 18.

….containing 38.34 acres, more or less.

COAL OWNERSHIP:

Owner/Lessor:	*Lessee:*
Heaton Brothers, LLC P.O. Box 100773 Alton, UT 84710	Alton Coal Development, LLC
Delila B. Heaton Inter Vivos Trust, P.O. Box 100063 Alton, UT 84710	
Ross E. Heaton Family Trust, P.O. Box 100063 Alton, UT 84710	

SURFACE OWNERSHIP:

Owner/Lessor:	*Lessee:*
Dean R. Heaton-Successor Trustee of the Trust Dated 11/12/90 c/o Dean R. Heaton P.O. Box 435 Fredonia, AZ 86022	Alton Coal Development, LLC

Legal Description (Dean R. Heaton Property Tracts 9-6-12-2, 9-5-18-3, & 9-5-7-4A):

TOWNSHIP 39 SOUTH-RANGE 06 WEST, SLB&M
Section 12: BEGINNING at a point 5.00 chains West from the SE Corner of Said Section 12, and running thence North 20.00 chains; thence South 10.00 chains; thence West 5.00 chains; thence South 10.00 chains; thence West 10.00 chains; thence South 10.00 chains; thence East 15.00 chains to the point of beginning.

….containing 20.00 acres, more or less.

TOWNSHIP 39 SOUTH-RANGE 05 WEST, SLB&M
Section 18: BEGINNING at a point 60.00 rods East of the Northwest corner of Said Section 18, and running thence East 20.00 rods; thence South 80.00 rods; thence West 20.00 rods; thence North 80.00 rods to the point of beginning.

….containing 10.00 acres, more or less.

TOWNSHIP 39 SOUTH-RANGE 05 WEST, SLB&M
Section 18: BEGINNING at a point 60 rods East of the Southwest corner of Said Section 7, and running thence North 80.00 rods; thence East 33.00 rods; thence South 80.00 rods; thence West 33.00 rods to the point of beginning.

….containing 15.00 acres, more or less.

COAL OWNERSHIP:

Owner/Lessor:	*Lessee:*
Dean R. Heaton-Successor Trustee of the Trust Dated 11/12/90 c/o Dean R. Heaton P.O. Box 435 Fredonia, AZ 86022	Alton Coal Development, LLC

SURFACE OWNERSHIP:

Owner/Lessor:	*Lessee:*
Orval & Greta Palmer P.O. Box 100144 Alton, UT 84710-0144	Alton Coal Development, LLC

Legal Description (Orval & Greta Palmer Property Tract 9-6-12-3):

TOWNSHIP 39 SOUTH-RANGE 06 WEST, SLB&M
Section 12: BEGINNING at a point 20.0 chains North & 10.0 chains West of the Southeast corner of Section 12 Township 39 South, Range 6 West, SLB&M; & run th South 10.0 chains; th West 7.0 chains; th North 10.0 chains; th East 7.0 chains to the point of beginning.

….containing 7.0 acres, more or less.

COAL OWNERSHIP:

Owner/Lessor:	*Lessee:*
Orval & Greta Palmer P.O. Box 100144 Alton, UT 84710-0144	Alton Coal Development, LLC

SURFACE OWNERSHIP:

Owner/Lessor:	*Lessee:*
Heaton Brothers, LLC P.O. Box 100773 Alton, Utah 84710	

Legal Description (Heaton Brothers, LLC Property Tract 9-6-12-5 and 9-6-13-2):

TOWNSHIP 39 SOUTH-RANGE 06 WEST, SLB&M
Section 12: BEGINNING 20.00 chains West from the Southeast corner of Section 12, T39S-R6W, S.L.B.&M., Running Thence North 20 chains, thence West 5 chains, thence South 20 chains, thence East 5 chains to the point of beginning.

….containing 10.00 acres, more or less.

TOWNSHIP 39 SOUTH-RANGE 06 WEST, SLB&M
Section 12: BEGINNING 20.00 chains West from the Southeast corner of Section 12, T39S-R6W, S.L.B.&M., Running Thence South 20 chains, thence West 20 chains, thence North 5 chains, thence East 15 chains, thence North 15 chains, thence East 5 chains to the point of beginning.

….containing 17.50 acres, more or less.

COAL OWNERSHIP:

Owner/Lessor:	*Lessee:*
USA	Not Leased

112.600 Owners of Record of Property Contiguous to Proposed Permit Area

Owners of surface properties contiguous to the proposed permit area are shown on Drawing 1-3 and the name and address of each such owner is as follows:

Department of the Interior, Bureau of Land Management
District and Regional Office
Salt Lake City, Utah

Darlynn and Arlene Sorensen
Orderville, Utah
435-648-2462

Ann Marie Stanworth 9-5-18-2
1757 N 2975 W
Cedar City, Utah 84720-2507

Darrel A. & Georgia T. Heaton 9-6-12-4
PO Box 232
Fredonia, Arizona 86022-0232

William J. Mackelprang 9-5-18-1
6562 Begonia Bay Ave.
Las Vegas, Nevada 89142

Gene Edward Roundy 9-6-12-8
440 E 200S
Cedar City, Utah 84720-3313

112.700 MSHA Numbers

The MSHA Mine Identification Number for the Coal Hollow and North Private Lease Project is 42-02519. The Burton #1, underground mine, has been issued MSHA Mine Identification Number 42-02639.

112.800 Interest in Contiguous Lands

The applicant has interest in lands contiguous to the permit area. A Lease by Application (LBA) ~~is currently being~~was processed and a lease issued by the United States Department of the Interior, Bureau of Land Management, Salt Lake City, Utah on November XX, 2018. Alton Coal Development, LLC, the sole party in interest, submitted the LBA application in September, 2004. The LBA is contiguous to the permit area and contains approximately 3,581 acres. Coal recovery within the LBA is amenable to both surface and underground mining. See Drawing 1-2 for LBA delineation.

In addition to the LBA application, Alton Coal Development, LLC also has property leased from C. Burton Pugh located east of the permit boundary. This property which is contiguous to the permit area, is part of a land tract (9-5-20-2) owned by Mr. Pugh that is split across the permit boundary and is located in Section 20, Township 30 South, Range 5 West. This entire tract was leased prior to the final determination of the Permit Boundary (9/10/04). The area leased from

Mr. Pugh outside the Permit Boundary are not planned for development except for approximately 43 acres located in the SW¼, NW¼ Section 20 which is included as part of the LBA application. The 43 acres would possibly be developed for surface coal mining operations if the LBA mining rights are successfully acquired. Land tracts leased by Alton Coal Development, LLC within and contiguous to the permit area are identified on Drawing 1-3.

112.900 Certification of Submitted Information

After Alton Coal Development, LLC is notified that the application is approved, but before the permit is issued, Alton Coal will update, correct or indicate that no change has occurred in the information submitted under R645-301-112.100 through .800.

113 VIOLATION INFORMATION

Neither the applicant, affiliates, members or managers or persons controlled by or under common control with the applicant (including Charles Ungurean and Thomas Ungurean, as confirmed by the Applicant/Violator System (AVS) search, dated December 23, 2013) has: (i) had a federal or state mining permit suspended or revoked in the last five years; (ii) nor forfeited a mining bond or similar security deposited in lieu of a bond. Neither the applicant, affiliates, members or managers or persons controlled by or under common control with the applicant has received a violation during the last three year period. Compliance information on Ungurean's operations and the Coal Hollow Mine is attached at Appendix 1-10.

114 RIGHT OF ENTRY INFORMATION

Applicant bases its right to enter and begin coal mining activities in the permit area and the consent of the surface owner to extract coal by surface mining methods upon the following documents:

Lessor:	*Lessee:*
C. Burton Pugh	Alton Coal Development, LLC

Surface and Mineral Lease, dated 9/10/04; originally recorded 5/25/06

Lessor:	*Lessee:*
Roger M. Pugh	Alton Coal Development, LLC

Mineral Lease, dated 9/11/08; recorded 9/11/08

Lessor:	*Lessee:*
Margaret and Mark Moyers	Alton Coal Development, LLC

Mineral Lease, dated 6/26/08; recorded 7/21/08

Lessor: *Lessee:*
Department of the Interior, Alton Coal Development, LLC
Bureau of Land Management
District and Regional Office
Salt Lake City, Utah
Mineral Lease, dated 11/XX/18; recorded 11/XX/18

Lessor: *Lessee:*
Alecia Swapp Dame Trust Alton Coal Development, LLC
Surface and Mineral Lease, dated 4/29/05; recorded 5/17/06
Mineral Lease, dated 10/23/13; recorded 10/23/13

Lessor: *Lessee:*
Heaton Brothers, LLC Alton Coal Development, LLC

Surface and Mineral Lease, dated 3/15/07
Surface and Mineral Lease, dated 10/22/14
Surface and Mineral Lease, dated 12/31/14

Lessor: *Lessee:*
G. Ferril & Dorothy M. Heaton Alton Coal Development, LLC

Surface Lease, dated 5/4/07
Surface Lease, dated 5/4/07
Surface Lease, dated 5/4/07
Surface Lease, dated 5/4/07

Lessor: *Lessee:*
Delbert R. Palmer Alton Coal Development, LLC

Mineral Lease, dated 7/2/14

Lessor: *Lessee:*
Elgin R. Palmer Alton Coal Development, LLC

Mineral Lease, dated 7/8/14

Lessor: *Lessee:*
Dean R. Heaton Alton Coal Development, LLC

Surface and Mineral Lease, dated 5/4/07
Surface and Mineral Lease, dated 5/4/07
Surface and Mineral Lease, dated 12/15/14

Lessor: *Lessee:*
Orval & Greta Palmer Alton Coal Development, LLC

Surface and Mineral Lease, dated 6/30/14

Copies of these lease assignments are included in Appendix 1-2 located in the Volume 9, Confidential binder.

115 STATUS OF UNSUITABILITY CLAIMS

115.100 The permit area is not within an area or under study as an area designated as unsuitable for mining under R645-103-400, nor has any petitions been filed with the UDOGM under R645-103-420 that could affect the proposed permit area. The Coal Hollow Project is located on private lands adjacent to federal lands, which after careful consideration were declared suitable for mining in 1980 by then Secretary of Interior Andrus. Secretary's Decision, Petition to Designate Certain Federal Lands In Southern Utah Unsuitable for Surface Coal Mining, OSM Ref No. 79-5-001, dated December 16, 1980, copy attached at Appendix 1-3.

This petition was filed under the provisions of section 522(c) of the federal Surface Mining Control and Reclamation Act ("SMCRA"). OSM Notice, Receipt of a Complete Petition for Designation of Lands as Unsuitable for Surface Coal Mining Operations, 45 fed. Reg. 3398, Jan. 17, 1980, attached at Appendix 1-3.

Those federal lands in the Petition area found suitable for mining include lands adjacent to the private lands which the Project has included in a federal lease by application and located in Kane County, Utah within Township 39 South, Ranges 5 and 6 West, SLM. Secretarial Decision at Paragraph 4. The Secretarial Decision was based on an extensive Administrative Record, including the Petition filed under Section 533 of SMCRA, 30 U.S.C. Section 1272, public hearings, a combined petition evaluation document and environmental impact statement published in two volumes on November 26, 1980 as, "Southern Utah Petition Evaluation Document" and the "Southern Utah Petition Evaluation Document - Comments and Responses." The Secretarial Decision was further supported by a 52 page Statement of Reasons, dated January 13, 1981, attached at Appendix 1-3.

The Secretarial Decision was upheld by the federal court in *Utah International, Inc. v. Watt*, 553 F. Supp. 872 (D. Utah 1982).

115.300 Coal mining and reclamation activities at the Coal Hollow Project are not planned within 300 feet, measured horizontally, of an occupied dwelling or 100 feet of a public road. Drawing 1-5 shows the proximity of the Swapp Ranch to the planned operations. With the alternate highwall method, coal will be recovered by highwall mining beneath the Swapp Ranch. Engineering has been completed and incorporated into the plan such that subsidence does not occur to the surface.

116 PERMIT TERM

116.100 There are ~~6~~ 7 mining phases or areas associated with this permit term. ~~Three~~ Four phases contained within the Coal Hollow Mine Permit boundary, and three permit areas contained within the North Private Lease boundary. The first phase of mining at the Coal Hollow Mine began on November 10, 2010. Phase ~~3~~ 4 for the Coal Hollow Mine is anticipated to conclude in year ~~2017~~20XX. The first area of mining for the North Private Lease began on February 22, 2016. Area 3 for the North Private Lease is anticipated to conclude in year 2023.

116.101 Coal Hollow Acres of disturbance per Mining Phase

Phase 1	250 acres
Phase 2	54 acres
Phase 3	68.5 acres
Phase 4	42 acres

116.102 North Private Lease Acres of disturbance per Mining Phase

Area 1	69.79 acres
Area 2	112.0 acres
Area 3	57.2 acres

116.200 Permit Term

The Coal Hollow Mine Project is proposed for a 5-year term under the Permanent Regulatory Program for 5 years

117 INSURANCE, PROOF OF PUBLICATION

Proof of publication pursuant to R645-303-322 is included in Appendix 1-5.

117.100 Certificate of Liability Insurance

A copy of the Certificate of Liability Insurance is found in Appendix 1-4.

118 PERMIT FILING FEE

A copy of this permit is on file with the Utah Division of Oil, Gas and Mining (UDOGM), P.O. Box 145801, Salt lake City, Utah 84114-5801. A filing fee of $5.00 accompanied permit submittal.

120 PERMIT APPLICATION FORMAT AND CONTENTS

This permit application contains information and will comply with R645-301-120. A notarized statement attesting to the accuracy of this information is set forth at Appendix 1-6.

130 REPORTING OF TECHNICAL DATA

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

The following assisted or were consulted in the preparation of this permit application:

State of Utah, Department of Natural Resources
Division of Oil, Gas and Mining
Salt Lake City, Utah

Department of the Interior, Bureau of Land Management
District and Regional Office
Kanab and Salt Lake City, Utah

United States Geological Survey, Utah Region
Salt Lake City, Utah

United States Department of Agriculture
Natural Resources Conservation Service
Salt Lake City, Richfield and Cedar City, Utah

State of Utah, Department of Natural Resources
Division of Wildlife Resources (DWR)
Salt Lake City, Price and Cedar City, Utah

Dr. James E. Nelson
Brigham Young University
Provo, UT

Dr. Patrick D. Collins
Mt. Nebo Scientific Research & Consulting
Springville, UT

Talon Resources, Inc
Huntington, UT

Erik Petersen, P.G.
Petersen Hydrologic, LLC
Lehi, UT

C. Burton Pugh
Lindon, UT

John T. Boyd Company
James Boyd
Mining & Geological Consulting
Canonsburg, PA

John T. Boyd Company
Rich Bate
Mining & Geological Consulting
Denver, CO

Keith Montgomery
Montgomery Archaeological
Moab, UT

Dr. Stephen Petersen
Elk Ridge, UT

Larry Hayden-Wing
Hayden-Wing Associates, LLC
Laramie, WY

Mark Page
Water Rights Consultant
Price, UT

D.A. Smith Drilling
Loma, CO

Kane County
76 North Main
Kanab, UT

Heaton Livestock
PO Box 100773
Alton, UT

Patricia Stavish
Montgomery Archeological
Moab, UT

Byron Caton
SGS North America, Inc
Denver, CO

Richard Dame
Boulder City, NV

University of Miami
Miami, FL

Geochron Laboratories
Cambridge, MA

Energy Labs
Billings, MT

Taylor Geo-Engineering
Alan O. Taylor
Lehi, UT

Long Resource Consultants
Robert E. Long
Morgan, UT

JBR Environmental, Inc.
Dawn Whaley
Sandy, UT

Bruce Chesler
Escalante, UT

A.H. Hamblin
Paleontogical Consulting
Cedar City, UT

Mike Shurtz, C.E.T
AGEC
Cedar City, UT

Inter-Mountain Laboratories
Karen Secor
1673 Terra Avenue
Sheridan, WY

Glenn Grossman
Will Spitzenberg, P.E.

Boss Engineering
Pleasant Grove, UT

GEM Engineering, Inc.
Cedar City, UT

David Newman, PhD P.E.
Appalachian Mining & Engineering, Inc.
Lexington, Kentucky

Brown Consulting Engineers
163 West 1600 South #5
St. George, UT 84770

Jay S. Adams, RLS
Adams Surveying Inc.
Cedar City, Utah 84721

Tom Campbell

TerraTek
Salt Lake City, UT

Dan Guy
Mining & Engineering Consultant
St. George, UT

Dale Gourley
Bighorn Archaeological Consultants
3706 Nicholas Drive
Santa Clara, Utah 84765

Southwest Energy LLC
Orica Mining Service
Tucson, AZ 85705

140 DRAWING AND PLANS

The Drawing and plans in the Mining and Reclamation Plan are submitted consistent with the requirement of R645-301-140.

150 COMPLETENESS

Alton Coal Development, LLC represents that the information contained in the Coal Hollow Mining and Reclamation Plan permit application to be complete and correct.

R645-301-200. SOILS

210. INTRODUCTION

211. Soil Removal

In this section, the Alton Coal Project will present a description of the pre-mining soil resources as specified under R645-301-221. Topsoil and subsoil to be saved under R645-301-232 will be separately removed and segregated from other materials.

212. Soil Redistribution

After removal, topsoil will be immediately redistributed in accordance with R645-301-242 and stockpiled pending redistribution under R645-301-234. For details refer to Section 5 of Appendix 2-1.

220. ENVIRONMENTAL DESCRIPTION

221. Prime Farmland Investigation

The Natural Resource Conservation Service conducted a prime farmland assessment in October 2006 and determined that "No Prime Farmland or Soils of Statewide Importance were found within the study area (Coal Hollow Mine area), per criteria outlined in the National Survey Handbook Part 622 and Exhibit UT603-1, respectively (C. Meier, 2006)." The assessment stated that the soils "..could classify as Soils of Statewide Importance, if irrigated.."

"An available and reliable source of moisture to sustain crops common to the area is the primary limiting factor that excludes the observed soils from classifying as Prime Farmland or SSI (C. Meier, 2006)."

"In addition to a lack of a reliable source of water, soils did not classify as Prime Farmland due to high pH, high electrical conductivity, excessive erosion potential on steep slopes and slow permeability (C. Meier, 2006)."

On January 28, 2014, the Natural Resource Conservation Service provided a prime farmland assessment for the Dame Lease IBC. It was determined that "About 80 acres of the area of interest meets the definition of "Statewide Important Farmland, if irrigated" . It is in map unit "1103- Sili-Sidshow- Gypsic Haplustepts complex, 2 to 15 percent slopes" .

A copy of the NRCS Prime Farmland Determination for both the 2006 (Coal Hollow Mine) and the 2014 (Dame Lease IBC) is included in Section 1 of Appendix 2-1.

The Natural Resource Conservation Service (NRCS) conducted a Prime Farmland assessment in December 2012 and determined that soil map unit 1111 is considered Prime Farmland, if irrigated." NRCS soil map unit 1111 is Naplene-Termote-Arboles Oxyaquic Ustifluvent complex, 2 to 8 percent slopes. The NRCS determined that there is "...approximately 292 of soil map unit 1111" which is irrigated and "...will be converted." The NRCS Prime Farmland assessment can be seen in Appendix A of Volume 11: Supplemental Report section of the MRP in the report called: *Order 2 Soil*

Survey for the North Private Lease Expansion of the Coal Hollow Mine (November 2014).

The NRCS Prime Farmland assessment is based on a broad Order 2 and Order 3, Soil Survey of Kane County, Utah.

An evaluation of potential Prime Farmland areas within the North Private Lease was conducted using field and lab data collected for the soil survey. The results found a difference between the soils mapped as part of the Kane County Area, Utah Soil Survey and those identified by the more intensive North Private Lease soil survey. The project specific evaluation of potential *Prime Farmland* map units was conducted using field and laboratory analysis data from the North Private Lease area and the criteria set forth in the *Code of Federal Regulations Title 7, Part 657.5 Identification of important farmlands*. The results of this evaluation can be seen in Section 4 of Volume 11: Supplemental Report section of the MRP in the report called: *Order 2 Soil Survey for the North Private Lease Expansion of the Coal Hollow Mine* (November 2014).

The results of this evaluation found that there is approximately 121 acres of Prime Farmland soil map units that are irrigated and approximately 130 acres of Farmland of Statewide Importance within the North Private Lease soil survey area. This total area of 251 acres is equivalent to the sum of all land that is currently under irrigation or has the potential of being irrigated with existing water rights. Handling procedures of Prime Farmland soils found in Area 2 of the NPL can be found in MRP, Chapter 9, Section R302-316 through R302-317.

222. Soil Survey

An order 2 soils survey has been completed in 2007 at the Coal Hollow Project. Appendix 2-1 contains a report that provides the details for this survey. Utilizing existing soils data, the soil map units were extended to include the Dame Lease IBC. Appendix 2-3 contains a report that provides details for this survey. The survey area is on private lands leased by Alton Coal Development (ACD) and adjacent lands. These soil surveys were prepared so that ACD could: 1) identify suitable sources of subsoil and topsoil; 2) determine topsoil and subsoil salvage depths and quantities; and, 3) develop a post mining reclamation plan using salvaged soil materials. These soil surveys cover approximately 716 acres.

An Order 2 soil survey was completed in the North Private Lease area in 2014. This soil survey report can be found in Volume 11: Supplemental Report section of the MRP in the report called: *Order 2 Soil Survey for the North Private Lease Expansion of the Coal Hollow Mine* (November 2014). The survey is on private lands leased by Alton Coal Development (ACD) and adjacent lands. This soil survey was prepared so that ACD could: 1) identify suitable sources of subsoil and topsoil; 2) determine topsoil and subsoil salvage depths and quantities; and, 3) develop a post mining reclamation plan using salvaged soil materials. These soil surveys cover approximately 428 acres.

A soil survey update was completed for approximately 27.9 acres of undisturbed soils in the Pit 10 Borrow Area. This update is described Appendix 2-4 called: *Topsoil and Subsoil Sources and Substitute Sources in the Pit 10 Borrow Area*.

222.100. Soils Map

A map with soil map unit delineations for the South Private Lease (SPL) is shown on Drawing 2-1. Mining and subsequent reclamation has been completed on portions of SPL, thus in 2018, the soil map units have been modified to reflect the redistribution of soils prior to initiation of coal extraction from the federal coal block located within the SPL.

A map with soil map unit delineations for the North Private Lease is shown on Soils Map 2 in Volume 11: Supplemental Report section of the MRP in the report called: *Order 2 Soil Survey for the North Private Lease Expansion of the Coal Hollow Mine* (November 2014).

An updated soil map for the Pit 10 Borrow Area was produced based on the July 26 and 27, 2016 field evaluation and subsequent laboratory analysis. This updated soil map is shown as Figure 2-4.1 in Appendix 2-4 called: *Topsoil and Subsoil Sources and Substitute Sources in the Pit 10 Borrow Area*.

222.200. Soil Identification

Initially, ~~S~~soils in the Coal Hollow project soil survey area ~~have been~~were grouped into thirteen soil map units based on taxonomic classification, depth to parent material, and slope. The composition of these initial 13 map units is described in table 2-1. Detailed descriptions of each soil map unit are included in Appendix 2-1. The soil survey map is Drawing 2-1. In 2016, the area planned as a backfill source for Pit 10 was resurveyed. Soil map units A1, A3 and L were added to Drawing 2-1. Detailed descriptions of each soil map unit are included in Appendix 2-4. In 2018, the Lease By Application (LBA) for federal coal within and adjacent to the Coal Hollow Mine (CHM) South Private Lease (SPL) was included in the permit. As prior mining and reclamation has occurred adjacent to the federal coal with in the SPL and some of the soils that have been reclaimed will again be disturbed, it was necessary to alter drawing 2-1 to indicate soils that had been redistributed. Four new soil map units (RS, R1, CS, CS1) have been added to designate the soils that have been redistributed. As these four soils are the product of redistribution, the brief description and depths found on Drawing 2-1 will guide in the recovery effort as portions are salvaged with the continued mining of the federal coal beneath.

Table 2-1. Soil map unit composition for the Coal Hollow project area.

Map Unit	Pct	Soil Type[1]	Taxonomic Classification[2]	Modal Pedon[3]
1		**A Family – Wapiti Family complex, 3 to 8 percent slopes**		
	65	A Family	fine, mixed, superactive, mesic Aridic Calciustept	1
	15	Wapiti Family	fine-loamy, mixed, superactive, mesic Calcidic Argiustoll	32
	10	D	fine, mixed, superactive, mesic Aridic Calciustoll	33
	5	Manzanst Family	fine, mixed, superactive, mesic Aridic Haplustalf	48
	5	N Family	fine, mixed, superactive, frigid Aquic Calciustoll	26
2		**M Family - Calendar Family – D Family complex, 3 to 8 percent slopes**		

Map Unit	Pct	Soil Type[1]	Taxonomic Classification[2]	Modal Pedon[3]
	60	M Family	fine, mixed, superactive, mesic Aridic Calciustepts	3
	25	Calendar Family	fine, mixed, superactive, mesic Aridic Haplustepts	4
	15	D Family	fine, mixed, superactive, mesic Aridic Calciustoll	2
3		**Cibeque Family – Wapiti Familiy complex, 3 to 8 percent slopes**		
	60	Cibeque Family	fine-loamy, mixed, superactive, mesic Aridic Calciustept	6
	30	Wapiti Family	fine-loamy, mixed, superactive, mesic Calcidic Argiustoll	31
	5	A Family	fine, mixed, superactive, mesic Aridic Calciustept	
	5	Calendar Family	fine, mixed, superactive, mesic Aridic Haplustepts	
4		**Jonale Family - Graystone Cobbly Substratum Family - Wapiti Family complex, 3 to 8 percent slopes**		
	50	Jonale Family	fine-loamy, mixed, superactive, mesic Aridic Calciustoll	17
	25	Graystone cobbly substratum Family	coarse-loamy, mixed, superactive, mesic Aridic Calciustoll	39
	15	Wapiti Family	fine-loamy, mixed, superactive, mesic Calcidic Argiustoll	19
	5	D Family	fine, mixed, superactive, mesic Aridic Calciustoll	
	5	A Family	fine, mixed, superactive, mesic Aridic Calciustept	
5		**Calendar Family - M Family – Drififty Family complex, 8 to 25 percent slopes**		
	40	Calendar Family	fine, mixed, superactive, mesic Aridic Haplustepts	24
	30	M Family	fine, mixed, superactive, mesic Aridic Calciustept	25
	20	Drififty Family	loamy, mixed, superactive, calcareous, mesic Aridic Lithic Ustorthent	49
	10	Zigzag	Clayey, mixed, superactive, calcareous, mesic, shallow Aridic Ustorthent	
6		**Graystone - Cookcan – Jonale Family complex, 1 to 5 percent slopes**		
	45	Graystone	coarse-loamy, mixed, superactive, mesic Aridic Calciustoll	15
	20	Cookcan	coarse-loamy, mixed, superactive, frigid Typic Calciaquoll	9B
	20	Jonale Family	fine-loamy, mixed, superactive, mesic Aridic Calciustoll	16
	15	I Family	fine-loamy, mixed, superactive, frigid Aquic Calciustept	14
7		**Happyhollow Family - Alamosa complex, 1 to 5 percent slopes**		
	55	Happyhollow Family	fine, mixed, superactive frigid Aeric Epiaquept	38
	20	Alamosa	fine-loamy, mixed, superactive, frigid Typic Argiaquoll	18A
	10	Jicarilla Family	fine, mixed, superactive, frigid Typic Argiaquoll	43
	10	Tetonview Family	fine-loamy, mixed, superactive frigid Aeric Calciaquoll	40
	3	Brumley	fine-loamy, mixed, superactive, mesic Calcidic Haplustalf	
	2	Jonale Family	fine-loamy, mixed, superactive, mesic Aridic Calciustoll	
8		**Brumley – Graystone - Snilloc complex, 3 to 8 percent slopes**		

Map Unit	Pct	Soil Type[1]	Taxonomic Classification[2]	Modal Pedon[3]
	40	Brumley	fine-loamy, mixed, superactive, mesic Calcidic Haplustalf	22
	30	Graystone Cobbly Substratum Family	coarse-loamy, mixed, superactive, mesic Aridic Calciustoll	20
	20	Snilloc	coarse-loamy, mixed, superactive, mesic Aridic Calciustept	21
	10	Jonale Family	fine-loamy, mixed, superactive, mesic Aridic Calciustoll	
9		**D Family - Deacon complex, 5 to 30 percent slopes**		
	55	D Family	fine, mixed, superactive, mesic Aridic Calciustoll	41
	30	Deacon	fine-loamy, mixed, superactive, mesic Aridic Haplustoll	42
	10	A Family	fine, mixed, superactive, mesic Aridic Calciustept	
	5		Creek bottom	
10		**Zigzag clay, 8 to 25 percent slopes**		
	85	Zigzag	Clayey, mixed, superactive, calcareous, mesic, shallow Aridic Ustorthent	50
	10	Drififty Family	loamy, mixed, superactive, calcareous, mesic Aridic Lithic Ustorthent	
	5	Calendar Family	fine, mixed, superactive, mesic Aridic Haplustepts	
11		**A family clay, 8 to 25 percent slopes**		
	85	A Family	fine, mixed, superactive, mesic Aridic Calciustept	28
	10	Calendar Family	fine, mixed, superactive, mesic Aridic Haplustepts	
	5	Zigzag	Clayey, mixed, superactive, calcareous, mesic, shallow Aridic Ustorthent	
12		**Manzanst Taxadjunct Family clay, 3 to 12 percent slopes**		
	85	Manzanst Family	very fine, mixed, superactive, mesic Aridic Haplustalf	48
	10	Manzanst Family Deep	very fine, mixed, superactive, mesic Aridic Haplustalf	60
	5	A Family	fine, mixed, superactive, mesic Aridic Calciustept	
13		**A Family – Happyhollow Family complex, 1 to 5 percent slopes**		
	80	A Family	fine, mixed, superactive, mesic Aridic Calciustept	59
	15	Happyhollow Family	fine, mixed, superactive frigid Aeric Epiaquept	45
	5	I Family	fine-loamy, mixed, superactive, frigid Aquic Calciustept	52

Soils in the North Private Lease soil survey area were delineated with 12 soil map units and 1 miscellaneous land form. The composition of the soil map units is described in Table 6 in Volume 11: Supplemental Report section of the MRP in the report called: *Order 2 Soil Survey for the North Private Lease Expansion of the Coal Hollow Mine* (November 2014). Detailed descriptions of the soil map units can be seen in Section Three in Volume 11: Supplemental Report section of the MRP in the report called: *Order 2 Soil Survey for the North Private Lease Expansion of the Coal Hollow*

Mine (November 2014). The soil survey map is Drawing 2-3.

222.300 Soil Descriptions

Based on the order 2 soils survey that was completed on 20072008, the following soil map unit descriptions and productivities apply. Additional information describing each soil map unit is contained in Appendix 2-1.

1 A Family – Wapiti Family complex, 3 to 8 percent slopes

General Description

Map unit 1 is dominated by clayey soils with very slow hydraulic conductivity rates of less than 0.04 inches per hour based on the silty clay soil texture (p. 91, Renard, 1997). The depth to Tropic shale is greater than 40 inches in the major soils (A and Wapiti soil families), but minor inclusions with Tropic shale from 20 to 40 inches deep occur. The map unit is dominated by big sagebrush and grasses.

This map unit occurs at the north end of the map unit where the Coal Hollow project proposes to build facilities and establish topsoil and subsoil stockpiles.

Taxonomic Soil Classifications

Percent of Map Unit	Soil Series Family	Taxonomic Family	Typifying Soil Pedon
65	A Family	fine, mixed, superactive, mesic Aridic Calciustept	1*
20	Wapiti Family	fine-loamy, mixed, superactive, mesic Calcidic Argiustoll	32
10	D Family	fine, mixed, superactive, mesic Aridic Calciustoll	33
5	M	fine, mixed, superactive, mesic Aridic Haplustepts	26
* Lab analysis of typifying soil pedon for map unit.			

Map unit 1 description is continued on page 2-5.

Typifying Soil Pedon Descriptions

Soil colors are for dry soil unless specified otherwise.

The typifying soil pedon for A family soils in map unit 1 is soil pedon 1. The surface is a grayish brown clay loam 12 inches thick, dark grayish brown (moist). The subsoil (calcic) consists of light brownish gray silty clay, light olive brown (moist). Decomposing Tropic shale occurs at 42 inches below the surface.

The typifying soil pedon for the Wapiti family soils in map unit 1 is soil pedon 32. The mollic surface is a brown loam 8 inches thick, very dark grayish brown (moist). The subsurface (argillic) is a pale brown clay loam and silty clay, brown (moist). The subsoil (calcic) is pink loam to 6 feet, brown (moist). The underlying soil to nearly 12 feet is light yellowish brown silty clay over pink coarse sands with 10 percent faint strong

brown mottles.

Supporting Soil Pedons

Soil family A is also represented by soil pits 27 and 30 in map unit A. Soil pit 27 does not have Tropic shale within 140 inches of the surface. Soil pit 30 has decomposing Tropic shale at 105 inches below the surface.

Laboratory Analysis

Analysis of soil samples from soil pit 1 had a poor soil pH (8.7) from 24 to 42 inches and fair lime percents (22.6 to 28.3 percent) throughout the soil profile. The silty clay texture at 24 inches is in the poor category for texture. SAR increases gradually with depth to 4.02 in the 24 to 42 inch horizon and then reaches 12.3 in the tropic shale below 42 inches.

Soil Inclusions

Small inclusions of D Family and N Family soils occur within map unit 1. D Family soils are similar to the A Family soils, but have a mollic epipedon (dark surface). The N family soils are very deep, similar to the D Family soil, but have aquic soil conditions below 20 inches and are located in concave depressions within map unit 1.

2 M Family – Calendar Family - D Family complex, 3 to 8 percent slopes

General Description

This map unit is dominated by soils with Tropic shale parent material at 20 to 72 inches below the surface. The map unit is dominated by big sagebrush and grasses with some pinyon pine and Utah juniper encroaching along edges of the map unit near map unit 5. This map unit is dominated by clayey soils with very slow hydraulic conductivity rates of less than 0.04 inches per hour based on the silty clay soil texture (p. 91, Renard, 1997).

This map unit occurs at the north end of the map unit where the Coal Hollow project proposes to build facilities. A second small delineation of map unit 2 occurs along the south boundary of the proposed year 1 mining area west of the county road.

Taxonomic Soil Classifications

Percent of Map Unit	Soil Series Family	Taxonomic Family	Typifying Soil Pedon
60	M Family	fine, mixed, superactive, mesic Aridic Calciustepts	3*
25	Calendar Family	fine, mixed, superactive, mesic Aridic Haplustepts	4*
15	D family	fine, mixed, superactive, mesic Aridic Calciustoll	2*
* Lab analysis of typifying soil pedon for map unit.			

Typifying Soil Pedon Descriptions

The typifying soil pedon for M family soils in map unit 2 is soil pedon 3. The surface is a brown loam 4 inches thick, dark brown (moist). The subsurface (cambic) is a grayish brown clay loam and silty clay loam 15 inches thick, brown (moist). The underlying subsoil to 33 inches is light brownish gray silty clay, light olive brown (moist). Tropic shale parent material occurs at 33 inches below the surface.

The typifying soil pedon for Calendar family soils in map unit 2 is pedon 4. The surface is pale brown silty clay 4 inches thick, dark grayish brown (moist). The subsurface (cambic) is light brownish gray silty clay moderate to strong structure, dark grayish brown (moist) to 31 inches. Tropic shale parent material occurs at 31 inches.

The typifying soil pedon for D family soils in map unit 2 is pedon 2. The surface (mollic) is brown clay loam 12 inches thick, very dark grayish brown (moist). The subsurface (cambic and calcic) is pale brown silty clay and clay to 48 inches deep, brown (moist). The subsoil is white silty clay to 72 inches, brown (moist). Tropic shale parent material occurs at 72 inches below the surface.

Supporting Soil Pedons

Soil pedon 12 is representative of soil type M and is located in the delineation of map unit 2 along the south boundary of the year 1 mining area. The depth to Tropic shale in pedon 12 is 26 inches.

Laboratory Analysis

The main limiting feature of soils in map unit 2 is an increase of conductivity and SAR into the fair range as the soil depth reaches the interface with Tropic shale. The percent lime in the soil ranges from 18.6 to 27.5 above the Tropic shale. The saturation percentage increases with the percent clay, but remains in the fair range even with the clay and silty clay.

3 Cibeque Family - Wapiti Family complex, 3 to 8 percent slopes

General Description

Map unit 3 is characterized by very deep soils that show some indication of alluvial deposition most likely from the large alluvial fan that formed this portion of Sink Valley. Recent soil deposition from nearby Robinson Creek is indicated in pedon 6 by an increase of organic matter at 12 inches below the soil surface.

Taxonomic Soil Classifications

Percent of Map Unit	Soil Series Family	Taxonomic Family	Typifying Soil Pedon
60	Cibeque	fine-loamy, mixed, superactive, mesic Aridic Calciustept	6*

30	Wapiti	fine-loamy, mixed, superactive, mesic Calcidic Argiustoll	31
5	A Family	fine, mixed, superactive, mesic Aridic Calciustept	
5	Calendar Family	fine, mixed, superactive, mesic Aridic Haplustepts	

* Lab analysis of typifying soil pedon for map unit.

Typifying Soil Pedon Descriptions

The typifying soil pedon for Cibeque family soils in map unit 3 is soil pedon 6. The surface is brown loamy sand 12 inches thick, dark yellowish brown (moist). The subsoil (calcic) is pale brown loam and sandy loam to 34 inches deep, brown (moist). The underlying soil to 60 inches is light grayish brown silty clay, brown (moist).

The typifying soil pedon for Wapiti family in map unit 3 is soil pedon 31. The surface (mollic) is dark grayish brown loam 7 inches thick, dark brown (moist). The subsurface (argillic) is light yellowish brown clay loam to 17 inches, dark yellowish brown (moist). The subsoil (lower argillic and calcic) is light brownish gray and brown clay loam and loam to 52 inches, grayish brown and brown (moist). The underlying soil to 110 inches is very pale brown sandy loam and loamy sand, brown and yellowish brown (moist).

Supporting Soil Pedons

Soil pedon 13 is representative of Cibeque family in map unit 3.

Laboratory Analysis

Soil pH increases to the fair category (8.3 to 8.5) at 6 inches below the surface in pedon 6. The soil pH is consistent with percent lime in fair category (18.4 to 29.2). The loamy sand surface has a fair water holding capacity. Organic matter has an irregular increase at 12 inches from 0.7 in the A2 horizon to 2.6 in the upper Bk horizon.

Soil Inclusions

Small inclusions of A and Calendar soil families occur in map unit 3. A family soils are similar to Cibeque soils, but have a higher percentage of clay in the control section (10 to 40 inches). Calendar soils are very deep but do not have either an argillic horizon (increase in illuvial clays) or a calcic horizon within 40 inches of the soil surface.

4 Jonale Family – Graystone cobbly substratum Family - Wapiti Family complex, 3 to 8 percent slopes

General Description

Map unit 4 is characterized by very deep fine-loamy and coarse-loamy soils with mollic epipedons and calcic horizons. Lime accumulations below 12 to 22 inches are common in these soils. Soil pH is strongly alkaline below 22 inches in some soils. Vegetation in this map unit is big sagebrush and grasses.

Taxonomic Soil Classifications

Percent of Map Unit	Soil Series Family	Taxonomic Family	Typifying Soil Pedon
50	Jonale Family	fine-loamy, mixed, superactive, mesic Aridic Calciustoll	17*
25	Graystone cobbly substratum family	coarse-loamy, mixed, superactive, mesic Aridic Calciustoll	39*
15	Wapiti Family	fine-loamy, mixed, superactive, mesic Calcidic Argiustoll	19*
5	D Family	fine, mixed, superactive, mesic Aridic Calciustoll	7*
5	A Family	fine, mixed, superactive, mesic Aridic Calciustept	
* Lab analysis of typifying soil pedon for map unit.			

Typifying Soil Pedon Descriptions

The typifying soil pedon for Jonale family in map unit 4 is soil pedon 17. The surface (mollic) is a brown clay loam 9 inches thick, dark brown (moist). The subsurface (cambic) is a pale brown clay loam to 18 inches, brown (moist). The lower subsurface (Bwk) to 45 inches is light yellowish brown loam and clay loam, dark yellowish brown (moist). The underlying subsoil (calcic) is very pale brown clay loam and silty clay to 80 inches, yellowish brown (moist).

The typifying soil pedon for Graystone cobbly substratum family in map unit 4 is soil pedon 39. The surface is brown clay loam 12 inches thick, dark brown (moist). The subsurface (calcic) is a very pale brown to light yellowish brown sandy loam to 36 inches deep, yellowish brown (moist) with 0 to 15 percent gravels and cobbles. The underlying subsoil is very pale brown very cobbly loamy sand to 75 inches, brown (moist).

The typifying soil pedon for Wapiti family in map unit 4 is soil pedon 19. The surface (mollic) is a grayish brown loam 6 inches thick, very dark grayish brown (moist). The subsurface (upper argillic) is a brown and pale brown clay loam to 24 inches deep, dark grayish brown and yellowish brown (moist). The lower subsurface (lower argillic and upper calcic, Btk) is a pale brown loam to 37 inches deep, brown (moist). The underlying subsoil (calcic) is a pale brown and light yellowish brown sandy loam to 90 inches deep, yellowish brown (moist).

Supporting Soil Pedons

Jonale family is represented by soil pedons 5, 8, 10, 18B, 23, 34, and 35. Soil family H is represented by soil pedons 11, 36, and 37.

Laboratory Analysis

Jonale soil family is characterized by soil pH in the poor range of 8.6 to 9.0 (Utah DOGM, 2005) at depths below 22 to 40 inches. This strongly alkaline soil pH corresponds to lime percentages of greater than 30 in this same portion of the soil profile.

Graystone cobbly substratum soil family is dominated by sandy loam and loamy sand

textures with some clay loam. Lime accumulation occurs below 12 to 16 inches, but percentages are lower relative to the fine-loamy type C soils. Soil pH becomes strongly alkaline at depths of 48 inches in some pedons. There is 15 to 45 percent gravels and cobbles below 36 inches.

Wapiti soil family has fair levels of carbonates throughout the soil profile. Soil pH was measured as poor below 68" in soil pedon 19.

Soil Inclusions

Soil family D is represented by pedon 7 in map unit 4. There are also small inclusions of soil family A where map unit 4 borders map units 1 and 11.

5 Calendar Family - M Family – Drififty Family complex, 8 to 25 percent slopes

General Description

These soils are moderately deep (20 to 40 inches) to shallow (less than 20 inches to Tropic shale. The moderately deep soils have clayey textures, while the shallow soils are loamy. Vegetation is pinyon pine, Utah juniper, black sage and grasses.

Taxonomic Soil Classifications

Percent of Map Unit	Soil Series Family	Taxonomic Family	Typifying Soil Pedon
45	Calendar Family	fine, mixed, superactive, mesic Aridic Haplustepts	24*
30	M family	fine, mixed, superactive, mesic Aridic Calciustept	25*
20	Drififty Family	loamy, mixed, superactive, calcareous, mesic Aridic Lithic Ustorthent	49*
5	Zigzag	Clayey, mixed, superactive, calcareous, mesic, shallow Aridic Ustorthent	
* Lab analysis of typifying soil pedon for map unit.			

Typifying Soil Pedon Descriptions

The typifying soil pedon for Calendar family in map unit 5 is soil pedon 24. The surface is olive brown clay 5 inches thick, dark grayish brown (moist). The subsurface (cambic) is dark grayish brown and olive clay with moderate to strong blocky structure to 32 inches. Tropic shale parent material is at 32 inches.

The typifying soil pedon for M family in map unit 5 is soil pedon 25. The surface is covered with a half inch of decomposing needles and twigs. The soil surface is light brown clay 5 inches thick, brown (moist). The subsurface (calcic) is brown and strong brown clay with lime accumulations, dark brown (moist). Tropic shale parent material is at 32 inches.

The typifying soil pedon for Drififty family in map unit 5 is soil pedon 49. The surface

light yellowish brown silty clay loam 3 inches thick, light olive brown (moist). The subsoil is a light olive brown loam to 10 inches, olive brown (moist). Interbeded sandstone and Tropic shale are at 10 inches.

Laboratory Analysis

Calendar soil family is characterized by percent clay of 44 to 47 with correspondingly high saturation percentages of 73.6 to 91.2. Conductivity increases to 7.8 at 17 inches below the surface.
Soil type M is characterized by percent clay of 40 to 47 with correspondingly high saturation percentages of 58.5 to 80.6 in the upper 20 inches of the soil profile. The percent clay decreases to 33 percent below 20 inches. Lime percentage is greater than 30 in the 5 to 20 inch depth, but less than 5 above and below this zone.

Drifity soil family is characterized by pH of 8.1 to 8.4, lime percentage of 18, and SAR of less than 0.1.

Soil Inclusions

There are some inclusions of Zigzag soils that are shallow (less than 20 inches) to Tropic shale. Zigzag soils are clayey.

6 Graystone – Cookcan – Jonale Family complex, 1 to 5 percent slopes

General Description

These medium to coarse textured soils are very deep. Wet soil conditions are present at varying depths in all of the map unit soils. The depth to wet soil conditions varies from 14 to 58 inches. This map unit is not a good source of subsoil. It is estimated that these soils are slower to warm up in the spring due to the wet soil conditions. Vegetation is grasses, sedges, and forbs.

Taxonomic Soil Classifications

Percent of Map Unit	Soil Series Family	Taxonomic Family	Typifying Soil Pedon
45	Graystone	coarse-loamy, mixed, superactive, mesic Aridic Calciustoll	15*
20	Cookcan	coarse-loamy, mixed, superactive, frigid Typic Calciaquoll	9B*
20	Jonale Family	fine-loamy, mixed, superactive, mesic Aridic Calciustoll	16*
15	I Family	fine-loamy, mixed, superactive, frigid Aquic Calciustept	14*
* Lab analysis of typifying soil pedon for map unit.			

Typifying Soil Pedon Descriptions

The typifying soil pedon for Graystone soils in map unit 6 is soil pedon 15. There is a

dense root mat 1 inch thick on the surface. The surface is brown sandy loam 8 inches thick, dark brown (moist). The subsurface (cambic) is pale brown loam with moderate structure, dark yellowish brown (moist) to 20 inches. The subsoil (calcic) is very pale brown loam to 58 inches deep, yellowish brown (moist). The underlying soil is yellow and brownish yellow sandy loam with common prominent mottles to 96 inches, yellowish brown (moist).

The typifying soil pedon for Cookcan soils in map unit 6 is soil pedon 9B. The surface is dark grayish brown loam 6 inches thick, very dark grayish brown (moist). The lower surface is grayish brown sandy clay loam to 14 inches with few faint mottles, dark grayish brown (moist). The subsurface is light brownish gray sandy loam with common prominent mottles, dark gray (moist). The subsoil is light gray sandy loam with many prominent mottles, grayish brown (moist). The soil was wet below 48 inches.

The typifying soil pedon for Jonale soil family in map unit 6 is soil pedon 16. There is a dense root mat 1 ½ inch thick on the surface. The surface is dark grayish brown silty clay loam 8 inches thick, very dark grayish brown (moist). The subsurface (cambic) is pale brown silty clay to 18 inches, strong brown (moist). The subsoil is pink clay loam to 36 inches, brown (moist). The lower subsoil is pink silty clay loam and loam with few faint strong brown mottles to 68 inches, brown (moist). The underlying soil is light brownish gray clay loam with common prominent yellowish red mottles, grayish brown (moist).

Supporting Soil Pedons

Soil pedon 9A is similar to Graystone soils, but it has carbonates throughout the soil profile without any zone of accumulation.

Laboratory Analysis

Strongly alkaline soil pH (8.6 to 9.0) within 12 to 20 inches of the soil surface is the main limiting feature of the soils in map unit 6. Soil pedon 9A has very strongly alkaline pH (greater than 9.0) below 12 inches of the surface.

Lime percentage exceeds 30 in 3 of 5 pedons within 12 to 20 inches of the surface. Lime percentage ranges from 15 to 26 in the other two pedons from the surface to 48 inches.

Soil Inclusions

Soil pedon 14 is representative of I family soils within map unit 6 that do not have a mollic epipedon (dark surface) and have aquic (wet) soil conditions within 30 inches of the surface. These soils have a calcic horizon.

7 Happyhollow Family – Alamosa complex, 1 to 5 percent slopes

General Description

This soil map unit is located on a Tropic shale structural bench on the east side of the Sink Valley fault. Soils are characterized by clay and a high water table that is perched

on top of the heavy clay soils. The high water table is at or within a foot of the soil surface during the wet period of the year. It is estimated that these soils are slower to warm up in the spring due to the wet soil conditions. Vegetation is sedges and forbs.

Taxonomic Soil Classifications

Percent of Map Unit	Soil Series Family	Taxonomic Family	Typifying Soil Pedon
55	Happyhollow Family	fine, mixed, superactive frigid Aeric Epiaquept	38*
20	Alamosa	fine-loamy, mixed, superactive, frigid Typic Argiaquoll	18A*
10	Jicarilla Family	fine, mixed, superactive, frigid Typic Argiaquoll	43
10	Tetonview Family	fine-loamy, mixed, superactive frigid Aeric Calciaquoll	40*
3	Brumley	fine-loamy, mixed, superactive, mesic Calcidic Haplustalf	
2	Jonale Family	fine-loamy, mixed, superactive, mesic Aridic Calciustoll	
* Lab analysis of typifying soil pedon for map unit.			

Typifying Soil Pedon Descriptions

The typifying soil pedon for Happyhollow family soils in map unit 7 is soil pedon 38. The surface is dark grayish brown (moist) silty clay 6 inches thick. The subsurface is a yellowish brown (moist) silty clay 6 inches thick. The calcic horizon begins at 12 inches below the surface and is a light yellowish brown (moist) to very pale brown (moist) silty clay. The calcic horizon continues to 48 inches or deeper. The water table was at 29 inches when the pit was described in March 2007. Mottles and gleyed soil were observed below 12 inches. Vegetation is grasses, sedges, widely scattered Wyoming big sagebrush, and wild rose.

The typifying soil pedon for Alamosa soils in map unit 7 is soil pedon 18A. The mollic surface is a very dark grayish brown (moist) loam to 7 inches. The cambic horizon is a brown (moist) loam to 15 inches deep. The calcic horizon is a light olive brown (moist) sandy loam to 30 inches. The underlying soil is grayish brown (moist) clay loam and sandy clay loam to 60 inches deep. Mottles were observed below 7 inches. The water table was at 51 inches when the described in September 2006.

Supporting Soil Pedons

Happyhollow family soil type was observed in pedon 45 within map unit 7 and a similar clayey soil in pedon 44. The Alamoss soil was also observed in pit 46.

Laboratory Analysis

The Happyhollow family soil is characterized by silty clay from the surface down to 24 inches or greater. Soil pH is 8.3 to 8.5 in the 12 to 24” horizon. Saturation percentage ranges from 69.9 to 81.8 in the upper 24 inches. The calcium carbonate equivalent ranges from 17.8 to 28.3 in the upper 20 inches and then increases to 44.5 below 20 inches. This soil pit was not sampled below 24 inches, because of the high water table.

Alamosa soil is characterized by medium textured soils (loam, clay loam, and sandy clay loam) in the upper 60 inches. The calcium carbonate equivalent ranges increases from 20.2 percent in the upper 7 inches to 29.3 percent in the 30 to 45 inch horizon.

Soil Inclusions

A soil similar to Alamosa soils, but with more clay in the control section is in localized areas. Soil mottles were observed and water was flowing into pit 43 when it was described in April 2007. The water table appeared to be perched on top of the underlying clay horizon at 54 inches.

Tetonview family soils were identified in soil pit 40. Mottles were observed below 6 inches and a water table at 23 inches when the pit was described in March 2007. This soil has a dark surface (mollic) and a calcic horizon.

Dry soil profiles occur on small isolated mounds within map unit 7. These non-hydric soils include Brumley and Jonale family soils. Both are very deep soils with a calcic horizon. Jonale family soils have a dark surface (mollic).

8 Brumley – Graystone Cobbly - Snilloc complex, 3 to 8 percent slopes

General Description

These soils developed in very deep alluvium on the east side of the Coal Hollow project area. They are medium to coarse textured. Evidence of a fluctuating water table was observed in most soils below 48 to 60 inches, depending on location and physiographic setting. This map unit would be a good source of cover material, but most of the planned disturbance in this area will be limited to cover soil stockpiles.

Taxonomic Soil Classifications

Percent of Map Unit	Soil Series Family	Taxonomic Family	Typifying Soil Pedon
40	Brumley	fine-loamy, mixed, superactive, mesic Calcidic Haplustalf	22*
30	Graystone	coarse-loamy, mixed, superactive, mesic Aridic Calciustoll	20*
20	Snilloc	coarse-loamy, mixed, superactive, mesic Aridic Calciustept	21*
10	Jonale Family	fine-loamy, mixed, superactive, mesic Aridic Calciustoll	
* Lab analysis of typifying soil pedon for map unit.			

Typifying Soil Pedon Descriptions

Colors are for dry soil unless otherwise noted.

The typifying soil pedon for the Brumley soils in map unit 8 is soil pedon 22. The surface is pale brown sandy loam to 6 inches. The argillic and upper calcic horizon is a light yellowish brown silty clay loam and sandy clay loam to 28 inches. The underlying soil is very pale brown sandy loam to 84 inches. Mottles increase significantly below 48 inches indicating that there is fluctuating water table during wet years. This soil supports Gamble oak, snowberry, grasses, and forbs.

The typifying soil pedon for the Graystone soil in map unit 8 is soil pedon 20. The surface is brown loam to 6 inches. The cambic horizon is light yellowish brown clay loam to 13 inches. The calcic horizon is very pale brown to light yellowish brown sandy loam and loamy sand to 54 inches. The underlying soil is a light yellowish brown loam to

72 inches and loamy sand to 96 inches. This soil supports Pinyon pine, Utah Juniper, Gamble oak, and snowberry.

The typifying soil pedon for Snilloc soils in map unit 8 is soil pedon 21. The surface is a light yellowish brown sandy clay loam to 8 inches. The calcic horizon is a pale brown sandy clay loam to 18 inches. The underlying soil is a pale brown strongly alkaline sandy loam to 96 inches. This soil was described in an opening of Wyoming big sagebrush within a larger area of Gamble oak.

Supporting Soil Pedons

A moist phase of the Brumley soil was observed in pit 47 in big sagebrush in map unit 8. A few faint mottles were observed below 24 inches. The amount of soil mottling increased significantly below 44 inches. This soil is on a low mound surrounded on three sides by wet soils in map unit 7. A water table was not observed when the pit was described in April 2007, but the mottles indicate that it is common for the water to rise within 44 inches of the surface in most years, and 24 inches in wet year.

Laboratory Analysis

The Brumley soil has calcium carbonate equivalents ranging from 17.5 to 23.8 percent.

The Graystone soil has a low saturation percentage in the 13 to 28 inch horizon (calcic). Calcium carbonate equivalents range from 16.5 to 25.4 percent. Available water capacity is 0.08 in layers of loamy sands below 28 inches.

The Snilloc family soil is characterized by strongly alkaline soil pH (8.7) below 36 inches. Calcium carbonate equivalents range from 16.8 to 29.8 percent.

Soil Inclusions

The Jonale family soils occur within this map unit. These soils are similar to Brumley soils, but have a dark surface (mollic).

9 D Family - Deacon complex, 5 to 30 percent slopes

General Description

These clayey soils are very deep and dominated by clayey textures. They have a dark surface (mollic epipedon). The D family soil has an increase in lime at 6 to 12 inches below the surface, while the Deacon soil has similar levels of lime throughout the soil profile. Soils in this map unit appear to have developed from the large alluvial fan that covers most of Sink Valley. The map unit is delineated along Robinson Creek and in an area south of the creek that could be the remnants of a historic channel. Vegetation is dominantly big sagebrush, rabbitbrush, and grasses with pinyon pine and Utah juniper encroaching from adjacent areas.

Taxonomic Soil Classifications

Percent of Map Unit	Soil Series Family	Taxonomic Family	Typifying Soil Pedon
55	D Family	fine, mixed, superactive, mesic Aridic Calciustoll	41*
30	Deacon	fine-loamy, mixed, superactive, mesic Aridic Haplustoll	42*
10	A Family	fine, mixed, superactive, mesic Aridic Calciustept	
5		Creek bottom	
* Lab analysis of typifying soil pedon for map unit.			

Typifying Soil Pedon Descriptions

The typifying soil pedon for the D family soil in map unit 9 is soil pedon 41. The surface is brown sandy clay loam to 6 inches, dark brown (moist). The lower surface is brown clay to 12 inches, dark brown (moist). The subsurface (cambic) is pale brown silty clay to 36 inches, brown (moist). The subsoil (calcic) is very pale brown silty clay loam and sandy loam to 80 inches, yellowish brown (moist).

The typifying soil pedon for Deacon soils in map unit 9 is soil pedon 42. The surface is brown loam 9 inches thick, very dark grayish brown (moist). The subsurface (cambic) is pale brown silty clay to 24 inches, brown (moist). The upper subsoil (lower cambic) is pale brown sandy clay loam to 36 inches, brown (moist). The lower subsoil is light yellowish brown loam to 48 inches, yellowish brown (moist).

Supporting Soil Pedons

Soil pedon 29 is representative of the D family soil in map unit 9.

Laboratory Analysis

Poor soil pH at depth and clayey horizons characterize soils in map unit 9. Soil pH is poor below 64 inches in the D family soil (pit 41) and below 36 inches in the Deacon soil. Horizons of silty clay and clay occur in the D family soil (pit 41) between 6 and 36 inches. The clayey horizon in the Deacon soil is between 9 and 24 inches.

Soil Inclusions

The channel area of Robinson Creek comprises a small portion of this map unit. The creek bottom is not vegetated.

10 Zigzag clay, 8 to 25 percent slopes

General Description

These clayey soils are shallow to Tropic shale and formed along the Sink Valley escarpment. Vegetation is pinyon pine, Utah juniper, black sage, and Indian ricegrass.

Taxonomic Soil Classifications

Percent of Map Unit	Soil Series Family	Taxonomic Family	Typifying Soil Pedon
85	Zigzag	clayey, mixed, superactive, nonacid, mesic, shallow Aridic Ustorthent	50*
10	Drififty Family	loamy, mixed, superactive, nonacid, mesic Aridic Lithic Ustorthent	
5	Calendar Family	fine, mixed, superactive, mesic Aridic Haplustepts	
* Lab analysis of typifying soil pedon for map unit.			

Typifying Soil Pedon Description

The typifying soil pedon for the Zigzag soil in map unit 10 is soil pedon 50. The surface is light brownish gray clay to 4 inches, dark grayish brown (moist). The subsurface is light brownish gray clay to 19 inches, dark grayish brown and olive brown (moist). Tropic shale is at 19 inches.

Laboratory Analysis

Clayey soil texture is the main limiting feature to the Zigzag soil in map unit 10. Lime percentage is between 18 and 19 throughout the soil profile. SAR is less than 1. Soil pH is in the good to fair range (8.1 to 8.4).

Soil Inclusions

The Drififty family soil occurs along ridges where the Tropic shale is interbeded with sandstone. These soils are loamy and less than 20 inches deep.
Calendar family soil occur in concave toeslope areas. These soils are clayey and moderately deep (20 to 40 inches) to Tropic shale.

11 A Family clay, 8 to 25 percent slopes

General Description

These soils are very deep and are on the footslope and backslope of the Sink Valley fault escarpment. Vegetation is grasses, rabbitbrush, and big sagebrush.

Taxonomic Soil Classifications

Percent of Map Unit	Soil Series Family	Taxonomic Family	Typifying Soil Pedon
85	A Family	fine, mixed, superactive, mesic Aridic Calciustept	28*
10	Calendar Family	fine, mixed, superactive, mesic Aridic Haplustepts	
5	Zigzag	Clayey, mixed, superactive, nonacid, mesic, shallow Aridic Ustorthent	
* Lab analysis of typifying soil pedon for map unit.			

Typifying Soil Pedon Description

The typifying soil pedon for the A family soil in map unit 11 is soil pedon 28. The surface is grayish brown clay to 8 inches, dark grayish brown (moist). The subsurface (cambic) is gray clay with moderate blocky structure to 24 inches, grayish brown (moist). The upper subsoil (calcic, Bwk) is gray clay with common fine soft calcium carbonate masses to 48 inches, grayish brown (moist). The lower subsoil (calcic, Bk) is light grayish brown clay with common fine and medium soft calcium carbonate masses to 102 inches, grayish brown (moist).

Laboratory Analysis

Clay texture is the primary limiting feature with the A family soil in map unit 11. SAR and conductivity increase significantly in the 24 to 48 inch horizon, but both are still within the fair range (Utah DOGM, 2005). Lime percentage ranges from 17 to 19. Samples were not available for analysis for the 48 to 102 inch zone.

Soil Inclusions

Inclusions of the Calendar family soil occur along shoulders of hills and ridges. These soils are clayey and moderately deep (20 to 40 inches) to Tropic shale.

Small inclusions of the Zigzag soil occur on the summits of ridges and hills. These soils are clayey and shallow (less than 20 inches) to Tropic shale.

12 Manzanst Taxadjunct Family clay, 3 to 12 percent slopes

General Description

These clayey soils are deep to very deep to Tropic shale and formed on gently sloping to moderately steep slopes along the west side of Sink Valley. Vegetation is pinyon pine, Utah juniper, black sage, and Indian ricegrass. The very deep phase is on the backslopes and footslopes. The deep phase (40 to 60 inches to Tropic shale) of Manzanst family soil occurs on the shoulders of the hill sideslopes.

Taxonomic Soil Classifications

Percent of Map Unit	Soil Series Family	Taxonomic Family	Typifying Soil Pedon
85	Manzanst taxadjunct, very deep phase	very fine, mixed, superactive, nonacid, mesic, Aridic Ustorthent	48*
10	Manzanst taxadjunct, deep phase	very fine, mixed, superactive, nonacid, mesic, Aridic Ustorthent	60
5	A Family	fine, mixed, superactive, mesic Aridic Calciustepts	
* Lab analysis of typifying soil pedon for map unit.			

Typifying Soil Pedon Description

The typifying soil pedon for the Manzanst taxadjunct soil in map unit 10 is soil pedon 48. The surface is grayish brown clay (moist) 3 inches, very dark grayish brown (moist). The subsurface is light brownish gray clay to 30 inches, dark grayish brown (moist). The substratum is light brownish gray clay with 3 to 10 percent very fine and fine calcium carbonate masses to 84 inches, dark grayish brown (moist).

The typifying pedon for the Manzanst taxadjunct deep phase is pedon 60. It is similar to pedon 48. Tropic shale is at 48 inches.

Laboratory Analysis

Clayey soil texture and SAR are the main limiting features of the Manzanst soil family in map unit 12. The SAR ranges from 10.80 to 12.70 below 12 inches.

Soil Inclusions

The A family soil occurs on the toeslopes and in swales where alluvium has accumulated. These soils are clayey and very deep (greater than 60 inches). They have an accumulation of carbonates in the subsoil.

13 A Family – Happyhollow Family complex, 1 to 5 percent slopes

General Description

These clayey soils are very deep to Tropic shale and formed on nearly level to gently sloping slopes in the south central portion of Sink Valley. Vegetation is grasses. The very deep phase is on the backslopes and footslopes. The deep phase (40 to 60 inches to Tropic shale) of Manzanst family soil occurs on the shoulders of the hill sideslopes.

Taxonomic Soil Classifications

Percent of Map Unit	Soil Series Family	Taxonomic Family	Typifying Soil Pedon
80	A Family	fine, mixed, superactive, mesic Aridic Calciustepts	59
15	Happyhollow Family	fine, mixed, superactive frigid Aeric Epiaquept	45
5	I Family	fine-loamy, mixed, superactive, frigid Aquic Calciustept	52
* Lab analysis of typifying soil pedon for map unit.			

Typifying Soil Pedon Descriptions

The typifying soil pedon for the A family soil in map unit 13 is soil pedon 59. The surface is light yellowish brown clay loam to 10 inches, dark grayish brown (moist). The subsurface is light yellowish brown and very pale brown clay loam to 45 inches, yellowish brown and pale brown (moist). The substratum is very pale brown and pale yellow sandy clay loam to 76 inches. Reddish yellow medium and coarse mottles were observed below 62 inches.

The typifying soil pedon for the Happyhollow family soil is soil pedon 45. The surface is light brownish gray loam to 12 inches, dark grayish brown (moist). The subsurface is light gray and very pale brown sandy clay loam to 48 inches, gray and light yellowish brown (moist). The substratum is very pale brown sandy clay loam to 84 inches, light yellowish brown (moist). The lower substratum is light gray silty clay to 100 inches, gray (moist). Yellow and brownish yellow medium and coarse mottles were observed below 5 inches.

Laboratory Analysis

Field conductivity (ECe) measurements for soil pit 59 ranged from 0.39 to 1.30 mmhos/cm.

Lab analysis of soil pit 28 is representative of the A family soil in map unit 13. Clay texture is the primary limiting feature with the A family soil in map unit 13. SAR and conductivity increase significantly in the 24 to 48 inch horizon (pedon 28), but both are still within the fair range (Utah DOGM, 2005). Lime percentage ranges from 17 to 19. Samples were not available for analysis for the 48 to 102 inch zone.

Soil Inclusions

The I family soils are similar to the A family soil, but they have aquic conditions below 20 inches. Reddish yellow fine mottles were observed in soil pedon 52 below 24 inches.

Soil map unit descriptions for the North Private Lease soil survey area are in Section Three in Volume 11: Supplemental Report section of the MRP in the report called: *Order 2 Soil Survey for the North Private Lease Expansion of the Coal Hollow Mine* (November 2014).

Soils in the Pit 10 Borrow were examined on July 26 and 27, 2016. Soil mapping in the southwest portion of the area was updated based on additional soil descriptions and

laboratory analysis. The results of this field examination and laboratory analysis are described in Appendix 2-4 called: *Topsoil and Subsoil Sources and Substitute Sources in the Pit 10 Borrow Area*.

222.400 Present and Potential Productivity of Existing Soils

Soils in the Coal Hollow project area support big sagebrush, grasses (native and introduced species), pinyon pine, Utah juniper, and Gambel oak. Detailed descriptions of the present and potential productivity of the soils are detailed in Chapter 3, Section 321.200.

Soils in the northern portion of the North Private Lease area are in agricultural production of alfalfa and small grains, while soils in the southern portion support big sagebrush, rabbitbrush, grasses (native and introduced species), pinyon pine, Utah juniper, Russian olive, and Gambel oak. Detailed descriptions of the present and potential productivity are detailed in Chapter 3, Section 321.200.

223. Soil Characterization

This soil survey was made in accordance with the guidelines for an order 2 soil survey as detailed in the Soil Survey manual (USDA 1993). Soils were classified using the Keys to Soil Taxonomy, Ninth Edition (USDA 2003). Soils for the New Dame Lease IBC were classified using the Keys to Soil Taxonomy, Eleventh Edition (NRCS 2010). Representative soil samples were submitted for laboratory analysis of the parameters outlined by the Utah Division of Oil Gas and Mining's *Guidelines for Management of Topsoil and Overburden* (2005).

The North Private Lease soil survey was made in accordance with the guideline for an order 2 soil survey as detailed in the Soil Survey manual (USDA NRCS 1993). Soils were classified using the Keys to Soil Taxonomy, Twelfth Edition (USDA NRCS 2014d). Representative soil samples were submitted for laboratory analysis of the parameters outlined by the Utah Division of Oil Gas and Mining's *Guidelines for Management of Topsoil and Overburden* (2005).

The Pit10 Borrow Area soil survey update was made in accordance with the guidelines for an order 2 soil survey as detailed in the Soil Survey manual (USDA NRCS 1993). Soils were classified using the Keys to Soil Taxonomy, Twelfth Edition (USDA NRCS 2014d). Representative soil samples were submitted for laboratory analysis of the parameters outlined by the Utah Division of Oil Gas and Mining's *Guidelines for Management of Topsoil and Overburden* (2008).

224. Substitute Topsoil

Based on the 2006-2007 order 2 soil survey, sufficient quantities of suitable topsoil and subsoil are available for reclamation within the project area. The Coal Hollow Project does not plan to use substitute material for topsoil at the time of reclamation. However, if in the future the Coal Hollow mine plan proposes to use selected overburden materials as a supplement or substitute for topsoil, an application will be

provided to the DOGM that includes results of analyses, trials, and tests as described under R645-301-232.100 through R645-301-232.600, R645-301-234, R645-301-242, and R645-301-243. DOGM may also require the results of field-site trials or greenhouse tests as required under R645-301-233.

Based on the 2014 order 2 soil survey for the North Private Lease, sufficient quantities of suitable topsoil and subsoil are available for reclamation within the project area. The Coal Hollow mine does not plan to use substitute material for topsoil at the time of reclamation of North Private Lease expansion. However, if in the future the Coal Hollow mine plan proposes to use selected overburden materials as a supplement or substitute for topsoil, an application will be provided to the DOGM that includes results of analyses, trials, and tests as described under R645-301-232.100 through R645-301-232.600, R645-301-234, R645-301-242, and R645-301-243. DOGM may also require the results of field-site trials or greenhouse tests as required under R645-301-233.

A source of substitute subsoil was evaluated as part of the Pit 10 Borrow Area field evaluation on July 26, 2016 and subsequent laboratory analysis. This source of substitute subsoil is located on the interim reclamation slope at the top of the pit 10 highwall. The results of this evaluation and analysis are described in Appendix 2-4 called: *Topsoil and Subsoil Sources and Substitute Sources in the Pit 10 Borrow Area*. There are no plans to use this material as substitute subsoil at this time due to Poor soil pH in some areas, but will remain a source of substitute subsoil until Pit 10 is reclaimed. Additional sampling and analysis will be conducted prior to moving forward with any plans to use the material as substitute subsoil.

230. Operation Plan

231. General Requirements

231.100. Methods for Removing and Storing Subsoil and Topsoil

The methods for removing and storing topsoil, subsoil, and other materials will be to first remove the woody plants from the area and place them in piles for later placement in pit backfills. Next, dozers or scrapers will remove the topsoil layer to a depth determined by the soil survey. The topsoil will be stockpiled and protected from wind and water erosion. Stockpiles that will be in place for less than 1 year will be planted with "Quick Guard" at the recommended rate of 10 lbs. /acre. Those stockpiles that will be in place for at least one year will be seeded and covered with mulch during the appropriate season. Side slopes of stockpiles will be sloped to 3h:1v: The suitable subsoil will then be removed and stockpiled separately from the topsoil. The depth of topsoil and subsoil salvage will be determined by the aforementioned soil survey and in the field during mining by the Coal Hollow environmental technician in consultation with a certified professional soil scientist. Quality control of topsoil salvage depth will be accomplished by leaving pedestals (small islands of topsoil left to verify soil removal depth). Stockpiling of topsoil and subsoil will only occur when direct placement (or live hauling) is not operationally practical. Drawing 2-2 shows planned topsoil stockpiles and topsoil removal plans. Drawing 2-4 shows planned topsoil stockpiles and topsoil removal plans in the North Private Lease.

For the North Private Lease prior to mining Pit 1 the following steps will be followed:

1. The A horizon (topsoil) will be salvaged along with B horizon (subsoil) to a depth of 14 inches (1.2 feet) from all active mining areas (pits, ponds, roadways, haul roads, storage and repair yards, etc.). The only exception is that topsoil can remain under topsoil storage piles.

2. For the area inside the excavation perimeter of Pit 1, Pond 5 and Pond 6, the remaining subsoil (the B & C horizon above lithic contact, approximately 2.6 feet) will also be removed and stockpiled in a subsoil stockpile. This means that roadways and the subsoil and spoil piles depicted in Drawing 2-4 will be placed on top of native subsoil. This native subsoil will be protected in place beneath the spoil stockpile by using a marker fence to delineate the subsoil surface on 100 ft. centers and by using a gps survey grid of the topography of the subsoil surface layer. The native subsoil will be protected in place on any roadway receiving surface treatment (ie. Gravel, additional fill) by placing marker fence along the roadway centerline. The native subsoil will then be recovered as part of the subsequent mining sequence and placed directly over regraded backfill to the cover depth required in section 232.

4. A soil scientist will monitor the topsoil and subsoil removal and placement of geo-marker.

5.A surveyor will map the surface elevation of the subsoil being protected in place.

Area 1 expanded increases Area 1 by 17.89 acres, all topsoil and subsoil will be salvaged and stockpiled as mining of Pits 7, 8 and 9 progress. Stockpile locations are shown and volumes tabulated for on Drawing 2-4. These stockpiles will remain and be utilized for final reclamation of the last pits mined.

Area 2 encounters Prime Farmland and Soils of Statewide Importance, these are required to be stockpiled by owner and by horizon. The location of these stockpiles can be found on Drawing 2-4. DRH_C, DRH_B, OGP_B, and OGP_A will be on top of an area that has been previously been top soiled and seeded. The remaining stockpiles will be placed on subsoil. All stockpiles from the Prime Farmland and Soils of Statewide Importance weather placed on previously top soiled or subsoiled areas, will be placed on a layer of organic material to demarcate the separation at the time they are replaced in reclamation of the Prime Farmland and Soils of Statewide Importance areas. Those that are placed on topsoil will have the topsoil in the travel paths windrowed to a berm which also will be seeded until final placement. Once the stockpiles on top soil are removed, the area of the stockpile and associated travel paths will require ripping 18” prior to being reseeded.

As with the Coal Hollow Mine, topsoil and subsoil will be removed with dozers and/or scrapers to a depth determined by the soil scientist.

Topsoil and subsoil in Pit B1 will be removed with dozers and/or scrapers to a depth determined by the soil scientist.

231.200. Suitable Substitute Topsoil

The use of substitute topsoil is planned for the Coal Hollow. Location of "Potential Substitute Topsoil" is shown on Drawing 2-2. Demonstration studies of the suitability of topsoil substitutes or supplements will be submitted to the DOGM if the use of topsoil substitutes becomes necessary for future reclamation and revegetation.

Subsoil will be used as interim reclamation cover for the Pit 10 Borrow Area. Organic mulches will be incorporated to improve fertility and soil quality, as detailed in R645-301-244.200. This improved subsoil will be salvaged and stockpiled as cultivated topsoil at the end of the interim reclamation phase of the Pit 10 Borrow Area project. Cultivated topsoil will be used as topsoil during reclamation of the Pit 10 Borrow Area. This operation is described in more detail in Appendix 2-4 called: *Topsoil and Subsoil Sources and Substitute Sources in the Pit 10 Borrow Area*. Salvage and stockpiling of the cultivated topsoil will be monitored by a Certified Professional Soil Scientist.

The use of substitute topsoil is not planned for the North Private Lease based on the 2014 soil survey information. Demonstration studies of the suitability of topsoil substitutes or supplements will be submitted to the DOGM if the use of topsoil substitutes becomes necessary for future reclamation and revegetation.

231.300. Soil Testing for Reclamation

The final seedbed of the reclaimed areas will be prepared by first replacing the subsoil and topsoil in the same order it existed prior to removal by the mining activities. Next, a basic topsoil (top 8 inches of reclamation profile) sampling regime will be implemented prior to seeding that should identify fertility problems and will provide a basis for determining necessary soil amendments. The parameters analyzed will be:

Available phosphorus (P)
Soluble Potassium (K)
Nitrate-Nitrogen

One composite sample will be collected from approximately every 2 to 5 acres based on soil types and variability. Each composite will be comprised of at least 4 sub-samples.

Pre-testing of the soils has been conducted as part of the soils survey. Results from the pre-testing of topsoil and subsoil can be viewed in Table C-1 of Appendix 2-1 (native topsoil and subsoil) and Table C-2 (samples from core hole/overburden pits) of Appendix 2-1.

Pre-testing of the soils has been conducted as part of the North Private Lease soils survey. Results from the pre-testing of topsoil and subsoil can be viewed in Appendix C of Volume 11: Supplemental Report section of the MRP in the report called: *Order 2 Soil Survey for the North Private Lease Expansion of the Coal Hollow*

Mine (November 2014).

Pre-testing of soils in the Pit 10 Borrow Area as part of the Order 2 Soil Survey of the Coal Hollow Mine Disturbance (2009) and as part of the July 26 and 27, 2016 evaluation of the Pit 10 Borrow Area as described in Appendix 2-4 called: *Topsoil and Subsoil Sources and Substitute Sources in the Pit 10 Borrow Area*.

Additional sampling and testing of the subsoil used for interim reclamation will be done prior to its salvage as cultivated topsoil at the end of the interim reclamation phase. Samples will be collected on the basis of approximately one sample per 2.5 acres. Sampling depth will be to 4 feet. This testing will include all parameters listed in Tables 3 and 7 in *Guidelines for Management of Topsoil and Overburden* (DOGM January 2008). Suitability will be evaluated based on the laboratory analysis and parameter limits listed in Tables 4 and 8 in *Guidelines for Management of Topsoil and Overburden* (DOGM January 2008).

Soil pH will be monitored in all subsoil salvaged below 58 inches (147 cm or 4.8 feet) in map unit G. Subsoil with pH greater than 8.8 will not be salvaged, stockpiled, or used for subsoil in the reclamation soil profile. Placement of subsoil within a pH range of 8.6 to 8.8 will be only be placed in the bottom foot (3 to 4 foot depth) of the reclamation soil profile.

231.400. Topsoil Handling

The topsoil will be removed from the mine area and either live hauled to a reclamation area or stored separately. All soil stockpiles piles will be seeded with an appropriate interim seed mix to prevent loss and deterioration by wind and water erosion. Soil stockpiles will have side slopes graded to a maximum 3h:1v. Piles will be bermed or otherwise treated to prevent the transport of sediments away from the pile. Details about soil horizons and zones planned for use as subsoil are detailed in Appendix 2-1. A detailed map showing stockpile designs/locations and soil removal are shown on Drawing 2-2.

Details about soils horizons and zones planned for use as subsoil in the North Private lease are shown on Drawing 2-4 and detailed in Volume 11: Supplemental Report section of the MRP in the report called: *Order 2 Soil Survey for the North Private Lease Expansion of the Coal Hollow Mine* (November 2014).

232. Topsoil and Subsoil Removal

232.100. Separate Layers

All soil materials will be removed in separate layers from the area to be disturbed, and segregated.

Based on soil map units, average depths have been estimated and will be used as a guide and monitored in the field. Refer to Table 4-2 in Appendix 2-1. Soil will be salvaged and directly placed or stockpiled as either topsoil or subsoil.

Based on soil map unit, average depths have been estimated and will be used as a guide and monitored in the field. Quality control of topsoil salvage depth will be accomplished by leaving pedestals (small islands of topsoil left to verify soil removal depth). Refer to Tables 13 and 14 in Volume 11: Supplemental Report section of the MRP in the report called: *Order 2 Soil Survey for the North Private Lease Expansion of the Coal Hollow Mine* (November 2014).

The estimated topsoil, subsoil, and substitute subsoil salvage and replacement depths for each mine area are shown in the following table.

Mining Area	Average Estimated Topsoil Salvage	Average Estimated Subsoil Salvage	Salvage of Upper Shale	Reclamation Soil Profile Depth	Notes
	inches	inches	inches	inches	
1	18	26	0	44	a
1extended	13	33	0	46	a
2	11	37	0	48	b
3	12	37	0	49	c

a. Salvage topsoil; salvage subsoil to depth of Tropic shale; follow sampling protocol for substitute subsoil in Section R645-301-232.720 for reclamation profile.
b. Salvage topsoil; salvage subsoil to 48 inches deep.
c. Salvage topsoil; salvage subsoil to 96 inches deep or bedrock.

Estimated topsoil and subsoil salvage depths were developed for the pit 10 Borrow Area and are detailed in Appendix 2-4 called: *Topsoil and Subsoil Sources and Substitute Sources in the Pit 10 Borrow Area*. Estimated depths of topsoil and subsoil available for salvage by soil map unit and area are detailed in Table 2-4.12. Soil will be salvaged and directly placed or stockpiled as either topsoil or subsoil.

The following table details the estimated topsoil and subsoil salvage depths by map unit in Area 1 Expanded. These salvage estimates were updated based on additional soil profile evaluations done in Area 1 during March 2016 (Appendix 2-5). The

subsoil salvage depth was increased to 4.8 feet in order to provide adequate subsoil for a total reclamation soil profile depth of 48 inches.

Estimated topsoil and subsoil salvage depths by soil map unit in *Area 1 Expanded*.

Map Unit	Estimated Topsoil Salvage Depth[1]	Estimated Subsoil Salvage Depth2	Map Unit Area[3]	Estimated Topsoil Salvage Volume	Estimated Subsoil Salvage Volume
	inches	inches	acres	cubic yards	cubic yards
A1	11	36	10.98	16,238	53,143
A2	11	36	30.46	45,047	147,426
A3	11	36	17.96	26,561	86,926
D	14	31	0.02	38	83
E	13	35	0.46	804	2,165
F	19	29	1.21	3,091	4,718
G	11	37	3.18	4,703	24,797
H	12	36	0.31	500	1,500
J	7	41	0.08	75	441
K	12	34	1.84	2,969	8,411
Total			66.5	100,025	329,611
			Inches	Feet	
Reclamation Depths		Topsoil	11.2	0.9	
		Subsoil	36.9	3.1	
		Profile	48.1	4.0	

1. Estimated topsoil salvage depths for map units A1, A2, and A3 are based on the average for soil profiles examined in March 2016 (Long 2016 in Appendix 2-5) and profiles within *Area 1 Expanded* which were examined during the *Order 2 Soil Survey of the North Private Lease* (Supplemental Volume 11). Estimated topsoil salvage depths for map units D thru K are based on estimated depths in Table 14 in the *Order 2 Soil Survey of the North Private Lease* (Supplemental Volume 11).
2. Estimated subsoil salvage depths for map units A1, A2, and A3 are based on the average for soil profiles examined in March 2016 (Long 2016 in Appendix 2-5) and profiles within *Area 1 Expanded* which were examined during the *Order 2 Soil Survey of the North Private Lease* (Supplemental Volume 11) . Estimated topsoil salvage depths for map units D thru K are based on estimated depths in Table 14 in the Order 2 Soil Survey of the North Private Lease (Supplemental Volume 11).
3. Measured map unit acres within Area 1 Expanded boundary.

232.200. Topsoil of Insufficient Quantity or Quality

Where the topsoil is of insufficient quantity or poor quality for sustaining

vegetation, other materials approved by the DOGM in accordance with R645-301-233.100 will be removed as a separate layer from the area to be disturbed, and segregated.

Based on the Soil Survey, there should be sufficient quantities of topsoil to place an average of eight inches of topsoil across all reclaimed areas.

Based on the 2014 Soil Survey of the North Private Lease, there should be sufficient quantities of topsoil to place an average of 13 inches of topsoil across all reclaimed areas. The estimated replacement topsoil depths for each mining area are 18 inches in Mine Area 1, 11 inches in Mine Area 2, and 12 inches in Mine Area 3 (based on soil profiles examined within each mine area).

Appendix 2-4 details that the amount of undisturbed topsoil that will be salvaged in the Pit 10 Borrow Area and available for final reclamation will provide an approximate depth of 3.5 inches. In order to increase the volume of topsoil available for final reclamation, organic mulches will be incorporated into subsoil used for interim reclamation to develop it into cultivated topsoil when it is salvaged at the end of the interim reclamation phase. These operations are detailed in Appendix 2-4 called: *Topsoil and Subsoil Sources and Substitute Sources in the Pit 10 Borrow Area*.

The estimated salvage depths listed for topsoil and subsoil in *Area 1 Expanded* will provide an estimated 11.2 inches (0.9 feet) of topsoil and 36.9 inches (3.1 feet) of subsoil for a total estimated reclamation soil profile of 48.1 inches (4.0 feet).

Soil pH will be monitored in all subsoil salvaged below 58 inches (147 cm or 4.8 feet) in map unit G. Subsoil with pH greater than 8.8 will not be salvaged, stockpiled, or used for subsoil in the reclamation soil profile. Placement of subsoil within a pH range of 8.6 to 8.8 will be only be placed in the bottom foot (3 to 4 foot depth) of the reclamation soil profile.

232.300. Shallow Topsoil Handling

If topsoil is less than six inches thick, the operator may remove the topsoil and the unconsolidated materials immediately below the topsoil and treat the mixture as topsoil.

Sufficient quantities of topsoil are estimated to be available for replacement of an average eight inches of topsoil across reclamation, with a minimum of six inches. Therefore, mixing of topsoil with subsoil is not anticipated to be necessary.

Localized areas of the Vessilla family soil in map unit C of the North Private Lease may be less than 6 inches thick. Topsoil and subsoil will be stockpiled together as topsoil. Mixing of topsoil with subsoil is not anticipated to be necessary in other areas of the North Private Lease area.

The estimated topsoil salvage and replacement depths for each mine area are shown in the table in Section R-645-301-232.100.

Localized areas of Vessilla clayey taxadjunct in map unit L and Zigzag in map unit 10 may be less than 6 inches thick in the Pit 10 Borrow Area. Topsoil and subsoil will be stockpiled together as topsoil. Mixing of topsoil with subsoil is not anticipated to be necessary in other areas of the Pit 10 Borrow Area.

232.400 - 232.420. Topsoil Removal Exceptions

UDOGM will not require the removal of topsoil for minor disturbances which occur at the site of small structures, such as power poles, signs, or fence lines. Removal of topsoil will not be required when the disturbances will not destroy the existing vegetation and will not cause erosion.

232.500. Subsoil Segregation

The Coal Hollow Project plans to remove soils as either topsoil or subsoil based on the completed soil survey. DOGM may require that the B horizon, C horizon, or other underlying strata, or portions thereof, be removed and segregated, stockpiled, and redistributed as subsoil in accordance with the requirements of R645-301-234 and R645-301-242 if it finds that such subsoil layers are necessary to comply with the revegetation requirements of R645-301-353 through R645-301-357.

Refer to Table 4-2 in Appendix 2-1, which contains estimated subsoil salvage depths. In addition, substitute subsoil has been identified in the layers between the identified topsoil layer and the Tropic Shale. Sufficient quantities of this material are available to live haul most of the subsoil with the exception of one stockpile that will be constructed from the initial mining area and reserved for reclamation of the final mining area and one temporary stockpile that will be constructed from removal of the NW/4, NE/4, Section 30. All substitute subsoil materials will be sampled and tested for pH, conductivity, SAR, percent lime, and texture, prior to salvage and stockpiling.

Refer to Appendix 2-4 for a summary of the amount of available subsoil, salvage depths, replacement, potential substitute subsoil needs, and potential sources of substitute subsoil in the Pit 10 Borrow Area. Sampling of the final graded overburden surface and the substitute subsoil source is described in Appendix 2-4. Table 2-4.14 summarizes the estimated amount of subsoil available for reclamation of the Pit 10 Borrow Area.

Refer to Table 14 in Volume 11: Supplemental Report section of the MRP in the report called: *Order 2 Soil Survey for the North Private Lease Expansion of the Coal Hollow Mine* (November 2014) for subsoil salvage depths. The estimated average subsoil salvage and replacement depths for each mine area is listed in the table in Section R-645-301-232.100.

The majority of the soils in the North Private lease were sampled to 8 feet or bedrock. The soil analysis results can be seen in Appendix C of Volume 11: Supplemental Report section of the MRP in the report called: *Order 2 Soil Survey for the North Private Lease Expansion of the Coal Hollow Mine* (November 2014). Additional testing of substitute subsoil materials will be

completed at the time of final reclamation by following the procedure outlined in R645-301-232.700. Analysis of substitute subsoil will include parameters listed in Tables 3 and 7 in the *Guidelines for Management of Topsoil and Overburden.*

The following soil sampling program will be conducted during the initial mining process in the Coal Hollow Mine and does not apply to the North Primate Lease area:

- Topsoil: Sampling will occur every 2 to 4 acres or approximately every 2,500 to 5,000 bank cubic yards.
- Subsoil: Sampling will occur every 2 to 3 acres or approximately every 10,000 to 15,000 bank cubic yards.

These samples are anticipated to be composites of individual samples taken throughout the week during the time frames that topsoil and subsoil are being salvaged. These individual samples would be taken five days a week and composited to a single sample representing the material moved each week. The parameters that will be analyzed for topsoil are found in Table 4-1 of Appendix 2-1.

Following the initial mining process (approximately 1 year), the sampling program was reviewed to determine the appropriate level of sampling necessary to ensure adequacy of topsoil and subsoil used in reclamation for all subsequent mining. It was determined that areas in the North or South Private Lease that exhibited a surface accumulation of salts after being placed, will be tested for elevated SAR ratio, this information will be reported with the topsoil sampling.

232.600. Timing

All material to be removed under R645-301-232 will be removed after the vegetative cover that would interfere with its salvage is cleared from the area to be disturbed, but before any drilling, blasting, mining, or other surface disturbance takes place. Drawing 2-2 shows the anticipated topsoil removal sequence and stockpiling.

Drawing 2-4 shows the anticipated topsoil removal sequence and stockpiling for the North Private Lease. Estimated average topsoil and subsoil salvage depths in the North Private Lease are detained in Soils map 10 in Volume 11: Supplemental Report section of the MRP in the report called: *Order 2 Soil Survey for the North Private Lease Expansion of the Coal Hollow Mine* (November 2014).

Figure 2-4.1 in Appendix 2-4 called: *Topsoil and Subsoil Sources and Substitute Sources in the Pit 10 Borrow Area* details topsoil and subsoil salvage areas for the Pit 10 Borrow Area.

232.700. Topsoil & Subsoil Removal Under Adverse Conditions

An exception to the requirements of R645-301-232 to remove topsoil or subsoils in a

separate layer from an area to be disturbed by surface operations may be granted by UDOGM where the operator can demonstrate;

232.710. Unsafe Conditions

The removal of soils in a separate layer from the area by the use of conventional machines would be unsafe or impractical because of the slope or other conditions of the terrain or because of the rockiness or limited depth of the soils.

These conditions are not anticipated in the Coal Hollow project area.

232.720. Lack of On-Site Material Available

If the requirements of R645-301-233 have been or will be fulfilled with regard to the use of substitute soil materials unless no available substitute material can be made suitable for achieving the revegetation standards of R645-301-356, then the operator will, as a condition of the permit, be required to import soil material of the quality and quantity necessary to achieve such revegetation standards.

The soil survey indicates that there are sufficient quantities of topsoil and subsoil to adequately reclaim the mined area with 48 inches of combined cover. If additional materials are needed, then Alton Coal Development (ACD) will salvage suitable overburden for use as substitute subsoil material from the zone below the topsoil layer (8 inches thick average) to a maximum depth of 30 feet, excluding any Tropic shale materials. ACD will do additional sampling to identify the zones in which suitable materials occur for maximum salvage potential of substitute subsoil. Representative overburden samples will be analyzed for pH, conductivity, SAR, percent lime, and texture. A detailed description of subsoil sampling is provided in Section 232.500.

The estimated combined salvage depths for each soil map unit are listed in Table 14 in Volume 11: Supplemental Report section of the MRP in the report called: *Order 2 Soil Survey for the North Private Lease Expansion of the Coal Hollow Mine* (November 2014). The table in Section R-645-301-232.100 details the estimated average depths of topsoil, subsoil, and substitute subsoil that will be salvaged and replaced in each mine area.

There are sufficient sources of native subsoil in adjacent soil map units to provide adequate amounts of native subsoil to cover mined areas 2 and 3 of the North Private Lease with a minimum 48 inches of combined cover.

Mine Area 1 may require an additional 4 inches and Mine Area 1 extended an additional 2 inches of substitute subsoil in order to achieve suitable material within the root zone. Also, for Mine Area 2 and 3 that will see more live haul, to ensure all areas achieve suitable material within the root zone, the following procedure will be followed. After backfill of the overburden has been complete, the upper 8 inches of Tropic Shale will be sampled on a basis of one sample per 2.5 acres as depicted in

Drawing 5-76A. Sample locations will be recorded with a GPS. Tropic Shale samples will be analyzed for the parameters listed in Tables 3 and 7 in the *Guidelines for Management of Topsoil and Subsoil* (Utah DOGM). Should a sample analysis indicate backfilled Tropic Shale are poor or unacceptable, samples will be taken half the distance between the unsuitable sample and the surrounding samples to delineate the extent of the unsuitable soil. Additional suitable subsoil or subsoil substitute will be placed over the delineated area to provide 48" of reclamation soil profile, as needed.

Subsoil will be used as interim reclamation cover for the Pit 10 Borrow Area. Organic mulches will be incorporated to improve fertility and soil quality, as detailed in R645-301-244.200. This improved subsoil will be salvaged and stockpiled as cultivated topsoil at the end of the interim reclamation phase of the Pit 10 Borrow Area project. Cultivated topsoil will be used as topsoil during reclamation of the Pit 10 Borrow Area. This operation is described in more detail in Appendix 2-4 called: *Topsoil and Subsoil Sources and Substitute Sources in the Pit 10 Borrow Area*. Salvage and stockpiling of the cultivated topsoil will be monitored by a Certified Professional Soil Scientist.

233.100 - 400 Topsoil Substitutes and Supplements.

Based on the Soil Survey contained in Appendix 2-1, topsoil substitutes and supplements are not anticipated to be necessary. This survey estimates that nine inches of topsoil can be replaced across the reclamation area.

Based on the Soil Survey, topsoil substitutes and supplements are not anticipated to be necessary. The North Private Lease soil survey estimates that thirteen inches of topsoil can be place over the entire mined area. Table 14 in Volume 11: Supplemental Report section of the MRP in the report called: *Order 2 Soil Survey for the North Private Lease Expansion of the Coal Hollow Mine* (November 2014) details the estimated depth of topsoil that can be salvaged from each soil map unit. The estimated average topsoil depth for soil map units C and J are 7 inches or less. However, the overall survey area estimated average topsoil salvage depth of approximately 13 inches. The estimated replacement topsoil depths for each mining area are 18 inches in Mine Area 1, 11 inches in Mine Area 2, and 12 inches in Mine Area 3 (based on soil profiles examined within each mine area).

Subsoil will be used as interim reclamation cover for the Pit 10 Borrow Area. Organic mulches will be incorporated to improve fertility and soil quality, as detailed in R645-301-244.200. This improved subsoil will be salvaged and stockpiled as cultivated topsoil at the end of the interim reclamation phase of the Pit 10 Borrow Area project. Cultivated topsoil will be used as topsoil during reclamation of the Pit 10 Borrow Area. This operation is described in more detail in Appendix 2-4 called: *Topsoil and Subsoil Sources and Substitute Sources in the Pit 10 Borrow Area*. Salvage and stockpiling of the cultivated topsoil will be monitored by a Certified Professional Soil Scientist.

The cultivated topsoil will be sampled and tested prior to salvage. Samples will be collected on the basis of approximately one sample per 2.5 acres. Sampling depth will be to 4 feet. This testing will include all parameters listed in Tables 3 and 7 in

Guidelines for Management of Topsoil and Overburden (DOGM January 2008). Suitability will be evaluated based on the laboratory analysis and parameter limits listed in Tables 4 and 8 in *Guidelines for Management of Topsoil and Overburden* (DOGM January 2008).

The following intermediate seed mix will be used to establish vegetation on the intermediate reclamation area in the Pit 10 Borrow where cultivated topsoil will be developed from subsoil. The Sweetpea milkvetch and alfalfa are legumes included for nitrogen fixation.

Intermediate Reclamation Seed Mix for Topsoil Cultivation Area			
		Seeds/Ft^2	Rate (PLS/Acre)
Astragalus cicer	Sweetpea milkvetch	9.99	3.00
Bromus carinatus	Mountain Brome	11.48	5.00
Elymus lanceolatus	Thickspike wheatgrass	10.61	3.00
Elymus smithii	Western wheatgrass	11.57	4.00
Elymus spicatus	Bluebunch wheatgrass	12.86	4.00
Medicago sativa	Alfalfa	14.46	3.00
Poa pratensis	Kentucky bluegrass	14.99	0.30
TOTAL		**85.96**	**22.30**

In the event that additional topsoil is needed to complete the required 48-inch reclamation profile, areas of interim reclamation have been identified as "Potential Topsoil" on drawing 2-2 that contain suitable topsoil. These areas potentially contain one foot of topsoil and have been accounted for on the soils accounting contained on drawing 2-2.

234. Topsoil Storage

234.100. Stockpiles

Materials removed under R645-301-232.100, R645-301-232.200, and R645-301-232.300 will be segregated and stockpiled when it is impractical to redistribute such materials promptly on regraded areas. Drawing 2-2 shows the planned stockpile areas, anticipated storage time, quantities and size.

Drawing 2-4 shows the planned stockpile areas, anticipated storage time, quantities and size for the North Private Lease.

Planned stockpile areas and quantities for the Pit 10 Borrow Area are shown on Drawing 2-2.

234.200. Requirements of Stockpiles

Stockpiled materials will be subject to the following conditions.

234.210. (a) They will be selectively placed on a stable site within the permit area. Areas are shown on Drawing 2-2.

Stockpile areas in the North Private Lease are shown on Drawing 2-4.

Stockpile areas for topsoil and subsoil salvaged from Pit B1 are shown on Drawing 2-2.

234.220. (b) They will be protected from contaminants and unnecessary compaction that would interfere with revegetation.

234.230. (c) They will be protected from wind and water erosion through prompt establishment and maintenance of an effective, quick growing vegetative cover. The side slopes will be graded to a maximum 3h:1v. Drawing 2-2 shows the planned stockpile areas, anticipated storage time, quantities and size. Drawing 2-4 shows the planned stockpile areas, anticipated storage time, quantities and size for the North Private Lease. Drawing 2-2 shows the planned stockpile areas, anticipated storage time, quantities and size for the Pit 10 Borrow Area. The interim seed mix for all the stockpiles is the following:

Stockpile Interim Seed Mix		
		Rate (PLS/Acre)
Bromus carinatus	Mountain Brome	6
Elymus lanceolatus	Thickspike wheatgrass	4
Elymus smithii	Western wheatgrass	5
Elymus spicatus	Bluebunch wheatgrass	6
Poa pratensis	Kentucky bluegrass	0.4
Total		**21.40**

Partially utilized stockpiles of topsoil, subsoil, and substitute subsoil will be reshaped and bermed within a reasonable time period following the end of use. The disturbance will be seeded during the next appropriate seeding period or by November 30th of that year. If the season is not appropriate for seeding after reshaping, the stockpile will then be coated with a tackifier at the manufacturer's suggested rate for dust control applications.

The following example balance sheet will be used to track salvage, stockpiling, and placement of topsoil, subsoil, and substitute subsoil in each mine area. Tracking of topsoil, subsoil, and substitute subsoil will be done for each Mine Area separately. The depth of topsoil and subsoil salvage will be determined by the soil survey and in the field during mining by the Coal Hollow environmental technician in consultation

with a certified professional soil scientist.

NPL AREA 1	Topsoil Stockpile	Subsoil Stockpile
Starting Stockpile Volume	74,953	41,378

BRP 1-10 = 12.21 ACRES

Source	NL Topsoil	Livehaul Topsoil*	Total Topsoil	NL Subsoil	Livehaul Subsoil	Total Subsoil	
	CY	CY	CY	CY	CY	CY	CY
Stockpile volume utilized	18,784	0	18,784	14,071	8,459	22,530	
Suitable spoil**							33,283
Remaining stockpile volume	56,169			27,307			

*Livehaul source: Area 1

**Suitable Spoil: Surface two feet of 9.38 acres represented by Soil Sample Pits 1, 2, and 3.5N

***Average topsoil cover depth 1.08 ft.

****Subsoil redistribution depth as shown on Drawing 5-76a

For the purpose of tracking soil balance in the Coal Hollow Mine, Figure 1with the addition of Table 1 of Appendix 2-2 has been revised to show soil placed in reclamation, topsoil sampled for fertility and includes a table indicating the soil remaining/planned in stockpiles including new stockpile address in Appendix 2-4 (Pit 10 Borrow amendment). As sampling and placement of soils progresses with reclamation, Figure 1 and Table 1of Appendix 2-2 will be updated with new information.

234.240. (d) They will not be moved until required for redistribution unless approved by the UDOGM. Anticipated storage time for each stockpile is shown on Drawing 2-2.

Drawing 2-4 shows the anticipated storage time for each stockpile in the North Private Lease. A portion of the topsoil stockpile in Area 1 will be relocated prior to mining Pit 11, ACD will notify the Division of the volume of stored topsoil to be moved and the timing for this movement.

Drawing 2-2 shows the anticipated storage time for each stockpile in the Pit 10 Borrow Area.

234.300. Long-Term Disturbance & Stockpiling

When long-term disturbed areas will result from facilities and preparation plants and when stockpiling of materials removed under 8645-301-232.100 would be detrimental to the quality or quantity of those materials, DOGM may approve the temporary distribution of the soil materials removed to an approved site within the permit area to enhance the current use of that site until later when needed for reclamation, provided that the following conditions occur.

234.310. Such action will not permanently diminish the capability of the topsoil of the host site.

234.320. The material will be retained in a condition more suitable for redistribution than if stockpiled.

240. Reclamation Plan (General Requirements)

A detailed Order 2 soil survey has been completed in 2006 and 2007 and extended to include the New Dame Lease IBC in 2014. This information provides detail for onsite soil suitability, salvage depths, and volumes available for reclamation of the mine site. Dozers or Scrapers will replace the subsoil and topsoil. The topsoil is estimated to average 8 inches and the subsoil will be approximately 39 inches in thickness. The total profile of topsoil and subsoil is estimated to average 48 inches.

A detailed Order 2 soil survey of the North Private Lease was completed in 2014 and is detailed in Volume 11: Supplemental Report section of the MRP in the report called: *Order 2 Soil Survey for the North Private Lease Expansion of the Coal Hollow Mine* (November 2014). This information provides detail for onsite soil suitability, salvage depths, and volumes available for reclamation of the mine site. Dozers or Scrapers will replace the subsoil and topsoil. The topsoil is estimated to average 13 inches and the subsoil will be approximately 31 inches in thickness. The total profile of topsoil and subsoil is estimated to average 44 inches.

A detailed Order 2 soil survey of the Pit 10 Borrow Area was completed in 2016 and is detailed in Appendix 2-4: *Topsoil and Subsoil Sources and Substitute Subsoil source in the Pit 10 Borrow Area* (September 2016). This information provides details for onsite soil suitability, salvage depths, and volumes available for reclamation of the mine site. Dozers or Scrapers will replace the subsoil and topsoil. The minimum final cover depths in the Pit 10 Borrow Area will be approximately 0.9 feet of topsoil and 3.1 feet of subsoil. The total reclamation profile of topsoil and subsoil is estimated to average 4.0 feet.

If soils balance information should indicate that less than 48 inches of soil is available for the total reclamation profile, the following plan will be implemented. After backfill of the overburden has been complete, the upper 8 inches of Tropic Shale will be sampled on a basis of one sample per 2.5 acres. Sample locations will be recorded with a GPS. Tropic Shale samples will be analyzed for the parameters listed in Tables 3 and 7 in the *Guidelines for Management of Topsoil and Subsoil* (Utah DOGM). Should a sample

analysis indicate backfilled Tropic Shale are poor or unacceptable, samples will be taken half the distance between the unsuitable sample and the surrounding samples to delineate the extent of the unsuitable soil. Additional suitable subsoil or subsoil substitute will be placed over the delineated area to provide 48" of reclamation soil profile, as needed.

241. General Requirements

Refer to R-645-301-242 for redistribution of soils, R-645-301-243 for soil nutrients and amendments, and R-645-301-244 for mulch use and application.

242. Soil Redistribution

242.100. Topsoil materials removed under R645-301-232.100, R645-301-232.200, and R645-301-232.300 and stored under R645-30I-234 will be redistributed in a manner that meets the following conditions.

242.110. (a) The material achieves an approximately uniform, stable thickness consistent with the approved postmining land use, contours, and surface-water drainage systems. All slopes will be appropriately graded and leveled prior to placement of topsoil and subsoil layers. Soil layer thicknesses will be regularly checked using a high precision GPS system and spot checking by the ACD environmental technician.

242.120. (b) Reduced material handling of the soil resource prevents excess compaction. Material handling will be minimized by direct hauling and placing materials when operationally practical rather than stockpiling. Materials will be spread by a dozer or scrapers and spread only as much as necessary to obtain the required uniform thickness. Traffic from rubber tired equipment across topsoil and subsoil will be minimized.

If heavy equipment operation results in excessive soil compaction at the surface of the reclaimed areas, they will then be ripped, disked, and harrowed to loosen the seedbed prior to seeding. Excessive compaction that could impact seeding success will be determined by observation and judgment of an environmental professional. In other areas where less compaction has occurred, the areas will be disked and harrowed. The disking and harrowing of all areas will be done parallel with the contour wherever possible to decrease the potential for water erosion downslope. In other areas where compaction is not a problem, dozer tracking can be used to roughen the surface, and to trap seed, fertilizer, mulch, and other amendments as well as decrease erosion by wind and water. In such cases seeding will be done immediately after this treatment, whereas soil amendments, where required, would be applied over the surface during seedbed preparations. Seeding will mainly occur in the early spring and late fall. Seeding will be accomplished by the seed drilling method followed by mulching as described in Section 244.200. Seed mixtures and rates can be viewed in Tables 3-37 through 3-42 in Chapter 3, Volume 2.

242.130. (c) Handling procedures will be implemented to protect the materials from wind and water erosion before and after seeding and planting.

Reclamation will be graded to the planned slope angles, not to exceed 3h:1v. Soil layers will be sloped as the material is relocated to the reclaim areas. Once soil is placed, seeding will occur at the earliest appropriate season suitable to planting conditions. If the season is not appropriate for seeding at the time of topsoil placement, the topsoil will then be coated with a tackifier at the manufacturer's suggested rate for dust control applications. Mulching will be implemented on all reclamation to control erosion following seeding.

242.200. Treatments of Material to be Redistributed

Before redistribution of the materials removed under R645-301-232, the regraded land will be treated if necessary to reduce potential slippage of the redistributed material and to promote root penetration. If no harm will be caused to the redistributed material and reestablished vegetation, such treatment may be conducted after the material is replaced. Potential for slippage is anticipated to be minimal based on the planned slope angles for reclamation.

In the North Private Lease, areas exceeding 3:1 slope, will have the underlying spoil ripped to a depth of 18" prior to placement of subsoil and the placed subsoil will be also be ripped to a depth of 18" prior to placement of topsoil. In all areas where the subsoil has become compacted, the subsoil will be ripped to a depth of 18" prior to placement of the topsoil.

When subsoil placement is not immediately followed by topsoil placement (within a month), the graded subsoil will be treated with mulch or tackifier (per Section 244.200) to prevent erosion in the interim; and the subsoil will be ripped to a depth of 18 inches prior to topsoil placement.

Area 2 encounters Prime Farmland and Soils of Statewide Importance, these are required to be stockpiled by owner and by horizon. The location of these stockpiles can be found on Drawing 2-4. DRH_C, DRH_B, OGP_B, and OGP_A will be on top of an area that has been previously been top soiled and seeded. The remaining stockpiles will be placed on subsoil. All stockpiles from the Prime Farmland and Soils of Statewide Importance weather placed on previously top soiled or subsoiled areas, will be placed on a layer of organic material to demarcate the separation at the time they are replaced in reclamation of the Prime Farmland and Soils of Statewide Importance areas. Those that are placed on topsoil will have the topsoil in the travel paths windrowed to a berm which also will be seeded until final placement. Once the stockpiles on top soil are removed, the area of the stockpile and associated travel paths will require ripping 18" prior to being reseeded.

242.300. Soil Redistribution on Impoundments & Roads

DOGM may not require the redistribution of topsoil or topsoil substitutes on the approved postmining embankments of permanent impoundments or roads if it determines the following.

242.310. (a) Placement of topsoil or topsoil substitutes on such embankments is

inconsistent with the requirement to use the best technology currently available to prevent sedimentation.

242.320. (b) Such embankments will be otherwise stabilized.

243. Soil Nutrients & Amendments

Nutrients and soil amendments will be applied to the redistributed material when necessary to establish the vegetative cover. The final seedbed of the reclaimed areas will be prepared by first replacing the subsoil and topsoil. Next, a basic topsoil (top 8 inches of reclamation profile) sampling regime will be implemented prior to seeding that should identify fertility problems and will provide a basis for determining necessary soil amendments. The parameters analyzed will be:

Available phosphorus (P)
Soluble Potassium (K)
Nitrate-Nitrogen

One composite sample will be collected from approximately every 2 acres based on soil types and variability. Each composite will be comprised of at least 4 sub-samples. This sampling will be completed within three months of topsoil placement.

Pre-testing of the soils has been conducted as part of the soils survey. Results from the pre-testing of topsoil and subsoil can be viewed in Table C-1 of Appendix 2-1 (native topsoil and subsoil) and Table C-2 (samples from core hole/overburden pits) of Appendix 2-1.

Results from the pre-testing of topsoil and subsoil can be seen in the laboratory analysis reports in Appendix C in Volume 11: Supplemental Report section of the MRP in the report called: *Order 2 Soil Survey for the North Private Lease Expansion of the Coal Hollow Mine* (November 2014).

Results from the pre-testing of topsoil and subsoil in the Pit 10 Borrow Area are in the laboratory analysis reports in Appendix 2-4: *Topsoil and Subsoil Sources and Substitute Subsoil source in the Pit 10 Borrow Area* (September 2016).

244. Soil Stabilization

244.100. Erosion Protection from Wind & Water

All exposed surface areas will be protected and stabilized to effectively control erosion and air pollution attendant to erosion. Reclamation will be regraded to the planned slope angles, not to exceed 3h:1v. Soil layers will be sloped as the material is relocated to the reclaim areas. Once soil is placed, seeding will occur at the earliest appropriate season suitable to planting conditions. Grass matting, mulching and/or cross ditches will be implemented as necessary to control erosion. Surfaces of stockpiles will be roughened by pocking, gouging or ripping. Soil stockpiles will be seeded with the temporary seed mix provided in Section 234.230 and mulched

by one of the methods described in Section 244.200.

Stockpiles of topsoil, subsoil, and substitute subsoil will be shaped, roughened, and bermed immediately following construction. The disturbance will be seeded during the next appropriate seeding period as described in the reclamation time table in Chapter 3 section 341.100. If the season is not appropriate for seeding the stockpile will be coated with a tackifier at the manufacturer's suggested rate for dust control applications.

The sideslopes of the temporary spoil pile will be roughened and coated with a tackifier at the manufacturer's recommended rate as the pile rises.

244.200. Mulch

Suitable mulch and other soil stabilizing practices will be used on all areas that have been regraded and covered by topsoil or topsoil substitutes. DOGM may waive this requirement if seasonal, soil, or slope factors result in a condition where mulch and other soil stabilizing practices are not necessary to control erosion and to promptly establish an effective vegetative cover.

Mulch will be placed on the seedbed surface once soil amendments have been incorporated. In most cases seeding will be accomplished after straw mulch has been placed to ensure seed is placed at the proper depth, exceptions would be for safety on steep slopes. Mulching treatments will occur by one or more of the following methods:

- Certified noxious weed free straw applied at a rate of 1 ton/acre anchored by crimping or a chemical binder.

- Wood fiber hydromulch at a rate of ¾ ton per acre for slopes flatter than 3:1 and 1 ton per acre for slopes at 3:1 which is the steepest slope planned at the project. This hydromulch would be anchored with a chemical binder at the manufacturer's suggested rate.

- Live mulch by use of quick growing sterile nurse crop such as "Quick Guard" with recommended rates of 5-10 lbs. /acre.

- The use of Nutri-Mulch® or equivalent product as an organic matter amendment and fertilizer. Application rate will be as recommended by the manufacturer.

The mulch should control erosion by wind and water, decrease evaporation and seed predation, and increase survivability of the seeded species. Since there is only one post mining land use, mulching will follow one of the above described methods for all reclaim areas. Although live mulch ("Quick Gard") has performed the best at the Coal Hollow Mine, other methods or combinations of the above listed methods will be used based on slope, climatic trends, soil moisture, soil texture, etc. and will be determined at the time of planting for each area.

244.300. Rills & Gullies

Rills and gullies that form in areas that have been regraded and topsoiled that cause the following conditions will have the topsoil replaced followed by reseeding or replanting if the following occurs.

244.310. (a) If they disrupt the approved postmining land use or the reestablishment of the vegetative cover.

244.320. (b) If they cause or contribute to a violation of water quality standards for receiving streams will be filled, regraded, or otherwise stabilized; topsoil will be replaced; and the areas will be reseeded or planted.

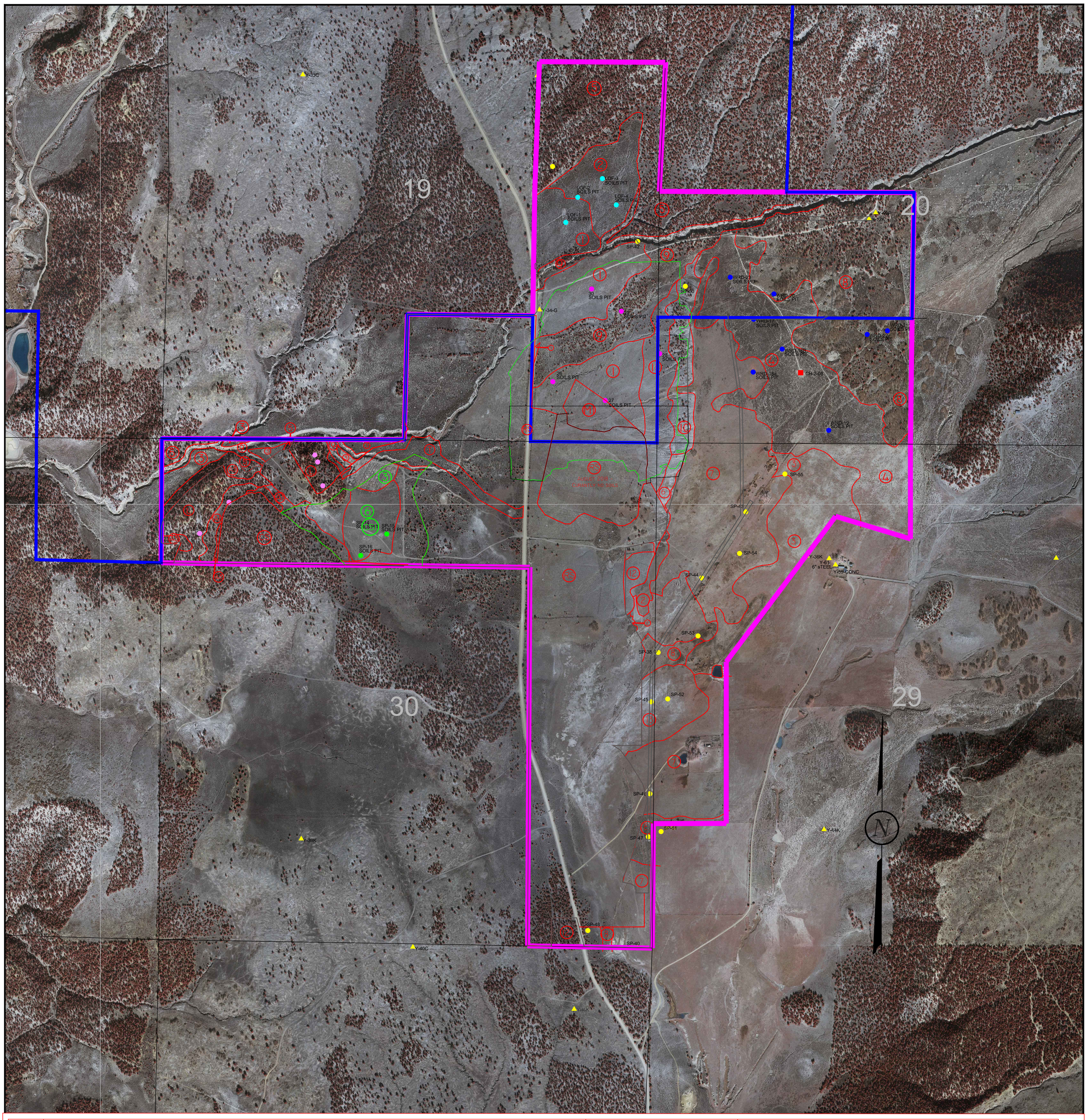
250. PERFORMANCE STANDARDS

251.Topsoil & Subsoil Removed

All topsoil, subsoil and topsoil substitutes or supplements will be removed, maintained and redistributed according to the plan given under R645-301-230 and R645-301-240.

252.Topsoil & Subsoil Stockpiled

All stockpiled topsoil, subsoil and topsoil substitutes or supplements will be located, maintained and redistributed according to plans given under R645-301-230 and R645-301-240.



Map Unit	Map Unit Name	Estimated Salvage Depths (1) Topsoil Depth	Good/Fair Subsoil(2)	Poor Subsoil(3)
		--------inches--------		
1	A Family - Wapiti Family complex, 3 to 8 percent slope	9	23	55
2	M Family - Calendar Family - D Family complex, 3 to 8 percent slopes	7	17	18
3	Cibeque Family - Wapiti Family complex, 3 to 8 percent slopes	6	19	50
4	Jonale Family - Graystone cobbly substratum Family - Wapiti Family complex, 3 to 8 percent slope	10	27	33
5	Calendar Family - M Family - Drififty Family complex, 8 to 25 percent slopes	7	15	8
6	Graystone - Cookcan - Jonale Family complex, 1 to 5 percent slopes	10	42	18
7	Happyhollow Family - Alamosa complex, 1 to 5 percent slopes	10	37	28
8	Brumley - Graystone - Snilloc complex, 3 to 8 percent slopes	10	55	20
9	D Family - Deacon complex, 5 to 30 percent slopes	10	19	42
10	Zigzag Clay, 8 to 25 percent slopes	5	13	1
11	A Family Clay, 8 to 25 percent slopes	8	17	56
12	Manzanst Family Clay Loam, 3 to 12 percent slopes	6	1	26
13	A Family - Happyhollow Family complex, 1 to 12 percent	9	19	58
A1	Sideshow Family, 0 to 4 percent	14	31	46
A3	Sideshow Family, 8 to 18 percent	17	25	48
L	Vesilla Clayed Taxadjunct Family- Sideshow Family, 3 - 25 percent slopes	4	10	14
RS	Reclamation Soil	8	40	
M1	Modified map unit 1,(Topsoil removed and replaced at 8")	8	23	55
CS	Cultivated Subsoil, (18" Subsoil over backfilled pit)	6	12	
CS1	Cultivated Subsoil, (18" Subsoil over Spoil and Native Subsoil)	6	12	
T	Topsoil Required	8	40	

(1) Estimated salvage depths are weighted averages based on map unit components and percentage of each component in the map unit. Variations of salvage depth occur within each map unit and should be monitored during salvage operations

(2) Good/Fair subsoil is based on the soil meeting the good and fair suitability criteria for all parameters except clay textures in Guidelines for Management of Topsoil and Overburden (Utah DOGM, 2005)

(3) Poor subsoil is based on material that meets all of the criteria for good and fair in all categories except pH, percent calcium carbonate; and clay textures; but meets the minimum requirements for these parameters in the poor category in Guidelines for Management of Topsoil and Overburden (Utah DOGM, 2005)

LEGEND:

- SECTION CORNER
- EXISTING DRILL HOLE
- 2005/2007 CORE HOLES
- LBA PERMIT AREA
- NPL & SPL PERMIT AREA

SOILS PIT

- SP
- YR
- ROV
- DAH
- WRD
- LOF
- 2007 Soil Pits

DRAWN BY:	CHECKED BY:
J. STANSFIELD	LWJ
DRAWING: 2-1	DATE: 04/20/07
	SCALE: 1" = 500'
JOB NUMBER: 1400	SHEET 1 OF 1

REVISIONS

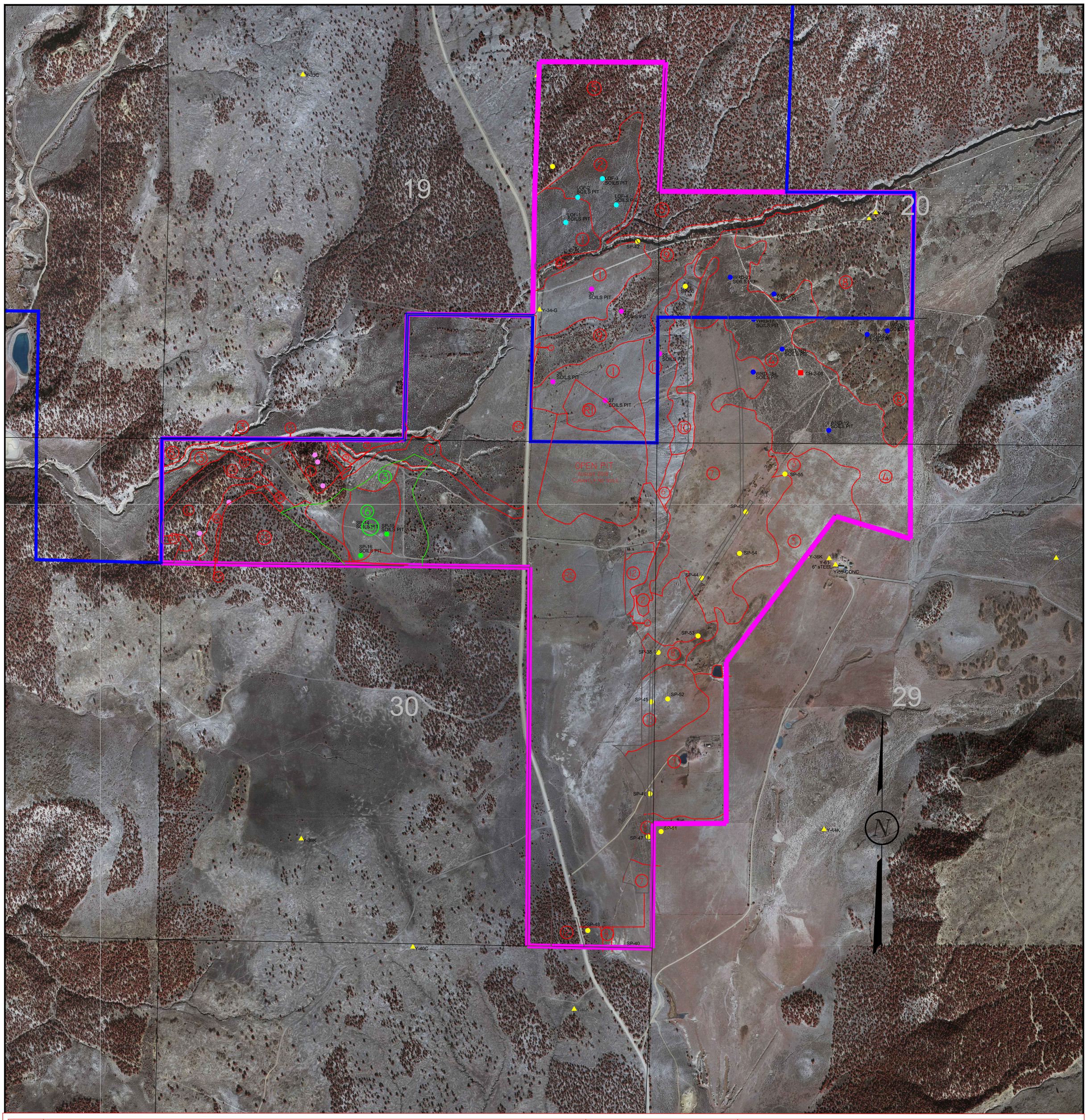
DATE:	BY:
4/30/07	NLB
1/11/08	RL/CRM
10/14/08	RL/CRM
01/10/14	KN
08/11/16	KN

SOIL SURVEY

COAL HOLLOW PROJECT
ALTON, UTAH

DRAWING: 2-1

Alton Coal Development
Coal Hollow Project
463 North 100 West, Suite 1
Cedar City, Utah 84720
Phone (435)867-5331
Fax (435)867-1192



Map Unit	Map Unit Name	Estimated Salvage Depths (1) Topsoil Depth	Good/Fair Subsoil(2)	Poor Subsoil(3)
		--------inches--------		
1	A Family - Wapiti Family complex, 3 to 8 percent slope	9	23	55
2	M Family - Calendar Family - D Family complex, 3 to 8 percent slopes	7	17	18
3	Cibeque Family - Wapiti Family complex, 3 to 8 percent slopes	6	19	50
4	Jonale Family - Graystone cobbly substratum Family - Wapiti Family complex, 3 to 8 percent slope	10	27	33
5	Calendar Family - M Family - Drififty Family complex, 8 to 25 percent slopes	7	15	8
6	Graystone - Cookcan - Jonale Family complex, 1 to 5 percent slopes	10	42	18
7	Happyhollow Family - Alamosa complex, 1 to 5 percent slopes	10	37	28
8	Brumley - Graystone - Snilloc complex, 3 to 8 percent slopes	10	55	20
9	D Family - Deacon complex, 5 to 30 percent slopes	10	19	42
10	Zigzag Clay, 8 to 25 percent slopes	5	13	1
11	A Family Clay, 8 to 25 percent slopes	8	17	56
12	Manzanst Family Clay Loam, 3 to 12 percent slopes	6	1	26
13	A Family - Happyhollow Family complex, 1 to 12 percent	9	19	58
A1	Sideshow Family, 0 to 4 percent	14	31	46
A3	Sideshow Family, 8 to 18 percent	17	25	48
L	Vesilla Clayed Taxadjunct Family- Sideshow Family, 3 - 25 percent slopes	4	10	14
RS	Reclamation Soil	8	40	
R1	Reclamation map unit 1,(Topsoil removed and replaced at 8")	8	23	55
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LEGEND:

- SECTION CORNER
- EXISTING DRILL HOLE
- 2005/2007 CORE HOLES
- LBA PERMIT AREA
- NPL & SPL PERMIT AREA

SOILS PIT

- SP
- YR
- ROV
- DAH
- WRD
- LOF
- 2007 Soil Pits

DRAWN BY: J. STANSFIELD	CHECKED BY: LWJ
DRAWING: 2-1	DATE: 04/20/07
	SCALE: 1" = 500'
JOB NUMBER: 1400	SHEET 1 OF 1

REVISIONS

DATE:	BY:
4/30/07	NLB
1/11/08	RL/CRM
10/14/08	RL/CRM
01/10/14	KN
08/11/16	KN
10/12/18	KN

SOIL SURVEY

COAL HOLLOW PROJECT
ALTON, UTAH

DRAWING: 2-1

Alton Coal Development
Coal Hollow Project
463 North 100 West, Suite 1
Cedar City, Utah 84720
Phone (435)867-5331
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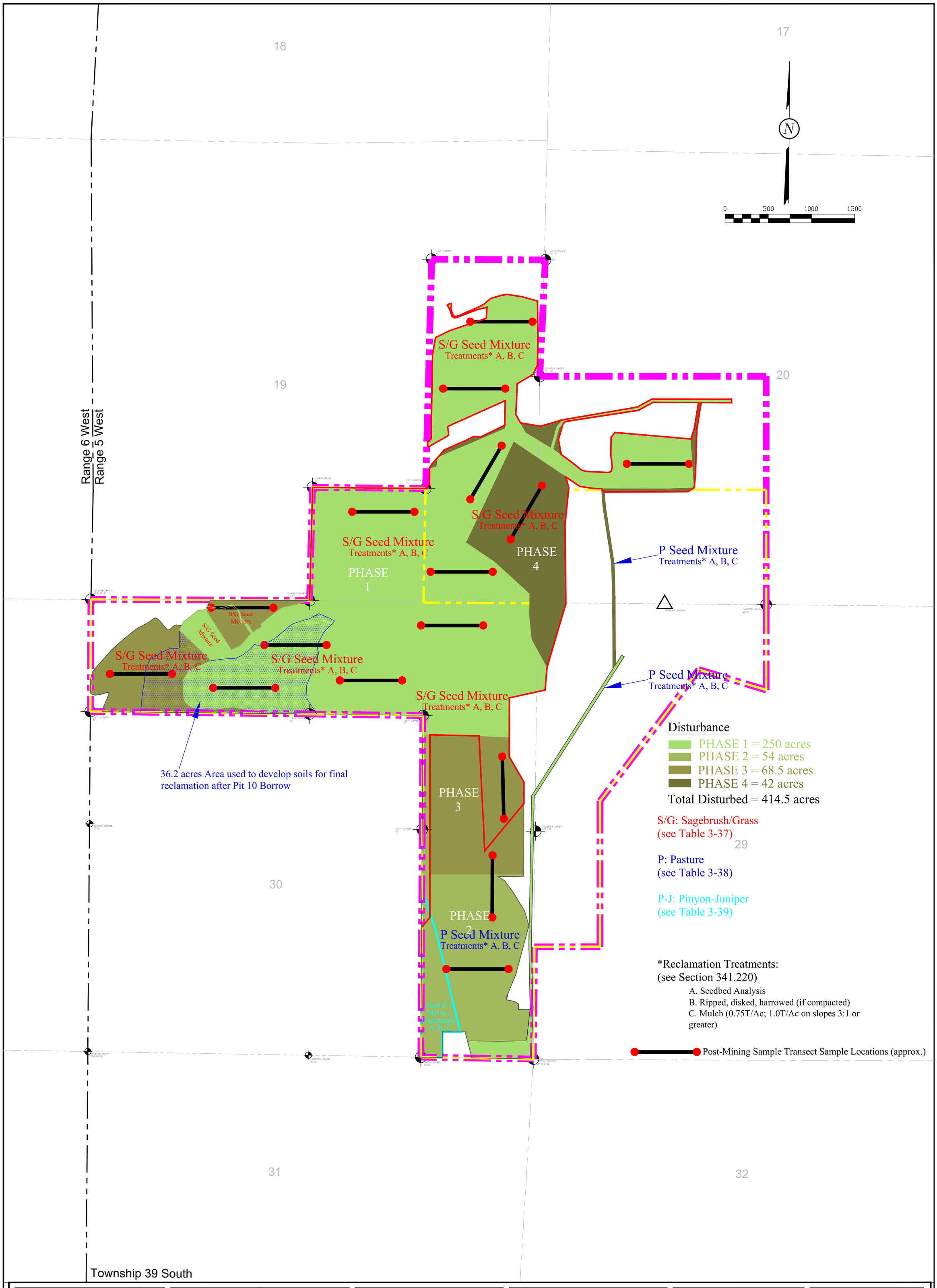


LEGEND:
- PERMIT BOUNDARY
- PRIVATE COAL OWNERSHIP
- SECTION LINE
- FOUND SECTION CORNER
- FOUND PROPERTY CORNER

DRAWN BY:	CHECKED BY:
K.NICHOLES	LWJ
DRAWING: 3–7	DATE: 2/26/14
	SCALE: 1" = 500'
JOB NUMBER: 1400	SHEET

REVISIONS

DATE:	BY:
02/26/14	KN
12/04/14	KN
05/13/16	KN
08/03/18	KN

RECLAMATION TREATMENTS, MONITORING & SAMPLE LOCATIONS

COAL HOLLOW PROJECT
ALTON, UTAH

DRAWING: 3-7

Alton Coal Development
Coal Hollow Project
463 North 100 West, Suite 1
Cedar City, Utah 84721
Phone (435)867-5331
Fax (435)867-1192

CHAPTER 5

R645-301-500. ENGINEERING

510. **INTRODUCTION**.

The engineering section of the Mining and Reclamation Plan (MRP) is divided into the operation plan, reclamation plan, design criteria, and performance standards. All of the activities associated with the coal mining and reclamation operations are designed, located, constructed, maintained, and reclaimed in accordance with the operation and reclamation plan.

511. **GENERAL REQUIREMENTS**

511.100 - 511.300. Contents

The operation and reclamation permit application includes descriptions of the coal mining and reclamation operations with attendant Drawings, plans, and cross sections. and its potential impacts to the environment as well as methods and calculations utilized to achieve compliance with design criteria.

All this information can be viewed in this section, Drawings 5-1 through 5-44 and Appendices 5-1 through 5-10 and 5-13 for the existing Coal Hollow Mine and on Drawings 5-45 through 5-78 and Appendices 5-11, 5-12, 5-12A, and 5-14 for the North Private Lease.

512. **CERTIFICATIONS**

512.100. Cross Sections and Drawings.

All cross sections and Drawings required under applicable portions of sections 512.100 through 512.150 have been prepared by, or under the direction of, and certified by: a qualified, registered, professional engineer; a professional geologist; or a qualified, registered, professional land surveyor, with assistance from experts in related fields such as hydrology, geology and landscape architecture.

Compliance with this section has been completed and certifications are available on all cross sections and Drawings.

512.200. Plans and Engineering Designs.

All plans for excess spoil, durable rock fills, coal mine waste, impoundments, primary roads and variances from approximate original contour will be certified by a qualified registered professional engineer.

Plans for excess spoil, sediment impoundments, and primary roads have been certified by a qualified registered professional engineer. These certifications can be viewed on Drawings 5-22 through 5-37 for the existing Coal Hollow Mine and on Drawings 5-51A & 5-58 through 5-75 for the North Private Lease. No coal mine waste or durable rock fills are planned.

512.210 Excess Spoil Disposal Areas

A professional engineer experienced in the design and construction of earth and rock fills will certify the design of Excess Spoil Disposal Areas according to 535.100.

A professional engineer with experience in design and construction of earth and rock fills has certified the design of the Excess Spoil Disposal for the existing Coal Hollow Mine and of the Temporary Excess Spoil Pile for the North Private Lease according to 535.100. An expert in the field of slope stability and geotechnical analysis has provided a thorough review of the designs. These analyses can be viewed in Appendix 5-1 for the Coal Hollow Mine and in Appendix 5-11 for the North Private Lease.

512.220 - 230 Durable Rock Fills and Coal Mine Waste Structures

The MRP does not contemplate the construction of any permanent Durable Rock Fills or Coal Mine Waste structures. If such structures become part of the plan, a professional engineer experienced in the design of earth and rock fills and or disposal facilities will certify the design according to R645-301-535.100 - 536.

512.240. Impoundments.

A professional engineer experienced in the design and construction of impoundments will use current, prudent, engineering practices and will certify the design of the impoundment according to R645-301-743.

A professional engineer experienced in the design and construction of impoundments with assistance from a geotechnical expert has used current, prudent, engineering practices to design the proposed impoundments. The plans have been certified and a detailed geotechnical analysis has been provided. The detailed investigation for impoundments 5 through 9 and T1 found soils to be representative of the Coal Hollow Mine, thus additional geotechnical analysis, specific stability analysis for the Coal Hollow Mine apply to the impoundments at the North Private Lease. The certifications and drawings can be viewed in Drawings 5-25 through 5-31 and Appendices 5-1 and 5-2 for the existing Coal Hollow Mine and on Drawings 5-65 through 5-73 and Appendix 5-11, 5-12, and 5-12A for the North Private Lease. Investigation and analysis have been performed for all impoundments of the North Private Lease. This includes ponds 5 through 9 and T1 as well as ditches 5 through 20, T1-01 and T1-02.

512.250. Primary Roads.

A professional engineer will certify the design and construction or reconstruction of primary roads as meeting the requirements of 742.420.

Designs of primary roads have been certified as meeting the requirements of 742.420.

512.260. Variance From Approximate Original Contour.

In areas of the MRP where a variance from the approximate original contour is required, a professional engineer will certify the design for the proposed variance from the approximate original contour, as described under 270, in conformance with professional standards established to assure the stability, drainage and configuration necessary for the intended use of the site.

The MRP does not contemplate any variances from Approximate Original Contour for the Coal Hollow Mine or the North Private Lease.

513. **COMPLIANCE WITH MSHA REGULATIONS AND MSHA APPROVALS.**

513.100. Coal Processing Waste Dams and Embankments

The MRP does not contemplate the construction of any coal processing waste dams and embankments.

513.200. Impoundments and Sedimentation Ponds

Impoundments and sedimentation ponds meeting the size or other qualifying criteria of MSHA, 30 CFR 77.216(a) will comply with the requirements of MSHA, 30 CFR 77.216 (see R645-301-533.600, R645-301-742.222, and R645- 301-742.223).

No impoundments or sedimentation ponds meeting the size or other qualifying criteria of MSHA, 30 CFR 77.216(a) exist or are planned within the proposed Mine Permit Area. Should impoundments and sedimentation ponds meeting the size or other qualifying criteria of MSHA, 30 CFR 77.216(a) become necessary, compliance with the requirements of MSHA, 30 CFR 77.216 will be met.

513.300. Disposal of Underground Development Waste, Coal Processing Waste and Excess Spoil in underground mine workings.

The MRP does not contemplate any underground development waste, coal processing waste, or excess spoil being disposed of in underground mine workings.

513.400. Refuse Piles

The MRP does not contemplate the construction of any refuse piles.

513.500. Capping, Sealing and Backfilling Openings to the Surface from the Underground.

Each shaft, drift, adit, tunnel, exploratory hole, entryway or other opening to the surface from the underground will be capped, sealed, backfilled or otherwise properly managed consistent with MSHA, 30 CFR 75.1711 (see R645-301-551).

Underground mine portals are located in the bottom of the Coal Hollow Pit 10, and will ultimately be reclaimed and sealed by the backfilling of the pit to a vertical depth of approximately 112 feet (as shown on Drawing 5-37A) when no longer required.

All wells will be managed to comply with R645-301-748 and R645-301-765. Water monitoring wells will be managed on a temporary basis according to R645-301-738.

Wells constructed for monitoring groundwater conditions in the proposed Coal Hollow Mine permit and adjacent area, including exploration holes and boreholes used for water wells or monitoring wells, will be designed to prevent contamination of groundwater and surface-water resources and to protect the hydrologic balance. A diagram depicting typical monitoring well construction methods is shown in Figure 7-11. Monitoring wells will include a protective hydraulic seal immediately above the screened interval, an annular seal plugging the borehole above the hydraulic seal to near the ground surface, and a concrete surface seal extending from the top of the hydraulic seal to the ground surface which is sloped away from the well casing to prevent the entrance of surface flows into the borehole area. Well casings will protrude above the ground surface a sufficient height so as to minimize the potential for the entrance of surface water or other material into the well. A steel surface protector with a locking cover will be installed at monitoring wells to prevent access by unauthorized personnel. Where there is potential for damage to monitoring wells, the wells will be protected through the use of barricades, fences, or other protective devices. These protective devices will be periodically inspected and maintained in good operating conditions. Monitoring wells will be locked in a closed position between uses.

When no longer needed for monitoring or other use approved by the Division upon a finding of no adverse environmental or health and safety effects, or unless approved for transfer as a water well under R645-301-731.100 through R645-301-731.522 and R645-301-731.800, each well will be capped, sealed, backfilled, or otherwise properly managed, as required by the Division in accordance with R645-301-529.400, R645-301-631.100, and R645-301-748. Permanent closure measures will be designed to prevent access to the mine workings by people, livestock, fish and wildlife, machinery and to keep acid or other toxic drainage from entering ground or surface waters.

If a water well is exposed by coal mining and reclamation operations, it will be permanently closed unless otherwise managed in a manner approved by the Division.

Permanent closure and abandonment of water wells greater than 30 feet in depth will be in accordance with the requirements of "Administrative Rules for Water Well Drillers", State of Utah, Division of Water Rights or other applicable state regulations. Abandonment of wells will be performed by a licensed water well driller. The wells to be abandoned will be completely filled using neat cement grout, sand cement grout, unhydrated bentonite, or bentonite grout, or other materials approved by the Utah State Engineer's office. Alternatively, the well may be abandoned using a different procedure upon approval from the Utah State Engineer's office.

Abandonment materials will be introduced at the bottom of the well or required sealing interval and placed progressively upward to the top of the well. The casing will be severed a minimum of 2 feet below the ground surface. A minimum of 2 feet of compacted native material will be placed above the abandoned well upon completion.

Within 30 days of the completion of well abandonment procedures, a report will be submitted to the State Engineer by the responsible licensed driller giving data related to the abandonment of the well. This shall include the name of the licensed driller or other person(s) performing abandonment procedures, name of well owner at the time of abandonment, the address or location of the well by section, township, and range, abandonment materials and equipment used, water right or file number covering the well, the final disposition of the well, and the date of completion.

Exploration holes and boreholes will be backfilled, plugged, cased, capped, sealed, or otherwise managed to prevent acid or toxic contamination of water resources and to minimize disturbance to the prevailing hydrologic balance. Exploration holes and boreholes will be managed to ensure the safety of people, livestock, fish and wildlife, and machinery.

If a water well is exposed by coal mining and reclamation operations, it will be permanently closed unless otherwise managed in a manner approved by the Division.

If any exploration boreholes are to be used as monitoring wells or water wells, these will meet the provisions of R645-301-731

Boreholes will be backfilled to within 1 foot of the land surface with concrete or other materials approved by the Division as necessary to prevent contamination of groundwater or surface-water resources or to protect the prevailing hydrologic balance. The upper approximately 1 foot will be backfilled with native materials to facilitate reclamation (see Drawing 6-11). Exploration holes and boreholes that may be uncovered during mining and reclamation activities will be permanently closed unless approved for water monitoring or otherwise managed in a manner approved by the Division.

513.600. Discharges into an underground mine

The MRP does not contemplate discharges into an underground mine.

513.700. Surface Mining Closer than 500 Feet to an Active Underground Mine

The MRP does not contemplate mining within 500 feet of an active underground mine.

513.800. Coal Mine Waste Fires

The MRP does not contemplate the generation of any coal mine waste.

514. **INSPECTIONS**

*All engineering inspections, excepting those described under R645-301-514.320, will be conducted by a qualified registered professional engineer or other qualified professional specialist under the direction of the professional engineer.*514.100 Excess Spoil.

The professional engineer or specialist will be experienced in the construction of earth and rock fills and will periodically inspect the fill during construction. Regular inspections will also be conducted during placement and compaction of fill materials.

The construction method for the excess soil specified in 528.310 is expected to meet the 85% compaction standard. As verification, the fill compaction will be periodically field tested using method(s) as directed by the qualified registered professional engineer. A description of the test method and the test results will be provided to the Division as part of the quarterly inspection reports.

514.110. *Such inspections will be made at least quarterly throughout construction and during critical construction periods. Critical construction periods will include at minimum:*

514.111. *Foundation preparation, including the removal of all organic material and topsoil;*

514.112. *Placement of underdrains and protective filter systems.*

No underdrains or protective filter systems are planned as part of the excess spoil.

514.113. *Installation of final surface drain systems; and*

514.114. *The final graded and revegetated fill.*

514.120. *The qualified registered professional engineer will provide a certified report to the Division promptly after each inspection that the fill has been constructed and maintained as designed and in accordance with the approved plan and the R645-301 and R645-302 Rules. The report will include appearances of instability, structural weakness, and other hazardous conditions.*

514.200 - 250. Refuse Piles.

The MRP does not contemplate the construction of any refuse piles.

514.300. Impoundments.

514.310 - 313. Certified Inspection.

A professional engineer or specialist experienced in the construction of impoundments will inspect impoundments. Inspections will be made regularly during construction, upon completion of construction, and at least yearly until removal of the structure or release of the performance bond. The qualified registered professional engineer will promptly, after each inspection, provide to the Division, a certified report that the impoundment has been constructed and maintained as designed and in accordance with the approved plan and the R645 Rules. The report will include discussion of any appearances of instability, structural weakness or other hazardous conditions, depth and elevation of any impounded waters, existing storage capacity, any existing or required monitoring procedures and instrumentation and any other aspects of the structure affecting stability. A copy of the report will be retained at or near the mine site.

514.320. Inspection Standard and Frequency

Impoundments meeting the NRCS Class B or C criteria for dams in TR-60, or the size or other criteria of 30 CFR Sec. 77.216 must be examined in accordance with 30 CFR Sec. 77.216-3. Impoundments not meeting the NRCS Class B or C Criteria for dams in TR-60, or subject to 30 CFR Sec. 77.216, shall be examined at least quarterly. A qualified person designated by the operator shall examine impoundments for the appearance of structural weakness and other hazardous conditions.

The MRP does not contemplate construction of any impoundments meeting the NRCS Class B or C criteria for dams in TR-60, or the size or other criteria of 30 CFR Sec. 77.216. If such impoundments become necessary, they will be examined in accordance with 30 CFR Sec. 77.216-3. Impoundments not meeting the NRCS Class B or C Criteria for dams in TR-60, or subject to 30 CFR Sec. 77.216, will be examined at least quarterly. A qualified person designated by Alton Coal Development LLC will examine impoundments for the appearance of structural weakness and other hazardous conditions.

515. **REPORTING AND EMERGENCY PROCEDURES**

515.100. Slides

Any time a slide occurs which may have a potential adverse effect on public, property, health, safety, or the environment, Alton Coal Development LLC will notify the Division by the fastest available means and comply with any remedial measures required by the Division.

515.200. Impoundment Hazards.

If any examination or inspection of an impoundment discloses that a potential hazard exists, the person who examined the impoundment will promptly inform the Division of the finding and of the emergency procedures formulated for public protection and remedial action. If adequate procedures cannot be formulated or implemented, the Division will be notified immediately.

515.300. Temporary Cessation

515.311

During a temporary cessation of the Underground operations, surface access openings to underground operations and facilities in areas in which there are no current operations, but in which operations are to be resumed under an approved permit will be effectively maintained secured. Portal access will be controlled by security personnel, signage, temporary fencing and/or other means as determined appropriate by the company and MSHA. Portal access will be provided as required. Any facilities or equipment required to protect the underground workings, i.e. fans, pumps, etc., will be maintained and operated during this time. Since the portal area is graded to drain to a collection sump, any surface runoff will be collected there and will be utilized for dust control during operations and temporary cessation.

515.312.

During a temporary cessation, surface facilities in areas in which there are no current operations, but in which operations are to be resumed under an approved permit will be effectively secured.

For the North Private Lease, the temporary excess spoil pile is expected to be in place for less than 6 months. Should a temporary cessation occur and cause the pile to remain longer than 6 months, erosion control measures such as a tackifier will be applied to the pile to minimize damage and ensure stability.

515.321.

Before temporary cessation of coal mining and reclamation operations for a period of 30 days or more, or as soon as it is known that a temporary cessation will extend beyond 30 days, a notice of intention to cease or abandon operations will be submitted to the division. This notice will include:

- A statement of the exact number of surface acres and the horizontal and vertical extent of subsurface strata which have been in the permit area prior to cessation or abandonment,,
- The extent and kind of reclamation of those areas which has been accomplished, and
- Identification of the backfilling, regrading, revegetation, environmental monitoring, and water treatment activities that will continue during the temporary cessation.

515.322.

Before temporary cessation of coal mining and reclamation operations for a period of 30 days or more, or as soon as it is known that a temporary cessation will extend beyond 30 days, a notice of intention to cease or abandon operations will be submitted to the division. This notice will include:

- A statement of the exact number of acres which have been affected in the permit area prior to such temporary cessation,
- The extent and kind of reclamation of those areas which has been accomplished, and
- Identification of the backfilling, regrading, revegetation, environmental monitoring, and water treatment activities that will continue during the temporary cessation.

516. **PREVENTION OF SLIDES**

The moderate topography in the area of the planned Coal Hollow Mine will minimize the potential for unplanned slides. A natural barrier will, however, be left undisturbed except as necessary for roads, sedimentation control, temporary topsoil and spoil storage and similar features, beginning at the elevation of the coal seam and extending from the outslope for a distance of at least 50 ft. The barrier will be retained in place to prevent slides and erosion.

520. **OPERATION PLAN.**

521. **GENERAL.**

The plan, with Drawings, cross sections, narrative, descriptions, and calculations indicates how the relevant requirements will be met. The lands subject to coal mining and reclamation operations over the estimated life of the operations are identified and briefly described. All appropriate information for the Coal Hollow Mine is located in the subsequent sections and Drawings 5-1 through 5-44 and Appendices 5-1 through 5-10 and Appendix 5-13. Topsoil piles and removal sequencing is shown on Drawing 2-2. All appropriate information for the North Private Lease is located in the subsequent sections and Drawings 5-45 through 5-79 and Appendices 5-11, 5-12, 5-12A, and 5-14. Topsoil piles and removal sequencing is shown on Drawing 2-4.

The Coal Hollow Mine is located approximately 2.5 miles south of Alton, Utah. The North Private Lease is located approximately 0.8 miles south of Alton, Utah. In order to maximize the use and conservation of the coal resource, coal will be recovered using large hydraulic excavators, front end loaders, off-road trucks, underground continuous miner and a highwall auger miner (See Chapter 9 which addresses R645-302 regulations). Mined coal will be hauled to a central coal area for crushing and placement into a stockpile. Coal from the stockpile will be transferred into a bin and loaded into over-the-road trucks for transport. Section 523 of this chapter provides detailed production, sequence, and timing information. Drawings 5-2 and 5-46 show the disturbance sequence for the Coal Hollow and North Lease permit areas, respectively.

521.100. Cross Sections and Drawings.

The application includes cross sections, Drawings and plans showing all the relevant information required by the Division. Appropriate information is provided in Drawings and cross sections 5-1 through 5-44 for the existing Coal Hollow Mine and on Drawings and cross sections 5-45 through 5-79 for the North Private Lease.

521.110. Previously Mined Areas.

Historically, there has been some underground mining of coal within the Alton Amphitheater. The following underground mines are known to have historically existed within the Amphitheater:

- Seaman Mine
- Smirl Mine
- Alton Mine
- Johnson Mine
- Silver Mine

There are not any known mines that existed or currently exist within the permit areas or the adjacent area as defined in R645-100-200. There is also not any active coal mining operations in the area.

521.120. Existing Surface and Subsurface Facilities and Features**.**

521.121. Buildings

The location of all buildings in and within 1,000 feet of the proposed permit area, with identification of the current use of the buildings is shown on Drawings 1-5 and 1-6 for the Coal Hollow Mine. There are no buildings in or within 1,000 feet of the permit area for the North Private Lease.

521.122. Surface and Subsurface Man-Made Features

The only known surface and subsurface manmade features that exist within the existing and proposed permit areas are:

- County Road 136 (locations shown on Drawing 5-3 and Drawing 5-47)
- Alton Coal Mine Road (location shown on Drawing 5-47)
- Water pipeline to Pond 20-1 (location shown on Drawing 7-7)
- Water pipelines for agricultural uses in the North Private Lease (locations shown on Drawing 7-7)

521.123. Public Roads

Two Class B public roads, Kane County Road 136 (K3900) and Alton Coal Mine Road (K3100), are located in or within 100 feet of the permit areas and are shown on Drawing 5-3 and Drawing 5-47. Drawing 5-48 also shows County Road 136 in relation to the North Private Lease Permit Area 1. While the bypass around the North Private Lease for County Road 136 is being constructed, mining operations will commence in Area 1. During this time, traffic on County Road 136 will continuously have unimpeded access and will not require escort through the mine permit area. Until the bypass road is complete, the mining area will be barricaded and fenced along County Road 136 and access will be limited to four (4) temporary gates.

In addition, Kane County has recently made a claim on the two-track road located adjacent to Lower Robinson Creek which is also located within the permit boundary. This road has mostly been closed to the public since it crosses private land and ACD has worked with Kane County to develop an access agreement which includes access through the permit area by mine personnel escort only. This agreement is included as Appendix 1-8 in Chapter 1. The County has named this Class D public road K3993.

521.124. Existing areas of spoil, waste, coal development waste, and noncoal waste disposal, dams, embankments, other impoundments, and water treatment and air pollution control facilities.

There are three impoundments currently located within the existing Coal Hollow Mine permit area which are Pond 20-1, Pond 29-3 and Pond 29-5 shown on Drawing 7-7. The area of these impoundments are approximately 3,400, 10,500 and 6,963 square feet respectively. There are four impoundments located within the North Private Lease permit area, Ponds 12-1 thru 12-3 and Pond 13-1 shown on Drawing 7-7. The area of these impoundments are approximately 823, 3,853, 8,319 and 33,525square feet, respectively.

These stock ponds identified on Drawing 7-7 within the center and western drainages existing prior to mining will be eliminated per the landowner request. This requires coordination with the USACOE for the elimination of wet lands (final landform shown on Drawings 5-74 and 5-75) identified in the Preliminary Jurisdictional Determination SPK-2011-01248 November of 2012 and updated September 2015 (MRP, Volume 10, NPL Wetland Study Report Final). Disturbances within the identified wetlands will not occur until approval of the 404 permit. The 404 permit will allow for take of the wetlands within the center drainage with wetlands being replaced in offsite mitigation under USCOE jurisdiction.

There are no other areas of existing spoils, waste, coal development waste, and noncoal waste disposal, dams, embankments, other impoundments, and water treatment and air pollution control facilities within the permit area.

521.125. Ponds and Other Impoundments

The MRP does not contemplate construction of any permanent water impoundments; coal processing waste banks and coal processing waste dams or embankments. The planned location of each sedimentation pond is shown on Drawing 5-3 for the Coal Hollow Mine and Drawing 5-47 for the North Private Lease. Appendix 5-12 and Drawing 5-79 detail the post-mining surface hydrology of the North Private Lease

521.130. Landowners and Right of Entry and Public Interest Drawings.

All boundaries of lands and the names of present owners of record of both surface and subsurface within the Mine Permit Area are shown on Drawing 1-3 (Surface) and Drawing 1-4 (Subsurface).

521.132. Permit Boundary

The boundaries of land within the proposed permit area are shown on all applicable Drawings.

521.133. Public Roads

Limited mining or reclamation operations are planned within 100 ft. of an operating public road. Operations adjacent to County Road 136 will occur during construction of the bypass road around the North Private Lease, and mine vehicles may cross the right-

of-way of Kane County Road 136 for a short period early in the operation's life. Any mine traffic crossing the county road will be required to stop and yield to any County Road 136 traffic before proceeding. Other appropriate measures, including signage and mine operating practices and training will be implemented to protect the public. Appendix 1-11 includes an easement and agreement with Kane County to construct the North Private Lease bypass road and to safely conduct mining operations adjacent to the current county road concurrent with construction activities.

521.133.2 Relocating a Public Road:

The design of any relocated road will be approved by Kane County authorities, or such other authorities as have jurisdiction. Appropriate measures will be taken to prevent entrance into the mining area via the pre-existing road, and appropriate signage and barriers will be installed to protect the public.

County Road 136 (K3900) and Alton Coal Mine Road (K3100) will be temporarily relocated outside the permit areas concurrent with the beginning of mining for both the existing Coal Hollow Mine and the North Private Lease until mining is complete and then reconstructed. The relocation of County Road 136 for both the Coal Hollow Mine and the North Private Lease will require construction of temporary bypass roads. The locations of these bypass roads are shown in Drawings 5-3 and 5-45 for the Coal Hollow Mine and North Private Lease respectively. Plans and details for these roads are shown in Appendix 1-7 and 1-11. Each bypass road will be constructed, inspected, certified and available for public use prior to closure of the associated section of impacted County Road 136. The Alton Coal Mine Road (K3100) will not require a significant bypass, but will be accessed via a new intersection with the North Private Lease bypass road approximately 500 ft. south of the current intersection with County Road 136.

Drawing 5-48 shows County Road 136 in relation to the North Private Lease Permit Area 1. While the bypass around the North Private Lease for County Road 136 is being constructed, mining operations will commence in Area 1. During this time, traffic on County Road 136 will continuously have unimpeded access and will not require escort through the mine permit area. Until the bypass road is complete, the mining area will be barricaded and fenced along County Road 136 and access will be limited to four (4) temporary gates.

Upon completion of mining and reclamation activities in each permit area, the aforementioned pre-mining roads will be reestablished to their pre-mining state or better. The details for reestablishing road K3900 within the Coal Hollow Mine are shown on Drawings 5-22E, 5-22F and 5-22H. The details for reestablishing roads K3900 and K3100 within the North Private Lease are shown on Drawings 5-61 thru 5-63. The details related to reestablishing K3993 following mining are shown on Drawing 5-22C.

It is expected that County Road 136 will be diverted around the Coal Hollow Mine for approximately 5 years, and diverted around the North Private Lease for approximately 6 years.

521.140. Mine Drawings and Permit Area Drawings.

521.141 *The boundaries of all areas proposed to be affected over the estimated total life of the coal mining and reclamation operations, with a description of size, sequence and timing of the mining, the coal mining and reclamation operations to be conducted, the lands to be affected throughout the operation, and changes in facilities or features to be caused by the proposed operations;*

These items are depicted on Drawings 5-1 through 5-44 for the Coal Hollow Mine and on Drawings 5-45 through 5-79 for the North Private Lease.

Current land disturbance for the Coal Hollow Mine is shown on Drawing 5-2, while the expected land disturbance sequence for the North Private Lease is shown on Drawing 5-46. Total disturbance for the Coal Hollow mine is ~~372.5~~414.5 acres. Total disturbance for the North Private Lease is expected to reach a maximum of 239.0 acres over a 6.5 year period, with 69.8 acres in Area 1 of operations, 112.0 acres in Area 2, and 57.2 acres in Area 3.

Overburden mining for the Coal Hollow Mine and North Private Lease is depicted on Drawing 5-16 and Drawing 5-57 respectively, according to the methods and schedules detailed in section 523 Mining Methods of this chapter.

Coal mining for the Coal Hollow Mine and North Private Lease is depicted on Drawings 5-9 & 5-10 and Drawings 5-52 & 5-53 respectively, according to the methods and schedules detailed in section 522 Coal Recovery of this chapter.

A layout of facilities, structures, and features for the Coal Hollow Mine and North Private lease is shown on Drawing 5-3 and Drawing 5-47 respectively. Sections 521.160, 521.170, and 521.180 of this chapter describe these features and their construction and use.

Post-mining topography and cross-sections of the reclamation plans of the Coal Hollow Mine permit area are provided in Drawings 5-37 and 5-37A. This reclamation requires rehandling much of the fill above original contour to fill in the final pits, except Pits ~~9-C and 10~~F-7 and F-8 which will remain open until the closure of underground operations. Pits ~~9-C and 10~~F-7 and F-8 will then require additional borrow (apx. 1.5 Million C.Y.) from the areas outlined in Drawings 5-19, 5-37 and 5-37A . In preparation for this final borrow, Pit B-1 (as shown on Drawing 5-10) will be excavated and simultaneously backfilled (as detailed in sections 523 and 553 of this chapter) to remove all coal from the borrow volume to reach the intermediate landform depicted in Drawings 5-35 and 5-36. Upon completion of underground mining, Pit ~~10-~~F-8 will then be backfilled from the Borrow Area and all ground will be returned to the final landform shown in Drawings 5-37 and 5-37A.. This rehandle and additional borrow will bring all disturbed ground back to Approximate Original Contour (AOC). All post-mining landforms, drainage, and

slopes will be consistent with pre-mining conditions and regional trends. A detailed description of the reclamation scenario is provided in Section 528.200 Overburden and 553 Backfilling and Grading of this Chapter. The Coal Hollow Mine requires ~~239.5~~297.9 acres of Phase 1 reclamation, ~~372.5~~414.5 acres of Phase 2, and ~~372.5~~414.5 acres of Phase 3.

Reclamation plans for the North Private Lease area are provided in Drawings 5-74 thru 5-76B and Drawing 5-79. These plans include restoration of all disturbed ground to AOC with only slight variation in landform, most notably a possible material void on the east of Kanab Creek which will result in a net increase of land available for agriculture and elimination of the center and western drainages east of Kanab Creek. In the case where borrow from the area east of Kanab Creek is not necessary, the material void will not occur and post-mining topography will achieve AOC while closely mirroring original topography as shown on Drawing 5-45. All post-mining landforms, drainage, and slopes will be consistent with pre-mining conditions and regional trends. A detailed description of the reclamation scenario is provided in Section 528.200 Overburden and 553 Backfilling and Grading of this Chapter. The North Private Lease requires 189.3 acres of Phase 1 reclamation, 239.0 acres of Phase 2, and 239.0 acres of Phase 3.

Underground mining is also permitted for the Coal Hollow Mine. Mine portals will be within an existing pit and coal will be loaded within the pit and hauled in the same manner as with the surface mining. Underground mining plans are shown in Drawings 5-3, 5-3B, 5-9 and 5-10.

521.142

Drawing 5-10 shows the underground workings. All underground coal mining will be first mining only. Subsidence will be prevented by following the recommendations provided in the Norwest Corporation letter report found in Appendix 5-9.

521.143 The proposed disposal sites for placing excess spoil generated at surface areas affected by surface operations, underground operations and facilities for the purposes COAL MINING and RECLAMATION ACTIVITIES according to:

- *R645-301-211: The applicant will present a description of the premining soil resources as specified under R645-301-221. Topsoil and subsoil to be saved under R645-301-232 will be separately removed and segregated from other material.*

  The soil resources for the excess spoil disposal area in the Coal Hollow Mine are described in Appendix 2-1. A plan has been developed for removal of topsoil and suitable subsoil based on the soil descriptions in this appendix. The handling plan can be viewed on Drawing 2-2. Topsoil and acceptable subsoil will be separately removed and segregated from other material prior to placement of any spoil.

The soil resources for the North Private Lease temporary excess spoil disposal area are described in Volume 11. A plan has been developed for removal of topsoil and suitable subsoil based on the soil descriptions in this appendix. The handling plan can be viewed on Drawing 2-4 and is described in Chapter 2 Section 231 and Section 523 of this Chapter. Topsoil and acceptable subsoil will be separately removed and segregated from other material prior to placement of any spoil.

- *R645-301-212: After removal, topsoil will be immediately redistributed in accordance with R645-301-242, stockpiled pending redistribution under R645-301-234, or if demonstrated that an alternative procedure will provide equal or more protection for the topsoil, the Division may, on a case-by case basis, approve an alternative;*

  Excess spoil will have topsoil and subsoil redistributed in an approximately uniform, stable thickness with the approved post mining land use, contours and surface water drainage systems. Material handling practices will prevent excess compaction of these materials. Handling practices will also protect the materials from wind and water erosion before and after seeding and planting.

- *R645-301-412.300: Criteria for Alternative Postmining Land Uses.*

  The MRP does not contemplate alternative postmining land uses.

- *R645-301-512.210: Excess Spoil. The professional engineer experienced in the design of earth and rock fills will certify the design according to R645-301-535.100.*

  A professional engineer experienced in the design of earth and rock fills with assistance from a geotechnical expert has certified the design according to R645-301-535.100. These certifications can be viewed on Drawings 5-37, 5-37A and 5-17 for the Coal Hollow Mine and Drawing 5-51A for the North Private Lease.

- *R645-301-512.220: Durable Rock Fills*

  No durable rock fills are planned.

- *R645-301-514.100: Excess Spoil. The professional engineer or specialist will be experienced in the construction of earth and rock fills and will periodically inspect the fill during construction. Regular inspections will also be conducted during placement and compaction of fill materials.*

  A professional engineer or specialist that is experienced in the construction of earth and rock fills will inspect the fill during construction and regular inspections will also be conducted during placement and compaction of fill materials.

- *R645-301-528.310: Excess spoil will be placed in designated disposal areas within the permit area, in a controllable manner to ensure mass stability and prevent mass movement during and after construction. Excess spoil will meet the design criteria of R645-301-535. For the purposes of SURFACE COAL MINING AND RECLAMATION ACTIVITIES, the permit application must include a description of the proposed disposal site and the design of the spoil disposal structures according to R645-301-211, R645-301-212, R645-301-412.300, R645-301-512.210, R645-528.310, R645-301-535.100 through R645-301-535.130, R645-301-535.300 through R645-301-535.500, R645-536.300, R645-301-542.720, R645-301-553.240, R645-301-745.100, R645-301-745.100, R645-301-745.300, and R645-301-745.400.*

  Excess spoil will be placed in the area designated on Drawing 5-3 and 5-37 for the Coal Hollow Mine and on Drawing 5-47 and 5-51A for the North Private Lease. This fill will be placed in lifts not to exceed 4 feet. The material will be transported from the overburden removal area to the fill by end dump haul trucks and a dozer(s) will spread the spoil to this lift thickness. The fill will meet at minimum 85% compaction as related to the standard Procter. Final slopes will be regraded to a maximum slope of 3h:1v. The top of the fill will be sloped to approximately 2% to prevent pooling of water and to reestablish drainage similar to original flow patterns.

  The excess spoil placed on the non-mined areas of the Coal Hollow Mine is approximately 32 acres and varies in height from 35 to 110 feet. Design and the geotechnical study for this fill can be viewed in Appendix 5-1. Due to actual swell factors of overburden material differing from swell factors used in initial planning, the size and configuration of the excess spoils has varied greatly from what was originally analyzed in Appendix 5-1. It is now anticipated that the excess spoil pile will be completely rehandled as pit backfill.

  The temporary excess spoil placed on the subsequent pit areas of the North Private Lease is approximately 9 acres and varies in height from 23 to 59 feet. Design of this temporary fill can be viewed in Drawing 5-51A and the geotechnical study can be viewed in Appendix 5-11.

- *R645-301-535.100 through R645-301-130: Disposal of Excess Spoil*

  A geotechnical analysis of the Coal Hollow Mine long term excess spoil structure design has been completed by an expert in this field. The long term static safety factor for this structure design is estimated at 1.6 to 1.7. Lifts will be placed in thicknesses not to exceed 4 feet. The lifts will meet 85% compaction by the standard Procter. The fill will be graded to allow for drainage similar to original patterns and to prevent excessive infiltration of water. Fill will then be rehandled as pit backfill prior to final reclamation while the remaining landform shown in Drawing 5-37 will be covered with subsoil and topsoil as specified in Chapter 2 to

provide conditions suitable for revegetation of the area. The geotechnical study can be viewed in Appendix 5-1.

A geotechnical analysis of the North Private Lease temporary excess spoil structure design has also been completed by an expert in this field. The long term static safety factor for this structure design is estimated at 1.6 to 1.7. Lifts will be placed in thicknesses not to exceed 4 feet. The lifts will meet 85% compaction by the standard Procter. The fill will be graded to allow for drainage similar to original patterns and to prevent excessive infiltration of water. As this excess spoil structure will be rehandled to backfill the open pit in a short time frame (less than 6 months), it is not anticipated that this fill will be covered with subsoil and topsoil. The geotechnical study can be viewed in Appendix 5-11.

- *R645-301-535.300 through R645-301-535.500: Disposal of Excess - Spoil Durable Rock Fills.*

  No durable rock fills are planned.

- *R645-301-536.300: Disposal of Coal Mine Waste in Excess Spoil*

  No coal mine waste is planned in the excess spoil area.

- *R645-301-542.720: Excess spoil will be placed in designated disposal areas within the permit area, in a controlled manner to ensure that the final fill is suitable for reclamation and revegetation compatible with the natural surroundings and the approved postmining land use. Excess spoil that is combustible will be adequately covered with noncombustible material to prevent sustained combustion. The reclamation of excess spoil will comply with the design criteria under R645-301-553.240.*

  The Coal Hollow Mine long term excess spoil will be completely rehandled as pit backfill as shown in Drawing 5-37 and 5-37A. The remaining landform will be suitable to the surrounding area and for the postmining land use of primarily grazing. No combustible excess spoil will be placed in the proposed structure. The reclamation of the spoil does not include any terraces and the slopes will not exceed 3h:1v.

  The North Private Lease temporary excess spoil will be rehandled and used as backfill in a short time frame (less than 6 months) and will not require any reclamation measures.

- *R645-301-553.240: The final fill configuration of the fill (excess spoil) will be suitable for the approved postmining land use. Terraces may be constructed on the outslope of the fill if required for stability, control of erosion, to conserve soil moisture, or to facilitate the approved postmining land use. The grade of the outslope between terrace benches will not be steeper than 2h:1v (50 percent).*

The Coal Hollow Mine long term excess spoil will be completely rehandled as pit backfill as shown in Drawings 5-37 and 5-37A. The remaining landform will be suitable to the surrounding area and for the postmining land use of primarily grazing. The reclamation of the spoil does not include any terraces and the slopes will not exceed 3h:1v. The long term static safety factor for these slopes is estimated to be 1.6 to 1.7.

The North Private Lease temporary excess spoil will be rehandled and used as backfill in a short time frame (less than 6 months). The spoil will not include any terraces and the slopes will be maintained at no less than an overall 3h:1v. The static safety factor for these temporary slopes is estimated to be 1.6 to 1.7.

- *R645-301-745.100: General Requirements.*

  745.110: Excess Spoil will be placed in designated disposal areas within the permit area, in a controlled manner to:

  745.111: Minimize the adverse effects of leaching and surface water runoff from the fill on surface and underground water;

  Reclamation of the final landform following rehandle of the Coal Hollow Mine excess spoil will include topsoil and a subsoil layer. Infiltration through the reclamation is expected to be minimal based on the high clay content of these soils. The North Private Lease temporary excess spoil will be in use for such a short period of time and will be comprised entirely of high-clay tropic shale such that infiltration is also expected to be negligible. In addition, laboratory data located in Appendix 7-16 for the overburden shows that there is minimal potential for leaching of pollutants should infiltration rates become higher than expected.

  The foundations of both of the excess spoil areas also have high clay content with minimal potential for infiltration. This will provide an additional, natural barrier to protect ground water present beneath the proposed structures.

  745.112: Ensure permanent impoundments are not located on the completed fill. Small depressions may be allowed by the Division if they are needed to retain moisture or minimize erosion, create and enhance wildlife habitat or assist revegetation, and if they are not incompatible with the stability of the fill; and

  Permanent impoundments are not planned on either of the excess spoil areas. Small depressions may be constructed as allowed by the Division to retain moisture, minimize erosion, create and enhance wildlife habitat or assist revegetation.

  745.113: Adequately cover or treat the excess spoil that is acid- and toxic forming with nonacid nontoxic material to control the impact on the surface and

ground water in accordance with R645-301-731.300 and to minimize adverse effects on plant growth and approved postmining land use.

Laboratory data located in Appendix 7-16 representative of the overburden planned for disposal in the excess spoil areas does not show acid- and toxic forming characteristics.

745.120: Drainage Control. If the disposal area contains springs, natural or manmade water courses, or wet weather seeps, the fill design will include diversions and underdrains as necessary to control erosion, prevent water infiltration into the fill and ensure stability.

A spring and seep survey available in Chapter 7 has identified no springs or wet weather seeps in the proposed excess spoil areas. The final surface of the landform underneath the Coal Hollow Mine excess spoil will be regraded to a contour that will route water from snowmelt and rainfall to natural drainages as shown on the final contours Drawing 5-37. There are no manmade water courses present in the excess spoil areas. No underdrains are planned for the excess spoil structures.

745.121: Diversions will comply with the requirements of R645-301-742.300

No diversions are planned in the excess spoil areas.

745.122 : Underdrains

No underdrains are planned in the excess spoil areas.

745.300: Durable Rock Fills

No durable rock fills are planned in the excess spoil areas.

745.400: Preexisting Benches

Excess spoil will not be disposed of through placement on preexisting benches.

521.150. Land Surface Configuration Drawings.

Surface contours representing the existing land surface configuration of the Coal Hollow Mine permit area are shown on Drawing 5-1 and the post mining land configuration is shown on 5-37. Cross sections with both these landforms are shown on Drawing 5-37A.

Surface contours representing the existing land surface configuration of the proposed North Private Lease permit area are shown on Drawing 5-45 and the post mining land configuration is shown on 5-74. Cross sections with these landforms are shown on

Drawing 5-75. Post mining land configuration is also shown for each of the individual Permit Areas on Drawings 5-74A through 5-74C.

521.151 Slope Measurements or Surface Contours:

For both the Coal Hollow Mine and the North Private Lease, Drawings 5-1, 5-37 & 5-37A and Drawings 5-45, 5-74 & 5-75 respectively use topographical contours to represent the surface configuration for pre- and –post mining scenarios. The contours for the Coal Hollow Mine drawings occur at 2 ft. elevation intervals, with index contours occurring at 10 ft. elevation intervals. The contours for the North Private Lease drawings occur at 2 ft. elevation intervals, with index contours occurring at 10 ft. elevation intervals. Each Drawing has been certified according to R645-301-512.

521.152 Previously Mined Areas:

Neither the Coal Hollow Mine nor the North Private Lease propose activities on areas that have been previously mined.

521.160. Maps and Cross sections of the Proposed Features for the Proposed Permit Area. These maps and cross sections will clearly show:

521.161 Buildings, utility corridors, and facilities to be used:

These items are shown on Drawings 5-3 through 5-8C for the Coal Hollow Mine and on Drawing 5-47 for the North Private Lease.

521.162 The area of land to be affected within the proposed permit area, according to the sequence of mining and reclamation:

A yearly and overall disturbance sequence for the permit area is provided on Drawing 5-2 for the Coal Hollow Mine and on Drawing 5-46 for the North Private Lease.

521.163 Each area of land for which a performance bond or other equivalent guarantee will be posted under R645-301-512;

The area of land that will have a performance bond posted in the Coal Hollow Mine is shown on Drawing 5-3. Drawing 5-3 was reconfigured in December of 2014 prior to phased bond release to remove performance bond from areas that are no-longer within the MRP planed disturbance (not disturbed by mining), thus removing the need to include in bond release. The total disturbance area is also broken up into discrete bond polygons on Drawing 5-19.

The area of land that will have a performance bond posted in the North Private Lease is shown on Drawing 5-47. The lease boundary encompasses three Permit Areas. The total disturbance area for the North Private Lease is also broken up into discrete bond polygons on Drawing 5-77.

521.164 Each coal storage, cleaning and loading area. The map will be prepared and certified according to R645-301-512;

These facilities can be viewed on Drawings 5-3 through 5-5 for the Coal Hollow Mine and on Drawing 5-47 through 5-51A for the North Private Lease. Note that coal loading will occur within the active pit excavation and backfill crest on the North Private Lease area, and the mine will not use a designated coal loading or stockpile area.

521.165 Each topsoil, spoil, coal preparation waste, underground development waste, and noncoal waste storage area. The maps will be prepared and certified according to R645-301-512;

For the Coal Hollow Mine, topsoil storage areas and handling can be viewed on Drawing 2-2. Spoil placement and the excess spoil structure can be viewed on Drawings 5-3, 5-17, 5-37 and 5-37A.

For the North Private Lease, prime farmland soils and topsoil storage areas and handling can be viewed on Drawings 2-4 and 5-51B. Temporary spoils placement can be viewed on Drawing 5-47 through 5-51A.

521.166 Each source of waste and each waste disposal area relating to coal processing or pollution control;

Only sizing of the coal is proposed. This process will not produce any waste.

521.167 Each explosive storage and handling facility;

Need for these facilities are not anticipated at this time. Instead, blasting will be contracted out to a local blasting company who is licensed to transport explosives. The blasting contractor will transport all explosives material needed for the shot into the mine for use, and take any remaining explosives inventory for storage offsite after each shot is completed. While onsite, all explosive materials will be handled solely by the licensed contractor. These activities will follow the blasting plan as outlined in Appendix 5-4. Should these facilities become necessary, appropriate drawings will be provided to the Division.

521.168 For the purposes of SURFACE COAL MINING AND RECLAMATION ACTIVITIES, each air pollution collection and control facility; and

There are no specific air pollution collection or control facilities proposed.

521.169 Each proposed coal processing waste bank, dam or embankment. The map will be prepared and certified according to R645-301-512.

The MRP does not contemplate processing of coal that will produce waste.

521.170. Transportation Facilities Drawings.

Transportation facilities for the Coal Hollow Mine include eight primary roads, a conveyor system, and miscellaneous ancillary/temporary roads. Numerous drawings detail the designs and specifications for each one of the proposed facilities. The following is a description of each facility and a reference for the associated drawings:

- Roads: Three primary mine haul roads are planned within the permit area. The first road extends from the coal unloading area to the first series of pits along the west side of the property. This road will be utilized for access to the pits (pits shown on Drawing 5-10). This road will be approximately 1,1400 feet in length and will be utilized throughout mining. There will be ~~three~~ four culverts installed along this road all sized for a 100 year, 24 hour storm event. The first culvert will be across a tributary of Lower Robinson Creek and will be a 36 inch corrugated steel pipe. The second culvert is the main crossing over Lower Robinson Creek and is a 96 inch corrugated steel pipe. Both of these culverts have been sized based on analysis of the Lower Robinson Creek watershed. This analysis can be viewed in Appendix A5-3. The third and fourth culverts are~~is~~ crossing over a diversion ditch that will route water mainly from disturbed areas along the south side of Lower Robinson Creek to a sediment impoundment. These~~is~~ culverts will be a 24 inch corrugated steel pipe.

  The second road extends from the first road and proceeds southwest to join and run along a 1,200' section of the rebuilt County Road 136 corridor. ~~This section of road will be single lane travel only for all production equipment. The road then continues to the southwest to provide access to Pit B-1.~~ This road is approximately ~~4,750~~2,900 feet in total length. There are two culvert crossings along the County Road 136 portion of this road that are placed to match the original county specifications. These culverts will be 18 inch culverts sized to match the County Road 136 culverts originally in place.

  The following specifications apply to these Primary mine haul roads:

  1) Roads will be approximately 80' in width
  2) Approximately a 2% crown
  3) Approximately one foot deep cut ditches along shoulders for controlling storm water
  4) 18" of crushed rock or gravel for road surfacing, except for the section of the Pit B-1 access extending from County Road 136 to the pit. This section of road will utilize approximately 6" of crushed rock or gravel for road surfacing. This shallower depth of gravel will still provide the necessary benefits of dust control and sediment control for surface water runoff during a short usage life. For this section of road will be utilized for coal haulage for only around 2-3 months and the western half of it will be eventually mined out as part of the borrow area.
  5) Cut and fill slopes of 1.5 h:1v
  6) Minimum fill over each culvert will be 2 times diameter of culvert
  7) Berms placed as necessary along fills

The underground mine portal access and haul road ~~in Pit 10~~ will also be a primary road. This road is accessed from the main haul road from the coal unloading area. The underground access/haul road will be constructed to the same specifications for the haul roads above, except that the road may be narrowed to a 40 foot width. Drawing 5-22I provides the as-built plan and profile for the underground access road, and will be updated when the portal area is re-established in subsequent Federal Block pits.~~.~~

The ancillary roads will have similar specifications except surfacing will occur only as needed and may be narrowed to a 40 foot road width. A typical cross section for the ancillary roads can be viewed on Drawing 5-24.

The location and details for Primary Mine Haul roads can be viewed on Drawings 5-3 and 5-22 and 5-23.

In addition to the three primary Mine Haul roads, the road located within the facilities area is also classified as a primary road. This road is planned to be 24 feet wide with 24 inches of compacted sub base and 8 inches of compacted 1 inch minus gravel as surfacing. This road is referred to as "Facilities Roadway" and more details are described in 527.200 along with Drawings 5-22A and 5-22B.

In addition to the primary roads that will be present during active mining, four additional roads are planned to exist postmining and are also classified as primary roads for this reason.

Roads that will remain postmining are the following:

- Road to Water Well with details shown on Drawing 5-22D
- Road to east C. Burton Pugh property (K3993) with details shown on Drawing 5-22C. Kane County has claimed this road as County Road K3993.
- County Road 136 (K3900) with details on Drawing 5-22E, 5-22F and 5-22H. This County road will be reconstructed within the permit area by Kane County. This reconstruction will occur concurrently with the final phase of reclamation as scheduled on Drawing 5-38 and is expected to be completed by 2017.
- Road to Swapp Ranch (same specification as the Water Well Road)

The location of these roads is shown on Drawing 5-37 along with the post mining topography.

The ramps, benches and equipment travel paths within the active surface mining area are temporary in nature and will be relocated frequently as mining progresses. These temporary travelways are considered part of the pit due to their short term use, and are not individually designed nor engineered. They will be built and maintained to facilitate safe and efficient mine and reclamation operations.

Other temporary ancillary roads (such as the Pond 3 access road shown on Drawing 5-3) outside the mining area may be necessary from time to time to access facilities or impoundments during the life of operations. These roads will typically only comprise a single lane access approximately 14 feet wide that would see minimal use. Any surface flow on these roadways would not be highly erosive along generally gentle road gradients. Any flow on these roads will be controlled using minor berms or ditches, and in each case would be fully contained within the watershed of, and would report to the impoundments that they provide access for. These roads will not remain post-mining and also will not be individually designed nor engineered. They will be built and maintained to facilitate safe and efficient mine and reclamation operations.

- Conveyors: A conveyor system will be used to stockpile coal and to load highway approved haul trucks for transportation to market. The first conveyor is mainly a stacker system for the coal stockpile which will be located at the coal unloading area and will be approximately 451' in length. This conveyor is estimated to be a 48" solid frame system.

  The second conveyor is a coal reclaim belt that will be loaded by an above ground reclaim feeder from the coal stockpile and will convey coal to the loadout chute which will load the highway approved coal haulage trucks. This section will be approximately 290' in length. Similar to the first section, this conveyor is estimated to be a 48" solid frame system.

  An additional stacking conveyor will be installed to transfer coal from the underground conveyor system to stockpile from which trucks will be loaded. The stacking conveyor will be a 48" wide, wheel-mounted system, approximately 125' in length.

  Drawings of these systems can be viewed on Drawings 5-3 through 5-5.

Transportation facilities for the North Private Lease will consist of two primary roads, and miscellaneous ancillary/temporary roads. Drawings detail the designs and specifications for each one of the proposed facilities. The following is a description of each facility and a reference for the associated drawings:

- Roads: A primary haul road shown in Drawings 5-47, 5-58 and 5-59 will extend from the entrance of the permit area to the Center of Pit 21. There is one culvert crossing on this road as shown on Drawing 5-59. Culvert 4 (C-4) is sized at 12 inches. This road is approximately 3,800 feet in length. This road is referred as the "Northern Haul Road". A second primary haul road shown in Drawings 5-47 and 5-60, the "Southern Haul Road" extends from the South end of Pit 1 on the West, to the South end of the Highwall Trench on the East. This road is approximately 2,980 feet in length. There are three culvert crossings along this road as shown in Drawing 5-60 including a substantial culvert to cross Kanab Creek. Culvert 1 (C-1) is sized at 24 inches. C-2 is sized at 36 inches to match the current culvert under County Road 136,

and C-3 is sized at 144 inches for maximum anticipated flows in Kanab Creek. Final design of this culvert will be in conjunction with approvals and oversight from the Army Corps of Engineers. Culvert sizing calculations can be found in Appendix 5-12.

The following specifications apply to this Primary mine haul roads:

1) Roads will be approximately 80' in width
2) Approximately a 2% crown
3) Approximately one foot deep cut ditches along shoulders for controlling storm water
4) 18" of crushed rock or gravel for road surfacing
5) Cut and fill slopes of 1.5 h: 1v
6) Berms placed as necessary along fills

The ramps, benches and equipment travel paths within the active surface mining area are temporary in nature and will be relocated frequently as mining progresses. These temporary travelways are considered part of the pit due to their short term use, and are not individually designed nor engineered. They will be built and maintained to facilitate safe and efficient mine and reclamation operations. On the North Private Lease area, topsoil and approved subsoil will be removed and salvaged for all surface mining areas and roadways as they are developed according to the plan and methods described in Chapter 2 Section 231 and Section 523 of this chapter and shown on Drawing 2-4.

521.180. Support facilities.

Description of the support facilities is provided in Section 526.220. Drawings 5-3, 5-3B, 5-4, 5-5, 5-6, 5-7, 5-8, 5-8A, 5-8B, 5-8C, and 5-47, provide the maps, appropriate cross-sections, design drawings and specifications to demonstrate compliance with R645-301-526.220 through R645-301-526.222 for each facility.

521.200. Signs and Markers Specifications.

Signs and markers will be posted, maintained, and removed by Alton Coal Development LLC. Signs and markers will be a uniform design that can be easily seen and read; made of durable material; conform to local laws and regulations, and be maintained during all activities to which they pertain;

521.240. Mine and Permit Identification Signs.

Identification signs showing the name, business address, and telephone number of Alton Coal Development LLC and the identification number of the permanent program permit authorizing coal mining and reclamation operations will be displayed at each point of access to the permit area from public roads, and will be retained and maintained until after the release of all bonds for the permit area;

521.250. Perimeter Markers.

The perimeter of a permit area will be clearly marked with fencing before the beginning of surface mining activities. The perimeter of all permitted and bonded surface disturbance areas will also be clearly marked with signage stating “disturbance boundary.”

The perimeter of the surface disturbance associated with Pit B-1 will be clearly marked prior to disturbance activities. Additionally, cultural resource sites will be demarcated, monitored and barricaded according to the practices detailed in chapter 4.

521.260. Buffer Zone Markers.

Buffer zones will be marked along their boundaries as required under 731.600

521.270. Topsoil Markers.

Markers will be erected to mark where topsoil or other vegetation - supporting material is physically segregated and stockpiled.

522. **COAL RECOVERY**.

The MRP is designed to maximize recovery of the coal resource within technological, safety and legal limitations. Coal will be recovered from the Smirl Seam which ranges in thickness from 11.0 to 18.5 feet averaging approximately 16 feet in the planned mining area. The Smirl Seam is the only surface mineable seam in the permit area. Isopach maps of the coal thickness and strip ratio can be viewed on Drawings 5-13 and 5-14 for the Coal Hollow Mine and Drawings 5-54 and 5-55 for the North Private Lease.

Some coal along the boundaries of the mine area will not be recovered in conjunction with the proposed operation. This includes coal underlying the pit highwalls and areas where drainage or sedimentation control structures (diversions, ditches, ponds, etc) are located. The mine is designed to minimize such losses by locating haulage ramps in the spoil rather than on the pit wall, by oversteepening the coal face at the pit edges, and by minimizing the use of out of pit ancillary roads. Coal which is left in place in these areas may be recovered in the future when adjacent property rights are secured. Current plans are for a planned maximum mining depth of approximately 200 ft. and a strip ratio of 10:1; however, the ultimate mining depth will depend on cost related factors.

Additional coal (shown on Drawing 5-9 and Drawing 5-10 as Pit B-1) at the Coal Hollow Mine will also be encountered incident to reclamation and borrow activities where it would not have been practical to mine otherwise. This coal will be surface mined. Coal mined in Pit B-1 will be extracted to an extent that protects eventual regrading and reclamation efforts in the Borrow Area from potential oxidation, heating, or spontaneous combustion.

A detailed mine plan has been developed for the proposed permit area and the following tables for each area along with Drawing 5-9 for the Coal Hollow Mine and Drawing 5-52 for the North Private lease summarize the coal extraction for the permit area for the open pit mining, highwall mining and underground mining:

Existing Coal Hollow Mine – Fee Coal

Description	Extraction Status	Average Coal Thickness (ft)	Average Strip Ratio* (yd^3/Ton)	Quantity (**Ton)
Total Coal within Permit Boundary	N/A	16.3	7.7	12,092,000
High Strip Ratio Area (NE corner of permit area)	Not Mined	16.0	13.5	~~2,812,000~~3,856,100
Coal under highwalls and sedimentation structures	Not Mined	17.2	4.8	~~2,305,000~~3,116,100
Coal under Robinson Creek Diversion	Not Mined	15.5	3.9	~~172,000~~235,200
Highwall & Underground	Not Mined	16.0	0	~~2,460,000~~1,463,900
Recoverable Coal (Surface)	Mined	16.3	6.4	~~3,416,000~~3,225,900
Recoverable Coal (Underground)	Mined	16.0	0	~~927,000~~54,500

*All strip ratios are bank cubic yards of overburden to tons of coal
**All coal tons are based on a 95% recovery factor for open pit mining and 45% for highwall mining and the underground mining.

Existing Coal Hollow Mine – Federal Coal

Description	Extraction Status	Average Coal Thickness (ft)	Average Strip Ratio* (yd^3/Ton)	Quantity (**Ton)
Total Coal within Permit Boundary	N/A	16.3	7.7	5,664,100
Coal Not Yet Permitted	Not Mined	16.0	13.5	4,329,800
Coal under highwalls and sedimentation structures	Not Mined	17.2	4.8	0
Coal under Robinson Creek Diversion	Not Mined	15.5	3.9	0
Highwall & Underground	Not Mined	16.0	0	143,500
Recoverable Coal (Surface)	Mined	16.3	6.4	1,135,200
Recoverable Coal (Underground)	Mined	16.0	0	0

*All strip ratios are bank cubic yards of overburden to tons of coal

**All coal tons are based on a 95% recovery factor for open pit mining and 45% for highwall mining and the underground mining.

North Private Lease

Description	Extraction Status	Average Coal Thickness (ft)	Average Strip Ratio* (yd^3/Ton)	Quantity (**Ton)
Total Fee Coal within Permit Boundary	N/A	15.4	4.5:1	7,127,300
Coal under highwalls and sedimentation structures	Not Mined	15.1	10.1:1	2,201,700
Highwall	Not Mined	15.2	0	1,514,900
Highwall	Mined	15.2	0	530,200
Open Pit	Mined	15.6	6.0:1	2,880,500
Total Recoverable Coal (Surface)	Mined	15.5	4.6:1	3,410,700

*All strip ratios are bank cubic yards of overburden to tons of coal
**All coal tons are based on a 95% recovery factor for open pit mining and 35% for highwall mining.

Once approval is received to progress with mining on the adjacent federal coal reserves outside of the current permit areas, an additional ~~57%~~percentage of the coal under the highwalls will be recovered as part of the progression into these adjacent reserves.

With open pit mining, the application of highly flexible, open pit truck/shovel techniques will minimize losses of coal due to pit geometry or spoil support requirements, allowing the maximum possible exposure of the coal resource. The full seam section will be loaded primarily using large hydraulic backhoes. The backhoes, which can work from the top of the seam, provide the ability to efficiently and cleanly excavate the lower part of the coal seam without disturbing the pit floor. This, along with the machine's high degree of bucket horizon control will minimize floor losses. The backhoes can also work safely from the top of the seam to over steepen the loading face along the pit walls, thus recovering the maximum amount of coal.

Where pit geometry or operational factors preclude the use of backhoes for loading, a large rubber tire front end loader will be used. These machines provide similar horizon control, can operate on the floor of the pit or on an intermediate bench, and can recover coal from confined areas such as the ends of the pits.

With the highwall miner (See Chapter 9 which addresses R645-302 regulations), the application of a highwall mining system will be employed to recover coal from the exposed face. In this method of mining, an unmanned cutter module is driven underground and operated in front of the highwall. The highwall mining machine stands on the pit floor or on a bench, directly in front of the exposed seam and makes long parallel rectangular drives into the coal seam. A remote-operated cutter module is pushed

into the seam by a string of push beams (unmanned coal-conveying elements) that transport the mined coal back to the entry of the drive onto a stockpile.

The underground mining will utilize standard extraction methods. These will include a continuous miner, shuttle cars and a conveyor system to the surface. The mine plan calls for first mining only to prevent subsidence. Coal brought to the surface will flow to a stacking conveyor and stockpile as shown on Drawing 5-3B.

The limited extraction, first-mining only and compliance with the recommendations in the Norwest Report (Appendix 5-9) will ensure access in the event the portals should need to remain open for future underground operations.

For the Coal Hollow Mine, rear dump haul trucks, loaded by the backhoes or front end loader, will be used to move the coal from the pit via inpit roads and the primary haulroad to the crusher and stockpile. The trucks will be equipped with "combo" beds suitable for hauling both coal and overburden, and configured to minimize coal spillage. For the North private Lease, over-the-road trucks, loaded by the backhoes or front end loader, will be used to move the coal from the pit via inpit roads and the primary haulroad to the Coal Hollow Mine crushing facility. For the initial cut, coal waste will be temporarily pushed into a pile on top of unmined coal until enough coal has been removed to place the coal waste on the floor of the pit.

A net recovery of 95% (including the effects of in-pit coal losses and out-of-seam dilution) of the coal exposed in the open pit is anticipated. A net recovery of 45% of the coal mined by the highwall system (See Chapter 9 which addresses R645-302 regulations) as well as the underground mining is anticipated. Normal coal losses are expected due to cleaning of the top of the seam, loading losses at the seam floor, and coal oxidation near the outcrop.

No coal washing is contemplated at this time, thus there will be no coal processing losses.

Maps and cross sections providing detailed information related to coal recovery activities can be viewed on Drawings 5-9 through 5-14 for the Coal Hollow and on Drawings 5-52 through 5-55 for coal recoveries at the North Private Lease.

523. **MINING METHOD(s).**

The Coal Hollow Mine will be a combination coal mining operation, utilizing open pit mining, highwall mining (See Chapter 9 which addresses R645-302 regulations) and underground mining methods. Primary mining equipment will include hydraulic excavators, a highwall miner, standard underground mining equipment including a continuous miner, shuttle cars and conveyor system, and end-dump mining trucks. The coal will be crushed at the mine site, and hauled to market in over-the-road coal trucks.

The Coal Hollow Mine is planned to produce approximately ~~3.6~~4.5 million tons of coal over a life of approximately 11~~7~~ years. The estimated production schedule is summarized below:

Production Schedule		
		Tons Produced
Year		(000)
2011		~~405~~542
2012		~~578~~505
2013		~~741~~568
2014		~~534~~607
2015		~~326~~498
2016 - Surf		118
2016 – UG		~~362~~55
2017 ~~–~~ ~~UG~~		~~565~~0
2018		0
2019		714
2020		872
Total		~~3,629~~4,478

Initial mine development will involve removal and storage of topsoil from mine infrastructure locations. Facilities for equipment maintenance/warehouse, coal handling, and offices will be constructed. During the development and initial mining period, facilities temporary in nature may be used until permanent facilities can be built. Construction of sedimentation ponds, diversion ditches, and mine roads accessing the initial mining areas will also be ongoing.

Mining will employ typical open pit methods using truck/loader type equipment to remove overburden and recover the coal. Mining will advance across the property in successive cuts approximately 250 ft. in width and 800 to 1,300 ft. long (generally equal to the width of the property less property barriers). Layout of these pits can be viewed on Drawing 5-10. Drawing 5-10 has been modified from the original layout to accommodate modifications to the plan for highwall mining, underground mining and anomalies encountered in the coal (large sand channels), thus the non-sequential numbering of the pits. The overburden will be removed in layers or lifts approximately 20 to 40 feet deep. In practice, these overburden lifts are mined in a stairstep fashion ahead of the coal removal operation to provide adequate working room for the equipment and stable advancing slopes. Once mining is complete, excavated overburden (spoil) from a successive cut is used to backfill the excavation. General cross sections of this process can be viewed on Drawings 5-11 and 5-12.

Prior to beginning mining, the area will be cleared of vegetation, and the topsoil will be recovered and either stockpiled or live hauled to regraded areas. It is not anticipated that blasting of the overburden will be necessary based on drilling data. Should this process become necessary, this is the phase where it would be implemented. Overburden will then be removed using large hydraulic excavator(s) or front end loaders and off-road

trucks which will haul the spoil and place it in parts of the pit where the coal has been removed, or in the excess spoil area shown on Drawing 5-3. Overburden is removed in successively deeper benches until the coal seam is exposed. Some overburden in lower lifts may be moved by direct dozing into the mined out pit by large bulldozers.

When overburden removal is finished in a particular pit, the top of the coal will be cleaned (removal of any roof rock or other non-coal material on top of the seam) using a motor grader, dozer or front end loader. The material removed will be placed in the adjacent mined out pit. For the open pit mined coal, if necessary, the coal seam will be loosened by drilling and blasting or ripping prior to loading. Drilling and blasting of the coal is not expected to be necessary. The cleaned, exposed coal is then excavated by backhoe or front end loader and placed into off-road rear dump trucks. Coal mined with a highwall miner would not require blasting.

Once the coal is removed, the pit will be backfilled by spoil from adjacent mine pits. Spoil will be placed in lifts and spread with a dozer. Once the pit is backfilled to the planned final surface contour, suitable topsoil and subsoil will be replaced, and the area reseeded. Revegetation work will proceed seasonally as appropriate for planting.

Overburden excavation and coal mining at Coal Hollow will begin near the subcrop of the coal seam at the western end of the permit area in the NW ¼ NE ¼ of Section 30, T39S, R5W. Topsoil will be removed and stored separately in topsoil stockpiles as shown on Map 2-2. Overburden from the initial pits will be hauled to the excess spoil pile east of the mining area. Once the initial pits are established, as much spoil as possible will be placed directly in the pit backfill, allowing reclamation to closely follow mining. This initial phase includes pits 1 through 9 as shown on Drawing 5-10.

From the initial mining area, operations will proceed from the southeast ¼ of Section 30, beginning with pit 28 and proceeding north to pit 22. Pit 9 will not be backfilled at this stage; it has been left open for placement of the highwall miner to recover coal from panels 1-3. In hole 27 of Pit 9 Panel 3, the highwall miner head became lodged. Another head was leased in order to continue highwall mining in pits 22 and 23 while a recovery plan was approved to mine Pit 10 and recover the lodged miner head. Pit 21 was then mined along the highwall panels in 21, then Pit10. Pits F-7 and F-8 ~~10~~ will remain open for potential development of the underground portals and remain open until all underground coal is mined or a subsequent amendment details another location for underground portals. Surface mining will continue with mining of Highwall Trench (HWT) 1 continuing south to HWT 3.

~~The last pit of coal (shown on Drawing 5-9 and Drawing 5-10 as~~ Pit B-1~~)~~ at the Coal Hollow Mine will be encountered incident to reclamation and borrow activities where it would not have been practical to mine otherwise. This resource is estimated at 118,000 tons and ~~is expected to~~has been fully mined and immediately backfilled (to the intermediate landform shown in Drawings 5-35 and 5-36) in 2016. The coal will be surface mined utilizing the same equipment and methods as the previous pits and will be extracted to an extent that protects eventual regrading and reclamation efforts in the

Borrow Area from potential oxidation, heating, or spontaneous combustion. Mining of Pit B-1 will begin by dozing a thin layer (apx. 5 ft) of overburden covering the eastern extent of Pit B-1 from east to west in a strip 50 to 100 ft wide to create a temporary overburden berm. The coal underneath this first strip will then be extracted leaving a void into which the berm and subsequent strip overburden can be placed. The coal strips will progress from east to west, with dozing and potentially truck haulage replacing the stripped overburden into the coal voids from west to east. Mining slopes will be maintained at a 1:1 face angle for mining benches under 50 ft. Above 50 ft., a 40 ft. catch bench will be installed between 40 ft. 1:1 benches. Additional fill material will be sourced from the adjacent pit slopes as necessary to establish the final 3:1 slope on the South pit wall and to meet the intermediate design surface depicted in Drawings 5-35 and 5-36.

Following approval of the Federal LBA and acquisition of necessary leases, mining will continue into pits 10-B and Pits F-1 to F-8 as shown on Drawings 5-10 and 5-16. These pits will be mined with the same methods described above and will progress from South to North while directly backfilling to the South. This will result in the backfill of the current underground portal area, so that as mining finishes in Pit F-8 the pit will be left open in anticipation of development of another portal with the borrow area serving to provide eventual backfill. As permitting of the larger LBA continues, subsequent amendments will address the final location of the portal pad and further plans for underground mining as well as any potential changes to backfill sourcing.

The North Private Lease will be a combination coal mining operation, utilizing open pit mining, and highwall mining. Primary mining equipment will include hydraulic excavators, a highwall miner, and end-dump mining trucks. The raw coal will be mined from the open pits and loaded to over-the-road coal trucks and delivered to the Coal Hollow Mine for crushing then hauled to market in over-the-road coal trucks.

The North Private Lease is planned to produce approximately 3.4 million tons of coal over a life of approximately 6 years. The estimated production schedule is summarized below:

Production Schedule		
		Tons Produced
Year		(000)
1		531
2		724
3		586
4		536
5		525
6		345
7		165
Total		3,411

Initial mine development will involve removal and storage of topsoil from mine infrastructure locations. Construction of sedimentation ponds, diversion ditches, and mine roads accessing the initial mining areas will also be ongoing. See chapter 2, section

231.100 and Drawing 2-4 for topsoil handling methods, quantities, and plans. For the North Private Lease prior to mining Pit 1 the following steps will be followed:

1. The A horizon (topsoil) will be salvaged along with B horizon (subsoil) to a depth of 14 inches (1.2 feet) from all active mining areas (pits, ponds, roadways, haul roads, storage and repair yards, etc.). The only exception is that topsoil can remain under topsoil storage piles.

2. For the area inside the excavation perimeter of Pit 1, Pond 5 and Pond 6, the remaining subsoil (the B & C horizon above lithic contact, approximately 2.6 feet) will also be removed and stockpiled in a subsoil stockpile. This means that roadways and the subsoil and spoil piles depicted in Drawing 2-4 will be placed on top of native subsoil. This native subsoil will be protected in place beneath the spoil stockpile by using a marker fence to delineate the subsoil surface on 100 ft. centers and by using a gps survey grid of the topography of the subsoil surface layer. The native subsoil will be protected in place on any roadway receiving surface treatment (ie. Gravel, additional fill) by placing marker fence along the roadway centerline. The native subsoil will then be recovered as part of the subsequent mining sequence and placed directly over regraded backfill to the cover depth required in section 232.

4. A soil scientist will monitor the topsoil and subsoil removal and placement of geomarker.

5. A surveyor will map the surface elevation of the subsoil being protected in place.

Area 1 expanded increases Area 1 by 17.89 acres, all topsoil and subsoil will be salvaged and stockpiled as mining of Pits 7, 8 and 9 progress. Stockpile locations are shown and volumes tabulated for on Drawing 2-4. These stockpiles will remain and be utilized for final reclamation of the last pits mined.

As with the Coal Hollow Mine, topsoil and subsoil will be removed with dozers and/or scrapers to a depth determined by the soil scientist.
Mining will employ typical open pit methods using truck/loader type equipment to remove overburden and recover the coal. Mining will advance across the property in successive cuts approximately 200 ft. in width and 500 to 1,300 ft. long. Layout of these pits can be viewed on Drawing 5-53. The overburden will be removed in layers or lifts approximately 20 to 40 feet deep. In practice, these overburden lifts are mined in a stair step fashion ahead of the coal removal operation to provide adequate working room for the equipment and stable advancing slopes. Once mining is complete, excavated overburden (spoil) from a successive cut is used to backfill the excavation. General cross sections of this process can be viewed on Drawings 5-11 and 5-12.

Following initial construction and prior to beginning mining of each pit, the area will be cleared of vegetation, and the topsoil will be recovered and either stockpiled or live hauled to regraded areas. Blasting of the overburden will then be performed according

the plan and methods outlined in Section 524 of this chapter and Appendix 5-4. Overburden will then be removed using large hydraulic excavator(s) or front end loaders and off-road trucks which will haul the spoil and place it in parts of the pit where the coal has been removed, or in the temporary spoil area shown on Drawing 5-47. Overburden is removed in successively deeper benches until the coal seam is exposed. Some overburden may be moved by direct dozing into the mined out pit by large bulldozers.

When overburden removal is finished in a particular pit, the top of the coal will be cleaned (removal of any roof rock or other non-coal material on top of the seam) using a motor grader, trackhoe, dozer or front end loader. The material removed will be placed in the adjacent mined out pit. For the open pit mined coal, if necessary, the coal seam will be loosened by drilling and blasting or ripping prior to loading. Drilling and blasting of the coal is not expected to be necessary. The cleaned, exposed coal is then excavated by backhoe or front end loader and placed into over-the-road trucks. Coal mined with a highwall miner would not require blasting.

Once the coal is removed, the pit will be backfilled by spoil from adjacent mine pits. Spoil will be placed in lifts and spread with a dozer. Once the pit is backfilled to the planned final surface contour, suitable topsoil and subsoil will be replaced, and the area reseeded. Revegetation work will proceed seasonally as appropriate for planting.

Overburden excavation and coal mining at the North Private Lease will begin near the subcrop of the coal seam at the southwestern end of the permit area in the SW ¼ NW ¼ of Section 13, T39S, R5W. Topsoil will be removed and stored separately in topsoil stockpiles as shown on Map 2-4. Overburden from the initial pit 1 and southern half of 2 will be hauled to the temporary excess spoil pile located on the future pits 3, 4 and 5. Once the initial pit is established, as much spoil as possible will be placed directly in the pit backfill, allowing reclamation to closely follow mining. As mining progresses to Pit 3, material from the temporary excess spoil pile can be rehandled to be placed in the mined out void. As mining proceeds from pit 5 to pit 10 all spoils mined is placed into pit backfill. This initial phase includes pits 1 through 10 as shown on Drawing 5-53. Depending on the timing of approval for Areas 2 and 3, mining in the extension of Area 1 (which contains Pits 7, 8 and 9) may be limited as shown in Drawing 5-57 by Pond T1 and the geologic contact between Tropic Shale and Quaternary Alluvium in Pits 8 and 9. Pond T1 must remain in place until Pond 7 has been constructed and no alluvium will be mined until the hydrologic analysis of Areas 2 and 3 has been performed and approved. Once these approvals are obtained, the Area 2 facilities will be constructed and Pond T1 and the other Area 1 extension facilities will be mined out by advancing pits.

From the initial mining area, operations will proceed to the North from Pit 11 to Pit 21. All spoils are placed in the proceeding void. Once coal is removed from Pit 21, overburden above the final landform depicted on drawing 5-74 from the adjacent backfilled pits will be used to backfill the remaining Pit 21.

The final mining area will be developed on the East side of Kanab Creek. Overburden from Highwall Trench 1 will proceed north in the trench with overburden being placed

into the previously mined out area. Backfill for the final Highwall Trench will come from the temporary overburden stockpiles.

Alton Coal Development, LLC is currently in the process of an Environmental Impact Study for Federal Reserve's adjacent to the private mining areas known as the LBA. It is expected that these rights will be acquired prior to the completion of the final phase in the proposed Permit Area. Also, if acquired, Pit 10 along with the underground portals will remain open to access underground coal within the LBA. The final landform for Coal Hollow Mine is shown on Drawings 5-37 and 5-37A. The final landform for the North Private Lease is shown on Drawings 5-74 and 5-75. In the case where borrow from the area east of Kanab Creek is not necessary, the material void will not occur and post-mining topography will achieve AOC while closely mirroring original topography as shown on Drawing 5-45.

An estimate of the primary mining equipment planned for use at the Coal Hollow Mine and North Private Lease is listed below:

Diesel - Hydraulic Excavators (15 to 38 cu. yd. capacity)
Highwall Mining System (CAT HW300 or equivalent)
Rubber Tired Front End Loaders (8 to 20 cu. yd. capacity)
End Dump Trucks (100 to 240 ton capacity class)
Track Dozers (Caterpillar D7 through D11 Class)
Motor Graders (Caterpillar 16H to 24H Class)
Water Trucks (8,000 to 20,000 Gallon Class)
Underground miner and associated equipment

A variety of other equipment will also be used to support the mining operation.

Proposed engineering techniques for meeting the proposed mining methods will include:

- Design support for roads, pits, sediment impoundments etc…
- Field staking of designs utilizing high precision GPS survey systems.
- Weekly field engineering support to view and provide guidance related to designs and environmental controls.
- Ongoing geotechnical support for ensuring highwall stability
- As additional information becomes available, update geological models to ensure full recovery of resource.
- Weekly mine plans that specify appropriate engineering and environmental specifications.

There are no known underground mines within 500 feet of the permit boundary. No surface mining or reclamation activities are proposed to take place within 500 feet of the underground mine.

524. **BLASTING AND EXPLOSIVES**

Explosives will be utilized as necessary at Coal Hollow Mine and the North Private Lease to break the overburden over the coal and may be used to break the coal for loading if necessary. In accordance with the requirements of this section, a blasting plan is provided to the Division in Appendix 5-4. Blasts that use more than five pounds of explosives or blasting agents will be conducted according to the schedule provided in R645-301-524..

524.100 Blaster Certification

Alton Coal Development, LLC (ACD) will, prior to conducting any surface blasting operations, ensure that all surface blasting incident to surface mining in Utah is conducted under the direction of a Utah Certified Blaster. Blaster certifications will be carried on the person of the Certified Blaster and copies of the Blasting license(s) will be on file at the mine. A blaster and at least one other person will be present at the firing of a blast.

The Certified Blaster will be responsible for blasting operations at the blasting site, will be familiar with the blasting plan and site-specific performance standards, and give on-the-job training to persons who are not certified and who are assigned to the blasting crew or assist in the use of explosives.

524.200 Blast Design

There are no dwellings, public buildings, schools, churches, or community or institutional building within 1,000 feet of the planned blasting area for either the Coal Hollow Mine or the North Private Lease. There are also no historic underground mines within 500 feet of either of the permit areas.

Overburden shot size is generally 450x200 ft or 200,000 cubic yards. A typical overburden blast design has a burden and spacing of 18x18ft at a depth of 60ft. Stemming height is typically 13 ft. Shots will be loaded with Ammonium Nitrate Fuel Oil (ANFO) in dry holes, and packaged emulsion on wet holes. Average pounds per hole will be 833 lbs. Powder Factors can range from .4 lbs/cyd to 1.25 lbs/cyd depending on geology. Each hole will have at least one booster (0.75 lb or 1 lb) and a 25/500ms nonel cap, as shown in Figure 1 of Appendix 5-4.

Timing will typically be 25 ms between holes with 84 ms between rows, and follow the pattern shown in Figure 2 of Appendix 5-4.

The closest structure to any blast pattern for the Coal Hollow Mine is the Richard Dame (Swapp Ranch) property at 1,585 ft. from the closest blast pattern. For the North Private Lease, the nearest structures (a pole barn and a fish pond with an earthen dam) are located on property owned by Heaton Brothers LLC, at least 2032 ft. away (See Drawing

1-7 for measured distances). The required scaled distance is 55 for Coal Hollow Mine and 55 for the North Private Lease per 524.640 – 662. Based on these scaled distances, the maximum pounds of explosives per 8 ms delay is 2,066 lbs for the Coal Hollow Mine and North Private Lease respectively.

The above blast design, loading, and timing are general designs for the mine and may be altered due to geology, mine design, production needs, and blast optimization.

Blasts conducted within 1000 ft. of a dwelling, public building, school, church, or community or institutional building will be submitted for Division and MSHA approval, prior to blasting. The blast design and shot report will contain sketches of the drill and delay patterns, decking, type and amount of explosives required per blast, critical dimensions, design factors utilized to protect the public, general location drawings of protected structures, which meet the applicable airblast, flyrock, and ground vibration standards in 524.600.

The blast design and shot report will be prepared and signed by a Utah certified blaster. Records documenting blasting operations will be maintained at the mine site for at least three years and upon request will be made available to the Division upon request. These records will include all information as required in R645-301-524.700. The contractor will also keep blasting records for at least 3 years at the contractors' site office. See Appendix 5-4 Section 4 for a blank shot report and Section 1H for a typical blast design.

524.300 - 350 Preblasting Survey

A preblasting survey will be conducted prior to commencement of blasting operations. As part of the preblasting survey Alton Coal Development LLC will:

- Notify, in writing, all residents or owners of dwellings or other structures located within one-half mile of the permit area how to request a preblasting survey at least 30 days before initiation of blasting.
- Prepare a written report of any preblasting survey. A resident or owner of a dwelling or structure within one-half mile of any part of the permit area may request a preblasting survey. This request will be made, in writing, directly to Alton Coal Development LLC or to the Division, who will promptly notify Alton Coal Development LLC. Alton Coal Development LLC will promptly conduct a preblasting survey of the dwelling or structure and promptly prepare the written report. An updated survey of any additions, modifications, or renovation will be performed by Alton Coal Development LLC if requested by the resident or owner.
- Determine the condition of the dwelling or structure and will document any preblasting damage and other physical factors that could reasonably be affected by the blasting. Structures such as pipelines, cables, transmission lines, and cisterns, wells, and other water systems warrant special attention; however, the assessment of these structures may be limited to surface conditions and other readily available data.

- Require the written report of the survey be signed by the person who conducted the survey. Copies of the report will be promptly provided to the Division and to the person requesting the survey. If the person requesting the survey disagrees with the contents and/or recommendations contained therein, he or she may submit to both Alton Coal Development LLC and the Division a detailed description of the specific areas of disagreement.
- Complete any survey requested more than ten days before the planned initiation of blasting, before blasting occurs.

  Preblasting surveys were conducted for the Swapp Ranch and the Darlynn Sorensen residence on August 23, 2011 for the Coal Hollow Mine.

  There are no residences within ½ mile of the North Private Lease requiring a preblasting survey. However, a preblasting survey will be offered to each of the owners of the five land parcels with structures in Alton Town that are nearest to the Northwest corner of the lease boundary. These parcels and ownership are depicted on Drawing 1-7 along with measured distances. Also shown on Drawing 1-7, there are two structures, a Pole Barn and a Fish Pond with an earthen dam, located on property owned by Heaton Brothers LLC that are both within the ½ mile limit of Permit Area 1. Preblasting surveys will be offered and conducted for each of these structures prior to any blasting operations for Permit Area 1.

524.400 Blasting Schedule

Blasting will typically take place approximately once every 1.5 weeks, with adjustments made for production, weather, and the mine's or contractor's schedule.

524.410. Unscheduled Blasts

Unscheduled blasts will be conducted only where public or operator health and safety so requires and for emergency blasting actions. When an unscheduled surface blast incidental to coal mining and reclamation operations is conducted, Alton Coal Development LLC, using audible signals (see section 524.500-532 for blasting signals), will notify residents within one-half mile of the blasting site and document the reason on the shot report in accordance with 524.760

Also, for unscheduled blast in the Coal Hollow Mine, Darlynn Sorensen, and Richard Dame will be notified. Within the North Private Lease there are no residents within a ½ mile radius that require notification.

524.420. Timing of Blasting

All blasting will be conducted between sunrise and sunset unless nighttime blasting is approved by the Division. Alton Coal Development LLC will conduct blasting operations at times approved by the Division and announced in the blasting schedule.

524.450 - 453. Blasting Schedule Publication and Distribution.

Alton Coal Development, LLC will:

- Publish the blasting schedule in a newspaper of general circulation in the locality of the blasting site at least ten days, but not more than 30 days, before beginning a blasting program;
- Distribute copies of the schedule to local governments and public utilities and to each local residence within one-half mile of the proposed blasting site described in the schedule; and
- Republish and redistribute the schedule at least every 12 months and revise and republish the schedule at least ten days, but not more than 30 days, before blasting whenever the area covered by the schedule changes or actual time periods for blasting significantly differ from the prior announcement.

A copy of the public notice is included in Appendix 5-4 as Exhibit 1

524.460 - 465. Blasting Schedule Contents.

The blasting schedule will contain, at a minimum:

- Name, address, and telephone number of operator;
- Identification of the specific areas in which blasting will take place;
- Dates and time periods when explosives are to be detonated;
- Methods to be used to control access to the blasting area; and
- Type and patterns of audible warning and all-clear signals to be used before and after blasting.

A copy of the public notice is included in Appendix 5-4 as Exhibit 1

524.500 - 532 Blasting and Warning Signs, Access Control

Blasting signs will read **"Blasting Area"** and be conspicuously placed along the edge of any blasting area that comes within 100 feet of any public right-of-way, and at the point where any other road provides access to the blasting area. At all entrances to the mine permit area from public roads or highways, signs will be conspicuously placed which read **"Warning! Explosives in Use"**, clearly list and describe the meaning of the audible blast warning and all-clear signals in use, and explain the identification of blasting areas where charged holes await firing at the blasting site in the mine permit area.

Warning and all-clear signals of different character or pattern that are audible within a range of one-half mile from the point of the blast will be given. Each person within the permit area and each person who resides or works regularly within one-half mile of the

blast site in the mine permit area will be notified of the meaning of the signals in the blasting schedule and notification.

Prior to blasting, all persons will be evacuated from the blasting zone and guards will be posted at the entrance of the blasting area. When blasting in the North Private Lease, blockers will also be placed on County Road 136 (K3900) west of the permit boundary at least 1000 feet from the nearest blast hole to restrict public access into the blasting zone. The exact blocker location will be determined by the blaster at the pre blast safety meeting. A typical blast sequence will be the following:

- 30 minute warning – Blast announced over all Coal Hollow Mine or North Private Lease radio channels.
- 15 minute warning – Blast once again announced over all Coal Hollow Mine or North Private Lease radio channels. Guards are placed at the entrance of the blasting area and the pit is cleared.
- 5 minute warning – Guards blocking all access, pit cleared, access to the blasting area blocked, radio silence required and siren activated. Siren will be three prolonged wales.
- 1 minute warning – A series of short siren wales
- Countdown to ignition @ 5,4,3,2,1 – Announced across Coal Hollow Mine or North Private Lease radio channels
- All clear signal – One prolonged siren wale

A post blast inspection will be conducted by the qualified blaster and/or foreman prior to clearing the area. All guards will remain at their assigned positions until the blast area has been cleared by the qualified person.

The post blast inspection will include an examination of faces and/or muck piles associated with the blasting operation.

Access within the blasting areas will be controlled to prevent presence of livestock or unauthorized persons during blasting and until the Certified Blaster has reasonably determined that no unusual hazards exist, such as imminent slides or un-detonated charges; and access to and travel within the blasting area can be safely resumed.

524.600 - 610 Adverse Effects Of Blasting

Blasting will be conducted to prevent injury to persons, damage to public or private property outside the mine permit area, and changes in the course, channels, or availability of surface or ground water outside the mine permit area by following industry best practices, limits, and regulations

524.620 Airblast Limits

Airblast will not exceed the maximum limits listed below at the location of any dwelling, public building, school, church, or community or institutional building outside the mine permit area, except for those structures and facilities owned by Alton Coal Development LLC as approved by the Division. Maximum airblast limits are as follows:

Lower Frequency Limit of Measuring System, HZ (+3dB)		Maximum Level dB
2 Hz or lower – flat response		133 peak

(1)

524.630. Monitoring:

Periodic monitoring will be conducted once per quarter, unless there are no blasts, to ensure compliance with the airblast standards. Airblast measurements will be taken as required by the Division at locations specified by the Division. The measuring system used will have an upper-end flat frequency response of at least 125 Hz.

The first blast in the North Private Lease will be monitored from the earthen dam of the pond located to the west of the lease on Heaton Brothers LLC property and from a location approximately 2500’ away from the blast along County Road 136 (K3900). The Division will be notified prior to the first blast taking place to provide the Division with their own opportunity to conduct monitoring activities. Following the first blast, each of the subsequent blasts in Permit Area 1 will be monitored from the earthen dam of the pond mentioned above until blasting activities are no longer within ½ mile of the structure. Periodic (quarterly) monitoring will then continue through Permit Area 2 until mining commences in Pit 20 (Shown in Drawing 5-57). Each blast in Pits 20 and 21 will be monitored from the nearest Alton Town structure located on Parcel A-B-23-2 (Shown on Drawing 1-7). Subsequent blasting activities in Permit Area 3 will be monitored periodically (quarterly).

524.633. Flyrock:

Flyrock traveling in the air or along the ground will not be cast from the blasting site more than one-half the distance to the nearest dwelling or other occupied structure; beyond the area of blasting access control or beyond the mine permit area boundary. Each shot will be recorded to ensure flyrock falls within the limits described above. If flyrock occurs, it will be documented on the shot report in the comments section.

524.640 - 662. Ground Vibration.

In all blasting operations, except as otherwise authorized by the Division, the maximum ground vibration will not exceed the values approved by the Division. The maximum ground vibration for protected structures will be in accordance with the maximum peak-

particle velocity limits. All other structures in the vicinity of the blasting area such as water towers, pipelines and other utilities, tunnels, dams, impoundments, and underground mines will be protected from damage by establishment of a maximum allowable limit on the ground vibration. These limits will be submitted by Alton Coal Development LLC and approved by the Division prior to blasting. A seismographic record will be provided for each blast if protected structures are within 2500 ft of the blast. If no protected structures are within the 2500 ft limit, periodic monitoring will be conducted once per quarter, unless there are no blasts, to ensure compliance with the ground vibration limits. In the event a scaled distance less than 55 or PPV greater than 1.00 in/s is anticipated in the blast design, Maximum Peak Particle Velocity Method and Scaled Distance Equation Method will be used to monitor.

The first blast in the North Private Lease will be monitored for ground vibration from the earthen dam of the pond located to the west of the lease on Heaton Brothers LLC property and from a location approximately 2500' away from the blast along County Road 136 (K3900). The Division will be notified prior to the first blast taking place to provide the Division with their own opportunity to conduct monitoring activities. Following the first blast, each of the subsequent blasts in Permit Area 1 will be monitored from the earthen dam of the pond mentioned above until blasting activities are no longer within ½ mile of the structure. Periodic (quarterly) monitoring will then continue through Permit Area 2 until mining commences in Pit 20 (Shown in Drawing 5-57). Each blast in Pits 20 and 21 will be monitored from the nearest Alton Town structure located on Parcel A-B-23-2 (Shown on Drawing 1-7). Subsequent blasting activities in Permit Area 3 will be monitored periodically (quarterly).

Maximum Peak-Particle Velocity Method: The maximum ground vibration will not exceed the following limits at the location of any dwelling, public building, school, church, or community or institutional building outside the mine permit area in accordance with the following:

Distance (D) from Blast Site in feet	Maximum allowable Particle Velocity (Vmax) for ground vibration, in inches/second (1)	Scaled distance factor to be applied without seismic monitoring (Ds) (2)
0 to 300	1.25	50
301 to 5,000	1.00	55
5,001 and beyond	0.75	65

(1) Ground vibration will be measured as the particle velocity. Particle velocity will be recorded in three mutually perpendicular directions. The maximum allowable peak particle velocity will apply to each of the three measurements.
(2) Applicable in the scale-distance equation of 524.651.

For the North Private Lease, as no structure resides within 300 feet of any planned blasting activity, all blasts will be designed and monitored to a threshold Peak-Particle Velocity of 1.00 inches/second.

524.690. Standards not Applicable

The maximum airblast and ground-vibration standards of 524.620 through 524.632 and 524.640 through 524.680 will not apply at the following locations: At structures owned by Alton Coal Development LLC and not leased to another person; and at structures owned by Alton Coal Development LLC and leased to another person, if a written waiver by the lessee is submitted to the Division before blasting.

524.700 Records of Blasting Operations**:**

Blasting records will be maintained at the mine site for at least three years and upon request, records will be available for inspection by the Division or the public. A blasting record will contain the name of Alton Coal Development LLC; location, date, and time of the blast; name, signature, and Utah certification number of the blaster conducting the blast. It will also include the identification, direction, and distance, in feet, from the nearest blast hole to the nearest dwelling, public building, school, church, community or institutional building outside the permit area, except those described in 524.690 and weather conditions, including those which may cause possible adverse blasting effects.

The blasting record will include: The type of material blasted; sketches of the blast pattern including number of holes, burden, spacing, decks, and delay pattern; diameter and depth of holes; types of explosives used; total weight of explosives detonated in an eight-millisecond period; initiation system; type and length of stemming; and mats or other protection used.

If protected structures are within 2500 ft of the blast or it is periodic monitoring as outlined in sections 524.620 through 524.690, a record of seismographic and airblast information will include: type of instrument, sensitivity, and calibration signal or certification of annual calibration; exact location of instrument and the date, time, and distance from the blast; name of the person and firm analyzing the seismographic record; and the vibration and/or airblast level recorded; and the reasons and conditions for each unscheduled blast.

See Appendix 5-4 for example shot report.

524.800 Use of Explosives:

Alton Coal Development LLC will comply with all appropriate Utah and federal laws and regulations in the use of explosives.

525. **SUBSIDENCE CONTROL PLAN**

The proposed underground mining is first-mining only and is planned for limited extraction with no subsidence. Refer to Appendix 5-9 (Norwest Report) for geotechnical and design information. Due to the design and mining method of underground mining in this plan, no subsidence is projected and no monitoring is planned. As requested by the Division, however, the company will conduct surface observation walkovers of each of the 4 developed panel areas in this proposed plan within 60 days of completion of mining in those areas. Two additional observation walkovers will be made at approximately 1 year intervals following the initial walkover. If the observations determine that no affects or voids have developed to the surface, it will be documented and forwarded to the Division. If surface cracking, sinkholes or other surface impacts are noted during the walkovers, they will be documented, located on a surface topographic map, reported to the Division, photographed and repaired after approval by the Division. If the observation indicates no deformation is occurring, no further walkovers are proposed to be conducted on the respective panel areas.

It should be noted that, in addition to the larger pillar sizing near the portals (Appendix 5-9), the portal entries will be lined with arches and/or crossbars in areas of less than 120' of cover, per recommendations in the Norwest Report (Appendix 5-9), to further reduce the possibility of subsidence or failure in that low cover area.

Highwall mining or Auger mining, as defined in the definitions in R645-100-200 is Surface Mining, thus Underground regulations do not apply. Therefore, highwall mining in this plan have been addressed using the regulations contained in R645-302-240, Special Categories of Mining (See Chapter 9). The alternate highwall option has limited extraction with no subsidence. Refer to Appendix 5-8 (Feasibility of highwall mining the Smirl seam) for geotechnical and design information. Due to the design and mining method of highwall mining in this plan, no subsidence is projected and no monitoring is planned. Appendix 1-2 Right of Entry, Exhibit 5 contains the New Dame Lease. In this document, under Article 7 Section 7.03, provisions have been made if there is material damage as a result of subsidence.

526. **MINE FACILITIES**:

The area of land that will have a performance bond posted in the North Private Lease is shown on Drawing 5-47. The lease boundary encompasses three Permit Areas. Due to bond requirements and the scarcity of open space with relation to the soil and spoil stockpiles in Permit Area 1, construction of facilities and development of the mining pits must follow a rigid sequence. As depicted in Appendix 8-2, the first increment of bonding in Permit Area 1 covers all of Area 1's Phase 2, Phase 3, and Facilities costs

while only allowing Phase 1 (excavation) cost for Pit 1. Therefore, as shown in Drawing 5-48, the first stage of mining activity involves construction of the South Haul Road, Ponds 5 and 6, Ditches 5 through 11, and the temporary topsoil, subsoil and spoil stockpiles. To construct each of these facilities, ground cover, topsoil, and subsoil must be removed and stockpiled according to the plan and methods set out in Chapter 2 section 231 and section 523 of this chapter and also shown on Drawing 2-4. Once these facilities have been constructed, excavation of Pit 1 will commence.

526.110-115 Existing Structures.

There are no existing structures within the permit areas that will be utilized for the purposes of coal mining or reclamation.

526.116. Public Roads:

526.116.1. Operations Within 100 ft. of a Public Road

Initial mining operations at the Coal Hollow Mine will be on the western edge of the property, and will require rerouting Kane County Road #136 (K3900) so that operations do not come within 100 feet of this road. During the initial development phase (topsoil removal, diversion construction, etc.), equipment traffic may cross the county road right-of-way to access the necessary area, see Drawing 5-3. Details related to the road relocation and reestablishment can be viewed on Drawings 5-3, 5-22E, 5-22F, 5-22H and in Appendix 1-7.

In addition, the road adjacent to Lower Robinson Creek (K3993) has been claimed by Kane County as a public road. An agreement has been developed with the County to restrict access on this road to escort by mine personnel only. Details for the reestablishment of this road following mining are provided on Drawing 5-22C.

Initial mining operations at the North Private Lease will be on the western edge of the property, and will require rerouting Kane County Road #136 (K3900) and placing the intersection with the Alton Coal Mine Road (K3100) outside of the mine boundary. Concurrent with and during construction of the bypass road, mining or reclamation operations are planned within 100 ft. of County Road 136 and mine vehicles may cross the right-of-way of Kane County Road 136 for a short period early in the operation's life. Any mine traffic crossing the county road will be required to stop and yield to any County Road 136 traffic before proceeding. Other appropriate measures, including signage and mine operating practices and training will be implemented to protect the public. Appendix 1-11 includes an easement and agreement with Kane County to construct the North Private Lease bypass road and to safely conduct mining operations adjacent to the current county road concurrent with construction activities. Details related to the road relocation and reestablishment can be viewed on Drawings 5-47, 5-48, 5-61, through 5-63 and in Appendix 1-11.

Drawing 5-48 specifically shows County Road 136 in relation to the North Private Lease Permit Area 1. While the bypass around the North Private Lease for County Road 136 is being constructed, mining operations will commence in Area 1. During this time, traffic on County Road 136 will continuously have unimpeded access and will not require escort through the mine permit area. Until the bypass road is complete, the mining area will be barricaded and fenced along County Road 136 and access will be limited to four (4) temporary gates.

526.116.2 Relocating a Public Road:

For the Coal Hollow Mine, following the initial development period, Kane County will temporarily relocate County Road #136 (K3900) to federal lands located west of the permit area which are managed by the BLM. This relocation will bypass the permit area for the duration of mining operations and is shown on Drawing 5-3. Details of agreements and appropriate approvals for this road relocation are located in Appendix 1-7. The relocated road is not within 100 ft. of mining or reclamation operations. The design and route of the relocated road has been approved by Kane County authorities and the BLM. Kane County will continue to have sole jurisdiction and will maintain it as a public road. Following completion of mining operations within the permit area, Kane County will reestablish the road to the approximate original location and will also reclaim the temporary road as required by the BLM. The existing road from the north relocation diversion point to the permit boundary will also continue to be maintained as a public road by Kane County. Once the road intersects the permit boundary, appropriate signs and barricades will be installed to protect the public. This road will be reestablished following mining as provided in the agreements in Appendix 1-7 and shown on Drawings 5-22E, 5-22F and 5-22H.

For the North Private Lease, Kane County will temporarily relocate County Road #136 (K3900) and the intersection with the Alton Coal Mine Road (K3100) to Private lands located west and south of the permit area which are leased by ACD. This relocation will bypass the permit area for the duration of mining operations and is shown on Drawing 5-47. Details of agreements and appropriate approvals for these road relocations are located in Appendix 1-11. The relocated road is within 100 ft. of mining or reclamation operations. The design and route of the relocated road has been approved by Kane County authorities and the property owner. Kane County will continue to have sole jurisdiction and will maintain it as a public road. Following completion of mining operations within the permit area, Kane County will reestablish the road to the approximate original location and will also reclaim the temporary road as required by the BLM. A fence will be installed on the mine boundary between the public road and the active mine. Appropriate signs and barricades will be installed to protect the public. This road will be reestablished following mining as provided in the agreements in Appendix 1-11 and shown on Drawings 5-61 through 5-63.

526.200 Utility Installation and Support Facilities

526.210 Existing Utilities.

There are no known oil, gas, and water wells; oil, gas, and coal-slurry pipelines, railroads; electric and telephone lines; and water and sewage lines passing over, under, or through the permit areas. Should such facilities be installed, mining and reclamation operations will be conducted in a manner that minimizes damage, destruction, or disruption of services provided by such facilities unless otherwise approved by the owner of those facilities and the Division.

526.220 Support Facilities

The primary mine support facilities will include an office, shop, wash bay, oil containment, fuel containment, coal stacking system, coal loadout system and an equipment parking area These facilities will be constructed on an isolated section of the Coal Hollow Mine permit area that is approximately 34 acres. This area is located immediately north of Lower Robinson Creek, in Township 39 South, Range 5 West, Section 19. A diversion ditch will route water from the upgradient area immediately east of the area around the facilities and into a tributary of Lower Robinson Creek as shown on Drawing 5-3. Storm water and snow melt that occurs within the facilities area will be routed to an impoundment that will contain sediment. This impoundment will have a drop-pipe spillway installed that will allow removal of any oil sheens that may result from parking lots or maintenance activities by using absorbent materials to remove the sheen. In addition to this pond, an additional small impoundment will also be located in the southwest corner of the facilities area to control drainage from the mine access road. Details for these impoundments can be viewed on Drawings 5-28 and 5-28B.

No additional support facilities are proposed for the North Private Lease permit area. Operations occurring within the North Private Lease will continue to utilize the Coal Hollow Mine support facilities as currently constituted.

The following is a detailed description of each proposed facility and a reference to where detailed drawings can be found:

- Office: The office will be located on the northwest corner of the facilities area, immediately adjacent to the facilities access road. This building will be a steel structure with concrete footers. This structure will be 150 feet long by 100 feet wide and will be two stories in height. The office will provide working space for administrative and technical personnel. Details for the office can be viewed of Drawings 5-3 and 5-6.
- Shop: The shop will be located on the northeast side of the facilities area. This building will be a steel structure with concrete floors and foundation. The structure will be approximately 200 feet long by 100 feet wide and 50 feet high. This building will be used for maintenance of equipment, parts storage, tool storage, and office space for maintenance personnel. Details for this building can be viewed on Drawings 5-3 and 5-7.
- Wash Bay: The wash bay will be located immediately east of the shop. This building will be a steel structure with a concrete foundation. The structure will be 50 feet long

by 60 feet wide and 50 feet high. Included will be a closed circuit water recycle system. This system will eliminate and store water impurities and reroute water back through the wash bay for cleaning equipment. Details for this structure can be viewed on Drawings 5-3, 5-8, and 5-8A.

- Oil and Fuel Containments: The oil and fuel containments will be concrete structures appropriately sized for containing metal tanks. The oil containment will contain 55 gallon barrels and up to 2,000 gallon totes. This containment will be 80 feet long by 30 feet wide and 3 feet deep. The fuel containment will store 3 fuel tanks. Included will be a 4,000 gallon unleaded fuel tank and two 12,000 gallon diesel tanks. This structure will 50 feet long by 30 feet wide and 3 feet deep. Details for this structure can be viewed on Drawings 5-3 and 5-8.
- Coal Stacking System: The coal stacking system will be located in the central part of the facilities area. This system will include a coal hopper, coal feeder breaker, feed conveyor, crusher, and an inclined conveyor belt. Trucks will dump coal into the coal hopper which will funnel coal through the feeder breaker onto a short feed conveyor belt. This conveyor belt will transport the coal approximately 195 feet to a crusher that will size the coal appropriately for market. Once the coal is sized through the crusher it will enter an inclined stacker conveyor belt that is angled at approximately 16 degrees and is 186 feet long. This system will be a radial conveyor which will feed a coal stock pile with a live storage of approximately 50,000 tons. This system can be viewed on Drawings 5-3 through 5-5.
- Coal Loadout System: The coal loadout system will be located in the central part of the facilities area. This system will include an above ground reclaim feeder, a coal reclaim conveyor and an inclined conveyor. The reclaim feeder will be loaded by a dozer pushing the coal onto the feeder. One inclined conveyor that is approximately 290 feet in length will convey the coal from the feeder to the loadout hopper. This loadout hopper will load highway approved haul trucks that transport coal to market.
- Minor Facilities: The minor facilities will include a septic vault at the office (Drawing 5-6), a power washing and water recycle system in the Wash Bay (Drawing 5-8A), conduit with electrical lines running from generators to various facilities (Drawing 5-8B), Water System (Drawing 5-8C), an Equipment Hotstart Area (Drawing 5-3, 5-8B) and a Field Hydrant (Drawing 5-4, 5-5, 5-8B).
- Electrical System: The electrical system for the facilities at Coal Hollow will consist of two diesel fuel powered generators. One generator is a 750 KVA unit that will provide electricity to all the buildings. The other generator is a 1200 KVA unit that will be used to supply electricity to the coal conveying, sizing, stockpiling and loading system. The anticipated layout of the electrical system is shown on Drawing 5-8B.
- Dust Control Structures: A water system will be constructed to provide water for non-potable uses at the facilities and also for fugitive dust control measures. This system will consist of a water well, 6” water transport pipe, and two 16,000 gallon water tanks. These two tanks are located at the facilities area to provide a water supply to the facilities for non-potable uses (cleaning equipment, restrooms, etc…) and to load the water truck which will spray water on the active roads for dust control. The pipeline connecting the tanks to the well will be buried (3,578 ft). The tanks are portable units with its own elevated base, no base is required. These tanks

supply water to the crusher through a buried pipe (869 ft.) A third tank is located east of the underground portals in Pit 10 and will supply water for dust control underground and other non-potable uses. The pipe line connecting the tank to the well will be above ground (996 ft.). This tank is also a portable unit with its own elevated base, no other base is required. It supplies water to the Underground facilities through a pipeline above ground (413 ft.). Further details related to this water system can be viewed on Drawing 5-8C.

- Underground Mining Facilities: Multiple facilities are required to provide air, water, and electricity to the underground operations as well as supporting coal handling functions. Air is provided by a 6 ft 150 hp Spendrup Mine fan. The mine fan is a single unit that is mounted, but easily removed. Electricity is produced by a 2,000 kVA primary portable generator/power supply, and a secondary portable generator/power supply as needed. Water is supplied to the underground operations via the water supply system described above. Water is also supplied from the same tank and supply line to the underground mine office and the underground bath house. Wastewater from the underground mine office is piped to a buried wastewater holding tank and periodically pumped out. Greywater from the bath house is piped to a buried septic vault and drain field. No wastewater is produced at the bath house. Coal is transported by belt from the underground and transferred to the stacking conveyor at the portal of underground Entry #3. Coal is loaded and hauled from the stockpile beneath the stacking conveyor to the loadout facilities described above. The generator and stacker are mobile and considered temporary. All of these facilities are in an existing pit, and shown on Drawing 5-3B. These facilities will be removed and stored until the next portal pad is prepared in the bottom of Pit F-8 or as otherwise permitted.

During mine development and the initial mining period, some facilities of a temporary nature such as mobile buildings and crusher/stacking conveyors may be utilized.

Support facilities to provide lighting at night will be kept to a minimum but will need to be sufficient enough to provide safe operating conditions in the dark. The following lighting equipment is anticipated to be used to provide safe working conditions:

- Two to three mobile light plants: Each light plant will have up to four 1,000 watt lights.
- Four to six exterior lights at the facilities area for lighting walkways and miscellaneous work areas: Each of these is expected to be 250 watt lights.
- Lights on mobile mining equipment, support vehicles and building lights

The support facilities will be located, maintained, and used in a manner that prevent or control erosion and siltation, water pollution, and damage to public or private property; and to the extent possible use the best technology currently available to minimize damage to fish, wildlife, and related environmental values; and minimize additional contributions of suspended solids to stream flow or runoff outside the mine permit area. Any such contributions will not be in excess of limitations of Utah or Federal law.

The facilities will be fully reclaimed at the end of mining operations with the exception of the water well. The final contour for this area can be viewed on Drawing 5-37 and an anticipated timetable is shown on Drawing 5-38.

526.300 Water Pollution Control Facilities:

Water pollution associated with mining and reclamation activities within the permit areas will be controlled by:

- Construction of berms and/or diversion ditches to control runoff from all facilities areas.
- Roads will be constructed with ditches to capture runoff
- Diversion ditches will be constructed as necessary around active mining and reclamation areas to capture runoff from those areas.
- Sedimentation impoundments will be constructed to control discharges
- In areas where impoundments or diversions are not suitable to the surrounding terrain, silt fence or other appropriate structures will be utilized to control sediment discharge from the permit area.

In order to accomplish these objectives for the Coal Hollow Mine, watershed analysis of the permit and adjacent areas has been completed and specific designs are established for each water pollution control structure. Primary control structures include five sediment impoundments, four diversion ditches and miscellaneous berms. The locations of these structures can be viewed on Drawing 5-3. The detailed analysis for these structures and specific designs can be viewed on Drawings 5-25 through 5-34. As mining advances into the federal coal, the open pits will mine out Pond 2 and Ditch 2. These structures will not be rebuilt following backfill and reclamation. In addition, a geotechnical analysis of the impoundments to ensure stability can be viewed in Appendix 5-1. The watershed and structure sizing analysis can be viewed in Appendix 5-2. An evaluation of the possible addition of underground mine water pumped to Sediment Pond 3 is included as Appendix 5-13. Additionally, any stormwater produced within Pit 10 and surrounding the underground facilities is routed to the same sump used to pump water to Pond 3. The sump, ditches, culverts and flow paths for this area are shown on Drawing 5-3B.

In addition to these primary structures, temporary diversions and impoundments may also be implemented, as necessary, in mining areas to further enhance pollution controls.

All these facilities will be reclaimed to approximate original contour. The reclamation sequence and final landform can be viewed on Drawings 5-37 and 5-38.

In order to accomplish these objectives for the North Private Lease, watershed analysis of the permit and adjacent areas has been completed and specific designs are established for each water pollution control structure. Primary control structures include six sediment impoundments, eighteen diversion ditches, a temporary 18” culvert directing undisturbed runoff beneath Pond T1, a temporary engineered mobile pump and pipeline system from Pond T1 to Pond 6, and miscellaneous berms. The locations of these structures can be viewed on Drawings 5-48 to 5-50, 5-65 and 5-65A. The detailed analysis for these

structures and specific designs can be viewed on Drawings 5-67 through 5-73. In addition, a geotechnical analysis of the impoundments to ensure stability can be viewed in Appendix 5-11. The watershed and structure sizing analysis can be viewed in Appendices 5-12 and 5-12A. Depending on the timing of approval for Areas 2 and 3, mining in the extension of Area 1 (which contains Pits 7, 8 and 9) may be limited as shown in Drawing 5-57 by Pond T1 and the geologic contact between Tropic Shale and Quaternary Alluvium in Pits 8 and 9. Temporary Pond T1 must remain in place until Pond 7 has been constructed and no alluvium will be mined until the hydrologic analysis of Areas 2 and 3 has been performed and approved. Once these approvals are obtained, the Area 2 facilities will be constructed and Pond T1 and the other Area 1 extension temporary facilities will be removed or mined out by advancing pits.

In addition to these primary structures, temporary diversions and impoundments may also be implemented, as necessary, in mining areas to further enhance pollution controls.

All these facilities, except for the previously removed temporary structures in the extension of Area 1, will be reclaimed to approximate original contour. The reclamation sequence and final landform can be viewed on Drawings 5-74 through 5-76B.

ACD has obtained a Nationwide Permit through the US Army Corps of Engineers (SPK 2011-01248) for the crossing of Culvert C-2. ACD will send the Division a copy of the mitigation completion report for this permit along with the Division's annual report in the year which the mitigation is completed. ACD will also notify the Division of completion and approval by the Corp of ACD's application for an Individual Section 404 permit under the same number. This notification will include a copy of the approval letter and reference to USACOE's public archive for viewing of the permit documents.

526.400 Air Pollution Control Facilities:

Air pollution (fugitive dust) emissions from mining and reclamation operations in the permit area will be controlled by a number of means, including:

- Haul roads will be maintained and will have water or other dust suppressants applied as appropriate.
- Road surfaces will be graded to stabilize/remove dust-forming debris as required.
- Areas adjoining primary roads will be stabilized and vegetated as required.
- Mobile equipment speeds will be controlled to minimize dusting conditions.
- Cleared vegetation debris within the mine area will be disposed of by placement in pit backfills.

A water system will be constructed to provide water for non-potable uses at the facilities and also for fugitive dust control measures. This system will consist of a water well, 6" water transport pipe, and three 16,000 gallon water tanks. Two of these are placed along the coal haul road near the crushing area and will be used specifically to load the water truck which will spray water on the active roads within the permit area to control dust and

provide water for dust suppression at the crushing facilities as needed. The third tank is located above the underground facilities area to provide a water supply to the facilities for non-potable uses (cleaning equipment, restrooms, etc…). Further details related to this water system can be viewed on Drawing 5-8C.

Due to the close proximity between permit areas, aside from the addition (in correlation with the Division of Air Quality) of monitoring stations, proposed activities at the North Private Lease permit area will continue to utilize the air pollution control facilities as currently constituted at the Coal Hollow Mine.

For details related to air pollution control and monitoring, refer to Chapter 4 and Appendix 4-5 and 4-6 or additionally Air Approval Order DAQE-AN140470005-15 found at http://www.deq.utah.gov/Permits/air/index.htm.

527. **TRANSPORTATION FACILITIES**

527.100 Classification of Roads

Primary roads are any road that is used to transport coal or spoil and is frequently used for access or other purposes for a period in excess of six months; or is to be retained for an approved postmining land use. The following are the roads that meet the classification of a primary road based on this standard:

Roads used to transport coal or spoil in excess of six months

There are three roads in the Coal Hollow mine that will be used to transport coal or spoil in excess of six months and are referred to as "Facilities Access Haul Road" and "~~Pit B-1~~Dump Access Haul Road", and the Underground Portal Access/Haul Road. The two main haul roads will be the main accesses for the pits throughout the life of the mine. Details for these roads are provided in Section 527.200 and on Drawings 5-22 and 5-23. An as-built plan & profile of the Underground Portal Access is also provided in Drawing 5-22I. In addition to these roads, the road located within the facilities area is also classified as a primary road. This road is referred to as "Facilities Roadway" and details are described in 527.200 along with Drawings 5-22A and 5-22B.

There are two roads in the North Private Lease that will be used to transport coal or spoil in excess of six months and are referred to as "Northern Haul Road" and "Southern Haul Road". Details for these roads are provided in Section 527.200 and on Drawings 5-58, 5-59 and 5-60. These roads and the North Private Lease will be accessed via an approximate 50 foot driveway from County Road 136 (K3900) as depicted on Drawings 5-47 and 5-48.

Roads retained for an approved postmining land use

Roads retained for an approved postmining land use include the following: Access to East Pugh Property (K3993), County Road 136 (K3900), Alton Coal Mine Road (K3100), Access to Water Well and Road to Swapp Ranch. Details and locations for these roads are shown on Drawings 5-61through 5-63 5-35, 5-37, 5-22A, 5-22B, 5-22C, 5-22D, 5-22E, 5-22F and 5-22H.

All other roads planned for construction within the permit area will be classified as ancillary. These will include temporary ramps, benches and equipment travel paths within the active mining area.

527.200 Description of Roads

Transportation facilities for the Coal Hollow Mine include eight primary roads, 2 stacking conveyors, a conveyor system, and miscellaneous ancillary/temporary roads. Numerous drawings detail the designs and specifications for each one of the proposed facilities. The following is a description of each facility and a reference for the associated drawings:

- Roads: Three~~wo~~ primary mine haul roads are planned within the permit area. The first road extends from the coal unloading area to the first series of pits along the west side of the property. This road will be utilized for access to the pits (pits shown on Drawing 5-10). This road will be approximately ~~2,8~~1,100 feet in length and will be utilized throughout mining. There will be ~~three~~ four culverts installed along this road all sized for a 100 year, 24 hour storm event. The first culvert will be across a

tributary of Lower Robinson Creek and will be a 36 inch corrugated steel pipe. The second culvert is the main crossing over Lower Robinson Creek and is a 96 inch corrugated steel pipe. Both of these culverts have been sized based on analysis of the Lower Robinson Creek watershed. This analysis can be viewed in Appendix ~~A~~5-3. The third and fourth culverts are~~is~~ crossing over a diversion ditch that will route water mainly from disturbed areas along the south side of Lower Robinson Creek to a sediment impoundment. The~~se is~~ culverts will be a 24 inch corrugated steel pipe.

The second road extends from the first road and proceeds southwest to join and run along a 1,200' section of the rebuilt County Road 136 corridor. ~~This section of road will be single lane travel only for all production equipment. The road then continues to the southwest to provide access to Pit B-1.~~ This road is approximately ~~4,750~~2,900 feet in total length. There are two culvert crossings along the County Road 136 portion of this road that are placed to match the original county specifications. These culverts will be 18 inch culverts sized to match the County Road 136 culverts originally in place.

The following specifications apply to these Primary mine haul roads:

1) Roads will be approximately 80' in width
2) Approximately a 2% crown
3) Approximately one foot deep cut ditches along shoulders for controlling storm water
4) 18" of crushed rock or gravel for road surfacing, except for the section of the Pit B-1 access extending from County Road 136 to the pit. This section of road will utilize approximately 6" of crushed rock or gravel for road surfacing. This shallower depth of gravel will still provide the necessary benefits of dust control and sediment control for surface water runoff during a short usage life. For this section of road will be utilized for coal haulage for only around 2-3 months and the western half of it will be eventually mined out as part of the borrow area.
5) Cut and fill slopes of 1.5 h:1v
6) Minimum fill over each culvert will be 2 times diameter of culvert
7) Berms placed as necessary along fills

The underground mine portal access and haul road ~~in Pit 10~~ will also be a primary road. This road is accessed from the main haul road from the coal unloading area. The underground access road will be approximately 1,500' in length and will be constructed to the same specifications for the haul roads above, except that the road may be narrowed to a 40 foot width. A plan & profile of the as-built configuration for the underground access road is provided in Drawing 5-22I. This drawing will be updated when the portal area is re-established in subsequent Federal Block pits.

The ancillary roads will have similar specifications except surfacing will occur only as needed and may be narrowed to a 40 foot road width. A typical cross section for the ancillary roads can be viewed on Drawing 5-24.

The location and details for Primary Mine Haul roads can be viewed on Drawings 5-3

and 5-22 and 5-23.

In addition to the three primary Mine Haul roads, the road located within the facilities area is also classified as a primary road. This road is planned to be 24 feet wide with 24 inches of compacted sub base and 8 inches of compacted 1 inch minus gravel as surfacing. This road is referred to as "Facilities Roadway" and more details are described in 527.200 along with Drawings 5-22A and 5-22B.

In addition to the primary roads that will be present during active mining, four additional roads are planned to exist postmining and are also classified as primary roads for this reason.

Roads that will remain postmining are the following:

- Road to Water Well with details shown on Drawing 5-22D
- Road to east C. Burton Pugh property (K3993) with details shown on Drawing 5-22C
- County Road 136 (K3900) with details on Drawing 5-22E, 5-22F and 5-22G. This County road will be reconstructed within the permit area by Kane County. This reconstruction will occur concurrently with the final stage of reclamation as scheduled on Drawing 5-38 and is expected to be completed by the end of Year 4.
- Road to Swapp Ranch (same specification as the Water Well Road)

The location of these roads is shown on Drawing5-37 along with the post mining topography.

The ramps, benches and equipment travel paths within the active surface mining area are temporary in nature and will be relocated frequently as mining progresses. These temporary travelways are considered part of the pit due to their short term use, and are not individually designed nor engineered. They will be built and maintained to facilitate safe and efficient mine and reclamation operations. Other temporary ancillary roads (such as the Pond 3 access road shown on Drawing 5-3) outside the mining area may be necessary from time to time to access facilities or impoundments during the life of operations. These roads will typically only comprise a single lane access approximately 14 feet wide that would see minimal use. Any surface flow on these roadways would not be highly erosive along generally gentle road gradients. Any flow on these roads will be controlled using minor berms or ditches, and in each case would be fully contained within the watershed of, and would report to the impoundments that they provide access for. These roads will not remain post-mining and also will not be individually designed nor engineered. They will be built and maintained to facilitate safe and efficient mine and reclamation operations.

- Conveyors: A conveyor system will be used to stockpile coal and to load highway approved haul trucks for transportation to market. The first conveyor is mainly a stacker system for the coal stockpile which will be located at the coal unloading area and will be approximately 451' in length. This conveyor is estimated to be a 48" solid frame system.

The second conveyor is a coal reclaim belt that will be loaded by an above ground reclaim feeder from the coal stockpile and will convey coal to the loadout chute which will load the highway approved coal haulage trucks. This section will be approximately 290' in length. Similar to the first section, this conveyor is estimated to be a 48" solid frame system.

An additional stacking conveyor will be installed to transfer coal from the underground conveyor system to a stockpile from which trucks will be loaded. The stacking conveyor will be a 48'wide, wheel-mounted system, approximately 250' in length.

Drawings of these systems can be viewed on Drawings 5-3 through 5-5.

Transportation facilities for the North Private Lease will consist of two primary roads, and miscellaneous ancillary/temporary roads. Drawings detail the designs and specifications for each one of the proposed facilities. The following is a description of each facility and a reference for the associated drawings:

- Roads: A primary haul road shown in Drawings 5-47, 5-58 and 5-59 will extend from the entrance of the permit area to the center of Pit 20. This road is approximately 3,800 feet in length. This road is referred as the "Northern Haul Road". A second primary haul road shown in Drawings 5-47 and 5-60, the "Southern Haul Road" extends from the South end of Pit 1 on the West, to the South end of the Highwall Trench on the East. This road is approximately 2,980 feet in length. A portion of this road will be constructed in designated wet meadow under Army Corps of Engineers permit NWP-14. Alton submitted pre-construction notification SPK 2011-001248 describing the disturbance and mitigation. These roads and the North Private Lease will be accessed via an approximate 50 foot driveway from County Road 136 (K3900) as depicted on Drawings 5-47 and 5-48.
- There are three culvert crossings along this road as shown in Drawing 5-58 including a substantial culvert to cross Kanab Creek. Culvert 1 (C-1) is sized at 24 inches. C-2 is sized at 36 inches to match the current culvert under County Road 136. Culvert C-3 is sized at 144 inches for maximum anticipated flows in Kanab Creek. Final design of this culvert will be in conjunction with approvals and oversight from the Army Corps of Engineers. Culvert sizing calculations can be found in Appendix 5-12.

  The following specifications apply to these Primary mine haul roads:
  1) Roads will be approximately 80' in width
  2) Approximately a 2% crown
  3) Approximately one foot deep cut ditches along shoulders for controlling storm water
  4) 18" of crushed rock or gravel for road surfacing
  5) Cut and fill slopes of 1.5 h:1v
  6) Berms placed as necessary along fills

The ancillary roads will have similar specifications except surfacing will occur only as needed and may be narrowed to a 40 foot road width. A typical cross section for the ancillary roads can be viewed on Drawing 5-24.

The ramps, benches and equipment travel paths within the active surface mining area are temporary in nature and will be relocated frequently as mining progresses. These temporary travelways are considered part of the pit due to their short term use, and are not individually designed nor engineered. They will be built and maintained to facilitate safe and efficient mine and reclamation operations.

527.220 Alteration or Relocation of Natural Drainageways.

As currently planned, no natural drainageways will be altered or relocated due to road construction, though a temporary diversion of Lower Robinson Creek will be constructed to allow for maximum recovery of coal. This temporary diversion of Lower Robinson Creek is not being constructed to facilitate road construction. If any other alterations or relocations are necessary, appropriate measures will be taken to obtain Division approval for such alterations or relocations. All culverts placed in natural drainageways for the North Private Lease have been described in Appendix 5-12 and shown on Drawing 5-47. Reclamation of these culverts is also described in the same Appendix and shown on Drawing 5-79. ACD has obtained a Nationwide Permit through the US Army Corps of Engineers (SPK 2011-01248) for the crossing of Culvert C-2. ACD will send the Division a copy of the mitigation completion report for this permit along with the Division's annual report in the year which the mitigation is completed. ACD will also notify the Division of completion and approval by the Corp of ACD's application for an Individual Section 404 permit under the same number. This notification will include a copy of the approval letter and reference to USACOE's public archive for viewing of the permit documents.

Mine development work will include a temporary diversion of Lower Robinson Creek away from the mining area. This diversion has been designed for a flow capacity of a 100 year, 24 hour storm event. The sides will be graded to a 3h:1v slope and rip-rap will be appropriately placed to minimize erosion of the channel beyond current channel conditions. All specifications required to meet the requirements for such a diversion have been included in this diversion design. Appendix 5-2 details the analysis/specifications for this diversion and Drawings 5-20 and 5-21 show the details of this design.

As part of the reclamation process, Lower Robinson Creek will be reconstructed to its approximate original location. The design for this reconstruction is shown on Drawings 5-20A and 5-21A. This design includes considerable improvements to the channel compared to the channel's current condition. The current condition is such that less than 25% of the channel within the disturbed area has a flood plain present and most of the slopes are near the angle of repose with fair to poor vegetative cover. The reconstructed channel includes stable slope angles that will be revegetated with a flood plain on both sides of the channel for the entire length reconstructed. Sharp corners in the original

alignment have been rounded to sinuous curve shapes and rip-rap will be installed in the bottom section of the channel to minimize erosion. The flood plain will seeded and covered with erosion matting to control erosion until a natural vegetative condition can be attained.

527.230 Road Maintenance

All roads will be maintained on an as needed basis using motor graders, water trucks for dust suppression, and other equipment as necessary. Crushed stone and/or gravel will be used as a surface course for primary roads outside the active mining area, and may be used as needed for ramps and travelways within the pit. Should the roads be damaged by a catastrophic event, such as an earthquake or a flood, repairs will be made as soon as possible after the damage has occurred or the road will be closed and reclaimed.

527.250. Geotechnical Analysis

No alternative specifications or steep cut slopes associated with roads are anticipated outside the active mine area. A report of appropriate geotechnical analysis will be provided should such alternative specifications or steep cut slopes where approval of the Division is required, become necessary.

528. **HANDLING AND DISPOSAL OF COAL, OVERBURDEN, EXCESS SPOIL, AND COAL MINE WASTE:**

528.100. Coal removal, handling, storage, cleaning, and transportation areas and structures;

Coal handling activities are confined to the active pit and underground portal areas, and the coal sizing/loading areas located north of Pit 10 at the Coal Hollow Mine. For the North Private Lease, coal handling activities will be isolated to the active mining pit

backfill and excavation crest. Temporary stockpiling of coal will only occur within the active pit backfill and excavation crest. Coal will then be transported in over-the-road trucks from the North Private Lease active pit to the loadout at Coal Hollow Mine for sizing and final loading. All areas and facilities will be designed and constructed, utilized and maintained in conformance with industry standards and all applicable regulations. At the conclusion of mining, the facilities will be removed as part of final mine reclamation activities. Material from coal stockpile areas, and other areas of potential coal accumulation will be excavated and the excavated material placed in the final mined out pit.

528.200. Overburden;

Overburden will be excavated after the removal of topsoil and subsoil as defined in Chapter 2. The overburden excavation will be accomplished by utilizing hydraulic excavators with end dump haul trucks and dozers. This process will include excavating this material in a stairstep fashion that will include benches approximately every 40 feet in depth. These benches are planned to be approximately 40 feet in width and will create an overall 2h:1v slope for the highwalls to create a stable and safe working area. This is a conservative approach for initial mining and once mining begins, ongoing geotechnical studies and monitoring will be used to further define the proper slope angle to ensure slope stability while maximizing resource recovery.

For the Coal Hollow Mine, based on the overburden isopach map (Drawing 5-15), the overburden removal has been separated into three major stages. The first stage of overburden removal is the initial mining area, Pits 1-9. These pits have a relatively low strip ratio, approximately 4.3:1 (refer to Drawing 5-13). In order to efficiently remove overburden for this phase, spoil from the first three pits will be placed in an excess spoil area. This excess spoil structure will hold approximately 2.7 million loose cubic yards (LCY) of material. Once the excess spoil pile is filled, overburden from the next 5 pits can then be used as pit backfill as the mining progresses through Pit 9.

As is depicted, each Pit/Highwall Trench consists of Panels, each panel consisting of 10 holes. The spacing between the holes and the spacing between the panels are dictated by the amount of overburden over the panels. Highwall mining (See Chapter 9 which addresses R645-302 regulations) is designed such that subsidence does not occur to the surface with nonyieldable webs and barriers. Specific information concerning these design are found in Appendix 5-8. Highwall mining will have only the disturbance associated with the pit/trench for placement of the highwall miner and will have no impact on the surface above the highwall panels.

During the course of mining, some additional excavated overburden may be placed temporarily on mined over and backfilled areas due to operational considerations. This material will be re-excavated and moved to a final placement location as operations allow.

Following the completion of surface mining in the highwall trench, backfill operations from the long-term excess spoil structure to the open pit has been ongoing to bring both the spoil structure and highwall trench areas to AOC. It is anticipated that backfill of the highwall trench will be completed by the 9th of June, 2016.

~~The last pit of coal (shown on Drawing 5-9 and Drawing 5-10 as~~ Pit B-1~~)~~ at the Coal Hollow Mine will be encountered incident to reclamation and borrow activities where it would not have been practical to mine otherwise. This resource is estimated at 118,000 tons and ~~is expected to~~has been fully mined and immediately backfilled (to the intermediate landform shown in Drawings 5-35 and 5-36) in 2016. The coal will be surface mined utilizing the same equipment and methods as the previous pits and will be extracted to an extent that protects eventual regrading and reclamation efforts in the Borrow Area from potential oxidation, heating, or spontaneous combustion. Mining of Pit B-1 will begin by dozing a thin layer (apx. 5 ft) of overburden covering the eastern extent of Pit B-1 from east to west in a strip 50 to 100 ft wide to create a temporary overburden berm. The coal underneath this first strip will then be extracted leaving a void into which the berm and subsequent strip overburden can be placed. The coal strips will progress from east to west, with dozing and potentially truck haulage replacing the stripped overburden into the coal voids from west to east. Mining slopes will be maintained at a 1:1 face angle for mining benches under 50 ft. Above 50 ft., a 40 ft. catch bench will be installed between 40 ft. 1:1 benches. Additional fill material will be sourced from the adjacent pit slopes as necessary to establish the final 3:1 slope on the South pit wall and to meet the intermediate design surface depicted in Drawings 5-35 and 5-36. This backfill will then remain in place until closure of the Underground Mine and finally rehandled as backfill to Pit 10.

Following approval of the Federal LBA and acquisition of necessary leases, mining will continue into pits 10-B and Pits F-1 to F-8 as shown on Drawings 5-10 and 5-16. These pits will be mined with the same methods described above and will progress from South to North while directly backfilling to the South. This will result in the backfill of the current underground portal area, so that as mining finishes in Pit F-8 the pit will be left open in anticipation of development of another portal with the borrow area serving to provide eventual backfill. As permitting of the larger LBA continues, subsequent amendments will address the final location of the portal pad and further plans for underground mining as well as any potential changes to backfill sourcing.

The underground mining will be accessed through portals in an existing pit. There will be no additional overburden removal associated with the underground mining; however, cross sections of the portal area are shown on Drawing 5-3B. Cover or overburden depths for the underground mining are described in Section 627. Following the completion of underground mining, backfill of ~~Pit 10~~the remaining open pit will be completed utilizing borrow from the areas delineated in Drawings 5-19 and 5-37. Final backfill will require approximately 1.5 Million C.Y. of borrow material, but will still achieve AOC.

All maps related to the overburden removal process can be viewed on Drawings 5-15 through 5-17.
The following table summarizes overburden movement for the Coal Hollow Mine.

Coal Hollow Mine Overburden Summary	
2011	~~3,511,849~~2,065,000 CY
2012	~~2,135,022~~3,582,000 CY
2013	~~3,090,547~~3,090,500 CY
2014	~~3,423,635~~3,423,600 CY
2015	~~2,375,581~~1,613,000 CY
2016	277,000 CY
2017	0
2018	0
2019	5,196,600 CY
2020	5,032,300 CY
Borrow	1, 516,200 CY
Total	~~16,329,834~~25,796,200 CY

Based on the overburden isopach map (Drawing 5-56), the overburden removal has been separated into three major stages. The initial area of overburden removal is the mining area, Pits 1-10. These pits have a relatively low strip ratio, approximately 4.6:1 (refer to Drawing 5-52). In order to efficiently remove overburden for this phase, spoil from pit 1 and pit 2 will be placed in a temporary excess spoil area on the area of pits 5 and 6. This excess spoil structure will hold approximately 505,866 loose cubic yards (LCY) of material. Once the excess spoil pile is filled, overburden from the remaining pits can then be used as pit backfill as the mining progresses through Pit 10, also as pit 4 is completed, material from the temporary spoils pile can be placed in pit backfill.

In the North Private Lease permit area, coal will be loaded directly into over-the-road trucks at the pit floor. To the extent it is needed, a coal surge pile will be located on the pit floor or within the active pit backfill and excavation crest. Coal waste from cleaning the exposed seam will be retained in the pit. For the initial cut, coal waste will be temporarily pushed into a pile on top of unmined coal until enough coal has been removed to place the coal waste on the floor of the pit.

From the initial mining area, operations will proceed North from pit 11to Pit 21. These pits have a strip ratio increasing from 4.7:1 to 9.6:1. All spoils are placed in the

preceding void. Once coal is removed from Pit 21, overburden above the final landform depicted on Drawing 5-74 from the adjacent backfilled pits will be used to backfill the remaining Pit 21.

The final mining area will be developed on the East side of Kanab Creek. Overburden removal from Highwall Trench 1 will proceed north in the trench with overburden being placed directly as backfill in the same highwall trench, progressing from South to North.

The following table summarizes overburden movement for the North Private Lease.

North Private Lease Overburden Summary	
Year 1	2,013,603 CY
Year 2	2,414,827 CY
Year 3	3,429,000 CY
Year 4	3,429,000 CY
Year 5	3,456,000 CY
Year 6	3,456,000 CY
Year 7	1,254,600 CY
Total	19,453,030 CY

528.300. Spoil, coal processing waste, mine development waste, and noncoal waste removal, handling, storage, transportation, and disposal areas and structures;

528.310. Excess Spoil. Excess spoil will be placed in designated disposal areas within the permit areas, in a controllable manner to ensure mass stability and prevent mass movement during and after construction. Excess spoil will meet the design criteria of R645-301-535. For the purposes of SURFACE COAL MINING AND RECLAMATION ACTIVITIES, the permit application must include a description of the proposed disposal site and the design of the spoil disposal structures according to R645-301-211, R645-301-212, R645-301-412.300, R645-301-512.210, R645-528.310, R645-301-535.100 through R645-301-535.130, R645-301-535.300 through R645-301-535.500, R645-536.300, R645-301-542.720, R645-301-553.240, R645-301-745.100, R645-301-745.100, R645-301-745.300, and R645-301-745.400.

Excess spoil will be placed in the areas designated on Drawing 5-3 for the Coal Hollow Mine and on 5-47 & 5-51A for the North Private Lease. This fill will be placed in lifts not to exceed 4 feet in thickness. The material will be transported from the overburden removal area to the fill by end dump haul trucks and a dozer(s) will spread the spoil to this lift thickness. The fill will meet at minimum 85% compaction as related to the standard Procter. Final slopes will be regraded to a maximum slope of 3h:1v. The top of the fill will be sloped to approximately 2% to prevent pooling of water and to reestablish drainage

similar to original flow patterns. The excess spoil placed on the non-mined areas at the Coal Hollow Mine is approximately 32 acres and varies in height from 35 to 120 feet. The excess spoil pile will be completely rehandled as pit backfill prior to final reclamation. Following the completion of surface mining in the highwall trench, backfill operations from the long-term excess spoil structure to the open pit has been ongoing to bring both the spoil structure and highwall trench areas to AOC. It is anticipated that backfill of the highwall trench will be completed by the 9th of June, 2016. Design and the geotechnical study of this long-term fill can be viewed in Appendix 5-1. The report provided in Appendix 5-11 lists the spoil geotechnical characteristics for the North Private Lease.

- *R645-301-211: The applicant will present a description of the premining soil resources as specified under R645-301-221. Topsoil and subsoil to be saved under R645-301-232 will be separately removed and segregated from other material.*

  The soil resources for the proposed long-term excess spoil disposal area in the Coal Hollow Mine are described in Appendix 2-1. The soil resources for the North Private Lease temporary spoil disposal area are described in Volume 11. A plan has been developed for removal of topsoil and suitable subsoil based on the soil descriptions in these appendices. The handling plan can be viewed on Drawings 2-2 and 2-4. Topsoil and acceptable subsoil will be separately removed and segregated from other material prior to placement of any spoil.

- *R645-301-212: After removal, topsoil will be immediately redistributed in accordance with R645-301-242, stockpiled pending redistribution under R645-301-234, or if demonstrated that an alternative procedure will provide equal or more protection for the topsoil, the Division may, on a case-by case basis, approve an alternative;*

  Excess spoil will have topsoil and subsoil redistributed in an approximately uniform, stable thickness with the approved post mining land use, contours and surface water drainage systems. Material handling practices will prevent excess compaction of these materials. Handling practices will also protect the materials from wind and water erosion before and after seeding and planting. These practices include seeding and grading stockpiles that will exist for more than year to stabilize the soil.

- *R645-301-412.300: Criteria for Alternative Postmining Land Uses.*

  The MRP does not contemplate Alternative Postmining Land Uses.

- *R645-301-512.210: Excess Spoil. The professional engineer experienced in the design of earth and rock fills will certify the design according to R645-301-535.100.*

A professional engineer experienced in the design of earth and rock fills with assistance from a geotechnical expert has certified the design according to R645-301-535.100. These certifications can be viewed on Drawings 5-37, 5-37A and 5-17 for the Coal Hollow Mine and on Drawing 5-47 & 5-51A for the North Private Lease.

- *R645-301-512.220: Durable Rock Fills*

  No durable rock fills are planned.

- *R645-301-514.100: Excess Spoil. The professional engineer or specialist will be experienced in the construction of earth and rock fills and will periodically inspect the fill during construction. Regular inspections will also be conducted during placement and compaction of fill materials.*

  A professional engineer or specialist that is experienced in the construction of earth and rock fills will inspect the fill during construction and regular inspections will also be conducted during placement and compaction of fill materials.

- *R645-301-535.100 through R645-301-130: Disposal of Excess Spoil*

  A geotechnical analysis of the excess spoil structure designs has been completed by an expert in this field. The long term static safety factor for these structure designs are estimated at 1.6 to 1.7. Lifts will be placed in thicknesses not to exceed 4 feet. The lifts will meet 85% compaction by the standard Procter. The fill will be graded to allow for drainage similar to original patterns and to prevent excessive infiltration of water. For the Coal Hollow Mine, fill will be covered with subsoil and topsoil as specified in Chapter 2 to provide conditions suitable for revegetation of the area. The excess spoil pile will be completely rehandled as pit backfill prior to final reclamation. Following the completion of surface mining in the highwall trench, backfill operations from the long-term excess spoil structure to the open pit has been ongoing to bring both the spoil structure and highwall trench areas to AOC. It is anticipated that backfill of the highwall trench will be completed by the 9th of June, 2016. Design and the geotechnical study of this long-term fill can be viewed in Appendix 5-1. The geotechnical studies for both permit areas can be viewed in Appendix 5-1for the Coal Hollow Mine and 5-11 for the North Private Lease.

- *R645-301-535.300 through R645-301-535.500: Disposal of Excess - Spoil Durable Rock Fills.*

  No durable rock fills are planned.

- *R645-301-536.300: Disposal of Coal Mine Waste in Excess Spoil*

  No coal mine waste is planned in the excess spoil area.

- *R645-301-542.720: Excess spoil will be placed in designated disposal areas within the permit area, in a controlled manner to ensure that the final fill is suitable for reclamation and revegetation compatible with the natural surroundings and the approved postmining land use. Excess spoil that is combustible will be adequately covered with noncombustible material to prevent sustained combustion. The reclamation of excess spoil will comply with the design criteria under R645-301-553.240.*

  The landform underneath the Coal Hollow Mine long-term excess spoil as shown in Drawing 5-37 and 5-37A will be suitable to the surrounding area and for the postmining land use of primarily grazing. No combustible excess spoil will be placed in the proposed structure. The final reclamation of the spoil does not include any terraces and the slopes will not exceed 3h:1v.

  The North Private Lease temporary spoil pile will be in place for less than 6 months before being rehandled as pit backfill. Therefore, no postmining land use has been considered.

- *R645-301-553.240: The final fill configuration of the fill (excess spoil) will be suitable for the approved postmining land use. Terraces may be constructed on the outslope of the fill if required for stability, control of erosion, to conserve soil moisture, or to facilitate the approved postmining land use. The grade of the outslope between terrace benches will not be steeper than 2h:1v (50 percent).*

  The landform underneath the Coal Hollow long-term excess spoil as shown in Drawings 5-37 and 5-37A will be suitable to the surrounding area and for the postmining land use of primarily grazing. The reclamation of the spoil does not include any terraces and the slopes will not exceed 3h:1v. The long term static safety factor for these slopes is estimated to be 1.6 to 1.7.

- *R645-301-745.100: General Requirements.*

  745.110: Excess Spoil will be placed in designated disposal areas within the permit area, in a controlled manner to:

  745.111: Minimize the adverse effects of leaching and surface water runoff from the fill on surface and underground water;

  Reclamation of the landform underneath the Coal Hollow long-term excess spoil will include a topsoil cover and subsoil layer. Infiltration through the reclamation is expected to be minimal based on the high clay content of these soils. The North Private Lease temporary excess spoil will be in use for such a short period of time and will be comprised entirely of high-clay tropic shale such that infiltration is also expected to be negligible. In addition, laboratory data found at Appendix 7-16, page 20, for the overburden shows that there is minimal potential for leaching of pollutants should infiltration rates become higher than expected.

The foundations of these excess spoil areas also has high clay content with minimal potential for infiltration. This will provide an additional, natural barrier to protect ground water present beneath the proposed structure.

745.112: Ensure permanent impoundments are not located on the completed fill. Small depressions may be allowed by the Division if they are needed to retain moisture or minimize erosion, create and enhance wildlife habitat or assist revegetation, and if they are not incompatible with the stability of the fill; and

Permanent impoundments are not planned on the excess spoil areas. Small depressions may be constructed as allowed by the Division to retain moisture, minimize erosion, create and enhance wildlife habitat or assist revegetation.

745.113: Adequately cover or treat the excess spoil that is acid- and toxic forming with nonacid nontoxic material to control the impact on the surface and ground water in accordance with R645-301-731.300 and to minimize adverse effects on plant growth and approved postmining land use.

Laboratory data discussed at Appendix 7-16, pages 26-27, and representative of the overburden planned for disposal in the excess spoil areas does not show acid- and toxic forming characteristics.

745.120: Drainage Control. If the disposal area contains springs, natural or manmade water courses, or wet weather seeps, the fill design will include diversions and underdrains as necessary to control erosion, prevent water infiltration into the fill and ensure stability.

A spring and seep survey available in Chapter 7 has identified no springs or wet weather seeps in the proposed excess spoil areas. The final surfaces will be regraded to a contour that will route water from snowmelt and rainfall around the excess spoil as shown on the final contours Drawing 5-37 and 5-74. There are no manmade water courses present in the excess spoil area. No underdrains are planned for the excess spoil structure.

745.121: Diversions will comply with the requirements of R645-301-742.300

No diversions are planned in the excess spoil area.

745.122 : Underdrains

No underdrains are planned in the excess spoil area.

745.300: Durable Rock Fills

No durable rock fills are planned.

745.400: Preexisting Benches

The MRP does not contemplate disposal of excess spoil on preexisting benches.

528.320. Coal Mine Waste.

The MRP does not contemplate processing coal that would produce coal mine waste.

528.321 Coal Processing Waste

The MRP does not contemplate processing coal that would produce coal processing waste that would be returned to the Underground workings.

528.322. Refuse Piles.

The MRP does not contemplate the construction of any refuse piles,

528.323. Burning and Burned Waste Utilization.

The MRP does not contemplate processing coal that would produce coal mine waste, eliminating the any potential for coal mine waste fires.

528.330. Noncoal Mine Waste.

Noncoal mine wastes including, but not limited to, grease, lubricants, paints, flammable liquids, garbage, abandoned mining machinery, lumber and other combustible materials generated during mining activities will be temporarily stored in appropriate containers and removed from the permit area and will be properly disposed of according to applicable State and Federal regulations.

528.332.

Final disposal of noncoal mine wastes will be in a State-approved solid waste disposal site not located within the permit area. Exceptions to the removal of all noncoal mine waste from the permit area is concrete pads for the generator and fan utilized in the underground operation will remain and will be covered with approximately 120’ of overburden.

528.333.

At no time will any noncoal mine waste be deposited in a refuse pile or impounding structure, nor will any excavation for a noncoal mine waste disposal site be located within eight feet of any coal outcrop or coal storage area.

528.334.

Notwithstanding any other provision to the R645 Rules, any noncoal mine waste defined as "hazardous" under 3001 of the Resource Conservation and Recovery Act (RCRA) (Pub. L. 94-580, as amended) and 40 CFR Part 261 will be handled in accordance with the requirements of Subtitle C of RCRA and any implementing regulations.

528.340

As development of the Underground workings originates in the existing Surface mining Pit, development wastes have been stored in the excess spoils pile. Once all mining is complete spoils will be returned to the mined out Pit following the surface mining regulations.

528.350. Acid-Forming and Toxic Materials

If coal, having qualities that make it unmarketable, are to be left in the pit backfill in quantities greater than 5,000 tons: a minimum of 1 composite sample per 5,000 Tons of coal will be analyzed for the parameters list in Table 3 and 7 of the “Soil and Overburden Guidelines”. A record of the volume of coal remaining and laboratory analytical results will be kept onsite. Debris, acid-forming, toxic-forming materials and materials constituting a fire hazard will be identified and disposed of in accordance with R645-301-528.330, R645-301-537.200, R645-301-542.740, R645-301-553.100 through R645-301-553.600, R645-301-553.900, and R645-301-747. Appropriate measures will be implemented to preclude sustained combustion of such materials; and

528.400. Dams, embankments and other impoundments.

Plans do not include using dams, embankments or other impoundments for disposal of coal, overburden, excess spoil or coal mine waste

529. **MANAGEMENT OF MINE OPENINGS**.

When no longer required, underground mine openings will be closed in accordance with R645-301-513, R645-301-529, R645-301-551 and MSHA approved requirements and backfilled. Each entry to the Underground mine if temporarily inactive, but having further projected useful service will be secured by barricades or other covering devices and posted with signs, to prevent access into the entry and identify the hazardous nature of the openings.

Highwall mining (See Chapter 9 which addresses R645-302 regulations) will produce openings (holes) in the coal at the bottom of trenches specifically constructed for highwall mining. Trench depth to the holes range from 60 feet to 200 feet. After highwall mining is completed in a given trench, that trench will be completely backfilled, burying any openings made by highwall mining.

All wells will be managed to comply with R645-301-748 and R645-301-765. Water monitoring wells will be managed on a temporary basis according to R645-301-738.

Wells constructed for monitoring groundwater conditions in the proposed Coal Hollow Mine permit and adjacent area, including exploration holes and boreholes used for water wells or monitoring wells, will be designed to prevent contamination of groundwater and surface-water resources and to protect the hydrologic balance. A diagram depicting typical monitoring well construction methods is shown in Drawing 7-11. Monitoring wells will include a protective hydraulic seal immediately above the screened interval, an annular seal plugging the borehole above the hydraulic seal to near the ground surface, and a concrete surface seal extending from the top of the hydraulic seal to the ground surface which is sloped away from the well casing to prevent the entrance of surface flows into the borehole area. Well casings will protrude above the ground surface a sufficient height so as to minimize the potential for the entrance of surface water or other material into the well. A steel surface protector with a locking cover will be installed at monitoring wells to prevent access by unauthorized personnel. Where there is potential for damage to monitoring wells, the wells will be protected through the use of barricades, fences, or other protective devices. These protective devices will be periodically inspected and maintained in good operating conditions. Monitoring wells will be locked in a closed position between uses.

When no longer needed for monitoring or other use approved by the Division upon a finding of no adverse environmental or health and safety effects, or unless approved for transfer as a water well under R645-301-731.100 through R645-301-731.522 and R645-301-731.800, each well will be capped, sealed, backfilled, or otherwise properly managed, as required by the Division in accordance with R645-301-529.400, R645-301-631.100, and R645-301-748. Permanent closure measures will be designed to prevent access to the mine workings by people, livestock, fish and wildlife, machinery and to keep acid or other toxic drainage from entering ground or surface waters.

If a water well is exposed by coal mining and reclamation operations, it will be permanently closed unless otherwise managed in a manner approved by the Division.

Permanent closure and abandonment of water wells greater than 30 feet in depth will be in accordance with the requirements of “Administrative Rules for Water Well Drillers”, State of Utah, Division of Water Rights or other applicable state regulations. Abandonment of wells will be performed by a licensed water well driller. The wells to be abandoned will be completely filled using neat cement grout, sand cement grout, unhydrated bentonite, or bentonite grout, or other materials approved by the Utah State Engineer’s office. Alternatively, the well may be abandoned using a different procedure upon approval from the Utah State Engineer’s office.

Abandonment materials will be introduced at the bottom of the well or required sealing interval and placed progressively upward to the top of the well. The casing will be severed a minimum of 2 feet below the ground surface. A minimum of 2 feet of compacted native material will be placed above the abandoned well upon completion.

Within 30 days of the completion of well abandonment procedures, a report will be submitted to the State Engineer by the responsible licensed driller giving data related to the abandonment of the well. This shall include the name of the licensed driller or other person(s) performing abandonment procedures, name of well owner at the time of abandonment, the address or location of the well by section, township, and range, abandonment materials and equipment used, water right or file number covering the well, the final disposition of the well, and the date of completion.

Exploration holes and boreholes will be backfilled, plugged, cased, capped, sealed, or otherwise managed to prevent acid or toxic contamination of water resources and to minimize disturbance to the prevailing hydrologic balance. Exploration holes and boreholes will be managed to ensure the safety of people, livestock, fish and wildlife, and machinery.

If a water well is exposed by coal mining and reclamation operations, it will be permanently closed unless otherwise managed in a manner approved by the Division.

If any exploration boreholes are to be used as monitoring wells or water wells, these will meet the provisions of R645-301-731

Boreholes will be backfilled to within 1 foot of the land surface with concrete or other materials approved by the Division as necessary to prevent contamination of groundwater or surface-water resources or to protect the prevailing hydrologic balance. The upper approximately 1 foot will be backfilled with native materials to facilitate reclamation (see Drawing 6-11). Exploration holes and boreholes that may be uncovered during mining and reclamation activities will be permanently closed unless approved for water monitoring or otherwise managed in a manner approved by the Division.

530 **OPERATIONAL DESIGN CRITERIA AND PLANS:**

531 GENERAL:

There are five sediment impoundments for the Coal Hollow Mine permit area and six sediment impoundments for the North Private Lease. These structures will be constructed using a combination of dozers and backhoes. The structures have been designed to contain the required storm events as specified in Appendix 5-2 for the Coal Hollow Mine and Appendices 5-12 and 5-12A for the North Private Lease. The structures will have sediment removed as necessary to ensure the required capacities. Details for these structures can be viewed on Drawings 5-25, 5-26 and 5-28 through 5-32 with calculations and supporting text in Appendix 5-2 for the Coal Hollow Mine. An evaluation of the possible addition of underground mine water pumped to Sediment Pond

3 is included as Appendix 5-13. Details for the North Private Lease sediment impoundments are on drawings 5-67 through 5-71A with calculations and supporting text in Appendices 5-12 and 5-12A.

There are no other coal processing waste banks, dams or embankments proposed within the permit areas.

Underground mining has begun within the Coal Hollow Mine permit area, but none of the planned underground workings are closer than 900 ft. from the nearest sediment impoundment as shown by comparing Drawing 5-3 to Drawing 5-10. Also, all underground mining has been planned as "first mining" only, which means that underground workings are not expected to cause any surface subsidence.

532 SEDIMENT CONTROL:

Six diversion ditches along with five sediment impoundments are proposed for the Coal Hollow Mine. In addition, miscellaneous controls such as silt fence and berms are also proposed for specific areas. The proposed locations for these structures are shown on Drawing 5-3. Details associated with these structures can be viewed on Drawings 5-25 through 5-34 and Appendix 5-2. An evaluation of the possible addition of the underground mine water pumped to Sediment Pond 3 is included as Appendix 5-13. These structures have also been analyzed in relation to the requirement for borrow at the end of underground operations to backfill Pit 10. As mining advances into the federal coal, the open pits will mine out Pond 2 and Ditch 2. These structures will not be rebuilt following backfill and reclamation. The Drawings and Appendices listed above note this analysis. Eighteen diversion ditches, a temporary 18" culvert directing undisturbed runoff beneath Pond T1, a temporary engineered mobile pump and pipeline system from Pond T1 to Pond 6, along with six sediment impoundments are proposed for the North Private Lease. In addition, miscellaneous controls such as silt fence and berms are also proposed for specific areas. The proposed locations for these structures are shown on Drawing 5-65. Details associated with these structures can be viewed on Drawings 5-67 through 5-71A and Appendices 5-12 and 5-12A.

Mulch will be placed on the seedbed surface once soil amendments have been incorporated and seeding has been accomplished in areas that will be reclaimed to native plant communities. The mulch should control erosion by wind and water, decrease evaporation and seed predation, and increase survivability of the seeded species. Like the seeding methods, mulch will be applied with a variety of techniques and materials depending on the reclaimed area.

532.100 Disturbed Area:

The smallest practicable area, consistent with reasonable and safe mine operational practices will be disturbed at any one time during the mining operation and reclamation

phases. This will be accomplished through progressive backfilling, grading, and prompt revegetation of disturbed areas. An estimated reclamation schedule is shown on Drawing 5-38 for the Coal Hollow Mine and on 5-76A and 5-76B for the North Private Lease.

532.200 Backfill Stabilization:

The backfilled material will be stabilized by grading to promote a reduction of the rate and volume of runoff in accordance with the applicable requirements. The excess spoil and fill above approximate original contour will be graded to a maximum angle 3h:1v slope and revegetated to minimize erosion. This area is designed with concave slopes and slope irregularities that will also assist in minimizing erosion. A geotechnical analysis of this configuration has been completed and the factor of safety is estimated at 1.6 to 1.7. This analysis can be viewed in Appendix 5-1. The remaining backfill will be placed in the mined out pit, and thus confined on all sides. Any backfill placed along pit boundaries or on top of operational highwalls to blend with original topography will be contoured at a final slope angle not to exceed 3h:1v (18.4°). Appendix 5-5 provides an analysis of reclaimed slopes which shows that a minimum safety factor of these slopes reclaimed with a planned maximum slope angle of 3h:1v (18.4°) will be 1.7 which exceeds the requirement of 1.3. Appendix 5-5 also states that this planned reclaim slope angle is much less than the general area angle of repose. In fact it is at least 14° less. Therefore, postmining slopes reclaimed at the planned angle of 3h:1v (18.4°) are inherently stable. Any backfill material that must be stockpiled for longer than six months will be stabilized using tackifier or another surface stabilization method. Additionally, in areas upgradient of completed or near completed reclamation, temporary berms will be utilized to ensure a reduction of rate and volume of runoff into and through working areas. Also, all pits will be bermed to minimize runoff into and through working areas.

Mulch will be placed on the seedbed surface once soil amendments have been incorporated and seeding has been accomplished in areas that will be reclaimed to native plant communities. The mulch should control erosion by wind and water, decrease evaporation and seed predation, and increase survivability of the seeded species. Like the seeding methods, mulch will be applied with a variety of techniques and materials depending on the reclaimed area.

533. IMPOUNDMENTS.

533.100.

No impoundments meeting the NRCS Class B or C criteria for dams in TR-60, or the size or other criteria of 30 CFR Sec. 77.216(a) are planned for the Coal Hollow Mine.

533.110

Impoundments not included in 533.100, will be designed and constructed with a minimum static safety factor of 1.3 for a normal pool with steady state seepage saturation conditions or meet the requirements of R645-301-733.210.

The proposed sediment impoundments are expected to impound seasonal water and storms. A geotechnical analysis of these designs has been performed and can be reviewed in Appendix 5-1 for the Coal Hollow Mine and Appendix 5-11 for the North Private Lease. Static safety factors for the proposed designs range from 2.2 to 5.3.

533.200. Foundations.

Foundations for temporary and permanent impoundments will be designed so that

- *Foundations and abutments for the impounding structure are stable during all phases of construction and operation. Such foundations for temporary and permanent impoundments will be designed based on adequate and accurate information on the foundation conditions*

  Refer to Appendices 5-1 and 5-11 for information related to foundations of the proposed impounding structures. No permanent impoundments are proposed.

- *All vegetative and organic materials will be removed and foundations excavated and prepared to resist failure. Cutoff trenches will be installed if necessary to ensure stability.*

  All vegetation, topsoil and subsoil as identified in Chapter 2 will be removed from the impoundment areas prior to construction. Cutoff trenches will not be necessary for stability.

- *Slope protection will be provided to protect against surface erosion at the site and protect against sudden drawdown.*

  Slopes of impoundments will be seeded and sloped to protect against erosion at the site. The high clay content and compaction characteristics of the material present at the impoundments will also assist with minimizing erosion of the slopes.

- *Faces of embankments and surrounding areas will be vegetated except that faces where water is impounded may be riprapped or otherwise stabilized in accordance with accepted design practices.*

  Faces of embankments will be vegetated to minimize erosion. Standing water in the ponds is expected to be minimal and therefore these faces will also be seeded for erosion control.

- *The vertical portion of any remaining highwall will be located far enough below the low- water line along the full extent of highwall to provide adequate safety and access for the proposed water users.*

  All highwalls will be fully covered following active use and backfilling of pits.

A rapid drawdown analysis was completed assuming the spillways are plugged, the basin fills to top of the embankments and then the water is released or pumped down to the base of basins. The soil strengths utilized were based on total stress conditions as determined from the triaxial shear tests completed for this project. It should be noted that rapid drawdown is highly unlikely since spillway and outlet piping will be no more than 4-feet below the top of embankments. The resulting safety factors under these conditions range from 1.2 to 1.9. Based on this analysis, no additional protection measures are needed for the impoundments in relation to rapid drawdown. Details for this analysis on Coal Hollow impoundments are provided in Appendix 5-1, pages 6 through 7 in the main section of the report. Details for this analysis on the North Private Lease also refer to Appendix 5-1, pages 6 and 7, as the geotechnical report provided in Appendix 5-11 lists the soil characteristics present in the North Private Lease to be identical to those in the Coal Hollow Mine.

533.600.

The MRP does not contemplate construction of impoundments that meet the criteria of MSHA, 30 CFR 77.216(a).

533.700 - 714. Plans.

Each detailed design plan for structures not included in 533.610 shall:

- *Be prepared by, or under the direction of, and certified by a qualified, registered, professional engineer, except that all coal processing waste dams and embankments covered by R645-301-536 and R645-301- 746.200 shall be certified by a qualified, registered, professional engineer;*

  Designs for the proposed impoundments have been prepared by a qualified, registered, professional engineer, with assistance from a geotechnical expert. These certifications can be viewed on Drawings 5-28 through 5-31 for the Coal Hollow Mine and on Drawings 5-67 through 5-71A for the North Private Lease.

- *Include any design and construction requirements for the structure, including any required geotechnical information;*

  A geotechnical analysis of the impoundments has been prepared by an expert in this field. This analysis can be viewed in Appendix 5-1 for the Coal Hollow Mine and Appendix 5-11 for The North Private Lease. Embankments will be constructed in 2 foot lifts as recommended by the analysis.

- *Describe the operation and maintenance requirements for each structure; and*

  The proposed impoundments are designed to temporarily store water from storm events and snow melt. Long term standing water in the impoundments is anticipated to be seasonal and sediment will be removed as necessary to provide the required storage capacities. Emergency spillways have been included in the designs to provide a non-destructive discharge route should the capacities ever be exceeded, except in the case of Pond T1 which will utilize an engineered pump and pipeline to discharge excess water to Pond 6 Surveys of these impoundments

will be regularly conducted to ensure that design capacities are available. An evaluation of the possible addition of underground mine water pumped to Sediment Pond 3 is included as Appendix 5-13.

- *Describe the timetable and plans to remove each structure, if appropriate.*

  All impoundments will be reclaimed at the end of operations except Pond T1, which will be mined through directly following construction of Pond 7 in Area 2 and will not be rebuilt following backfill and reclamation. Pond T1 will remain in place until approval of Areas 2 and 3 for mining. The estimated timeline for removal of these structures are shown on Drawing 5-38 for the Coal Hollow Mine and Drawing 5-76B for the North Private Lease. Expected removal is year seven of the mining and reclamation process for the Coal Hollow Mine and year five - seven for the North Private Lease. In areas where soils are not stabilized following the removal of these sediment impoundments, silt fence will be appropriately installed and maintained to provide sediment control until stable conditions are met.

Detailed designs of impoundments can be viewed on Drawings 5-28 through 5-31 for the Coal Hollow Mine and Drawings 5-67 through 5-71A for the North Private Lease. Locations can be viewed on Drawing 5-3 and 5-25 for the Coal Hollow Mine and Drawings 5-47, 5-65 and 5-65A for the North Private Lease.

534. **ROADS**

534.100-200 Roads will be located, designed, constructed, reconstructed, used, maintained, and reclaimed so as to:

- *Prevent or control damage to public or private property;*

  All roads will be reclaimed to approximate original contour as shown on Drawings 5-37, 5-37A and 5-38 for the Coal Hollow Mine and Drawings 5-74 through 5-76B for the North Private Lease. These roads are designed to control damage to public and private property.

- *Use nonacid - or nontoxic-forming substances in road surfacing; and*

  There will be no acid or toxic forming substances used in road surfacing.

- *Have, at a minimum, a static safety factor of 1.3 for all embankments.*

  All embankments are designed with static safety factors that exceed 1.3.

- *Have a schedule and plan to remove and reclaim each road that would not be retained under an approved postmining land use.*

  All roads not planned to remain postmining will be removed and reclaimed according to Drawings 5-37 and 5-37A for the Coal Hollow Mine and Drawings 5-74, and 5-75 for the North Private Lease. The estimated timetable for removing these roads is shown on Drawing 5-38 and 5-76B respectively.

- *Control or prevent erosion, siltation and the air pollution attendant to erosion by vegetating or otherwise stabilizing all exposed surfaces in accordance with current, prudent engineering practices.*

  Cut ditches will be established on the shoulders of all primary roads to control drainage and erosion. Cut and fill slopes along the primary roads will be minimal and are not expected to cause significant erosion. In locations where there are culvert crossings (i.e. Lower Robinson Creek), the fills slopes will be stabilized by utilizing standard methods such as grass matting or straw wattles. Also, the upper slope of pit 10 is cut into alluvium at 4:1, this slope will be stabilized by planting with the interim seed mix found in Chapter 2 page 2-25.

- *To ensure environmental protection and safety appropriate for their planned duration and use, including consideration of the type and size of equipment used, the design and reconstruction of roads will incorporate appropriate limits for grade, width, surface materials, and any necessary design criteria established by the Division.*

The following specifications apply to the Primary Mine Haul roads:

1) Roads will be approximately 80' in width
2) Approximately a 2% crown
3) Approximately one foot deep cut ditches along shoulders for controlling storm water
4) 18" of crushed rock or gravel for road surfacing, except for the section of the Pit B-1 access extending from County Road 136 to the pit. This section of road will utilize approximately 6" of crushed rock or gravel for road surfacing. This shallower depth of gravel will still provide the necessary benefits of dust control and sediment control for surface water runoff during a short usage life. For this section of road will be utilized for coal haulage for only around 2-3 months and the western half of it will be eventually mined out as part of the borrow area.
5) Cut and fill slopes of 1.5 h:1v
6) Minimum fill over each culvert will be 2 times diameter of culvert
7) Berms placed as necessary along fills

The underground mine portal access and haul road ~~in Pit 10~~ (shown in Drawing 5-22I) will also be a primary road. This road is accessed from the main haul road from the coal unloading area. The underground access road will be approximately 1500' in length and will be constructed to the same specifications for the haul roads above, except that the road may be narrowed to a 40 foot width.

The ancillary roads will have similar specifications except surfacing will occur only as needed and may be narrowed to a 40 foot road width. A typical cross section for the ancillary roads can be viewed on Drawing 5-24.

The location and details for Primary Mine Haul roads can be viewed on Drawings 5-3, 5-22, 5-23, 5-47, and 5-58 through 5-60.

For the Coal Hollow Mine, in addition to the two primary Mine Haul roads, the road located within the facilities area is also classified as a primary road. This road is planned to be 24 feet wide with 24 inches of compacted sub base and 8 inches of compacted 1 inch minus gravel as surfacing. This road is referred to as "Facilities Roadway" and more details are described in 527.200 along with Drawings 5-22A and 5-22B.

In addition to the primary roads that will be present during active mining, four additional roads are planned to exist postmining and are also classified as primary roads for this reason.

Roads that will remain postmining are the following:

- Road to Water Well with details shown on Drawing 5-22D
- Road to east C. Burton Pugh property (K3993) with details shown on Drawing 5-22C
- County Road 136 (K3900) with details on Drawings 5-22E, 5-22F and 5-22G for the Coal Hollow Mine, and Drawings 5-61 and 5-63 for the North Private Lease. This County road will be reconstructed within the permit area by Kane County. This reconstruction will occur concurrently with the final stage of reclamation as scheduled on Drawings 5-38 and 5-76B and is expected to be completed by the end of Year 5 for the Coal Hollow Mine and Year 7 for the North Private Lease.
- Alton Coal Mine Road (K3100) in the North Private Lease with details on Drawings 5-62 and 5-63. This short section of County Road will also be reconstructed within the permit area by Kane County. The reconstruction will occur concurrently with the final stage of reclamation as scheduled on Drawing 5-76B and will be completed in Year 7.
- Road to Swapp Ranch (same specification as the Water Well Road)

The location of these roads is shown on Drawings 5-37 along with the post mining topography.

The ramps, benches and equipment travel paths within the active surface mining area are temporary in nature and will be relocated frequently as mining progresses. These temporary travelways are considered part of the pit due to their short term use, and are not individually designed nor engineered. They will be built and maintained to facilitate safe and efficient mine and reclamation operations.

Other temporary ancillary roads (such as the Pond 3 access road shown on Drawing 5-3) outside the mining area may be necessary from time to time to access facilities or impoundments during the life of operations. These roads will not remain post-mining and also will not be individually designed nor engineered. They will be built and maintained to facilitate safe and efficient mine and reclamation operations.

534.300-340. Primary Roads.

Primary roads will:

- *Be located, insofar as practical, on the most stable available surfaces;*

  These roads are designed on the most practicable, stable surfaces.

- *Be surfaced with rock, crushed gravel, asphalt, or other material approved by the Division as being sufficiently durable for the anticipated volume of traffic and the weight and speed of vehicles using the road;*

  Primary haul roads will be surfaced with approximately 18" of crushed rock or gravel to provide a durable surface for the anticipated volume of traffic and equipment, except for the section of the Pit B-1 access extending from County Road 136 to the pit. This section of road will utilize approximately 6" of crushed rock or gravel for road surfacing. This shallower depth of gravel will still provide the necessary benefits of dust control and sediment control for surface water runoff during a short usage life. For this section of road will be utilized for coal haulage for only around 2-3 months and the western half of it will be eventually mined out as part of the borrow area.

- *Be routinely maintained to include repairs to the road surface, blading, filling potholes and adding replacement gravel or asphalt. It will also include revegetation, brush removal, and minor reconstruction of road segments as necessary; and*

  All roads will be maintained on an as needed basis using motor graders, water trucks for dust suppression, and other equipment as necessary. Crushed stone and/or gravel will be used as a surface course for primary roads outside the active mining area, and may be used as needed for ramps and travelways within the pit. Should the roads be damaged by a catastrophic event, such as an earthquake or a flood, repairs will be made as soon as possible after the damage has occurred or the road will be closed and reclaimed. Roads will be reclaimed once they are no longer needed for their intended use.

- *Have culverts that are designed, installed, and maintained to sustain the vertical soil pressure, the passive resistance of the foundation, and the weight of vehicles using the road.*

  Road fill over culverts will be at minimum two times the diameter of the culvert. This is a conservative standard that has been effectively utilized at mining operations with similar equipment and mining practices.

535. **SPOIL**

535.100 -150 Disposal of Excess Spoil.

Excess spoil will be placed in designated disposal areas within the permit area in a controlled manner. The fill and appurtenant structures will be designed using current, prudent engineering practices and will meet any design criteria established by the Division.

- *The fill will be designed to attain a minimum long-term static safety factor of 1.5. The foundation and abutments of the fill must be stable under all conditions of construction.*

  A geotechnical analysis has been completed for both the long term excess spoil structure located at the Coal Hollow Mine and the temporary excess spoil structure located at the North Private Lease. These analyses estimate the long-term safety factor to be 1.6 to 1.7 based on the proposed designs. Following proper construction practices of building the structures in maximum four foot lifts and meeting 85% compaction based on the standard Procter will ensure that the structures will be stable under all conditions of construction. The following earthwork specifications will be followed:

  1) Areas to receive fill will be stripped of all vegetation, organic material, and debris. Any existing undocumented or non-structural fill/backfill materials and other unsuitable materials will be excavated in their entirety. All areas that are to receive fill will be observed by a professional engineer experienced in the design of earth and rock fills prior to placement of fill.

  2) Fill will be compacted to 85% of the maximum density as compared to ASTM D 698 (standard proctor) for the spoil.

  3) Individual lift thickness will not exceed 4 feet, unless approved by both the Division and the professional engineer based on compaction test results during field verification.

  4) Saturated soils will be placed in an area that will have minimal effect on the performance of slopes.

  5) A qualified professional engineer with experience in the design of earth and rock fills will periodically observe the placement of fill and conduct in-place field density tests on the fill to check for adequate moisture and relative compaction. The compaction tests will be conducted as part of the periodic inspections required in R645-301-514.100, 514.311, and R645-301-514.120. These compaction tests will be conducted using nuclear density (ASTM D2292-9) or equivalent method. If less than the specified relative compaction is obtained, additional compactive effort will be applied and the fill moisture-conditioned as necessary until the specified relative compaction is attained.

  6) Wherever, in the opinion of the ACD's representatives, an unstable condition is being created, the work will not proceed in that area until an evaluation has been made and the grading operations revised, if necessary.

7) During unfavorable weather conditions, construction of the fill will not proceed without confirmation from the professional engineer experienced in the design of earth and rock fills.

This construction will occur only in the designated excess spoil areas as shown on Drawings 5-3, 5-37, for the Coal Hollow Mine and Drawing 5-47 for the North Private Lease. The fill will be placed with end dump haul trucks and lifts will be constructed using dozers. High precision GPS systems will be regularly utilized to check grades and appropriate lift thickness. Following the completion of surface mining in the highwall trench, backfill operations from the long-term excess spoil structure to the open pit have been ongoing to bring both the spoil structure and highwall trench areas to AOC. It is anticipated that backfill of the highwall trench will be completed by the 9th of June, 2016. In preparation for final borrow, Pit B-1 (as shown on Drawing 5-10) will be excavated and simultaneously backfilled to remove all coal from the borrow volume to reach the intermediate landform depicted in Drawings 5-35 and 5-36. The spoil and coal will be surface mined utilizing the same equipment and methods as the previous pits and will be extracted to an extent that protects eventual regrading and reclamation efforts in the Borrow Area from potential oxidation, heating, or spontaneous combustion. Mining of Pit B-1 will begin by dozing a thin layer (apx. 5 ft) of overburden covering the eastern extent of Pit B-1 from east to west in a strip 50 to 100 ft wide to create a temporary overburden berm. The coal underneath this first strip will then be extracted leaving a void into which the berm and subsequent strip overburden can be placed. The coal strips will progress from east to west, with dozing and potentially truck haulage replacing the stripped overburden into the coal voids from west to east. Mining slopes will be maintained at a 1:1 face angle for mining benches under 50 ft. Above 50 ft., a 40 ft. catch bench will be installed between 40 ft. 1:1 benches. Additional fill material will be sourced from the adjacent pit slopes as necessary to establish the final 3:1 slope on the South pit wall and to meet the intermediate design surface depicted in Drawings 5-35 and 5-36. Then, upon completion of underground mining, Pit 10 will be backfilled and all ground will be returned to the final landform shown in Drawings 5-37 and 5-37A. The geotechnical analysis for this structure can be viewed in Appendix 5-1 for the Coal Hollow Mine and in Appendix 5-11 for the North Private Lease.

- *Be located on the most moderately sloping and naturally stable areas available, as approved by the Division, and placed, where possible, upon or above a natural terrace, bench or berm, if such placement provides additional stability and prevents mass movement;*

  The excess spoil is planned to be placed in areas where natural grades range from 0 to 5%. These are some of the most moderately sloping locations in the Permit Area. Stability of these structures is estimated to be 1.6 to 1.7 based on the Appendix 5-1.

- *Be subject of sufficient foundation investigations. Any necessary laboratory testing of foundation material, will be performed in order to determine the design requirements for foundation stability. The analyses of foundation conditions will take into consideration the effect of underground mine workings, if any, upon the stability of the fill and appurtent structures; and*

  Geotechnical borings and trench samples were completed in the foundations of the proposed disposal areas. Laboratory analysis of these borings and trench samples have also been completed. Details of this analysis can be viewed in Appendix 5-1 and Appendix 5-11.

- *Incorporate keyway cuts (excavations to bedrock) or rock buttresses to ensure stability where the slope in the disposal area is in excess of 2.8h:1v (36 percent), or such lesser slope as may be designated by the Division based on local conditions. Where the toe of the spoil rests on a downslope, stability analyses will be performed in accordance with R645-301-535.150 to determine the size of rock toe buttresses and keyway cuts*

  Slopes for the proposed excess spoil will not exceed 3h:1v (33 percent), therefore no keyway cuts have been proposed in the design. Appendix 5-1 and Appendix 5-11 detail the stability analyses for the proposed structures.

- *Excess spoil may be disposed of in underground mine workings,..*

  Excess spoil will not be disposed of in underground mine workings.

- *Placement of Excess Spoil. Excess spoil will be transported and placed in a controlled manner in horizontal lifts not exceeding four feet in thickness; concurrently compacted as necessary to ensure mass stability and to prevent mass movement during and after construction; graded so that surface and subsurface drainage is compatible with the natural surroundings: and covered with topsoil or substitute material in accordance with R645-301-232.100 through R645-301-232.600, R645-301-234, R645-301-242, and R645-301-243. The Division may approve a design which incorporates placement of excess spoil in horizontal lifts other than four feet in thickness when it is demonstrated by the operator and certified by a professional engineer that the design will ensure the stability of the fill and will meet all other applicable requirements.*

  Horizontal lifts will not exceed four feet in thickness unless otherwise approved by the Division. The lifts will be concurrently compacted to meet 85% of the standard Procter. The geotechnical analysis (Appendix 5-1 and Appendix 5-11), provides information showing that these construction standards will provide mass stability and will prevent mass movement during and after construction. The excess spoil will be graded to provide drainage similar to original flow patterns. Topsoil and subsoil as designated in Chapter 2 will be removed and separated from other materials prior to placement of spoil.

- *For the purposes of SURFACE COAL MINING AND RECLMATION ACTIVITIES the design of the spoil disposal structures will include the results of geotechnical investigations as follows:*

  1) *The Character of the bedrock and any adverse geologic conditions in the disposal area;*

     Refer to Appendix 5-1 and Appendix 5-11.

  2) *A survey identifying all springs, seepage, and ground water flow observed or anticipated during wet periods in the area of the disposal site;*

     Spring and seep survey information is provided on Drawing 7-1. There are no springs or seeps identified in the excess spoil area.

  3) *A survey of the potential effects of subsidence of the subsurface strata due to past and future mining operations;*

     There no historical underground mining operations in the proposed excess spoil area. There are also no future underground operations proposed.

  4) *A technical description of the rock material to be utilized in the construction of those disposal structures containing rock chimney cores or underlain by a rock drainage blanket; and*

     There are no rock chimneys or drainage blankets proposed.

  5) *A stability analysis including, but not limited to, strength parameters, pore pressures and long-term seepage conditions. These data will be accompanied by a description of all engineering design assumptions and calculations and the alternative considered in selecting the specific design specifications and methods.*

     The stability analysis and all supporting data are available in Appendix 5-1for Coal Hollow and Appendix 5-11 for the North Private Lease.

- *If for the purposes of SURFACE COAL MINING AND RECLAMATION ACTIVITIES, under R645-301-535.112 and R645-301-535.113, rock-toe buttresses or key-way cuts are required, the will include the following:*

  Neither rock-toe buttresses nor key-way cuts are required under R645-301-535.112 or R645-301-535.113.

535.200. Disposal of Excess Spoil: Valley Fills/Head-of-Hollow Fills.

The MRP does not contemplate disposal of excess spoil as valley fill or head-of-hollow fills.

535.300. Disposal of Excess Spoil: Durable Rock Fills.

The MRP does not contemplate disposal of excess spoil as durable rock fill.

535.400. Disposal of Excess Spoil: Preexisting Benches.

The MRP does not contemplate disposal of excess spoil on preexisting benches.

535.500 Disposal of Excess Spoil: At Drift Entries.

The MRP does not contemplate disposal of spoils resulting from face-up operations at the drift entries. Drift entries will originate from the existing Pit, excess spoil for which are stored in the pit backfill or in the approved Excess Spoils Pile.

536 **COAL MINE WASTE:**

The MRP does not contemplate processing of coal that would produce coal mine waste.

537 **REGRADED SLOPES**:

537.100 Geotechnical Analysis:

The long-term excess spoil structure and fill above approximate original contour at the Coal Hollow Mine are the only alternative specifications proposed. Although the structure will be rehandled as pit backfill prior to final reclamation to achieve AOC, a geotechnical analysis has been completed for this proposal and can be viewed in Appendix 5-1. All other mined areas within the Coal Hollow Mine and North Private Lease, for surface or underground will be restored to approximate original contour.

537.200 Regrading of Underground Fills/Spoil:

Any spoils produced by underground operations at the Coal Hollow Mine will be placed in the first instance in unused crosscuts or underground voids. If necessary, underground spoils may also be placed in the Pit 10 void, not to exceed approximate original contour. As a last resort, underground spoils may also be placed in the long-term excess spoil structure under the design criteria detailed in Appendix 5-1. No underground spoils are expected from the North Private Lease permit area.

540 **RECLAMATION PLAN**:

541.100 - 400 General

Concurrent with mining operations and when coal mining is complete, all pits within each permit area will be backfilled and reclaimed in accordance with the R645 rules and this permit. All equipment, structures, and other facilities, unless approved by the Division as suitable for the postmining land use or environmental monitoring, will be removed and the affected land reclaimed. Following the completion of surface mining in the highwall trench, backfill operations from the long-term excess spoil structure to the open pit has been ongoing to bring both the spoil structure and highwall trench areas to AOC. It is anticipated that backfill of the highwall trench will be completed by the 9th of June, 2016. In preparation for final borrow, Pit B-1 (as shown on Drawing 5-10) haswill been excavated and simultaneously backfilled to remove all coal from the borrow volume to reach the intermediate landform depicted in Drawings 5-35 and 5-36. The spoil and coal will be surface mined utilizing the same equipment and methods as the previous pits and will be extracted to an extent that protects eventual regrading and reclamation efforts in the Borrow Area from potential oxidation, heating, or spontaneous combustion. Mining of Pit B-1 will begin by dozing a thin layer (apx. 5 ft) of overburden covering the eastern extent of Pit B-1 from east to west in a strip 50 to 100 ft wide to create a temporary overburden berm. The coal underneath this first strip will then be extracted leaving a void into which the berm and subsequent strip overburden can be placed. The coal strips will progress from east to west, with dozing and potentially truck haulage replacing the stripped overburden into the coal voids from west to east. Mining slopes will be maintained at a 1:1 face angle for mining benches under 50 ft. Above 50 ft., a 40 ft. catch bench will be installed between 40 ft. 1:1 benches. Additional fill material will be sourced from the adjacent pit slopes as necessary to establish the final 3:1 slope on the South pit wall and to meet the intermediate design surface depicted in Drawings 5-35 and 5-36. Then, upon completion of underground mining, Pit 10the underground portal pit will be backfilled and all ground will be returned to the final landform shown in Drawings 5-37 and 5-37A.

Underground mine portals will be closed in accordance with R645-301-513, R645-301-529, R645-301-551 and approved MSHA plans and backfilled.

Since the underground mine portals are located in the bottom of Pit 10an open pit at the Coal Hollow Mine, they will be reclaimed and permanently closed by the backfilling of the pit to a depth of greater than 100’ when no longer required. Following the completion of underground mining, backfill of Pit 10the open pit will be completed utilizing borrow from the areas delineated in Drawings 5-19 and 5-37. Final backfill will require approximately 1.5 Million C.Y. of borrow material, but will still achieve AOC.

When no longer needed for monitoring or other use approved by the Division upon a finding of no adverse environmental or health and safety effects, or unless approved for transfer as a water well under R645-301-731.100 through R645-301-731.522 and R645-301-731.800,

each well will be capped, sealed, backfilled, or otherwise properly managed, as required by the Division in accordance with R645-301-529.400, R645-301-631.100, and R645-301-748. Permanent closure measures will be designed to prevent access to the mine workings by people, livestock, fish and wildlife, machinery and to keep acid or other toxic drainage from entering ground or surface waters.

If a water well is exposed by coal mining and reclamation operations, it will be permanently closed unless otherwise managed in a manner approved by the Division.

Permanent closure and abandonment of water wells greater than 30 feet in depth will be in accordance with the requirements of "Administrative Rules for Water Well Drillers", State of Utah, Division of Water Rights or other applicable state regulations. Abandonment of wells will be performed by a licensed water well driller. The wells to be abandoned will be completely filled using neat cement grout, sand cement grout, unhydrated bentonite, or bentonite grout, or other materials approved by the Utah State Engineer's office. Alternatively, the well may be abandoned using a different procedure upon approval from the Utah State Engineer's office.

Abandonment materials will be introduced at the bottom of the well or required sealing interval and placed progressively upward to the top of the well. The casing will be severed a minimum of 2 feet below the ground surface. A minimum of 2 feet of compacted native material will be placed above the abandoned well upon completion.

Within 30 days of the completion of well abandonment procedures, a report will be submitted to the State Engineer by the responsible licensed driller giving data related to the abandonment of the well. This shall include the name of the licensed driller or other person(s) performing abandonment procedures, name of well owner at the time of abandonment, the address or location of the well by section, township, and range, abandonment materials and equipment used, water right or file number covering the well, the final disposition of the well, and the date of completion.

Exploration holes and boreholes will be backfilled, plugged, cased, capped, sealed, or otherwise managed to prevent acid or toxic contamination of water resources and to minimize disturbance to the prevailing hydrologic balance. Exploration holes and boreholes will be managed to ensure the safety of people, livestock, fish and wildlife, and machinery.

If an exploration borehole is exposed by coal mining and reclamation operations, it will be permanently closed unless otherwise managed in a manner approved by the Division.

If any exploration boreholes are to be used as monitoring wells or water wells, these will meet the provisions of R645-301-731

Boreholes will be backfilled to within 1 foot of the land surface with concrete or other materials approved by the Division as necessary to prevent contamination of groundwater or surface-water resources or to protect the prevailing hydrologic balance. The upper approximately 1 foot will be backfilled with native materials to facilitate reclamation (see

Drawing 6-11). Exploration holes and boreholes that may be uncovered during mining and reclamation activities will be permanently closed unless approved for water monitoring or otherwise managed in a manner approved by the Division.

542 **NARRATIVE, DRAWINGS AND PLANS**:

542-100 through 600 Plan and Timetable.

Reclamation at the Coal Hollow Mine and North Private Lease includes both ongoing reclamation and final reclamation activities. Ongoing reclamation will follow mining operations as closely as practicable during the mine production phase. Major steps in the ongoing reclamation process are:

- Backfilling and Grading. The planned backfilling and grading operations are described more fully under section 553 below.
- Topsoil and Subsoil Replacement. Following grading, suitable topsoil and subsoil will be replaced on the regraded area. Topsoil may be direct placed from areas ahead of the mine, or may be taken from available stockpiled material. The planned topsoil operation will have topsoil ahead of the operation dozed into windrows, and loaded into trucks by a front end loader. The trucks will haul the topsoil to the regraded area, or to a temporary topsoil stockpile. Subsoil will be handled similar to topsoil. Once dumped on the regraded area, topsoil and subsoil layers will be dozed to a consistent thickness. Approximately 8 inches of topsoil is expected to be removed ahead of mining and replaced over the regraded area. Subsoil removed and replaced will average 40 inches thick and will be placed between the topsoil layer and run of mine spoil. The total profile thickness of topsoil and subsoil in mined areas will average 48 inches. Once in place, the area will be fine graded to remove small erosion features and depressions. It is important to note that bonding calculations have accounted for double handling of the topsoil and subsoil quantities for the borrow area at the Coal Hollow Mine.
- Revegetation. Following replacement of topsoil the area will be revegetated by seeding. Mulch will be placed on the seedbed surface once soil amendments have been incorporated and seeding has been accomplished in areas that will be reclaimed to native plant communities. The mulch should control erosion by wind and water, decrease evaporation and seed predation, and increase survivability of the seeded species. Like the seeding methods, mulch will be applied with a variety of techniques and materials depending on the reclaimed area.

Generally, mined areas will be backfilled and graded within approximately 60 days following coal removal, or 1,500 feet of the active coal removal face. One exception to this standard is that a portion of ~~Pit 10~~the open pit will be left open for access to the underground portals until completion of underground mining. Following the completion

of underground mining, backfill of the open pit ~~Pit 10~~ will be completed utilizing borrow from the areas delineated in Drawings 5-19 and 5-37. Final backfill will require approximately 1.5 Million C.Y. of borrow material, but will still achieve AOC. Areas needed for in-pit roads, ramps, drainage controls or areas which must be left open temporarily for operational reasons will be backfilled and graded when they are no longer needed. The rate of backfilling will depend on the availability of mined out pit areas for backfilling, and the rate of production at the mine. Based on anticipated production rates, Drawing 5-38 for the Coal Hollow Mine and Drawing 5-76A and 5-76B for the North Private Lease provide an estimated sequence and timing for reclamation.

Topsoil will be replaced on the graded areas as soon as operationally practicable. This work will depend on weather and soil conditions in the removal and replacement areas, but is generally anticipated to occur within 90 days of completion of regrading.

Revegetation activities will be seasonal in nature. As currently planned, initial seeding will occur at the first planting opportunity following replacement of topsoil. Supplemental seeding may be done subsequently as needed.

At the Coal Hollow Mine, ~~surface mining operations are at a steady state and nearing completion. As such,~~ all material mined goes directly to a backfill or reclaim capacity and is covered by subsoil and topsoil then prepared for mulching and seeding as soon as possible. During this ~~last~~ stage of mining, material from the Highwall Trench is directly backfilled into the remnants of Pits 9, 10 (a portion), 20, 21 and the northern extent of the trench itself. While a majority of Pit 10 will remain open until completion of underground mining, all other pits will be backfilled and reclaimed to approximate original contour. Any shortage of material for final backfill of the Highwall Trench will be made up by rehandle of spoil from the long term excess spoil pile. Following the completion of surface mining in the highwall trench, backfill operations from the long-term excess spoil structure to the open pit have been ongoing to bring both the spoil structure and highwall trench areas to AOC. It is anticipated that backfill of the highwall trench will be completed by the 9th of June, 2016. ~~The last pit (shown on Drawing 5-9 and Drawing 5-10 as~~ Pit B-1~~)~~ at the Coal Hollow Mine will be encountered incident to reclamation and borrow activities where it would not have been practical to mine otherwise. Mining of Pit B-1 will begin by dozing a thin layer (apx. 5 ft) of overburden covering the eastern extent of Pit B-1 from east to west in a strip 50 to 100 ft wide to create a temporary overburden berm. The coal underneath this first strip will then be extracted leaving a void into which the berm and subsequent strip overburden can be placed. The coal strips will progress from east to west, with dozing and potentially truck haulage replacing the stripped overburden into the coal voids from west to east. Mining slopes will be maintained at a 1:1 face angle for mining benches under 50 ft. Above 50 ft., a 40 ft. catch bench will be installed between 40 ft. 1:1 benches. Additional fill material will be sourced from the adjacent pit slopes as necessary to establish the final 3:1 slope on the South pit wall and to meet the intermediate design surface depicted in Drawings 5-35 and 5-36. As shown on in these drawings, this pit is nearly fully contained within the greater Borrow Area but will require approximately 91,000 CY of backfill material to establish the final 3:1 slope on top of the 1:1 operational slope and bench on

the South pit wall. This 91,000 CY will remain in place in the final slope and will not be recovered in the final borrow. The remaining backfill will then remain in place until closure of the Underground Mine and finally rehandled as backfill to Pits 9-C and 10. Upon completion of underground mining, Pits 9-C and 10 will be backfilled and all ground will be returned to the final landform shown in Drawings 5-37 and 5-37A. For the disturbed area that falls within the 62.0 acres required for eventual borrow and backfill of the final open pit~~Pit 10~~, the ground surface will be smooth graded subsoiled and treated for topsoil cultivation (according to described plans in Chapter 2) following completion of backfill of Pit B-1. The ground will remain in this cultivated state, but will not be released, until borrow and backfill following completion of the underground mine.

Following approval of the Federal LBA and acquisition of necessary leases, mining and reclamation will continue into pits 10-B and Pits F-1 to F-8 as shown on Drawings 5-10 and 5-16. These pits will be mined and backfilled with the same methods described above and will progress from South to North while directly backfilling to the South. This will result in the backfill of the current underground portal area, so that as mining finishes in Pit F-8 the pit will be left open in anticipation of development of another portal with the borrow area serving to provide eventual backfill. As permitting of the larger LBA continues, subsequent amendments will address the final location of the portal pad and further plans for underground mining as well as any potential changes to backfill sourcing. The reclamation sequence for the Coal Hollow Mine is shown in Drawing 5-38.

For start-up of the North Private Lease, some delay is unavoidable in reclamation of the initial mining areas due to the time required to establish the initial working pit and backfill area, and to achieve a steady state excavation/backfill operation. As currently planned, Pits 1 and 2 will be backfilled to the planned post mining contour, graded, and the subsoil and topsoil replaced concurrently with mining of Pits 3, 4, and 5 midway through the first year of mining. Depending on the timing of approval for Areas 2 and 3, mining in the extension of Area 1 (which contains Pits 7, 8 and 9) may be limited as shown in Drawing 5-57 by Pond T1 and the geologic contact between Tropic Shale and Quaternary Alluvium in Pits 8 and 9. Temporary Pond T1 must remain in place until Pond 7 has been constructed and no alluvium will be mined until the hydrologic analysis of Areas 2 and 3 has been performed and approved. Once these approvals are obtained, the Area 2 facilities will be constructed and Pond T1 and the other Area 1 extension temporary facilities will be removed or mined out by advancing pits. Reclamation activities will proceed at the regular planned rate thereafter. As mining progresses through Pit 21 the semi-final pit void will require approximately 1,600,000 cubic yards to be rehandled from the backfill located above the final landform depicted in Drawing 5-74 previously placed in the adjacent pits. No other borrow or rehandle will be necessary from the highwall trench area, but the final landform depicts the previously approved borrow configuration of the topographic ridge should the operational need for material arise. Either configuration of this ridge will provide that natural landform, post-mining land use, and drainage will be maintained or improved. In the case where borrow from the area east of Kanab Creek is not necessary, the material void will not occur and post-mining topography will achieve AOC while closely mirroring original topography as shown on Drawing 5-45. Proposed final reclamation contours and cross sections can be

viewed on Drawings 5-37 and 5-37A for the Coal Hollow Mine and on Drawings 5-74 and 5-75 for the North Private Lease.

The sequence and timing of reclamation activities is dependent on the coal production rate. Should that rate differ significantly from the current plan, the reclamation schedule will also vary.

Final reclamation includes the following:

- Backfilling and Grading. Backfilling of all final pits will commence at the conclusion of coal production. All highwalls, spoil piles, and depressions will be removed, except that small depressions may be constructed if they are needed to retain moisture, minimize erosion, create and enhance wildlife habitat, or assist revegetation. No permanent final pit impoundments are currently planned. Following the completion of surface mining in the highwall trench, backfill operations from the long-term excess spoil structure to the open pit has been ongoing to bring both the spoil structure and highwall trench areas to AOC. It is anticipated that backfill of the highwall trench will be completed by the 9th of June, 2016. Therefore, a small portion (apx. 250k C.Y.) of the long-term excess spoil structure may remain at the Coal Hollow Mine until final backfill of the final open pit~~Pit 10~~. In preparation for final borrow, Pit B-1 (as shown on Drawing 5-10) has~~will~~ been excavated and simultaneously backfilled to remove all coal from the borrow volume to reach the intermediate landform depicted in Drawings 5-35 and 5-36. Then, following the completion of underground mining, backfill of Pit 10 will be completed utilizing borrow from the areas delineated in Drawings 5-19 and 5-37. Final backfill will require approximately 1.5 Million C.Y. of borrow material, but will still achieve AOC. All exposed coal seams, and acidic or toxic-forming strata will be covered with at least five feet of noncombustible material.
- Topsoil and Subsoil Replacement. 8 inches of topsoil underlain by 40 inches of subsoil will be placed on the backfilled pits and excess spoil. Other disturbed areas will have topsoil replaced (including facilities sites, roads etc.).
- Removal of Structures. Before abandoning the permit area or seeking bond release, all structures not needed for the approved post mining land use will be removed and reclaimed. The Lower Robinson Creek diversion is proposed to be temporary. Material from the coal stockpile base area and other areas where coal spillage may accumulate will be excavated and placed in a controlled manner in the final pit and covered with noncombustible material to prevent sustained combustion. The only structure for both permit areas planned to exist postmining is the water well in the Coal Hollow Mine permit area with details shown in Drawing 5-8C and location shown on 5-3, 5-35 and 5-37.
- Removal of Roads. Roads not retained for use under an approved postmining land use will be reclaimed immediately after they are no longer needed for mining and reclamation operations. Roads that are not listed as postmining roads in this section, will be closed to traffic, and all bridges and culverts removed. Prior to

reclamation, surface material that is incompatible with the postmining land use and revegetation requirements will be removed from the roads and properly disposed of at the mine site. The main haul road roadbeds will be scarified or ripped to break up the surface. Topsoil will be replaced on the roadbed and the surface revegetated in accordance with the standards set forth in R645. The portal access/haul road is in Pit 10 and will be backfilled when no longer needed.

Roads that will remain postmining are the following:

- Road to Water Well with details shown on Drawing 5-22D
- Road to east C. Burton Pugh property (K3993) with details shown on Drawing 5-22C
- County Road 136 (K3900) with details on Drawing 5-22E, 5-22F and 5-22G for the Coal Hollow Mine permit area and Drawings 5-61 and 5-63 for the North Private Lease. This County road will be reconstructed within the permit areas by Kane County. This reconstruction will occur concurrently with the final stage of reclamation as scheduled on Drawing 5-38 for the Coal Hollow Mine and Drawing 5-76B for the North Private Lease and is expected to be completed by 2017 and year 5 of operations, respectively.
- Alton Coal Mine Road (K3100) with details on Drawings 5-62 and 5-63. This County road will also be reconstructed within the permit area by Kane County, and will also be constructed concurrently with the final stage of reclamation as shown on Drawing 5-76B. It is expected to be completed by year 5 of operations.
- Road to Swapp Ranch (same specification as the Water Well Road)

The location of these roads is shown on Drawings 5-37 and 5-38 along with the post mining topography for each permit area.

- Removal of Water Control Structures. All sedimentation control structures, including ditches, berms and sedimentation ponds not retained as part of the approved post-mining land use will be removed, the areas regraded, topsoiled, and revegetated. All water control structures will be removed at final reclamation. See Appendices 5-12 and 5-12A and Drawing 5-79 for descriptions and plans. ACD has obtained a Nationwide Permit through the US Army Corps of Engineers (SPK 2011-01248) for the crossing of Culvert C-2. ACD will send the Division a copy of the mitigation completion report for this permit along with the Division's annual report in the year which the mitigation is completed. ACD will also notify the Division of completion and approval by the Corp of ACD's application for an Individual Section 404 permit under the same number. This notification will include a copy of the approval letter and reference to USACOE's public archive for viewing of the permit documents.

Final pit backfilling, removal of buildings, roads and other facilities, along with replacement of topsoil is expected to require approximately 15 months after the last coal is removed.

542.700. Final Abandonment of Mine Openings and Disposal Areas.

Final abandonment of alternative mined highwall panels (See Chapter 9 which addresses R645-302 regulations) will be at the time when completed panels are backfilled as described in Section 529.

Underground mine openings will be closed in accordance with R645-301-513, R645-301-529, R645-301-551 and approved MSHA requirements and backfilled.

When no longer needed for monitoring or other use approved by the Division upon a finding of no adverse environmental or health and safety effects, or unless approved for transfer as a water well under R645-301-731.100 through R645-301-731.522 and R645-301-731.800, each well will be capped, sealed, backfilled, or otherwise properly managed, as required by the Division in accordance with R645-301-529.400, R645-301-631.100, and R645-301-748. Permanent closure measures will be designed to prevent access to the mine workings by people, livestock, fish and wildlife, machinery and to keep acid or other toxic drainage from entering ground or surface waters.

If a water well is exposed by coal mining and reclamation operations, it will be permanently closed unless otherwise managed in a manner approved by the Division.

Permanent closure and abandonment of water wells greater than 30 feet in depth will be in accordance with the requirements of "Administrative Rules for Water Well Drillers", State of Utah, Division of Water Rights or other applicable state regulations. Abandonment of wells will be performed by a licensed water well driller. The wells to be abandoned will be completely filled using neat cement grout, sand cement grout, unhydrated bentonite, or bentonite grout, or other materials approved by the Utah State Engineer's office. Alternatively, the well may be abandoned using a different procedure upon approval from the Utah State Engineer's office.

Abandonment materials will be introduced at the bottom of the well or required sealing interval and placed progressively upward to the top of the well. The casing will be severed a minimum of 2 feet below the ground surface. A minimum of 2 feet of compacted native material will be placed above the abandoned well upon completion.

Within 30 days of the completion of well abandonment procedures, a report will be submitted to the State Engineer by the responsible licensed driller giving data related to the abandonment of the well. This shall include the name of the licensed driller or other person(s) performing abandonment procedures, name of well owner at the time of abandonment, the address or location of the well by section, township, and range, abandonment materials and equipment used, water right or file number covering the well, the final disposition of the well, and the date of completion.

Exploration holes and boreholes will be backfilled, plugged, cased, capped, sealed, or otherwise managed to prevent acid or toxic contamination of water resources and to minimize disturbance to the prevailing hydrologic balance. Exploration holes and boreholes will be managed to ensure the safety of people, livestock, fish and wildlife, and machinery.

If an exploration hole is exposed by coal mining and reclamation operations, it will be permanently closed unless otherwise managed in a manner approved by the Division.

If any exploration boreholes are to be used as monitoring wells or water wells, these will meet the provisions of R645-301-731

Boreholes will be backfilled to within 1 foot of the land surface with concrete or other materials approved by the Division as necessary to prevent contamination of groundwater or surface-water resources or to protect the prevailing hydrologic balance. The upper approximately 1 foot will be backfilled with native materials to facilitate reclamation (see Drawing 6-11). Exploration holes and boreholes that may be uncovered during mining and reclamation activities will be permanently closed unless approved for water monitoring or otherwise managed in a manner approved by the Division.

542.720. Disposal of Excess Spoil.

A geotechnical analysis has been completed for the proposed long term and temporary excess spoil structures for each permit area. This analysis estimates the long-term safety factor to be 1.6 to 1.7 based on the proposed design. Following proper construction practices of building the structure in maximum four foot lifts and meeting 85% compaction based on the standard Procter will ensure that the structure will be stable under all conditions of construction. This construction will occur only in the designated excess spoil area as shown on Drawings 5-3 and 5-35 for the Coal Hollow Mine and Drawing 5-47 and 5-51A for the North Private Lease. The fill will be placed with end dump haul trucks and lifts will be constructed using dozers. High precision GPS systems will be regularly utilized to check grades and appropriate lift thickness. The geotechnical analysis for this structure can be viewed in Appendix 5-1 for the Coal Hollow Mine and Appendix 5-11 for the temporary structure at the North Private Lease. Following the completion of surface mining in the highwall trench, backfill operations from the long-term excess spoil structure to the open pit has been ongoing to bring both the spoil structure and highwall trench areas to AOC. It is anticipated that backfill of the highwall trench will be completed by the 9th of June, 2016. Therefore, a small portion (apx. 250k C.Y.) of the long-term excess spoil structure may remain at the Coal Hollow Mine until final backfill of Pit 10. In preparation for final borrow, Pit B-1 (as shown on Drawing 5-10) will be excavated and simultaneously backfilled to remove all coal from the borrow volume to reach the intermediate landform depicted in Drawings 5-35 and 5-36. Then, following the completion of underground mining, backfill of Pit 10 will be completed utilizing borrow from the areas delineated in Drawings 5-19 and 5-37. Final backfill will require approximately 1.5 Million C.Y. of borrow material, but will still achieve AOC.

Excess spoil that is combustible will be adequately covered with noncombustible material to prevent sustained combustion.

542.730. Disposal of Coal Mine Waste.

The MRP does not contemplate processing of coal that would produce coal mine waste.

542.740. Disposal of Noncoal Mine Wastes.

Noncoal mine waste including, but not limited to grease, lubricants, paints, flammable liquids, garbage, abandoned mining machinery, lumber and other combustible materials generated during mining activities will be placed and temporarily stored in a controlled manner in a designated portion of the permit area and hauled offsite to a state approved recycling or solid waste disposal site. Final disposal of noncoal mine waste will not take place within the permit area. With the exception of removal of perforated piping used in the construction of Alluvial Ground Water Drains that will be left in place as mining advances and water line piping. This perforated piping will be covered in place approximately 20' to 30' below the final reclaimed surface. All other waste materials (ie. metal culvert) associated with the Alluvial Ground Water Drains will be removed and disposed of in a State-approved solid waste disposal site. The buried water line from the well to the Coal Yard, all buried water pipe within the Coal Yard and the buried water line from the tank East of Pit 10 will be cut off 4' below the final surface, capped and left in place.

542.800. Reclamation Cost.

The amount of the bond will depend upon the requirements of the ***approved*** permit and reclamation plan (R645-830.120).

A preliminary estimate of reclamation costs is included in Chapter 8 and Appendices 8-1 and 8-2. This estimate is based upon the proposed plan of open pit, highwall and underground mining, as well as eventual borrow to backfill Pit 10 at the conclusion of underground mining. A final bond estimate will be provided by the applicant to the Division upon completion of the approved permit and reclamation plan.

550. RECLAMATION DESIGN CRITERIA AND PLANS

551. SEALING AND CASING OF UNDERGROUND OPENINGS

When no longer required, underground mine openings will be closed in accordance with R645-301-513, R645-301-529, R645-301-551 and MSHA approved requirements and backfilled. When no longer needed for monitoring or other use approved by the Division upon a finding of no adverse environmental or health and safety effects, or unless approved

for transfer as a water well under R645-301-731.100 through R645-301-731.522 and R645-301-731.800, each well will be capped, sealed, backfilled, or otherwise properly managed, as required by the Division in accordance with R645-301-529.400, R645-301-631.100, and R645-301-748. Permanent closure measures will be designed to prevent access to the mine workings by people, livestock, fish and wildlife, machinery and to keep acid or other toxic drainage from entering ground or surface waters.

If a water well is exposed by coal mining and reclamation operations, it will be permanently closed unless otherwise managed in a manner approved by the Division.

Permanent closure and abandonment of water wells greater than 30 feet in depth will be in accordance with the requirements of "Administrative Rules for Water Well Drillers", State of Utah, Division of Water Rights or other applicable state regulations. Abandonment of wells will be performed by a licensed water well driller. The wells to be abandoned will be completely filled using neat cement grout, sand cement grout, unhydrated bentonite, or bentonite grout, or other materials approved by the Utah State Engineer's office. Alternatively, the well may be abandoned using a different procedure upon approval from the Utah State Engineer's office.

Abandonment materials will be introduced at the bottom of the well or required sealing interval and placed progressively upward to the top of the well. The casing will be severed a minimum of 2 feet below the ground surface. A minimum of 2 feet of compacted native material will be placed above the abandoned well upon completion.

Within 30 days of the completion of well abandonment procedures, a report will be submitted to the State Engineer by the responsible licensed driller giving data related to the abandonment of the well. This shall include the name of the licensed driller or other person(s) performing abandonment procedures, name of well owner at the time of abandonment, the address or location of the well by section, township, and range, abandonment materials and equipment used, water right or file number covering the well, the final disposition of the well, and the date of completion.

Exploration holes and boreholes will be backfilled, plugged, cased, capped, sealed, or otherwise managed to prevent acid or toxic contamination of water resources and to minimize disturbance to the prevailing hydrologic balance. Exploration holes and boreholes will be managed to ensure the safety of people, livestock, fish and wildlife, and machinery.

If an exploration hole is exposed by coal mining and reclamation operations, it will be permanently closed unless otherwise managed in a manner approved by the Division. If any exploration boreholes are to be used as monitoring wells or water wells, these will meet the provisions of R645-301-731

Boreholes will be backfilled to within 1 foot of the land surface with concrete or other materials approved by the Division as necessary to prevent contamination of groundwater or surface-water resources or to protect the prevailing hydrologic balance. The upper approximately 1 foot will be backfilled with native materials to facilitate reclamation (see Drawing 6-11). Exploration holes and boreholes that may be uncovered during mining and

reclamation activities will be permanently closed unless approved for water monitoring or otherwise managed in a manner approved by the Division.

552. **PERMANENT FEATURES**.

552.100

Small depressions may be constructed if they are needed to retain moisture, minimize erosion, create and enhance wildlife habitat, or assist revegetation.

552.200

All impoundments will be reclaimed, no permanent impoundments are proposed.

553 **BACKFILLING AND GRADING:**

Backfilling and Grading of the mined areas will proceed in conjunction with coal recovery operations.

The following is a description of the overburden removal and backfilling process:

For the Coal Hollow Mine, based on the overburden isopach map (Drawing 5-15), the overburden removal and backfilling process has been separated into three major stages. The first stage of this process is for the initial mining area, Pits 1-9. These pits have a relatively low strip ratio, approximately 4:3 (refer to Drawing 5-13). In order to efficiently remove overburden for this phase, spoil from the first three pits will be placed in an excess spoil area located immediately west of Pit 1. This excess spoil structure will hold approximately 2.7 million loose cubic yards (LCY) of material. Once the excess spoil pile is filled, overburden from the next 5 pits can then be used as pit backfill as the mining progresses through Pit 9. Pit 9 will not be backfilled at this stage; it has been left open for placement of the highwall miner (See Chapter 9 which addresses R645-302 regulations) to recover coal from panels 1-3.

From the initial mining area, operations will proceed from the southeast ¼ of Section 30, beginning with pit 28 and proceeding north to pit 20. Material from pit 28 was place in the excess spoil structure with overburden material from successive pits to the north being placed in the mined out pit to the south. These pits were not mined as initially laid out due to the coal being eroded in the eastern half of pit 28 and numerous sand channels replacing much of the coal in the eastern portions of pit 22-27. These pits as mined have a relatively low strip ratio of approximately 5.0:2. While overburden removal was occurring in pit 22, coal recovery was occurring from the pit 9 highwall panels. In this method of mining, an unmanned cutter module is driven underground and operated in front of the highwall. The highwall mining machine stands on the pit floor or on a bench, directly in front of the exposed seam and makes long parallel rectangular drives into the coal seam. A remote-operated cutter module is pushed into the seam by a string of push

beams (unmanned coal-conveying elements) that transport the mined coal back to the entry of the drive onto a stockpile. Coal is then removed to the sizing/loading area. The miner is moved along the face making successive pushes into the coal face. Once coal is removed from the Pits/ Highwall Trench, overburden from excavation of the next Highwall Trench is used to backfilled the mined out area continuing with the progression of the trench. In hole 27 of Pit 9 Panel 3, the highwall miner head became lodged. Another head was leased in order to continue highwall mining from pits 22 and 23 while a recover plan was approved to mine Pit 10 and recover the lodged miner head.

In Stage three, Pit 21 was then mined along with the highwall panels in 21, then Pit10. The strip ratio for these two pits was 8.0 and 12.1 respectively. Overburden was placed in the pits to the south from pit 21 and in pit 9 from pit 10. Pit 10 will remain open for development of the underground portals and remain open until all underground coal is mined. There will be no additional overburden removal associated with the underground mining. Surface mining will continue with mining of Highwall Trench (HWT) 1 continuing south to HWT 3. The strip ratio for the highwall trench is 10.3:1. Overburden from HWT 1 will fill the remaining pit 9 with material from HWT 2 and 3 filling the previously mined portions of highwall trench and any remaining void in Pits 9, 20, 21, and 22.

Following the completion of surface mining in the highwall trench, backfill operations from the long-term excess spoil structure to the open pit has been ongoing to bring both the spoil structure and highwall trench areas to AOC. It is anticipated that backfill of the highwall trench will be completed by the 9th of June, 2016. Therefore, a small portion (apx. 250k C.Y.) of the long-term excess spoil structure may remain at the Coal Hollow Mine until final backfill of Pit 10. In preparation for final borrow, Pit B-1 (as shown on Drawing 5-10) hasswill been excavated and simultaneously backfilled to remove all coal from the borrow volume to reach the intermediate landform depicted in Drawings 5-35 and 5-36. Mining of Pit B-1 will begin by dozing a thin layer (apx. 5 ft) of overburden covering the eastern extent of Pit B-1 from east to west in a strip 50 to 100 ft wide to create a temporary overburden berm. The coal underneath this first strip will then be extracted leaving a void into which the berm and subsequent strip overburden can be placed. The coal strips will progress from east to west, with dozing and potentially truck haulage replacing the stripped overburden into the coal voids from west to east. Mining slopes will be maintained at a 1:1 face angle for mining benches under 50 ft. Above 50 ft., a 40 ft. catch bench will be installed between 40 ft. 1:1 benches. Additional fill material will be sourced from the adjacent pit slopes as necessary to establish the final 3:1 slope on the South pit wall and to meet the intermediate design surface depicted in Drawings 5-35 and 5-36. As shown on in these drawings, this pit is nearly fully contained within the greater Borrow Area but will require approximately 91,000 CY of backfill material to establish the final 3:1 slope on top of the 1:1 operational slope and bench on the South pit wall. This 91,000 CY will remain in place in the final slope and will not be recovered in the final borrow. The remaining backfill will then remain in place until closure of the Underground Mine and finally rehandled as backfill to Pits 9-C and 10. Final backfill will require approximately 1.5 Million C.Y. of borrow material, but will still achieve AOC.

Following approval of the Federal LBA and acquisition of necessary leases, mining and reclamation will continue into pits 10-B and Pits F-1 to F-8 as shown on Drawings 5-10 and 5-16. These pits will be mined and backfilled with the same methods described above and will progress from South to North while directly backfilling to the South. This will result in the backfill of the current underground portal area, so that as mining finishes in Pit F-8 the pit will be left open in anticipation of development of another portal with the borrow area serving to provide eventual backfill. As permitting of the larger LBA continues, subsequent amendments will address the final location of the portal pad and further plans for underground mining as well as any potential changes to backfill sourcing. The reclamation sequence for the Coal Hollow Mine is shown in Drawing 5-38.

The following table summarizes the overburden and backfill movement for the Coal Hollow Mine:

Coal Hollow Mine Overburden Summary	
2011	2,065,000 CY
2012	3,582,000 CY
2013	3,090,500 CY
2014	3,423,600 CY
2015	1,613,000 CY
2016	277,000 CY
2017	0
2018	0
2019	5,196,600 CY
2020	5,032,300 CY
Borrow	1, 516,200 CY
Total	25,796,200 CY

~~Coal Hollow Mine Overburden Summary~~	
~~2011~~	~~3,511,849 CY~~
~~2012~~	~~2,135,022 CY~~
~~2013~~	~~3,090,547 CY~~
~~2014~~	~~3,423,635 CY~~
~~2015~~	~~2,375,581 CY~~
~~2016~~	~~277,000 CY~~
~~Borrow~~	~~1, 516,200 CY~~
~~Total~~	~~16,329,834 CY~~

Rough backfilling and grading operations will follow coal removal by not more than 60 days or 1500 linear feet except that ~~Pit 10~~the final open pit will remain open until removal of underground coal is complete. Another possible exception would be the necessity of leaving a block of approximately 200’ X 600’ of North Private Lease Pit 9

open pending final approval of continued mining in Areas 2 and 3. Should approval of Areas 2 and 3 for further mining be delayed, the block would need to remain open until construction of Pond 7 was completed, so that mining and backfilling of Pit 9 could progress through Pond T1. As shown on Drawing 5-76A, under any final circumstance that disallows continuation of mining from the extension of Area 1 into Areas 2 and 3, the final pit void remaining in Pits 9 will be backfilled from backfill borrow upgradient to the West while achieving AOC in both areas.

For the North Private Lease, the lease boundary encompasses three Permit Areas.

Based on the overburden isopach map (Drawing 5-56), the overburden removal has been separated into three major stages. The initial area of overburden removal is the mining area, Pits 1-10. These pits have a relatively low strip ratio, approximately 4.6:1 (refer to Drawing 5-54). In order to efficiently remove overburden for this phase, spoil from pit 1 and pit 2 will be placed in a temporary excess spoil area on the area of pits 5 and 6. This excess spoil structure will hold approximately 506,000 loose cubic yards (LCY) of material. Once the excess spoil pile is filled, overburden from the remaining pits can then be used as pit backfill as the mining progresses through Pit 10, also as pit 4 is completed, material from the temporary spoils pile can be placed in pit backfill.

From the initial mining area, operations will proceed North from Pit 11to Pit 21. These pits have a strip ratio increasing from 4.7:1 to 9.6:1. All spoils are placed in the proceeding void.

The final mining area will be developed on the East side of Kanab Creek. Overburden removal from Highwall Trench 1 will proceed north in the trench with overburden being placed directly as backfill in the same highwall trench, progressing from South to North.

For start-up of the North Private Lease, some delay is unavoidable in reclamation of the initial mining areas due to the time required to establish the initial working pit and backfill area, and to achieve a steady state excavation/backfill operation. In accordance with R645-301-553, backfill of each pit will commence no more than 60 days after the removal of coal. As currently planned, Pits 1 and 2 will be backfilled to the planned post mining contour, graded, and the subsoil and topsoil replaced concurrently with mining of Pits 3, 4, and 5. Depending on the timing of approval for Areas 2 and 3, mining and backfill in the extension of Area 1 (which contains Pits 7, 8 and 9) may be limited as shown in Drawing 5-57 by Pond T1 and the geologic contact between Tropic Shale and Quaternary Alluvium in Pits 8 and 9. Temporary Pond T1 must remain in place until Pond 7 has been constructed and no alluvium will be mined until the hydrologic analysis of Areas 2 and 3 has been performed and approved. Once these approvals are obtained, the Area 2 facilities will be constructed and Pond T1 and the other Area 1 extension temporary facilities will be removed or mined out by advancing pits. Reclamation activities will proceed at the regular planned rate thereafter. As mining progresses through Pit 21 the semi-final pit void will require approximately 1,600,000 cubic yards to be rehandled from the backfill located above the final landform depicted in Drawing 5-74 previously placed in the adjacent pits. No other borrow or rehandle will be necessary

from the highwall trench area, but the final landform depicts the previously approved borrow configuration of the topographic ridge should the operational need for material arise. Either configuration of this ridge will provide that natural landform, post-mining land use, and drainage will be maintained or improved. In the case where borrow from the area east of Kanab Creek is not necessary, the material void will not occur and post-mining topography will achieve AOC while closely mirroring original topography as shown on Drawing 5-45.

Of note, erosional scours and the stock ponds identified on Drawing 7-7 within the center and western drainages existing prior to mining will be eliminated per the landowner request. This requires coordination with the USACOE for the elimination of wet lands (final landform shown on Drawings 5-74 and 5-75) identified in the Preliminary Jurisdictional Determination SPK-2011-01248 November of 2012 and updated September 2015 (MRP, Volume 10, NPL Wetland Study Report Final). Disturbances within the identified wetlands will not occur until approval of the 404 permit. The 404 permit will allow for take of the wetlands within the center drainage with wetlands being replaced in offsite mitigation under USCOE jurisdiction.

The following table summarizes overburden movement for the North Private Lease.

North Private Lease Overburden Summary	
Year 1	2,013,603 CY
Year 2	2,414,827 CY
Year 3	3,429,000 CY
Year 4	3,429,000 CY
Year 5	3,456,000 CY
Year 6	3,456,000 CY
Year 7	1,254,600 CY
Total	19,453,030 CY

Major steps in the backfilling and grading process for both permit areas are:

- Backfilling of the Mined Out Pit. Material from active pits will be used to backfill mined out pits as mining progresses. Material will be placed in the in-pit backfill in lifts, until the approximate planned final elevation is reached. Working stability in the backfill will be achieved by placement of the material, and control of the overall spoil face slope at stable angles. The mined out area will be filled to its planned post-mining elevation, which approximates the pre-mining land contour. The backfill will be inherently stable because the exposed surface will have shallow slopes, and the backfill surface will not be significantly higher than the surrounding undisturbed ground.
- Backfilling of Ramps. Ramps and travelways within the active mining will be moved as necessary for safe operation and efficient hauling of overburden and

coal. When a particular ramp or travelway is no longer needed, it will be backfilled with excavated overburden from the advancing pit.

- Grading. After backfilling is complete in each mined out area, the area will be graded using dozers and motor graders to achieve the planned post-mining contour, facilitate stable positive drainage patterns, and to blend in with the surrounding topography. Postmining slopes will not exceed either the angle of repose or such lesser slope as is necessary to achieve a minimum long-term static safety factor of 1.3 and prevent slides. A geotechnical analysis has been completed for the excess spoil structure and can be found in Appendix 5-1.

Timing of backfilling and grading operations will depend on the rate of mine advance and the availability of backfill space and material. It is planned that mined areas will commence backfilling and grading within 60 days following coal removal. As described in the previous text there will be a variance from this standard for ~~Pit 10~~the final pit of the Coal Hollow Mine as it remains open during underground mining operations. Also, as the North Private Lease progresses toward Pit 21 in the North of Permit Area 2 and accumulates an ever-growing void, the width of the void space increases but never exceeds 400 ft., therefore the area in the void may take slightly longer to commence backfill activities than the standard 60 days. This will be immediately resolved once mining commences in the Highwall Trench on the eastern side of the permit area. Areas needed for in-pit roads, ramps, drainage controls or areas which must be left open temporarily for operational reasons will be backfilled and graded as they become available.

553.110

All areas will be restored to approximate original contour for the Coal Hollow Mine as shown on Drawing 5-37. R645-301-553.800 (Thick Overburden) does not apply to this surface mine. The slopes will be regraded to a maximum angle of 3h:1v and most slopes are flatter as shown on Drawing 5-37 and 5-37A. A geotechnical analysis has been completed to verify that the spoil material will be stable long term. This analysis can be viewed in Appendix 5-1.

All areas will be restored to approximate original contour for the North Private Lease as shown on Drawings 5-74 and 5-75. R645-301-553.700 (Thin Overburden) does not apply to this surface mine. The slopes will be regraded to a maximum angle of 3h:1v and most slopes are flatter as shown on Drawing 5-74 and 5-75. A geotechnical analysis has been completed to verify that the spoil material will be stable long term. This analysis can be viewed in Appendix 5-11.

553.120

All highwalls will be eliminated in the final landform. Small depressions may be constructed as needed to retain moisture, minimize erosion, create and enhance wildlife habitat or assist vegetation. All spoil piles will be eliminated as shown on Drawing 5-37.

553.130

Postmining slopes for both permit areas will not exceed the angle of repose which is expected to be approximately 1.5h:1v (33° to 35°) as described in Appendix 5-5. This appendix is an analysis by Dr. Ben Seegmiller addressing the safety factor for the post mining reclaimed slope with the lowest safety factor outside the excess spoil area. This analysis concludes that a minimum safety factor of these slopes reclaimed with a planned maximum slope angle of 3h:1v (18.4°) will be 1.7 which exceeds the requirement of 1.3. Appendix 5-5 also states that this planned reclaim slope angle is much less than the general area angle of repose. In fact it is at least 14° less. Therefore, postmining slopes reclaimed at the planned angle of 3h:1v (18.4°) are considered stable.

The excess spoil slopes have been analyzed by Alan Taylor, P.E., an expert in geotechnical engineering. These slopes also significantly exceed the required 1.3 safety factor. Details for this analysis by Mr. Taylor can be viewed in Appendix 5-1.

553.140

Slopes will be regraded and vegetated to minimize erosion and water pollution on and off the site.

553.150

Backfilling and grading will be conducted to support the approved post mining land use.

553.200 Spoil and Waste.

Spoil located in each of the excess spoil areas will be compacted to 85% of the standard Procter to provide long term stability of these structures. Remaining backfill in mined out areas will be confined and regraded to approximate original contour and will therefore not require compaction for long term stability. Subsoil will be placed over spoils and waste prior to placement of topsoil. This subsoil layer will provide a covering with minimal infiltration rate to prevent leaching of toxic materials.

553.210

Excess spoil from surface mining activities will be disposed of according to R645-301-211, R645-301-212, R645-301-412.300, R645-301-512.210, R645-528.310, R645-301-535.100 through R645-301-535.130, R645-301-535.300 through R645-301-535.500, R645-536.300, R645-301-542.720, R645-301-553.240, R645-301-745.100, R645-301-745.100, R645-301-745.300, and R645-301-745.400. Detail for meeting these standards can be reviewed in the corresponding sections.

553.220

The MRP does not contemplate placing spoil on areas outside the mined-out surface area for the purposes of restoring the approximate original contour.

553.300. Covering of Exposed Coal Seams, and Acid- and Toxic-Forming Materials.

Exposed coal seams, acid- and toxic-forming materials, and combustible materials exposed, used, or produced during mining will be adequately covered with nontoxic and noncombustible materials, or treated, to control the impact on surface and ground water in accordance with R645-301-731.100 through R645-301-731.522 and R645-301-731.800, to prevent sustained combustion, and to minimize adverse effects on plant growth and on the approved postmining land use.

553.400. Cut and Fill Terraces

The MRP does not contemplate constructing cut and fill terraces.

553.500. Previously Mined Areas (PMA's) and Continuously Mined Areas (CMA's).

The MRP does not contemplate operations associated with PMA’s, CMA’s, or areas with remaining highwalls.

553.600. Highwall Management

The MRP does not contemplate operations associated with PMA’s, CMA’s, or areas with remaining highwalls.

553.700. Backfilling and Grading: Thin Overburden.

The Coal Hollow project is expected to have approximately 1.5 million cubic yards of spoil shortfall; but ACD proposes to make up for this void and still meet approximate original contour by handling approximately 1.5 million cubic yards of material from a borrow area as shown in Drawings 5-19, 5-37 and 5-37A to complete backfill of Pit 10 and the underground portals. In so doing, a surface configuration and drainage pattern that closely resemble original conditions will be achieved so that neither R645-301-553.700 nor 301-553.800 apply to the Coal Hollow Mine permit area.

For the North Private Lease, based on updated swell factors of mined material found in Appendix 5-11, mining is expected to result in a deficit of spoil of approximately 1.0 million cubic yards from original topography. ACD proposes to make up for this void and still meet approximate original contour utilizing the designed post mining landform depicted in Drawings 5-74 to 5-75. This landform accounts for the deficit while ensuring that a surface configuration and drainage pattern that closely resemble original conditions

will be achieved so that neither R645-301-553.700 nor 301-553.800 apply to the North Private Lease permit area.

553.800. Backfilling and Grading: Thick Overburden.

553.810

This rule does not apply to either the Coal Hollow Mine or the North Private Lease.

553.820 - 553.830

Backfilling and Grading of thick overburden will meet the following requirements:

- *R645-301-211: The applicant will present a description of the premining soil resources as specified under R645-301-221. Topsoil and subsoil to be saved under R645-301-232 will be separately removed and segregated from other material.*

  The soil resources for the proposed excess spoil disposal areas are described in Appendix 2-1. A plan has been developed for removal of topsoil and suitable subsoil based on the soil descriptions in this appendix. The handling plan can be viewed on Drawing 2-2. Topsoil and acceptable subsoil will be separately removed and segregated from other material prior to placement of any spoil.

- *R645-301-212: After removal, topsoil will be immediately redistributed in accordance with R645-301-242, stockpiled pending redistribution under R645-301-234, or if demonstrated that an alternative procedure will provide equal or more protection for the topsoil, the Division may, on a case-by case basis, approve an alternative;*

  The landform underneath the Excess spoil will have topsoil and subsoil redistributed in an approximately uniform, stable thickness with the approved post mining land use, contours and surface water drainage systems. Material handling practices will prevent excess compaction of these materials. Handling practices will also protect the materials from wind and water erosion before and after seeding and planting.

- *R645-301-412.300: Criteria for Alternative Postmining Land Uses.*

  Not Applicable

- *R645-301-512.210: Excess Spoil. The professional engineer experienced in the design of earth and rock fills will certify the design according to R645-301-535.100.*

A professional engineer experienced in the design of earth and rock fills with assistance from a geotechnical expert has certified the design according to R645-301-535.100. These certifications can be viewed on Drawings 5-37, 5-37A, 5-47, 5-51A and 5-17.

- *R645-301-512.220: Durable Rock Fills*

  No durable rock fills are planned.

- *R645-301-514.100: Excess Spoil. The professional engineer or specialist will be experienced in the construction of earth and rock fills and will periodically inspect the fill during construction. Regular inspections will also be conducted during placement and compaction of fill materials.*

  A professional engineer or specialist that is experienced in the construction of earth and rock fills will inspect the fill during construction and regular inspections will also be conducted during placement and compaction of fill materials.

- *R645-301-528.310: Excess spoil will be placed in designated disposal areas within the permit areas within the permit area, in a controllable manner to ensure mass stability and prevent mass movement during and after construction. Excess spoil will meet the design criteria of R645-301-535. For the purposes of SURFACE COAL MINING AND RECLAMATION ACTIVITIES, the permit application must include a description of the proposed disposal site and the design of the spoil disposal structures according to R645-301-211, R645-301-212, R645-301-412.300, R645-301-512.210, R645-528.310, R645-301-535.100 through R645-301-535.130, R645-301-535.300 through R645-301-535.500, R645-536.300, R645-301-542.720, R645-301-553.240, R645-301-745.100, R645-301-745.100, R645-301-745.300, and R645-301-745.400.*

  Excess spoil will be placed in the areas designated on Drawings 5-3 and 5-37 for the Coal Hollow Mine. This fill will be placed in lifts not to exceed 4 feet. The material will be transported from the overburden removal area to the fill by end dump haul trucks and a dozer(s) will spread the spoil to this lift thickness. The fill will meet at minimum 85% compaction as related to the standard Procter. Final slopes will be regraded to a maximum slope of 3h:1v. The top of the fill will be sloped to approximately 2% to prevent pooling of water and to reestablish drainage similar to the original flow patterns. The excess spoil placed on the non-mined areas at the Coal Hollow Mine is approximately 32 acres and varies in height from 35 to 110 feet. The excess spoil pile will be completely rehandled as pit backfill prior to final reclamation. Following the completion of surface mining in the highwall trench, backfill operations from the long-term excess spoil structure to the open pit has been ongoing to bring both the spoil structure and highwall trench areas to AOC. It is anticipated that backfill of the highwall trench will be completed by the 9th of June, 2016. Design and the geotechnical study of this long-term fill can be viewed in Appendix 5-1.

- *R645-301-535.100 through R645-301-130: Disposal of Excess Spoil*

  A geotechnical analysis of the excess spoil structure designs has been completed by an expert in this field. The long term static safety factor for these structure designs is estimated at 1.6 to 1.7. Lifts will be placed in thicknesses not to exceed 4 feet. The lifts will meet 85% compaction by the standard Procter. The fills will be graded to allow for drainage similar to original patterns and to prevent excessive infiltration of water. For the Coal Hollow Mine, following the completion of surface mining in the highwall trench, backfill operations from the long-term excess spoil structure to the open pit have been ongoing to bring both the spoil structure and highwall trench areas to AOC. It is anticipated that backfill of the highwall trench will be completed by the 9th of June, 2016. The landform beneanth the fill will be covered with subsoil and topsoil as specified in Chapter 2 to provide conditions suitable for revegetation of the area. The geotechnical study can be viewed in Appendix 5-1for the Coal Hollow Mine.

- *R645-301-535.300 through R645-301-535.500: Disposal of Excess - Spoil Durable Rock Fills.*

  Not Applicable

- *R645-301-536.300: Disposal of Coal Mine Waste in Excess Spoil*

  No coal mine waste is planned in the excess spoil area.

- *R645-301-542.720: Excess spoil will be placed in designated disposal areas within the permit area, in a controlled manner to ensure that the final fill is suitable for reclamation and revegetation compatible with the natural surroundings and the approved postmining land use. Excess spoil that is combustible will be adequately covered with noncombustible material to prevent sustained combustion. The reclamation of excess spoil will comply with the design criteria under R645-301-553.240.*

  The landform beneath the Coal Hollow Mine long term excess spoil as shown in Drawing 5-37 and 5-37A will be suitable to the surrounding area and for the postmining land use of primarily grazing. No combustible excess spoil will be placed in the proposed structure. The reclamation of the spoil does not include any terraces and the slopes will not exceed 3h:1v.

- *R645-301-553.240: The final fill configuration of the fill (excess spoil) will be suitable for the approved postmining land use. Terraces may be constructed on the outslope of the fill if required for stability, control of erosion, to conserve soil moisture, or to facilitate the approved postmining land use. The grade of the outslope between terrace benches will not be steeper than 2h:1v (50 percent).*

The landform beneath the Coal Hollow Mine excess spoil as shown in Drawings 5-37 and 5-37A will be suitable to the surrounding area and for the postmining land use of primarily grazing. The reclamation of the spoil does not include any terraces and the slopes will not exceed 3h:1v. This slope angle has been utilized at similar mining operations and found to be suitable for erosion control and revegetation of reclaim slopes. The long term static safety factor for these slopes is estimated to be 1.6 to 1.7.

- *R645-301-745.100: General Requirements.*

  745.110: Excess Spoil will be placed in designated disposal areas within the permit area, in a controlled manner to:

  745.111: Minimize the adverse effects of leaching and surface water runoff from the fill on surface and underground water;

  Reclamation of the landform beneath the Coal Hollow long term excess spoil will include a topsoil cover and subsoil layer. Infiltration through the reclamation is expected to be minimal based on the high clay content of these soils. In addition, laboratory data for the overburden shows that there is minimal potential for leaching of pollutants should infiltration rates become higher than expected.

  The foundation of the excess spoil area also has high clay content with minimal potential for infiltration. This will provide an additional, natural barrier to protect ground water present beneath the proposed structure.

  745.112: Ensure permanent impoundments are not located on the completed fill. Small depressions may be allowed by the Division if they are needed to retain moisture or minimize erosion, create and enhance wildlife habitat or assist revegetation, and if they are not incompatible with the stability of the fill; and

  Permanent impoundments are not planned on the excess spoil area. Small depressions are also not planned in the excess spoil and are not viewed as a necessary enhancement to final reclamation based on average annual moisture data and the proposed slope configuration of the pile.

  745.113: Adequately cover or treat the excess spoil that is acid- and toxic forming with nonacid nontoxic material to control the impact on the surface and ground water in accordance with R645-301-731.300 and to minimize adverse effects on plant growth and approved postmining land use.

  Laboratory data representative of the overburden planned for disposal in the excess spoil area does not show acid- and toxic forming characteristics.

  745.120: Drainage Control. If the disposal area contains springs, natural or manmade water courses, or wet weather seeps, the fill design will include

diversions and underdrains as necessary to control erosion, prevent water infiltration into the fill and ensure stability.

A spring and seep survey available in Chapter 7 has identified no springs or wet weather seeps in the proposed excess spoil area. The final surface will be regraded to a contour that will route natural water from snowmelt and rainfall around the excess spoil as shown on the final contours Drawing 5-37. There are no manmade water courses present in the excess spoil area. No underdrains are planned for the excess spoil structure.

745.121: Diversions will comply with the requirements of R645-301-742.300

No diversions are planned in the excess spoil area.

745.122 : Underdrains

No underdrains are planned in the excess spoil area.

745.300: Durable Rock Fills

No Durable Rock fills are planned.

745.400: Preexisting Benches

The MRP does not contemplate disposal of excess spoil on preexisting benches.

Alton Coal Development, LLC will provide the Division, as part of the annual report for each calendar year, Drawing 5-38 for the Coal Hollow Mine and Drawing 5-76A and 5-76B for the North Private Lease. The Drawings will provide an as-built of the reclamation sequence, depicting the acres of open pit and /or trench, the acres backfilled, the acres fully reclaimed (topsoiled and seeded) and revisions to the reclamation timetable. This information will be submitted by March 28th of each calendar year with the appropriate C1/C2.

560. Performance Standards

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

APPENDIX 5-2

HYDROLOGY AND RUNOFF CONTROL

COAL HOLLOW MINE

SOUTHERN BLOCK

AUGUST 2018

Hydrology and Runoff Control

For the

Southern Block

Coal Hollow Mine

General

The mining plan for the southern portion of the Coal Hollow Mine has been revised to include additional surface mining to the north of existing Pit 10. As a result, Pit 10 will now be backfilled according to the approved plan. The expansion will result in a series of changes to the hydrologic control structures within the minesite, which will include the elimination of Sediment Pond 2 and Ditch 2, the extension of Ditches 1 and 4 and changes in Watersheds 3, 4 and 5.

Due to the extent of the changes and in an effort to make the Hydrology and Runoff Plans for the North Lease and the South Block compatible, this appendix has been rewritten and will re-evaluate the watershed characteristics and provide updated sizing and design criteria for adequate runoff and sediment control for this area.

Method

The watersheds for the Undisturbed, Disturbed and Alternate Sediment Control Areas are shown on Drawing 5-26. Watershed areas, hydraulic lengths and elevations were measured directly from this map. Calculations to determine flow characteristics and volumes were performed using the Office of Surface Mining "Storm Program 6.20", by Gary E. McIntosh. This program is based on the SCS TR-55 Method of Peak Flow Determination.

Parameters

The following are the categories analyzed in this appendix, along with the parameters used:

Rainfall – Designs are based on rainfall amounts taken directly from the NOAA Atlas 14, Vol. 1, Version 5, "Point Precipitation Frequency, Alton, Utah". Rainfall amounts used herein are:

2 year – 6 hour precipitation event - 0.96”

10 year - 6 hour precipitation event - 1.41”

25 year - 6 hour precipitation event - 1.72”

10 year - 24 hour precipitation event - 2.39”

Watersheds – Watershed areas, lengths and elevations were measured directly from Drawing 5-26. All undisturbed areas were assigned a runoff curve number (CN) of 63, reclaimed and mining areas to be reclaimed are assigned a CN of 75, and all remaining disturbed areas have a runoff curve number of 89, as used in the existing approved plan.

Runoff Curve Numbers – As indicated above, 3 separate runoff curve numbers have been used in these calculations. The undisturbed CN of 63 is the same as previously used and approved for the minesite. The CN of 89 is also the same as previously approved, and is applied to those areas that will likely remain disturbed throughout the project. The intermediate runoff curve number of 75 has been used for all other areas to be mined and sequentially reclaimed per the approved mine plan. This number is considered conservative compared to the original approved plan, and is based on the following:

- Surface mining areas are reclaimed and revegetated within specified approved time frames, which minimizes the area that will be disturbed at any one time;
- Runoff from the active mining area is typically controlled within the pit area, greatly reducing the actual amount reporting to the ponds during an event;
- Only areas which are necessary to the operation or active mining are disturbed. All other areas draining to the ponds are left undisturbed, with a much lower runoff potential, until pit construction is necessary;
- Past experience on the property has shown that revegetation of reclaimed sites has good success in one to two growing seasons, also reducing runoff and sediment loading to the ponds.

This is the original permit area for the Coal Hollow Mine, and the majority of the site has been mined and reclaimed. Due to the past operations, the watersheds contributing

runoff to the sediment ponds may contain 2 or all 3 of the curve number conditions described above. As a result, the runoff calculations for each of the ponds has been re-evaluated using a weighted runoff CN value. The areas were taken from Drawing 5-26, and the weighted average CN values are as follows:

Watershed	CN 63 Ac.	CN 75 Ac.	CN 89 Ac.	Total Ac.	Weighted CN
1	11.1	0	16.6	27.7	79
3	147.4	227.4	3.6	378.4	70
4	23.5	74.0	2.3	99.8	73

All other watersheds are considered with single CN values as shown on Table 1.

Sediment Ponds – Sediment Pond designs are based on regulatory requirements of containment for runoff from a 10 year/24 hour precipitation event of 2.39", plus 3 years of calculated runoff sediment storage. Pond outlets are sized to carry at least the peak flow from a 25 year/6 hour event.

Diversions – All diversions are conservatively sized to control runoff from a 10 year-6 hour event of 1.41". All diversions on the site are considered temporary and will be removed upon completion of operations. Haul road ditch calculations and sizing are also included with the diversion calculations.

Culverts – There are 2 new culverts planned for the road crossings in Ditch 1, as shown on Drawing 5-3A. The culverts are designed to carry the runoff from a 10 year - 6 hour precipitation event, as required. Culvert designs are shown on Table 5 of this appendix.

ASCA's – There is one ASCA (Alternate Sediment Control Area) proposed for this site. The runoff for this area is based on the 10 year-24 hour event of 2.39". Runoff from the ASCA will be treated by filtering with straw bales and/or silt fences prior to discharge. Details are shown on Table 6 of this appendix.

Watersheds

Watershed parameters are summarized on Table 1. Peak flows and volumes are shown on Table 2.

Table 1

Watershed Characteristics

Watershed	Area (ac.)	Hyd. Length (ft.)	Elev. Chg. (ft.)	CN
1	27.7	1300	95	79*
3	378.4	6500	216	70*
4	99.8	4900	152	73*
5	24.2	2250	70	63
6	19.0	1550	38	63
7	5.0	750	29	89
D-1	243.6	9600	300	63
D-3	72.0	3450	502	63
D-4	189.1	6500	216	70
D4-A-D	6.7	856	36	89
D4-A-R	19.9	1141	26	75
D4-A-U	53.1	1800	102	63
B-1T-U	6.1	750	54	89
B-1T-L	11.3	650	70	89

* Weighted Average CN

Table 2

Runoff Calculations

Watershed	Flow (cfs) 10/6	25/6	10/24	Volume (ac. ft.) 10/24	Flows To:
1	3.27	6.98	19.73	1.77	Pond 1
3	6.57	13.03	32.81	12.73	Pond 3
4	2.69	4.81	14.06	4.23	Pond 4
5	0.15	0.46	1.22	0.42	Wattles/Pond 3
6	0.12	0.37	1.09	0.33	ASCA (Silt Fences)
7	2.48	3.56	6.51	0.57	Pond 1B
D-1	0.72	2.94	6.49	4.23	Ditch 1
D-3	0.48	1.42	4.29	1.25	Ditch 3
D-4	3.30	6.54	16.47	6.39	Ditch 4
D4-A-D	3.25	4.68	8.60	0.76	Silt Fence/Pond 3
D4-A-R	0.84	1.65	6.90	0.97	Silt Fence/Pond 3
D4-A-U	0.37	1.07	3.36	0.92	Silt Fence/Pond 3
B-1T-U	3.19	4.55	8.22	0.69	Ditch B-1T-L
B-1T-L*	8.94	12.73	22.93	1.97	Pond 3

*Total of B-1T-U and B-1T-L.

Sediment Ponds

There are 4 existing sediment control ponds on this site, designated Pond 1, Pond 1B, Pond 3 and Pond 4. Any discharge from these ponds will go to the existing channels in accordance with the approved UPDES Permits. Sediment Pond 2 will be permanently removed as part of mining Federal Block 1.

All sediment ponds are sized to contain the runoff from a 10 year-24 hour precipitation event of 2.39", plus at least 3 years of calculated sediment storage. Ponds 3 and 4 are equipped with an open-channel emergency spillway, capable of passing the flow from a 25 year-6 hour event of 1.72", as required. Pond 3 is also fitted with a decant to allow for controlled discharge in the event of the need to contain additional water from the mining operation. Ponds 1 and 1B are each equipped with a single, vertical pipe outlet with an oil skimmer, as previously approved.

All sediment pond inlets and open-channel emergency spillways will be protected with adequately sized rip-rap placed over erosion control fabric. Sizes are shown on Table 3.

Sediment markers will be installed in each pond, showing the 60% cleanout and maximum sediment levels. All ponds will be oversized and will be maintained to provide storage capacity for the required 10 year – 24 hour precipitation event, as required.

It should be noted that Table 3 shows that Sediment Pond 3 would have been slightly undersized based on the updated runoff and sediment calculations from Watershed 3. The pond size has been increased as shown on Drawing 5-30.

Sediment pond requirements and sizing are summarized on Table 3. Pond details and designs are shown on Drawings 5-28, 5-28A, 5-30, and 5-31.

Table 3

Sediment Pond Sizing

Sediment Pond No.	1	1B	3	4
10yr/24hr Runoff (ac. ft.)	1.77	0.57	12.73	4.23
+ 3 Yrs. Sediment (ac. ft.)	1.09	0.09	2.16	0.63
Required Capacity (ac. ft.)	2.86	0.66	14.89	4.83
Proposed Capacity (ac. ft.)	3.10	0.80	15.00	5.50
25yr/6hr Peak Flow (cfs)	6.98	2.48	13.03	4.81
Principle Spillway Pipe	24”	24”	N/A	N/A
Emergency Spillway Bottom	N/A	N/A	5’	4’
Velocity (fps)	5.04	3.89	9.19	6.86
Depth of Flow (ft)	1.33	0.90	0.26	0.16
Rip-Rap (D50)	6”	6”	6”	6”

Note: Emergency Spillways are based on 3H:1V slope with 2H:1V side slopes.

All rip-rap is underlain with erosion control fabric.

Diversions

All diversions (ditches) are sized to carry the runoff from a 10 year-6 hour precipitation event of 1.41". Diversions are considered temporary and will be removed when no longer required. Diversions are shown on Drawing 5-25.

Estimated flows to the diversions are taken from Table 2, "Runoff Calculations". Average slopes were taken from Drawing 5-27. All ditches are assumed to be constructed in a triangular shape with 2H:1V side slopes, unless otherwise noted; however, actual bottom width and slopes may vary as long as the required cross-sectional area is maintained. Minimum ditch depth and area is determined by the peak flow depth plus a minimum of 6" of freeboard. Proposed ditch depth is based on the expected maximum flow depth plus freeboard, increased to the nearest 1/2 foot. All ditches are assumed to have a Manning's No. (n) of 0.025 for unlined channels.

As shown on Table 4, Ditch B-1T-L has a calculated flow velocity of 6.68 fps. This diversion flows directly to Pond 3. If erosion of the ditch becomes evident, it will be repaired, and if necessary, the ditch will be lined with a minimum of 6" D50 rip-rap over erosion control fabric.

None of the other diversion ditches show erosive velocities above 5 fps; however, any ditches that exhibit excessive erosion will be repaired and those areas will be equipped with appropriate erosion protection. All sediment pond inlets and outlets will be rip-rapped for protection as shown on the sediment pond drawings 5-28, 5-28A, 5-30 and 5-31.

Table 4

Diversion Ditches

Diversion	Slope %	Flow cfs	Velocity fps	Flow Depth ft	Proposed Depth ft	Remarks
Ditch 1	2.33	0.72	2.00	0.11	1.00	Undist.
Ditch 3	2.40	0.48	1.51	0.07	1.00	Undist.
Ditch 4	3.09	3.30	3.26	0.19	2.00	To Pond 3
Ditch 4-A-D	2.86	3.25	4.27	0.62	1.50	To Pond 3
Ditch 4-A-R	1.18	0.84	2.19	0.44	1.00	To Pond 3
Ditch 4-A-U	1.41	0.37	1.90	0.31	1.00	To Pond 3
Ditch B-1T-U	1.00	3.19	2.87	0.75	1.50	To B-1T-L
Ditch B-1T-L	4.80	8.94	6.68	0.82	1.50	To Pond 3

Culverts

There are 2 new culverts proposed for this site, to be placed in the road crossings in the extended Ditch 4. Both culverts are proposed to be 24" cmp, and each will be fitted with inlet sections and outlet protection. The culverts are designated with C-n labels, and shown on Drawing 5-3A.

Culvert sizing is based on the Haestad Methods, Flowmaster I, Version 3.43 Computer Program.

All minesite culverts are considered temporary and will be removed upon final reclamation. The culvert beneath the county road may be left at the discretion of the county.

The following table will summarize the culvert sizing and requirements.

Table 5

Culverts

Culvert	Flow cfs	Velocity fps	Required Diam. Ft.	Proposed Diam. Ft.	Remarks
C-1	3.30	4.94	0.92	2.00	Primary Haul Road
C-2	3.30	4.94	0.92	2.00	County Road

Note:

1- Culverts C-1and C-2 are calculated with a 3.13% slope and a Manning's n of 0.020.

ASCA's

There is one area in this proposed mining plan that will not drain to the sediment ponds due to topographic restrictions. It uses silt fencing as an alternate sediment control technique to treat runoff from this area. The ASCA is on the west side of the restored Robinson Gulch and is shown on Drawing 5-26 as Watershed 6. Runoff from this area is based on the 10 year-24 hour precipitation event of 2.39", and will continue to be treated with the silt fencing as shown on Drawing 5-26. The area is well vegetated and considered undisturbed; however, the silt fences will be checked on a regular basis and repaired or replaced as necessary until removal is approved by the Division.

The Universal Soil Loss Equation (USLE) was used to estimate sediment yield from the ASCA, as well as all areas draining to sediment control structures. The results are shown in the section entitled Sediment Yield Calculations.

The following Table 6 will summarize the ASCA characteristics and expected runoff amounts.

Table 6

Alternate Sediment Control Areas

ASCA	Area ac.	Runoff Volume ac. ft.	Peak Flow cfs	Diversion Ditch
ASCA-1	19.0	0.33	1.09	Watershed 6

Note:

1 - All runoff is treated by filtering through silt fences.

2- See Table 7 for sediment yield calculations.

Sediment Yield

The Universal Soil Loss Equation (USLE) was used to estimate sediment yield from the disturbed and undisturbed areas draining to the sediment ponds and the Alternate Sediment Control Area (ASCA). All soil loss from these areas was assumed to be delivered to the respective sediment ponds or ASCA.

Erosion rate (A) in tons/acre/year is determined using the USLE as follows:

A = (R) (K) (LS) (CP) , where:

Variable R is the rainfall factor which can be estimated from R=27 times P to the 2.2 power, where P is the 2 year – 6 hour precipitation value. P for the Alton area is 0.96" ; therefore, the estimated value of R for this area is 24.68.

Variable K is the soil erodibility factor. For disturbed areas, the K value is conservatively estimated to be 0.5, and 0.35 for undisturbed areas.

Variable LS is the length-slope factor. This figure was determined by applying the slope length and percentage for each ASCA drainage area to the chart in Figure 5.15, p. 334, "Applied Hydrology and Sedimentology for Disturbed Areas", Barfield, Warner and Haan, 1983.

Variable CP is the control practice factor, which can be divided into a cover and a practice factor. For purposes of these calculations, the following CP values were used:

- Compacted Areas 1.20
- Mining / Reclaimed Areas 0.80
- Undisturbed Areas 0.38

The sediment volume is based on a density of 100 pounds per cubic foot of sediment.

The following Table is a summary of the sediment yield calculations.

Table 7

Sediment Yield Calculations

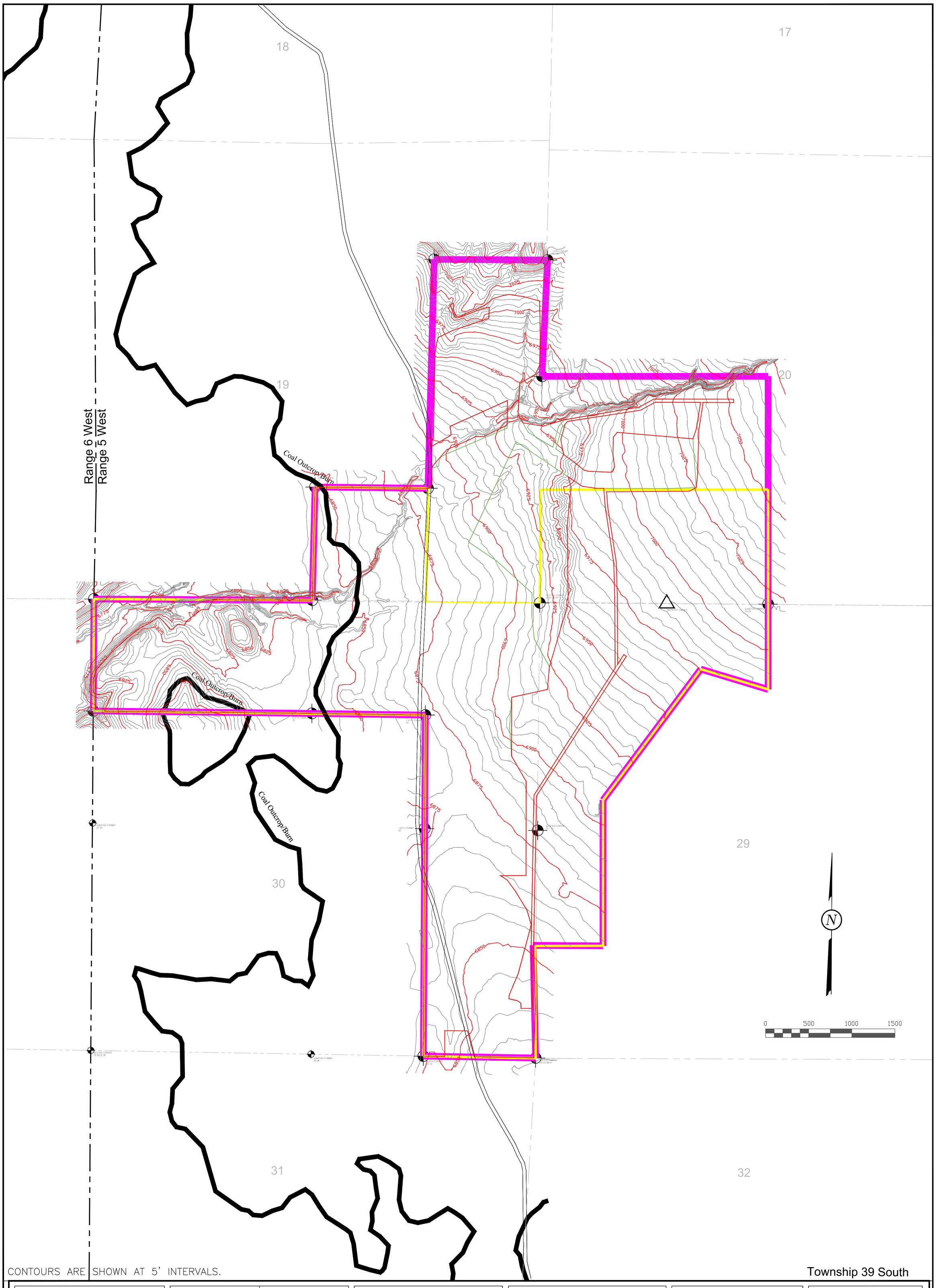
Drainage	R	K	Acres	Length	Slope (%)	LS	CP	*A	**Yield
1	24.68	0.5	27.7	1300’	7.3	2.90	0.80	28.63	0.364
3	24.68	0.35	378.4	6500’	3.3	0.60	0.80	4.14	0.720
4	24.68	0.35	99.8	4900’	3.1	0.66	0.80	4.56	0.209
6	24.68	0.35	19.0	1550’	2.5	0.53	0.80	3.66	0.032
7	24.68	0.5	5.0	750’	3.9	0.89	1.20	13.18	0.030

*A=Tons/Acre/Year

**Yield=Acre Ft./Year

Structure	Sediment (1 Year)	Sediment (3 Years)
	Acre Feet	Acre Feet
Pond 1	0.364	1.092
Pond 3	0.720	2.160
Pond 4	0.209	0.627
Pond 1B	0.030	0.090
ASCA*	0.032	0.096

*Watershed 6



CONTOURS ARE SHOWN AT 5' INTERVALS.

Township 39 South

LEGEND:

- PERMIT BOUNDARY
- PRIVATE COAL OWNERSHIP
- COAL LINE BOUNDARY
- SECTION LINE
- COUNTY ROAD
- FOUND SECTION CORNER
- FOUND PROPERTY CORNER

DRAWN BY: J. STANSFIELD C. McCOURT	CHECKED BY: GG
DRAWING: 5–1	DATE: 04/20/07
	SCALE: 1" = 500'
JOB NUMBER: 1400	SHEET

REVISIONS

DATE:	BY:
11/26/08	CRM
10/18/13	LWJ
8/5/18	AC

PRE-MINING TOPOGRAPHY

COAL HOLLOW PROJECT
ALTON, UTAH

DRAWING: 5-1

PROFESSIONAL ENGINEER
10230818
ANDREW R. CHRISTENSEN
STATE OF UTAH

Alton Coal Development
Coal Hollow Project
463 North 100 West, Suite 1
Cedar City, Utah 84721
Phone (435)867-5331
Fax (435)867-1192

2010 = 175 acres
2011 = 21 acres
2012 = 24 acres
2013 = 54acres
2014 = 58 acres
2015 = 10 acres
2016 = 31 acres
2019 = 42 acres

Total Disturbed = 414.5 acres

Range 6 West
Range 5 West

Township 39 South

0 500 1000 1500

LEGEND:

- PERMIT BOUNDARY
- PRIVATE COAL OWNERSHIP
- COAL LINE BOUNDARY
- SECTION LINE
- FOUND SECTION CORNER
- FOUND PROPERTY CORNER

DRAWN BY: C. McCOURT	CHECKED BY: LWJ
DRAWING: 5-2	DATE: 10/15/2013
	SCALE: 1" = 500'
JOB NUMBER: 1400	SHEET

REVISIONS

DATE:	BY:
10/19/13	KN
5/7/14	KN
11/19/14	KN
8/1/18	AC

DISTURBANCE SEQUENCE

COAL HOLLOW PROJECT
ALTON, UTAH

DRAWING: 5-2

PROFESSIONAL ENGINEER
10230818
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COUNTY RD 136

COUNTY RD INTERSECTION

TEMPORARY REROUTE COUNTY RD136

Range 6 West
Range 5 West

DIVERSION DITCH 3

12" Culvert 17
ROADWAY
18" Culvert 13
18" Culvert 12
18" Culvert 1
18" Culvert 2
18" Culvert 3
18" Culvert 4
Pond 1
24 inch DROP
PIPE SPILLWAY
TOP OF RISER 6918.17'
BOTTOM OF RISER 6917'
24 INCH PIPE
OUTLET 6915'
24 inch Drop Inlet Spillway
CULVERT 24 INCH
Top of Riser 6918
24 INCH DROP
PIPE SPILLWAY
Straw Bale
(Sediment Control)
COUNTY ROAD 136
CLOSURE POINT
24 INCH CULVERT
OUTLET 6897'
24 INCH CULVERT
INLET 6901'
Air Monitor Site

Berm
Berm
Berm

WATER TANKS
18" Culvert 7
36" Culvert 8
18" Culvert 6
96" Culvert 9
24" Culvert C-1
24" Culvert 14
24" Culvert 10
24" Culvert 15
Pond 2
24" Culvert 11
24" Culvert 16
24" Culvert C-2

Lower Robinson Creek

Primary Haulroad

DIVERSION DITCH 4
(Configuration will change as mining progresses)

Robinson Creek
Final plug to be removed by 2017

Robinson Creek
Temporary Diversion

DIVERSION DITCH 4 -
To be re-aligned following completion of UG mining and commencement of borrow.
(See Dwg. 5-25)

POND 3 ACCESS ROAD
(To be placed over subsoil as reclamation progresses, then re-aligned during final borrow)

18" Culvert CR-1
(2) 4" HDPE
PIPE BURIED

18" Culvert CR-2

Ditch 4-A-D
Removed as part of Primary Haul Road reclamation

Ditch 4-A-U
Removed after backfill of Pit 10

Weather Monitor Site

SURFACE PIPE

Diversion Ditch 1

Ditch 4-A-R
Remains as edge-of-road ditch when Primary Haul Road transitions to Pond 3 access road.
Removed after backfill of Pit 10

Refer to Drawings 5-3B, 5-3C & 5-3D for Underground Facilities Details

Total Disturbed 414.5 acres

Ditch B-1T-L
Constructed Prior to Mining of Pit B-1, remains in place as Pit B-1 reaches pit extents, then mined out during final borrow.

Ditch B-1T-U
Constructed Prior to Mining of Pit B-1, then mined out as Pit B-1 reaches pit extents.

Install silt fence downgradient of Ditch B-1T-U.
Constructed Prior to Mining of Pit B-1, remains in place as Pit B-1 reaches pit extents, then mined out during final borrow.

18" Culvert CR-3

Sump

COUNTY ROAD 136
CLOSURE POINT

Sink Valley Wash

0 500 1000 1500

Township 39 South

CONTOUR INTERVAL = 2'

LEGEND:
- PERMIT BOUNDARY
- PRIVATE COAL OWNERSHIP
- COAL RECOVERY LINE
- SECTION LINE
- FOUND SECTION CORNER
- FOUND PROPERTY CORNER
- DIVERSION DITCHES
- BERM
- 2019 BONDED DISTURBANCE
- CENTERLINE
- WATER LINE
- WATER TANK / WELL

DRAWN BY:	CHECKED BY:
C. McCOURT G. Grossman	CRM/WES
DRAWING: 5–3	DATE: 11/10/08
	SCALE: 1" = 500' on 24" X 36" paper
JOB NUMBER: 1400	SHEET

REVISIONS

DATE:	BY:
5/20/16	AC
8/01/16	AC
9/20/16	AC
3/3/17	AC
3/23/17	AC
6/7/17	AC
8/13/18	AC

FACILITIES & STRUCTURES

LAYOUT

COAL HOLLOW PROJECT
ALTON, UTAH

DRAWING: 5-3

PROFESSIONAL ENGINEER
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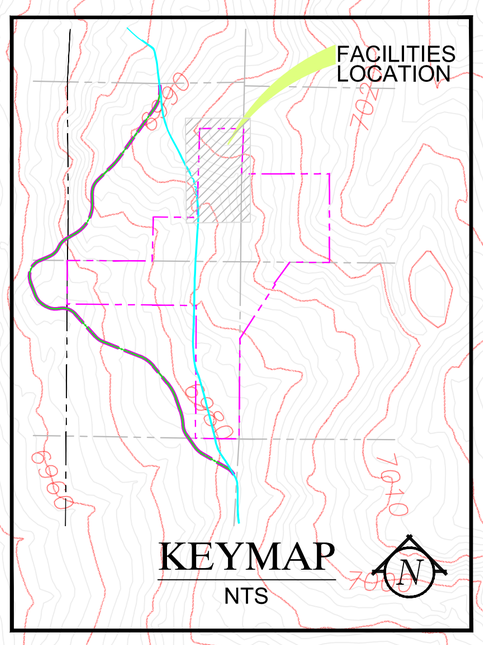
COUNTY RD INTERSECTION



1/16TH CORNER 19

1/16TH CORNER 19 - 20

DIVERSION DITCH 3

OIL/FUEL STORAGE

PROPOSED WASHBAY

Bone Yard

OFFICE 40'x90'

EQUIP. AREA HOT START

OFFICE PARKING AREA

Berm

CRUSHED COAL

RAW COAL

SCALE

QUARTER CORNER 19 - 20

WATER TANKS

12" Culvert 17

ROADWAY

18" Culvert 13

18" Culvert 12

18" Culvert 1

18" Culvert 2

18" Culvert 3

18" Culvert 4

Pond 1

24 INCH DROP PIPE SPILLWAY

TOP OF RISER 6918'

BOTTOM OF RISER 6917'

24 INCH PIPE OUTLET 6915'

CULVERT 5 - 12"

Pond 1B

24 INCH DROP PIPE SPILLWAY

Straw Bale
(Sediment Control)

COUNTY ROAD 136 CLOSURE POINT

24 INCH CULVERT OUTLET 6897'

24 INCH CULVERT INLET 6901'

Air Monitor Site

1/16TH CORNER 19

DIVERSION DITCH 4
(Configuration will change as mining progresses)

Berm

18" Culvert 6

18" Culvert 7

36" Culvert 8

96" Culvert 9

STORAGE CONTAINERS

24" Culvert C-1

Laydown Yard

Pond 2

24" Culvert 14

24" Culvert 10

24" Culvert 15

24" Culvert 11

24" Culvert 16

24" Culvert C-2

Primary Haulroad

Note: Pond 2 and Culverts 10, 11, 14, 15 and 16 will all be permanently removed as mining of the Federal Block 1 Pits progresses to their Northern limit.

LEGEND:

- PERMIT BOUNDARY
- PRIVATE COAL OWNERSHIP
- COAL RECOVERY LINE
- SECTION LINE
- DRAINAGE DITCH
- DIVERSION DITCHES

DRAWN BY: C. McCOURT G. Grossman	CHECKED BY: LWJ
DRAWING: 5-3A	DATE: 11/10/08
	SCALE: 1" = 150'
JOB NUMBER: 1400	SHEET

REVISIONS

DATE:	BY:
6/13/11	KN/JKJR
09/28/15	KN
6/7/17	AC
8/7/18	AC

FACILITIES & STRUCTURES

CULVERTS

COAL HOLLOW PROJECT
ALTON, UTAH

DRAWING: 5-3A

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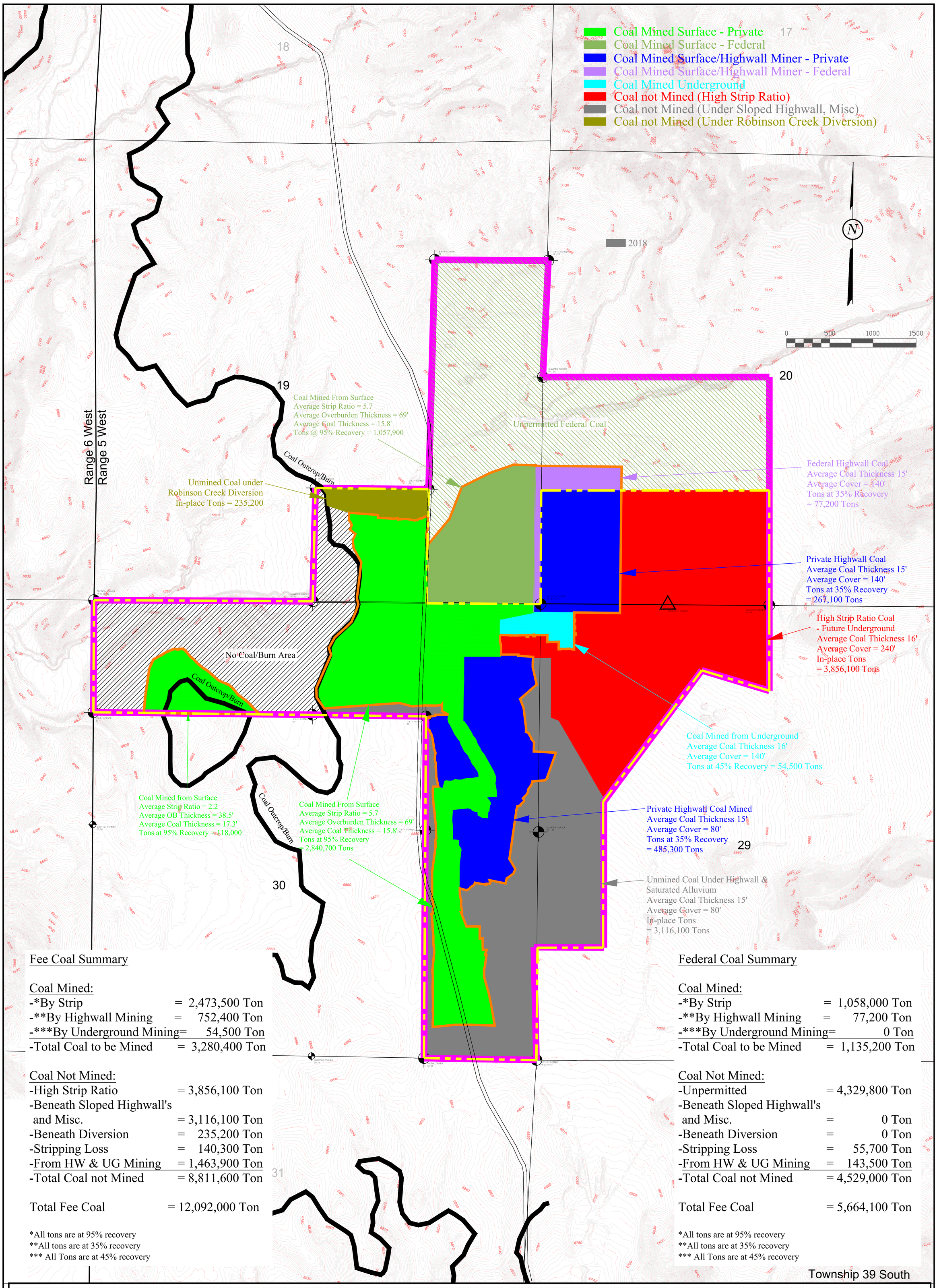
Fax (435) 867-1192



Fee Coal Summary

Coal Mined:

-*By Strip	= 2,473,500 Ton
-**By Highwall Mining	= 752,400 Ton
-***By Underground Mining	= 54,500 Ton
-Total Coal to be Mined	= 3,280,400 Ton

Coal Not Mined:

-High Strip Ratio	= 3,856,100 Ton
-Beneath Sloped Highwall's and Misc.	= 3,116,100 Ton
-Beneath Diversion	= 235,200 Ton
-Stripping Loss	= 140,300 Ton
-From HW & UG Mining	= 1,463,900 Ton
-Total Coal not Mined	= 8,811,600 Ton
Total Fee Coal	= 12,092,000 Ton

*All tons are at 95% recovery
**All tons are at 35% recovery
*** All Tons are at 45% recovery

Federal Coal Summary

Coal Mined:

-*By Strip	= 1,058,000 Ton
-**By Highwall Mining	= 77,200 Ton
-***By Underground Mining	= 0 Ton
-Total Coal to be Mined	= 1,135,200 Ton

Coal Not Mined:

-Unpermitted	= 4,329,800 Ton
-Beneath Sloped Highwall's and Misc.	= 0 Ton
-Beneath Diversion	= 0 Ton
-Stripping Loss	= 55,700 Ton
-From HW & UG Mining	= 143,500 Ton
-Total Coal not Mined	= 4,529,000 Ton
Total Fee Coal	= 5,664,100 Ton

*All tons are at 95% recovery
**All tons are at 35% recovery
*** All Tons are at 45% recovery

LEGEND:
- PERMIT BOUNDARY
- PRIVATE COAL OWNERSHIP
- COAL LINE BOUNDARY
- COAL RECOVERY
- SECTION LINE
- FOUND SECTION CORNER
- FOUND PROPERTY CORNER

DRAWN BY:	CHECKED BY:
K. NICHOLES	LWJ
DRAWING: 5–9	DATE: 5/09/14
	SCALE: 1" = 500' on 24" X 36" paper
JOB NUMBER: 1400	SHEET

REVISIONS

DATE:	BY:
05/09/14	KN
07/03/14	KN
11/24/14	KN
5/20/16	AC
8/01/16	AC
8/4/18	AC

COAL EXTRACTION OVERVIEW

COAL HOLLOW PROJECT
ALTON, UTAH

DRAWING: 5-9

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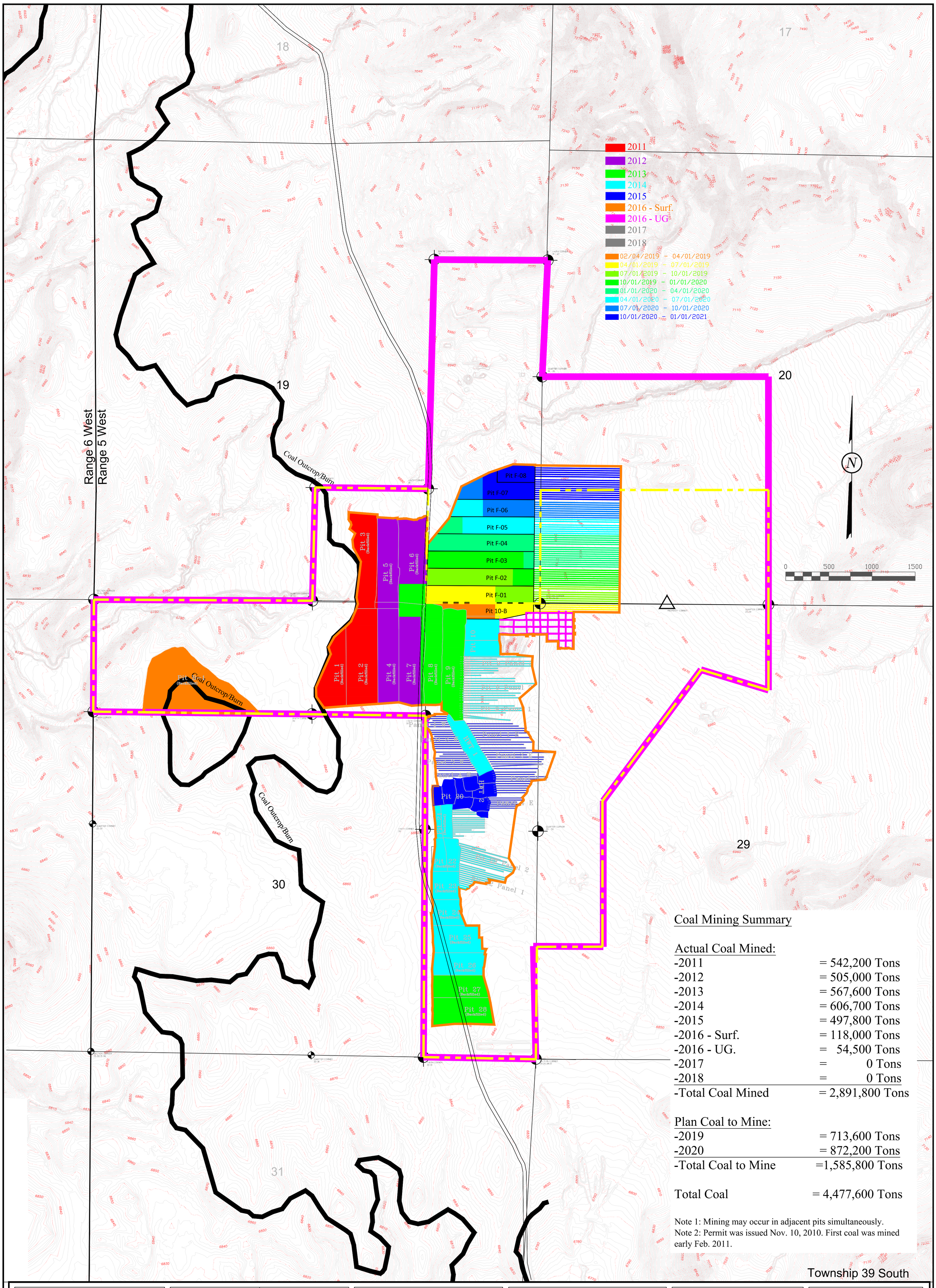

Coal Mining Summary

Actual Coal Mined:

-2011	= 542,200 Tons
-2012	= 505,000 Tons
-2013	= 567,600 Tons
-2014	= 606,700 Tons
-2015	= 497,800 Tons
-2016 - Surf.	= 118,000 Tons
-2016 - UG.	= 54,500 Tons
-2017	= 0 Tons
-2018	= 0 Tons
-Total Coal Mined	= 2,891,800 Tons

Plan Coal to Mine:

-2019	= 713,600 Tons
-2020	= 872,200 Tons
-Total Coal to Mine	=1,585,800 Tons
Total Coal	= 4,477,600 Tons

Note 1: Mining may occur in adjacent pits simultaneously.
Note 2: Permit was issued Nov. 10, 2010. First coal was mined early Feb. 2011.

Township 39 South

LEGEND:
- PERMIT BOUNDARY
- PRIVATE COAL OWNERSHIP
- COAL LINE BOUNDARY
- COAL RECOVERY
- SECTION LINE
- FOUND SECTION CORNER
- FOUND PROPERTY CORNER

DRAWN BY:	CHECKED BY:
K. NICHOLES	LWJ
DRAWING: 5–10	DATE: 1/30/14
	SCALE: 1" = 500' on 24" X 36" paper
JOB NUMBER: 1400	SHEET

REVISIONS

DATE:	BY:
5/7/14	KN
7/3/14	KN
10/31/14	KN
3/31/15	KN
5/20/16	AC
8/01/16	AC
8/4/18	AC

COAL REMOVAL SEQUENCE

COAL HOLLOW PROJECT
ALTON, UTAH
DRAWING: 5-10

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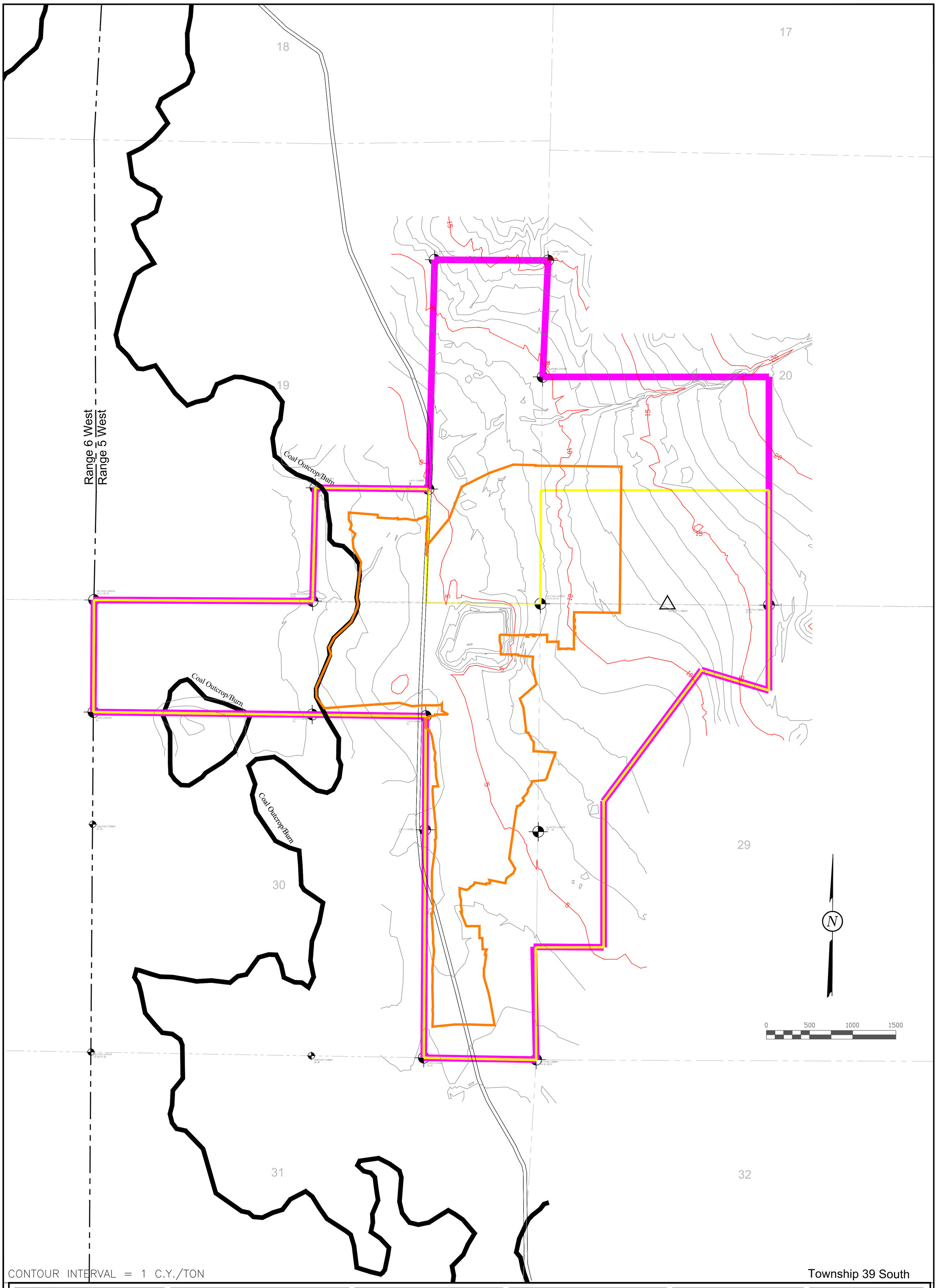

CONTOUR INTERVAL = 1 C.Y./TON

Township 39 South

LEGEND:

- PERMIT BOUNDARY
- PRIVATE COAL OWNERSHIP
- COAL LINE BOUNDARY
- COAL RECOVERY LINE
- SECTION LINE
- FOUND SECTION CORNER
- FOUND PROPERTY CORNER

DRAWN BY: C. McCOURT J. STANSFIELD	CHECKED BY: GG
DRAWING: 5–13	DATE: 4/20/07
	SCALE: 1" = 500'
JOB NUMBER: 1400	SHEET

REVISIONS

DATE:	BY:
9/16/08	CRM
6/4/16	ARC
8/5/18	ARC

STRIP RATIO ISOPACH

COAL HOLLOW PROJECT
ALTON, UTAH

DRAWING: 5-13

PROFESSIONAL ENGINEER
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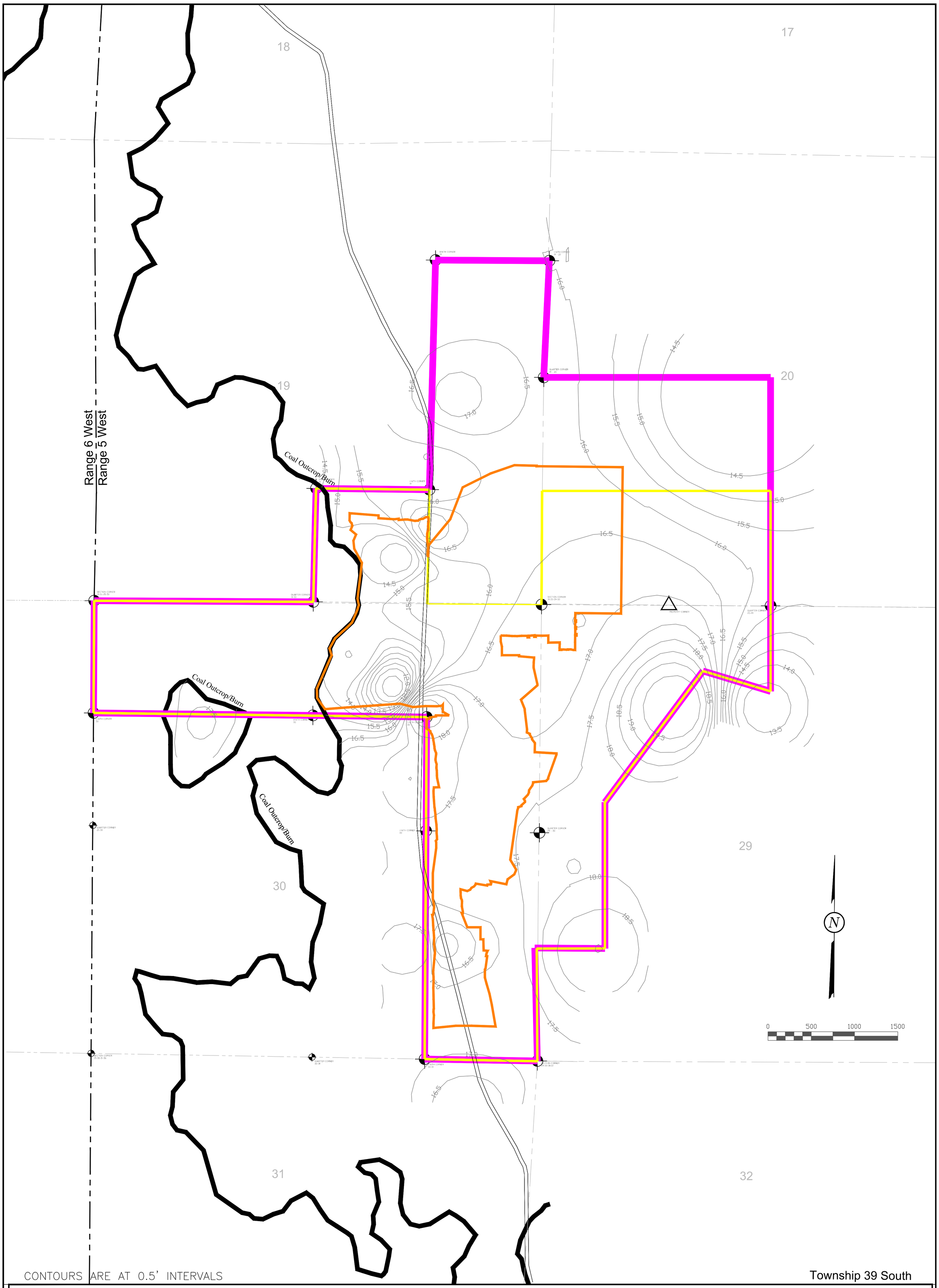

CONTOURS ARE AT 0.5' INTERVALS

Township 39 South

LEGEND:

- PERMIT BOUNDARY
- PRIVATE COAL OWNERSHIP
- COAL LINE BOUNDARY
- COAL REMOVAL LINE
- SECTION LINE
- FOUND SECTION CORNER
- FOUND PROPERTY CORNER

DRAWN BY:	CHECKED BY:
C. McCOURT	GG
DRAWING: 5–14	DATE: 3/20/07
	SCALE: 1" = 500'
JOB NUMBER: 1400	SHEET

REVISIONS

DATE:	BY:
9/16/08	CRM
6/4/16	ARC
8/5/18	ARC

COAL THICKNESS ISOPACH

COAL HOLLOW PROJECT
ALTON, UTAH

DRAWING: 5-14

PROFESSIONAL ENGINEER
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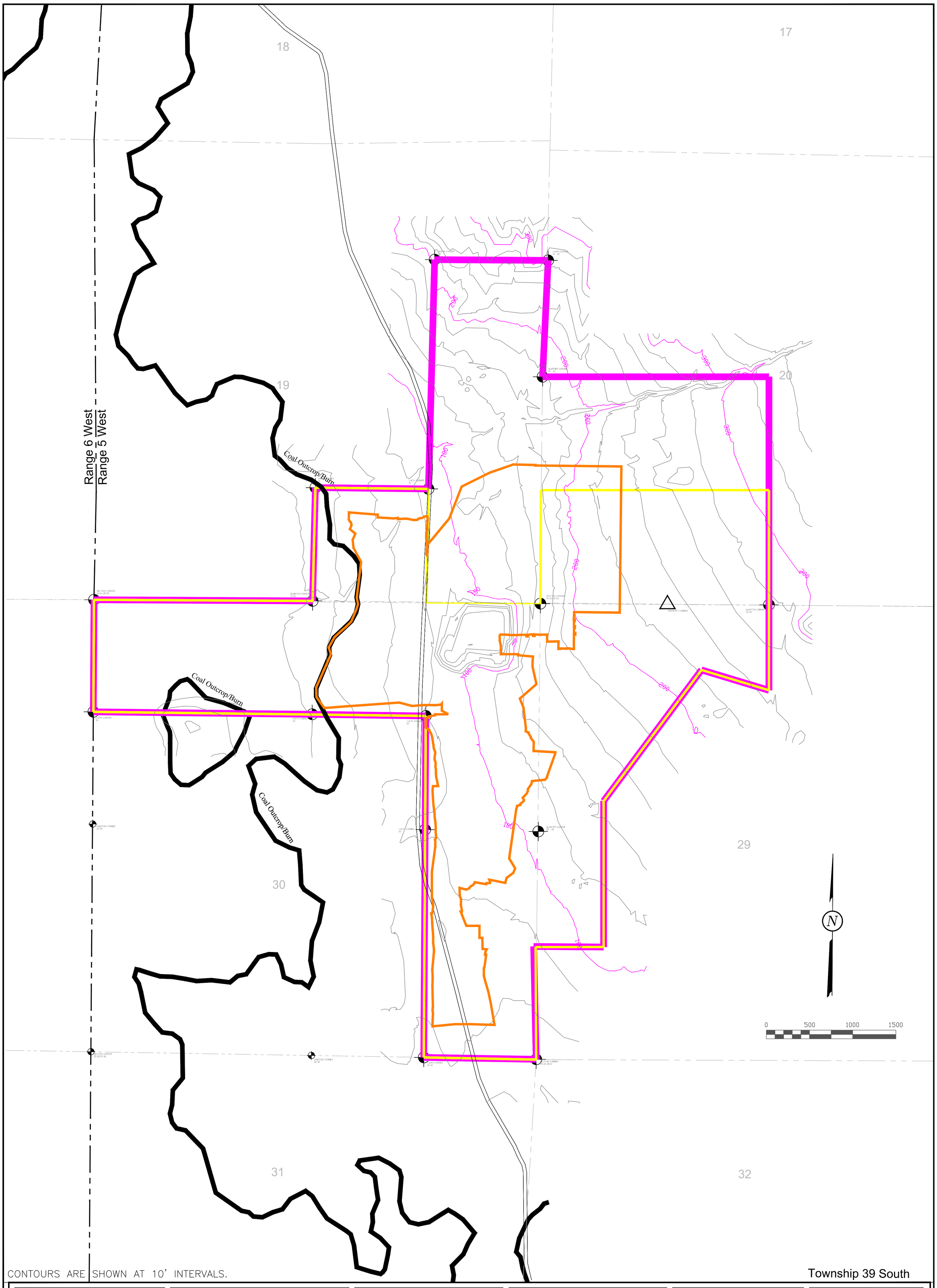

CONTOURS ARE SHOWN AT 10' INTERVALS.

Township 39 South

LEGEND:

- PERMIT BOUNDARY
- PRIVATE COAL OWNERSHIP
- COAL LINE BOUNDARY
- COAL RECOVERY LINE
- SECTION LINE
- FOUND SECTION CORNER
- FOUND PROPERTY CORNER

DRAWN BY:	CHECKED BY:
C. McCOURT	DWG
DRAWING: 5–15	DATE: 4/20/07
	SCALE: 1" = 500'
JOB NUMBER: 1400	SHEET

REVISIONS

DATE:	BY:
9/16/08	CRM
6/26/14	KN
12/26/14	KN
8/5/18	KN

OVERBURDEN ISOPACH

COAL HOLLOW PROJECT
ALTON, UTAH

DRAWING: 5-15

PROFESSIONAL ENGINEER
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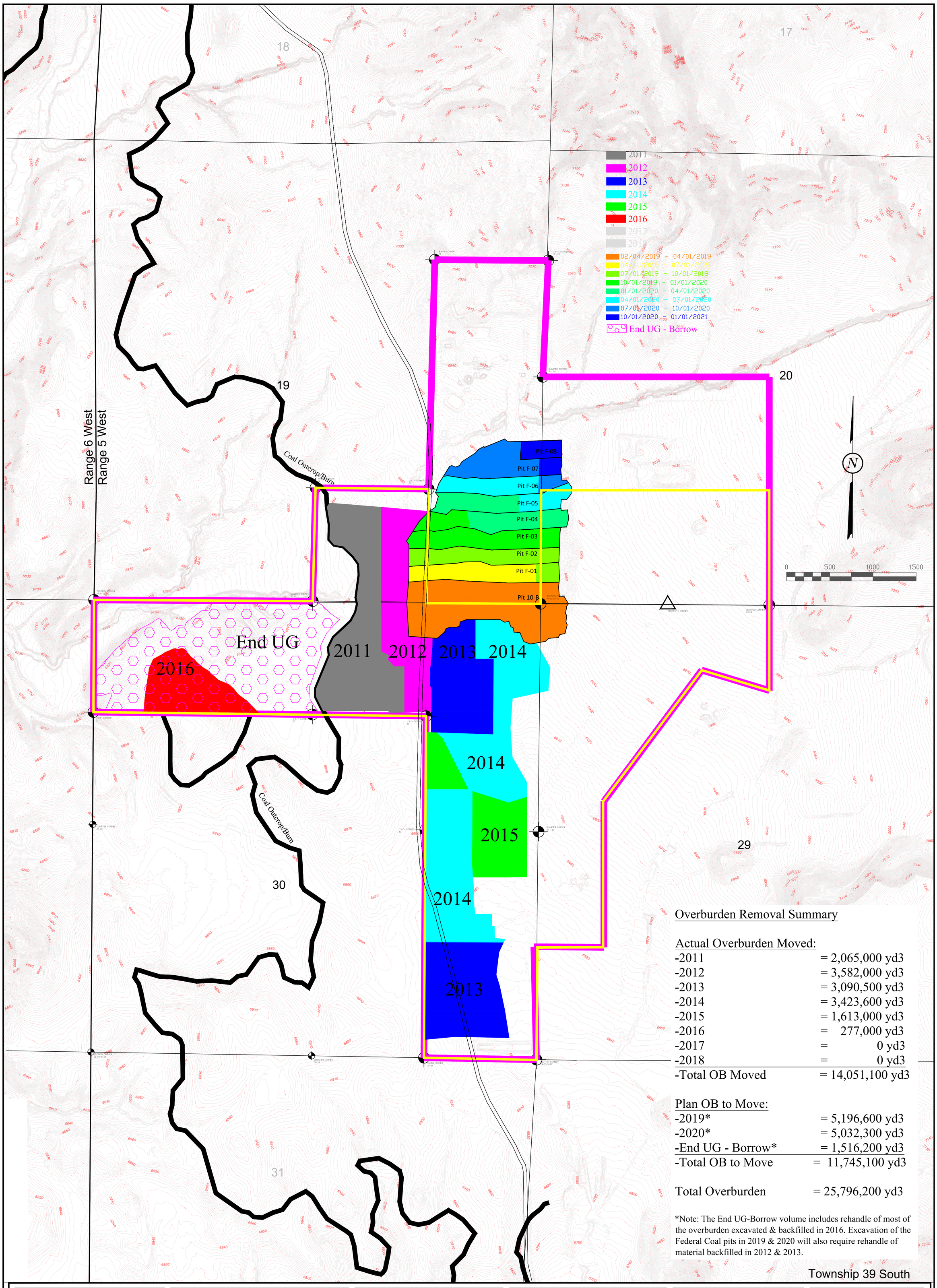

Overburden Removal Summary

Actual Overburden Moved:

-2011	= 2,065,000 yd3
-2012	= 3,582,000 yd3
-2013	= 3,090,500 yd3
-2014	= 3,423,600 yd3
-2015	= 1,613,000 yd3
-2016	= 277,000 yd3
-2017	= 0 yd3
-2018	= 0 yd3
-Total OB Moved	= 14,051,100 yd3

Plan OB to Move:

-2019*	= 5,196,600 yd3
-2020*	= 5,032,300 yd3
-End UG - Borrow*	= 1,516,200 yd3
-Total OB to Move	= 11,745,100 yd3

Total Overburden = 25,796,200 yd3

*Note: The End UG-Borrow volume includes rehandle of most of the overburden excavated & backfilled in 2016. Excavation of the Federal Coal pits in 2019 & 2020 will also require rehandle of material backfilled in 2012 & 2013.

Township 39 South

LEGEND:

- PERMIT BOUNDARY
- PRIVATE COAL OWNERSHIP
- COAL LINE BOUNDARY
- SECTION LINE
- FOUND SECTION CORNER
- FOUND PROPERTY CORNER

DRAWN BY:	CHECKED BY:
K. NICHOLES	LWJ
DRAWING: 5–16	DATE: 02/26/2014
	SCALE: 1" = 500' on 24" X 36" paper
JOB NUMBER: 1400	SHEET

REVISIONS

DATE:	BY:
05/09/14	KN
11/24/14	KN
12/12/14	KN
5/20/16	AC
8/01/16	AC
9/20/16	AC
8/4/18	AC

OVERBURDEN REMOVAL SEQUENCE

COAL HOLLOW PROJECT
ALTON, UTAH
DRAWING: 5-16

PROFESSIONAL ENGINEER
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Existing County Road 136

Range 6 West
Range 5 West

Township 39 South

Road to East Pugh Property

Water Well

Road to Swapp Ranch

Pit B-1 Excavation is primarily contained within the final borrow volume. All Pit B-1 excavated material (except 92,000 CY placed underneath the 3:1 South slope) was directly backfilled to the intermediate surface shown on Drawing 5-35 for subsequent rehandle as part of the borrow to backfill Pits 9-C & 10. Therefore, this area was not accounted as additional excavated area and only incurred additional bond as it was covered for the 3:1 slope backfill.

BORROW AREA DISTURBANCE

EXCAVATED AREA DISTURBANCE

SURFACE DISTURBANCE

N

0 500 1000 1500

Contour Interval = 2'

ULTIMATE DISTURBANCE:

Excavated Area	= 235.9 acres
Borrow Area	= 62.0 acres
Surface Dist Area	= 116.6 acres
Total Disturbance	= 414.5 acres

Total Bonded Excavation Volume
= 31,220,039 BCY

LEGEND:

- PERMIT BOUNDARY
- PRIVATE COAL OWNERSHIP
- ULTIMATE PIT BOUNDARY
- DISTURBANCE BNDY
- SECTION LINE
- FOUND SECTION CORNER
- FOUND PROPERTY CORNER

DRAWN BY: K NICHOLES	CHECKED BY: LWJ
DRAWING: 5-17	DATE: 12/24/2014
	SCALE: 1" = 500' Printed on 24" x36"
JOB NUMBER: 1400	SHEET

REVISIONS

DATE:	BY:
3/3/16	AC
3/22/16	AC
5/20/16	AC
8/01/16	AC
9/20/16	AC
7/31/17	AC
8/9/18	AC

OVERBURDEN REMOVAL ULTIMATE DISTURBANCE

COAL HOLLOW PROJECT
ALTON, UTAH

DRAWING: 5-17

PROFESSIONAL ENGINEER
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ANDREW R. CHRISTENSEN
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Note:

- See Appendix 8-1 for Bond Posting and Bond Release plans. Plans include liability amounts and disturbance acreages for each posting and release increment.

Existing County Road 136

Road to East Pugh Property

Road to Swapp Ranch

Water Well

Range 6 West

Range 5 West

Township 39 South

Pit B-1 Excavation is primarily contained within the final borrow volume. All Pit B-1 excavated material (except 92,000 CY placed underneath the 3:1 South slope) was directly backfilled to the intermediate surface shown on Drawing 5-35 for subsequent rehandle as part of the borrow to backfill Pits 9-C & 10. Therefore, this area was not accounted as additional excavated area and only incurred additional bond as it was covered for the 3:1 slope backfill.

Contour Interval = 2'

0 500 1000 1500

15_1 RELEASE – PHASE 1
15_2 RELEASE – PHASE 1
16_1 RELEASE – PHASE 1
16_2 RELEASE – PHASE 1
17_1 RELEASE – PHASE 1
17_2 RELEASE – PHASE 2
19_1 RELEASE – PHASE 1
19_2 RELEASE – PHASE 2
20_1 RELEASE – PHASE 1
21_1 RELEASE – PHASE 1
23_1 RELEASE – PHASE 2
END OF UG – PHASE 1, 2 & 3

LEGEND:

- PERMIT BOUNDARY
- PRIVATE COAL OWNERSHIP
- ULTIMATE PIT BOUNDARY
- DISTURBANCE BNDY
- SECTION LINE
- FOUND SECTION CORNER
- FOUND PROPERTY CORNER

DRAWN BY: A CHRISTENSEN	CHECKED BY: DWG
DRAWING: 5–18	DATE: 6/15/2015
	SCALE: 1" = 500' Printed on 24" x36"
JOB NUMBER: 1400	SHEET

REVISIONS

DATE:	BY:
3/22/16	AC
5/20/16	AC
8/01/16	AC
9/20/16	AC
7/31/17	AC
1/24/18	AC
8/9/18	AC

BOND SEQUENCE

COAL HOLLOW PROJECT
ALTON, UTAH

DRAWING: 5-18

PROFESSIONAL ENGINEER 10230818 ANDREW R. CHRISTENSEN STATE OF UTAH

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Coal Hollow Project
463 North 100 West, Suite 1
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Fax (435)867-1192

Existing County Road 136

0.5 Acres

LOADOUT
30.7 Acres

Road to East Pugh Property

28.6 Acres
SURF8 HAUL & MAINT

Pit F-8
15.7 Acres

Pit F-7 11.6 Acres
Pit F-6 7.8 Acres
Pit F-5 8.0 Acres
Pit F-4 8.4 Acres
Pit F-3 8.4 Acres
Pit F-2 8.7 Acres
Pit F-1 8.6 Acres
Pit 10-B 6.6 Acres

5.4 Acres
ROBINSON

9.8 Acres
SURF1

Pit 3 7.0 Acres
Pit 5 6.7 Acres
Pit 6 8.3 Acres

POND 3
4.1 Acres

BORROW
62.0 Acres

Pit 1A 3.6 Acres
Pit 1B 2.9 Acres
Pit 2 8.3 Acres
Pit 4 6.3 Acres
Pit 7 6.3 Acres
Pit 8 4.0 Acres

Pit B-1
14.2 Acres

Pit 10-A
8.9 Acres
Pit 9-C
3.3 Acres
Pit 9
8.0 Acres

HWT 1-B 8.9 Acres
HWT 1-A 3.2 Acres
SURF4 2.0 Acres
Pit 20-A 1.2 Acres
Pit 20-B 5.8 Acres
HWT 2-A 5.2 Acres
HWT 2-B 2.4 Acres
HWT 3-B 6.6 Acres
HWT 3-A 2.3 Acres
Pit 21-B 2.8 Acres
Pit 21-A 1.7 Acres

SURF5

Pit 22
6.3 Acres
Pit 23
4.5 Acres
Pit 24
4.6 Acres
Pit 25
6.8 Acres
Pit 26
6.2 Acres
Pit 27
6.5 Acres
Pit 28
6.5 Acres

SURF5
19.5 Acres

SURF6

7.4 Acres

Road to Swapp Ranch

SURF7
1.2 Acres

POND 4
7.3 Acres

Water Well

Pit B-1 Excavation is primarily contained within the final borrow volume. All Pit B-1 excavated material (except 92,000 CY placed underneath the 3:1 South slope) was directly backfilled to the intermediate surface shown on Drawing 5-35 for subsequent rehandle as part of the borrow to backfill Pits 9-C & 10. Therefore, this area was not accounted as additional excavated area and only incurred additional bond as it was covered for the 3:1 slope backfill.

Range 6 West
Range 5 West
Township 39 South

17 18 19 20 29 30 31 32

N

0 500 1000 1500

CURRENT MINING
CURRENT BACKFILL/SUBSOIL
PITS – PHASE 1 COMPLETE
FACILITIES
SPECIAL AREAS
SURFACE DISTURBANCE
BORROW DISTURBANCE

Contour Interval = 2'

LEGEND:
- PERMIT BOUNDARY
- PRIVATE COAL OWNERSHIP
- ULTIMATE PIT BOUNDARY
- DISTURBANCE BNDY
- SECTION LINE
- FOUND SECTION CORNER
- FOUND PROPERTY CORNER

DRAWN BY: A CHRISTENSEN	CHECKED BY: DWG
DRAWING: 5-19	DATE: 6/15/2015
	SCALE: 1" = 500' Printed on 24" x36"
JOB NUMBER: 1400	SHEET

REVISIONS

DATE:	BY:
3/3/16	AC
3/22/16	AC
5/20/16	AC
8/01/16	AC
9/20/16	AC
7/31/17	AC
8/7/18	AC

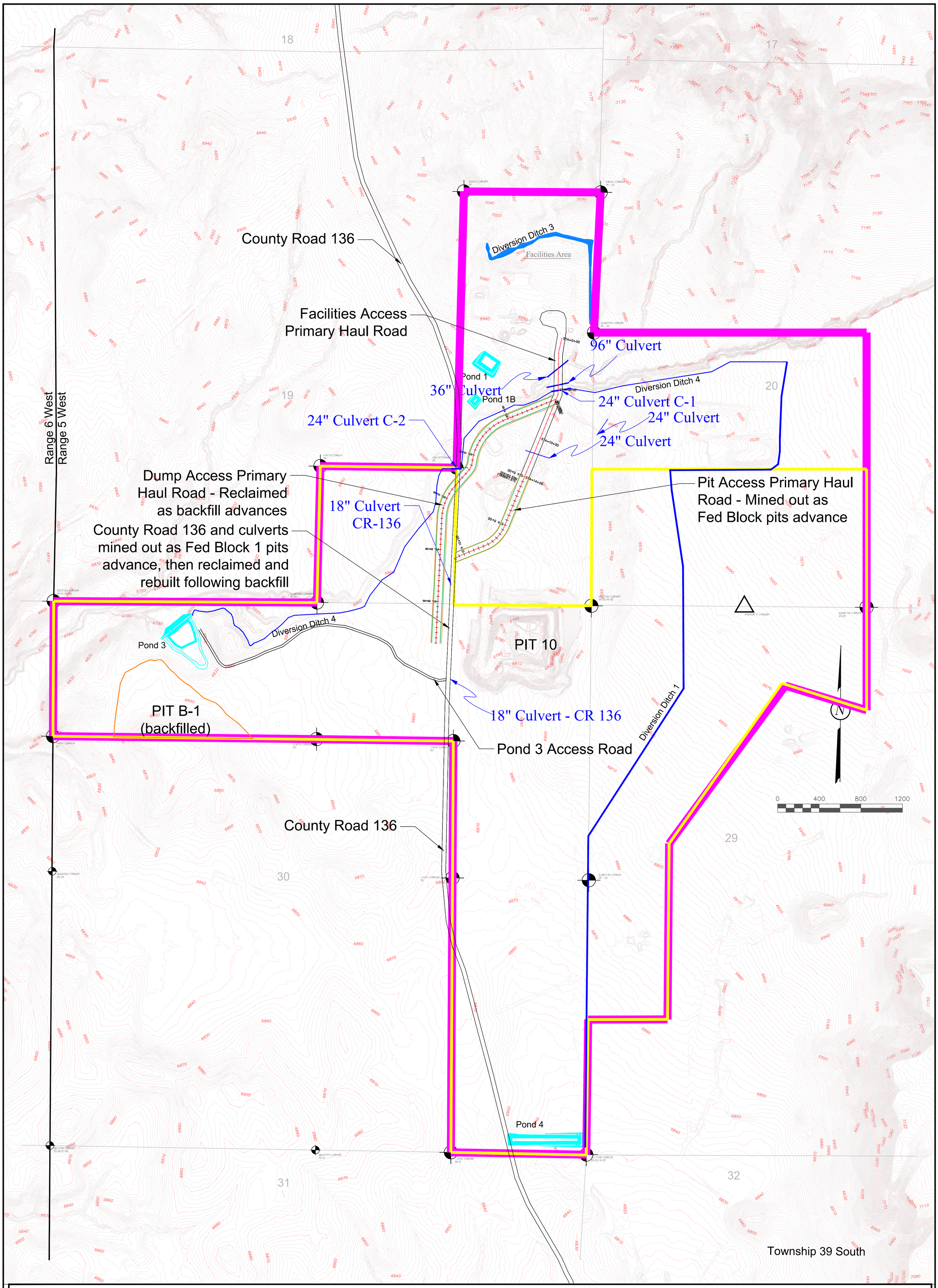
BOND POLYGONS

COAL HOLLOW PROJECT
ALTON, UTAH

DRAWING: 5-19

PROFESSIONAL ENGINEER 10230818 ANDREW R. CHRISTENSEN STATE OF UTAH

Alton Coal Development
Coal Hollow Project
463 North 100 West, Suite 1
Cedar City, Utah 84721
Phone (435)867-5331
Fax (435)867-1192



LEGEND:

- PERMIT BOUNDARY
- PRIVATE COAL OWNERSHIP
- COAL LINE
- BOUNDARY
- SECTION LINE
- FOUND SECTION CORNER
- FOUND PROPERTY CORNER
- PROPOSED SEDIMENT IMPOUNDS
- PROPOSED DIVERSION DITCHES

DRAWN BY: J. STANSFIELD	CHECKED BY: CRM/GG
DRAWING: 5-22	DATE: 4/20/07
	SCALE: 1" = 400' on 24" X 36" paper
JOB NUMBER: 1400	SHEET

REVISIONS

DATE:	BY:
9/16/08	CRM
11/25/14	KN
9/20/16	AC
8/7/18	AC

PRIMARY MINE HAUL ROADS PLAN VIEW

COAL HOLLOW PROJECT
ALTON, UTAH

DRAWING: 5-22

PROFESSIONAL ENGINEER
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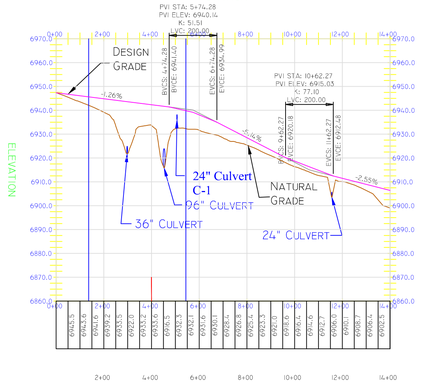
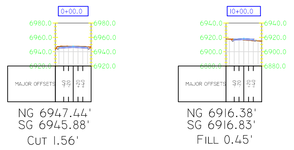
FACILITIES ACCESS

PROFILE VIEW: PV - (1)
SCALE: 20
DATUM: 6860.00

HORZ. SCALE 1" = 300', VERT. SCALE 1" = 100'
STATION

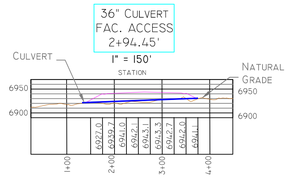


HORZ. SCALE 1" = 300', VERT. SCALE 1" = 100'

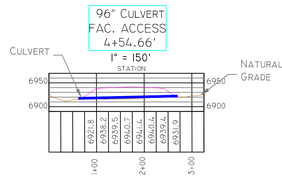


NG - NATURAL GROUND ELEVATION
SG - SUBGRADE ELEVATION

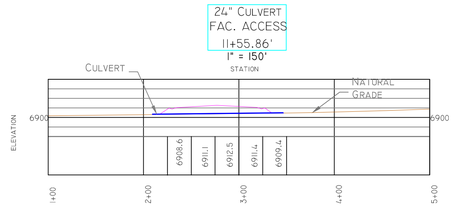
36" CULVERT
FAC. ACCESS
2+94.45'
1" = 150'



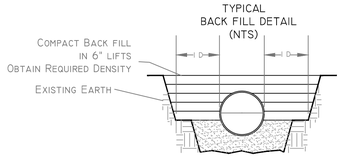
96" CULVERT
FAC. ACCESS
4+54.66'
1" = 150'



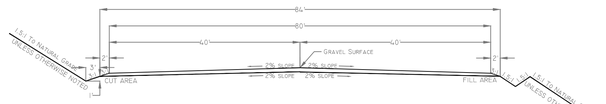
24" CULVERT
FAC. ACCESS
11+55.86'
1" = 150'



TYPICAL
BACK FILL DETAIL
(NTS)



PRIMARY HAUL ROAD TYPICAL CROSS SECTION
NTS



SUB-GRADE TO BE COMPACTED
TO APPROPRIATE DENSITY.

18" OF CRUSHED ROCK OR GRAVEL TO BE PLACED

POSTMINING ROAD TYPICAL CROSS SECTION
NTS

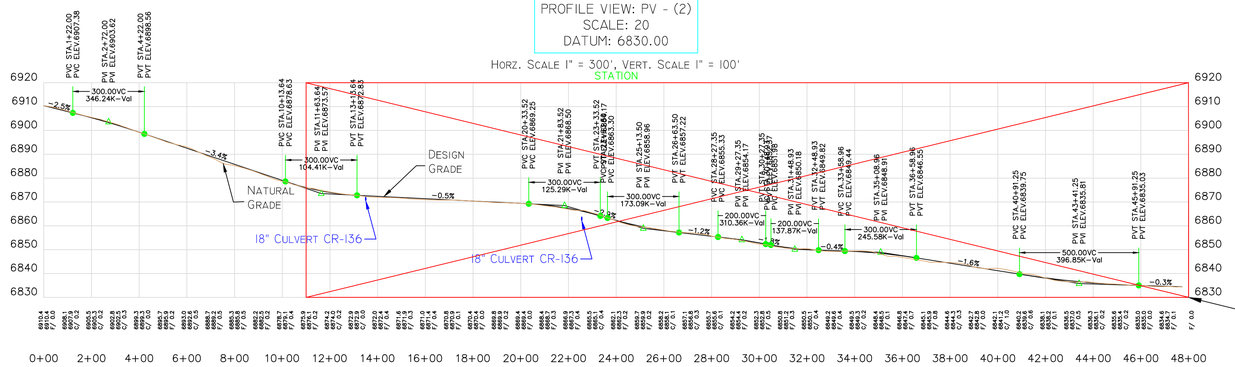
SUB-GRADE TO BE COMPACTED
TO APPROPRIATE DENSITY.

MIN. 6" OF CRUSHED ROCK OR GRAVEL TO BE PLACED

PIT ACCESS PRIMARY HAUL ROAD

PROFILE VIEW: PV - (2)
SCALE: 20
DATUM: 6830.00

HORZ. SCALE 1" = 300', VERT. SCALE 1" = 100'
STATION

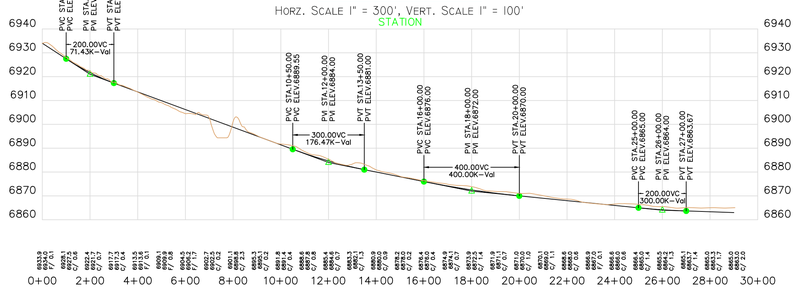


Pit B-1 Portion of Primary Road has been reclaimed. Remaining Portion will be utilized as pit access primary road and will gradually be mined out as Fed Block pits advance.

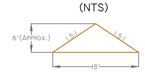
FED BLOCK I DUMP ACCESS PRIMARY HAUL ROAD

PROFILE VIEW: PV - (3)
SCALE: 20
DATUM: 6860.00

HORZ. SCALE 1" = 300', VERT. SCALE 1" = 100'
STATION



EARTHEN BERM DETAIL
(NTS)



BERM TO BE PLACED ON PV - (1)
FROM STATION 0+00 TO 5+10.

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PROFESSIONAL ENGINEER
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ANDREW R. CARLSTEN
STATE OF UTAH

PRIMARY MINE HAUL ROADS CROSS SECTION & DETAIL

COAL HOLLOW PROJECT
ALTON, UTAH

DRAWING: 5-23

REVISIONS

DATE:	BY:
9/16/08	CRM
9/20/16	AC
8/7/18	AC

DRAWN BY:	CHECKED BY:
J. STANSFIELD	CRM/GG
DRAWING: 5-23	DATE: 04/20/07
	SCALE: As Noted
	JOB NUMBER: 1400
	SHEET

LEGEND:

Ditch 3

Pond 1

Pond 1B

Lower Robinson Creek

Diversion Ditch 4-A-D
- Mined out by Federal Block 1 Pit

Ditch 1

Robinson Creek
Reconstruction

Ditch 4

Diversion Ditch B-1T-L
Mined out during final
borrow

Diversion Ditch 4
Borrow Alignment
(See Dwg 5-34)

Pond 3

Ditch to be
placed in fill.

Diversion Ditch 4-A-R

Diversion Ditch 4-A-U
- Mined out by Federal Block 1 Pit

Diversion Ditch B-1T-U
- Mined out as part of Pit B-1

Sink Valley Wash

Pond 4

Range 6 West
Range 5 West

19
20
29
30
31
32

0 500 1000 1500

N

LEGEND:
- PERMIT BOUNDARY
- PRIVATE COAL OWNERSHIP
- SECTION LINE
- FOUND SECTION CORNER
- FOUND PROPERTY CORNER
- PROPOSED SEDIMENT IMPOUNDS
- DIVERSION DITCHES
- EXISTING DRAINAGES

DRAWN BY:	CHECKED BY:
J. STANSFIELD	DWG
DRAWING: 5–25	DATE: 4/20/07
	SCALE: 1" = 500'
JOB NUMBER: 1400	SHEET

REVISIONS

DATE:	BY:
12/02/08	CRM
11/04/14	KN
5/20/16	AC
8/6/18	AC

DIVERSION DITCH & SEDIMENT IMPOUND PLAN VIEW

COAL HOLLOW PROJECT
ALTON, UTAH

DRAWING: 5-25

PROFESSIONAL ENGINEER
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Alton Coal Development
Coal Hollow Project
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Cedar City, Utah 84720
Phone (435)867-5331
Fax (435)867-1192

Ditch 3

Watershed 7
5 Acres

Watershed 1
27 Acres

Pond 1

Lower Robinson Creek

Pond 1B

Range 6 West

Range 5 West

Ditch 1

Silt Fence

Watershed 6
19 Acres

Ditch 4

Watershed 3
378.4 Acres

Pond 3

Pond 3

Excelsior Wattles

Watershed 5
(Subset of Watershed 3)
24.2 Acres

Watershed 4
99.9 Acres

Ditch 1

Sink Valley Wash

Pond 4

19

20

29

30

31

32

N

0 500 1000 1500

LEGEND:

- PERMIT BOUNDARY
- PRIVATE COAL OWNERSHIP
- SECTION LINE
- FOUND SECTION CORNER
- FOUND PROPERTY CORNER
- EXISTING DRAINAGES
- PROPOSED SEDIMENT IMPOUNDS
- SILT FENCE

DRAWN BY:	CHECKED BY:
C. McCOURT	DWG
DRAWING: 5–26	DATE: 4/20/07
	SCALE: 1" = 500'
JOB NUMBER: 1400	SHEET

REVISIONS

DATE:	BY:
12/02/08	CRM
08/12/13	KN
11/04/14	KN
3/22/16	AC
7/28/18	AC

SEDIMENT IMPOUND WATERSHEDS

COAL HOLLOW PROJECT
ALTON, UTAH

DRAWING: 5-26

PROFESSIONAL ENGINEER
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Phone (435)867-5331
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Ditch 3
Watershed
72 Acres

Ditch 3

Pond 1

24 inch Drop Pipe Spillway
Top of riser 6918'
Bottom of riser 6917'

Pond 1B
24 inch Drop Pipe Spillway
Top of riser 6906'
Bottom of riser 6903'

24 inch outlet 6916'

24 inch outlet 6903'

Ditch 4 Watershed
189.1 Acres

Ditch 4 Borrow Watershed
185.0 Acres

Diversion Ditch 4-A-D

Diversion Ditch 4-A-D
Watershed - 6.65 Acres

Ditch 1

Ditch 4

Diversion Ditch B-1T-L
- Mined out during final borrow

Diversion Ditch 4
Borrow Alignment
(See Dwg 5-34)

Diversion Ditch 4-A-U
Watershed - 53.08 Acres

Pond 3

Pond 3

Diversion Ditch 4
Watershed prior to
Borrow - (189.1 Acres)

Diversion Ditch 4-A-R
Watershed - 19.90 Acres

Diversion Ditch 4-A-R

Diversion Ditch 4
Watershed following
Borrow - 185.0 Acres

Diversion Ditch 4-A-U

Diversion Ditch B-1T-L Watershed
during mining of Pit B-1 (11.3 acres)

Diversion Ditch B-1T-U Watershed
during mining of Pit B-1 (6.1 acres)

Diversion Ditch B-1T-U
- Mined out as part of Pit B-1

Ditch 1

Ditch 1
Watershed
243.6 Acres

Lower Robinson Creek

Sink Valley Wash

Range 6 West

Range 5 West

Township 39 South

Pond 4

N

0 500 1000 1500

LEGEND:	
	PERMIT BOUNDARY
	PRIVATE COAL OWNERSHIP
	PROPOSED DIVERSION DITCHES
	EXISTING DRAINAGES
	PROPOSED SEDIMENT IMPOUNDMENT
	SECTION LINE
	FOUND SECTION CORNER
	FOUND PROPERTY CORNER

DRAWN BY:	CHECKED BY:
C. McCOURT	GG
DRAWING: 5–27	DATE: 4/20/07
	SCALE: 1" = 500'
JOB NUMBER: 1400	SHEET

REVISIONS

DATE:	BY:
6/13/11	KN/JKSR
4/22/13	KN
8/13/13	KN
5/20/16	AC
9/19/16	AC
3/3/17	AC
7/30/18	AC

DIVERSION DITCH WATERSHEDS

COAL HOLLOW
PROJECT
ALTON, UTAH

DRAWING: 5-27

PROFESSIONAL ENGINEER
10230818
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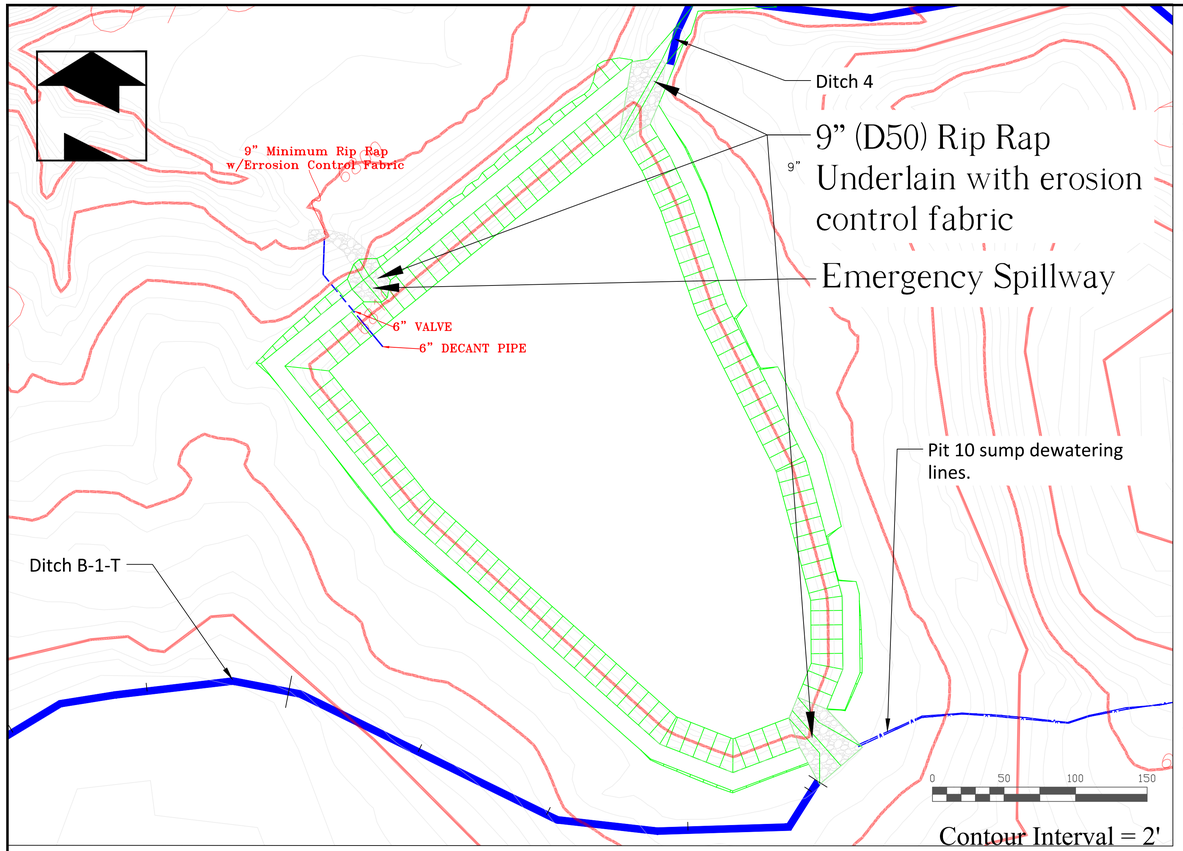
Alton Coal Development
Coal Hollow Project
463 North 100 West, Suite 1
Cedar City, Utah 84720
Phone (435)867-5331
Fax (435)867-1192



Design Pond Storage Volumes

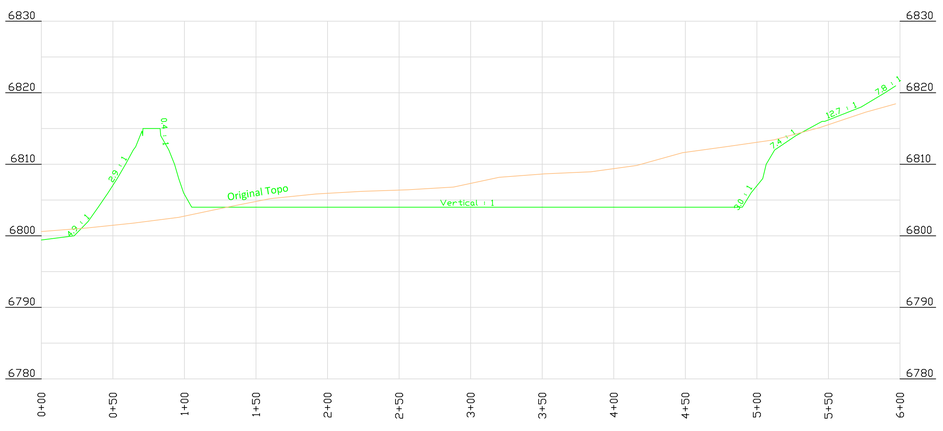
Sediment Control Structure No. 3

Water Elev (ft)	Area (Acres)	Average Area	Volume (Acre-Ft)	Accumulated Volume (Acre-Ft)	Stage
6804	-	-	-	-	Bottom Pond
6805	1.723	0.862	0.862	0.862	
6805.2	Calculated			1.438	60% Sediment Cleanout
6805.6	Calculated			2.397	Max Sediment Level
6806	1.794	1.759	1.759	3.381	
6807	1.857	1.826	1.826	5.195	
6808	1.909	1.883	1.883	7.068	Decant Pipe
6809	1.968	1.939	1.939	8.998	
6810	2.024	1.996	1.996	10.984	
6811	2.081	2.053	2.053	13.026	
6812	2.141	2.111	2.111	15.127	Emergency Spillway
6813	2.219	2.180	2.180	17.292	
6814	2.294	2.257	2.257	19.536	
6815	2.303	2.299	2.299	21.834	Top of Dike

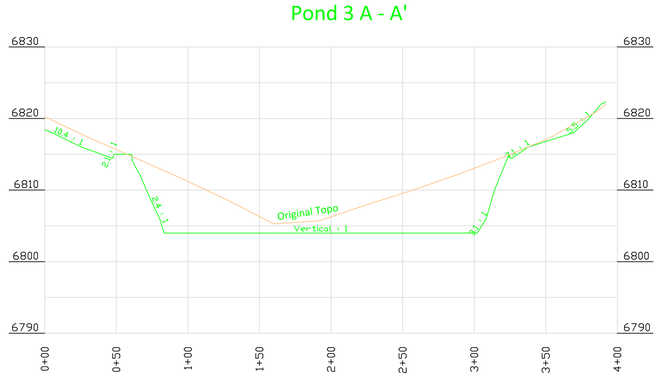
Pond #3

Required Storage for 10 year,
24 hr event = 14.89 acre/ft

Pond 3 A - A'

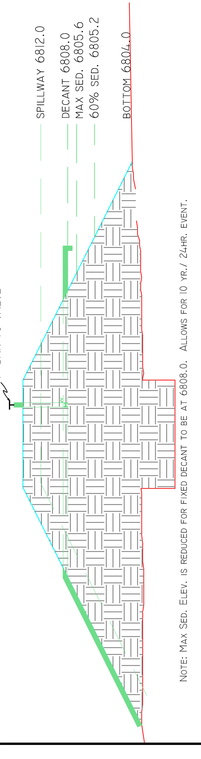


Pond 3 A - A'



X-Section Scale
1"=10'
1"=50'

CROSS SECTION
DECANT WITH VALVE



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ANDREW R. CHRISTENSEN
STATE OF UTAH

SEDIMENT IMPOUNDMENT 3 DETAILS

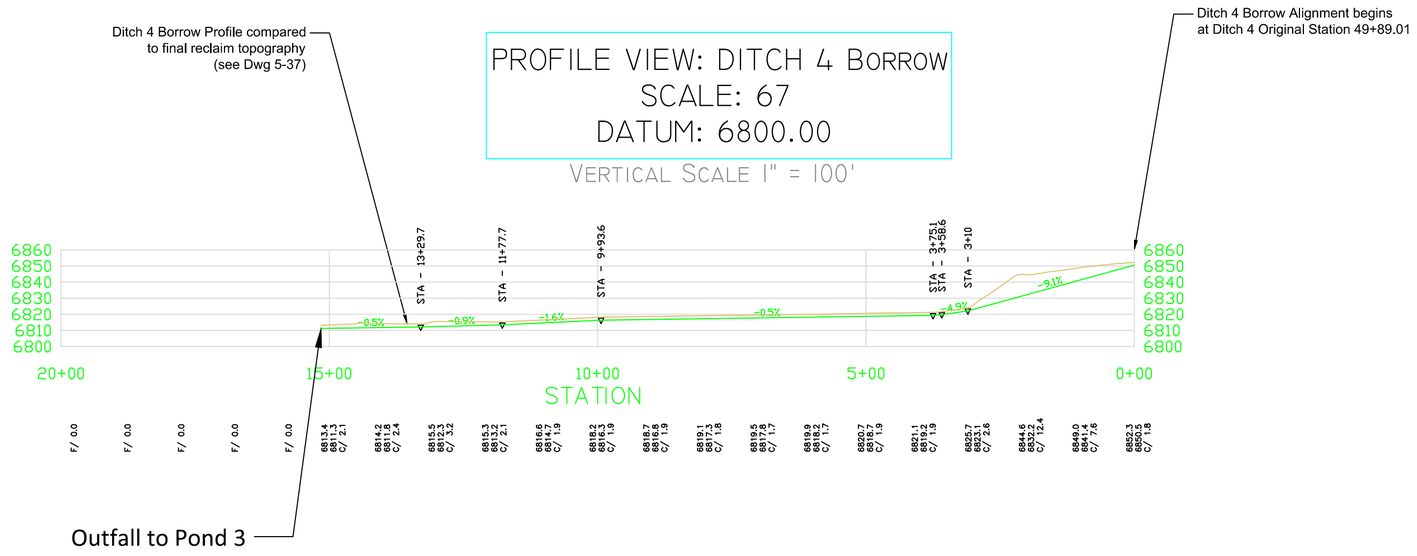
COAL HOLLOW PROJECT
ALTON, UTAH

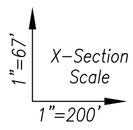
DRAWING: 5-30

REVISIONS

DATE:	BY:
12-04-08	CRM
01-18-15	KN
01-26-15	KN
8-7-18	KN

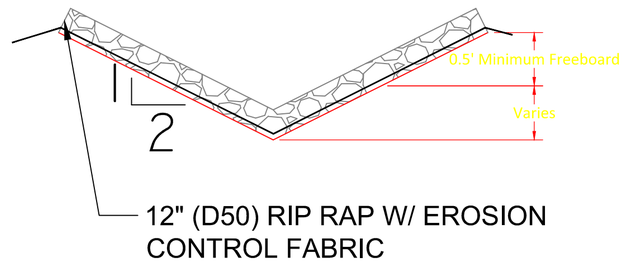
DRAWN BY: C. MCCOURT	CHECKED BY: GG		
DRAWING: 5-30	DATE: 12/18/06	SCALE: 1" = 50'	SHEET
			JOB NUMBER: 1400





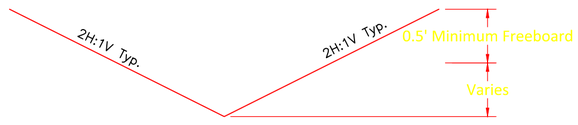
Diversion Ditch Typical Section (Lined)

(See Appendix 5-2, Table 4)

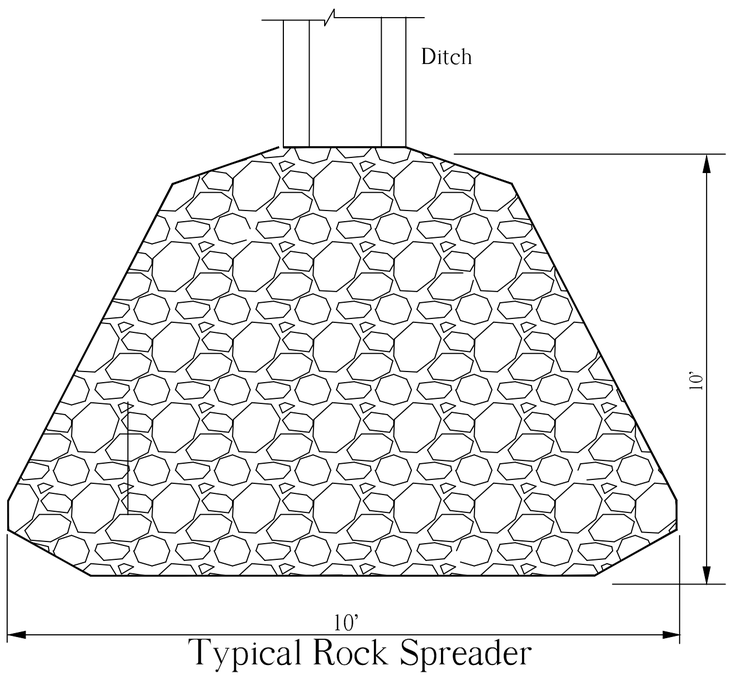


Diversion Ditch Typical Section (Unlined)

(See Appendix 5-2, Table 4)



Triangular Channel
Equal Side Slopes

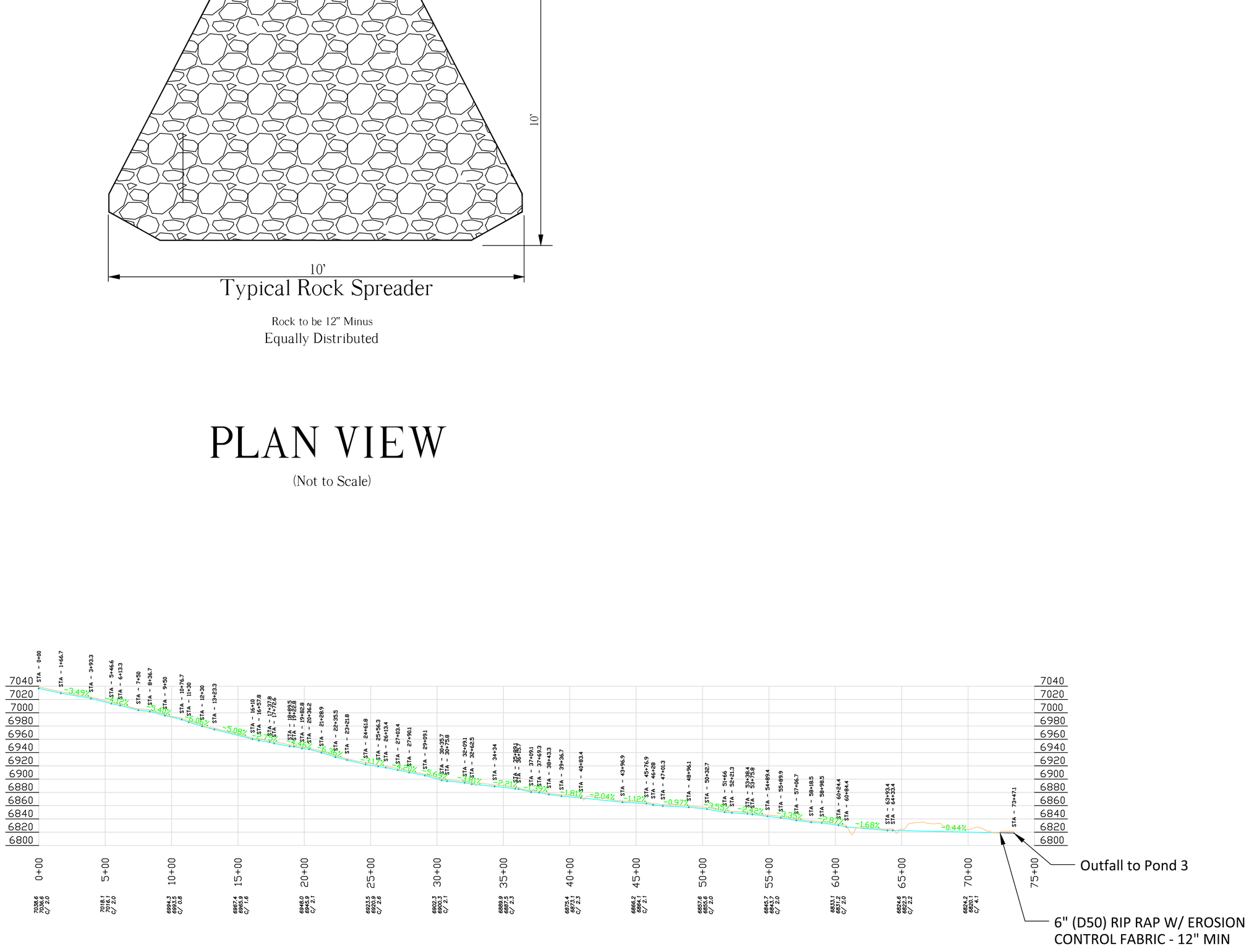


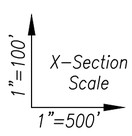
Typical Rock Spreader

Rock to be 12" Minus
Equally Distributed

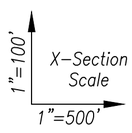
PLAN VIEW

(Not to Scale)





DITCH 4



DITCH 1

LEGEND:

- PROPOSED DITCH
- ORIGINAL TOPOGRAPHY

DRAWN BY:	CHECKED BY:
A. CHRISTENSEN	DWG
DRAWING: 5-72	DATE: 8/6/2018
	SCALE: As Shown
JOB NUMBER: 0001	SHEET

REVISIONS

DATE:	BY:

DIVERSION DITCH DETAILS
Ditches 1, 4 & 4 - Borrow

NORTH
COAL HOLLOW
PROJECT
ALTON, UTAH

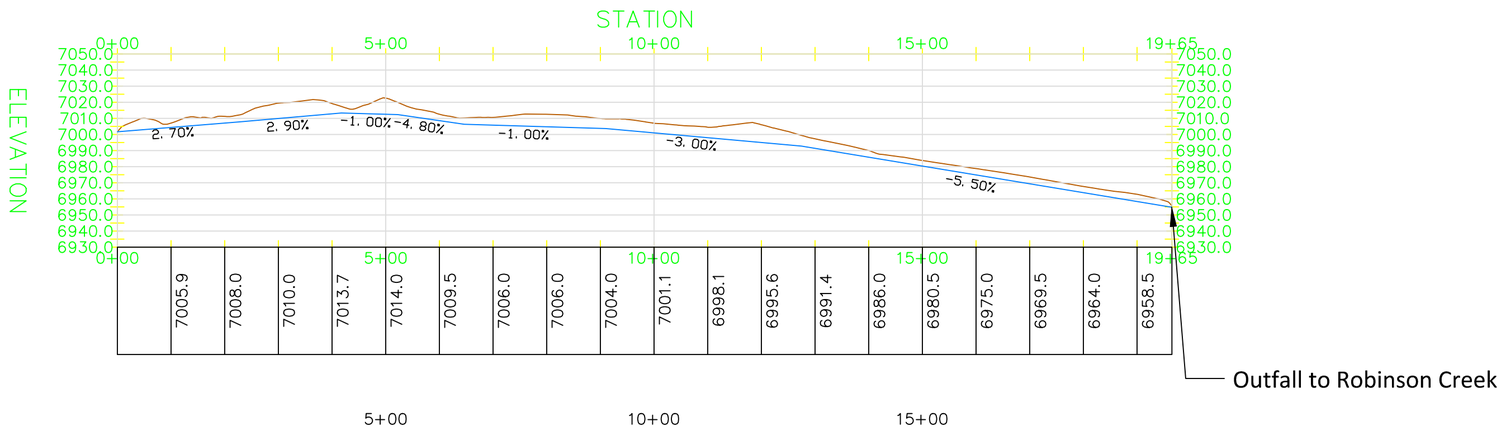
DRAWING: 5-33

PROFESSIONAL ENGINEER
10230818
ANDREW R. CHRISTENSEN
STATE OF UTAH

ALTON COAL DEVELOPMENT
COAL HOLLOW PROJECT
463 North 100 West, Suite 1
Cedar City, Utah 84721
Phone (435)867-5331
Fax (435)867-1192

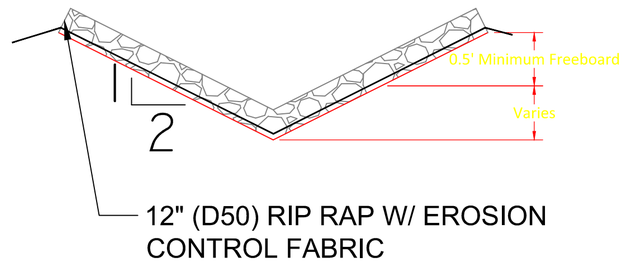
PROFILE VIEW: DITCH 3
SCALE: 67
DATUM: 6930.00

VERTICAL SCALE 1" = 100'



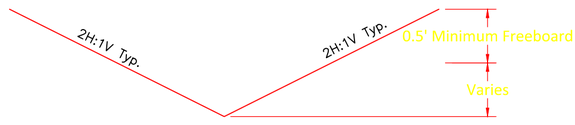
Diversion Ditch Typical Section (Lined)

(See Appendix 5-2, Table 4)



Diversion Ditch Typical Section (Unlined)

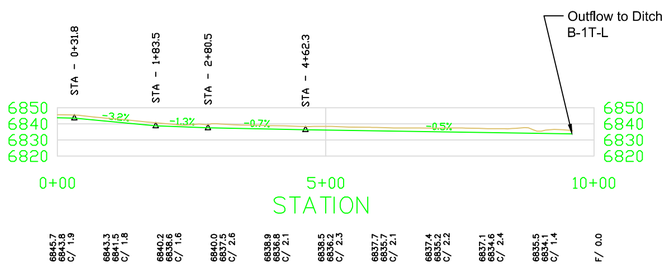
(See Appendix 5-2, Table 4)



Triangular Channel
Equal Side Slopes

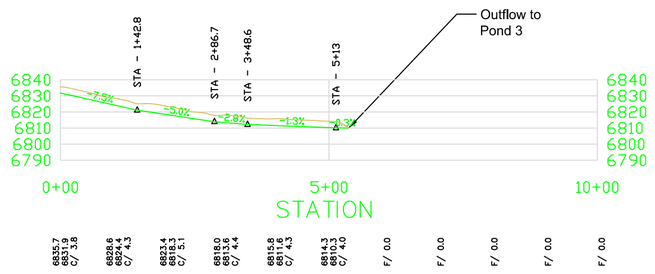
PROFILE VIEW: DITCH B-IT-U
SCALE: 67
DATUM: 6820.00

VERTICAL SCALE 1" = 100'



PROFILE VIEW: DITCH B-IT-L
SCALE: 67
DATUM: 6790.00

VERTICAL SCALE 1" = 100'



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DATUM: 6870.00

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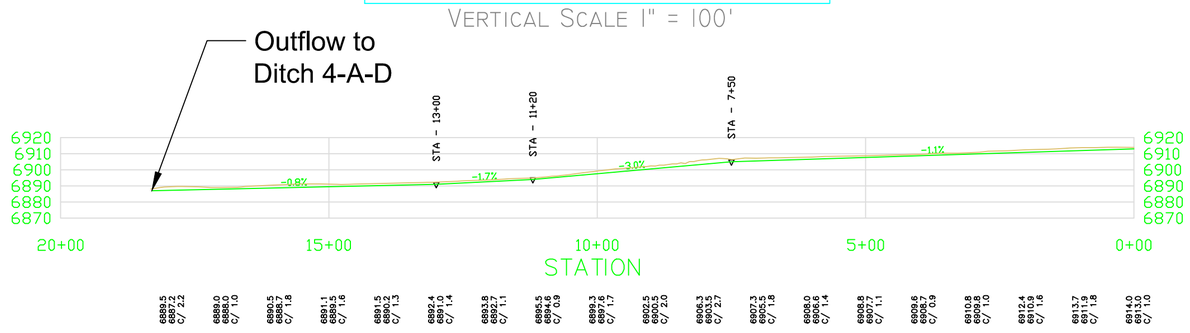

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DATUM: 6860.00

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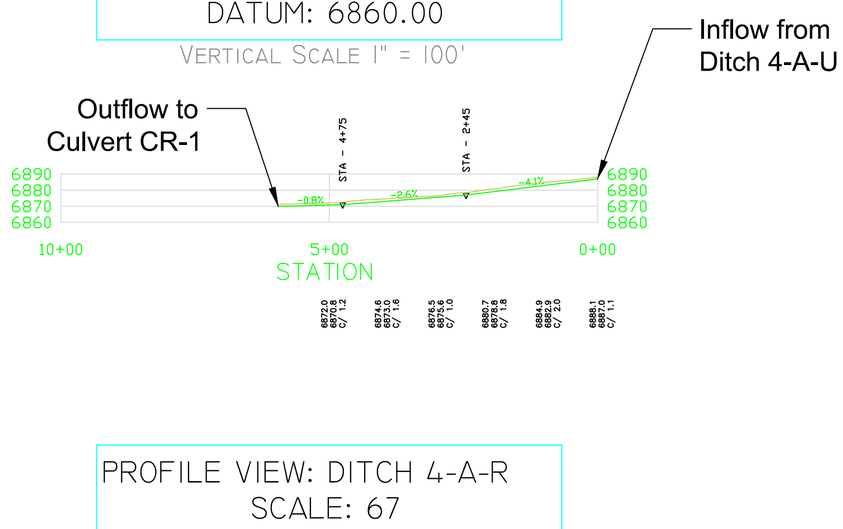

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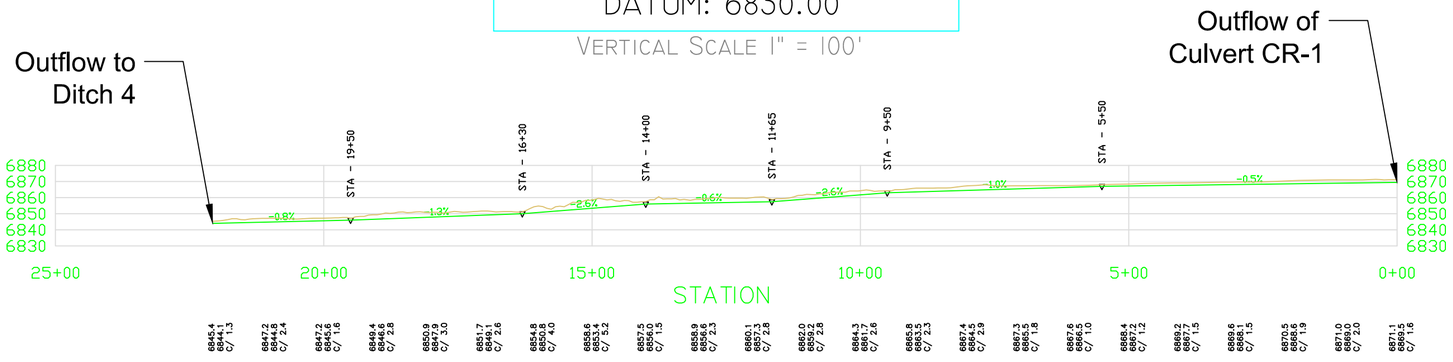
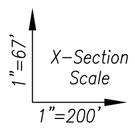
DATUM: 6830.00

VERTICAL SCALE 1" = 100'





LEGEND:

- PROPOSED DITCH
- ORIGINAL TOPOGRAPHY

DRAWN BY:	CHECKED BY:
A. CHRISTENSEN	DWG
DRAWING: 5-72	DATE: 8/6/2018
	SCALE: 1" = 200'
JOB NUMBER: 0001	SHEET

REVISIONS

DATE:	BY:

DIVERSION DITCH DETAILS
Ditches 3, B-1-T & 4-A

NORTH
COAL HOLLOW
PROJECT
ALTON, UTAH

DRAWING: 5-34

PROFESSIONAL ENGINEER
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ANDREW R. CHRISTENSEN
STATE OF UTAH

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COAL HOLLOW PROJECT

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Cedar City, Utah 84721
Phone (435)867-5331
Fax (435)867-1192

Existing County Road 136

Road to East Pugh Property

Water Well

Road to Swapp Ranch

Range 6 West

Range 5 West

Township 39 South

Township 39 South

Coal Outcrop/Burn

Coal Outcrop/Burn

3:1 Max. Final Slope along current Disturbance Boundary

CONTOURS ARE AT 2' INTERVALS.

0 500 1000 1500

N

LEGEND:

- PERMIT BOUNDARY
- PRIVATE COAL OWNERSHIP
- COAL LINE BOUNDARY
- COAL RECOVERY LINE
- SECTION LINE
- FOUND SECTION CORNER
- FOUND PROPERTY CORNER

DRAWN BY:	CHECKED BY:
A. CHRISTENSEN	BKN
DRAWING: 5-35	DATE: 6/6/2016
	SCALE: 1" = 500' on 24" X 36" paper
JOB NUMBER: 1400	SHEET

REVISIONS

DATE:	BY:
08/01/16	AC
09/20/16	AC
08/08/18	AC

INTERMEDIATE TOPOGRAPHY

COAL HOLLOW PROJECT
ALTON, UTAH

DRAWING: 5-35

PROFESSIONAL ENGINEER
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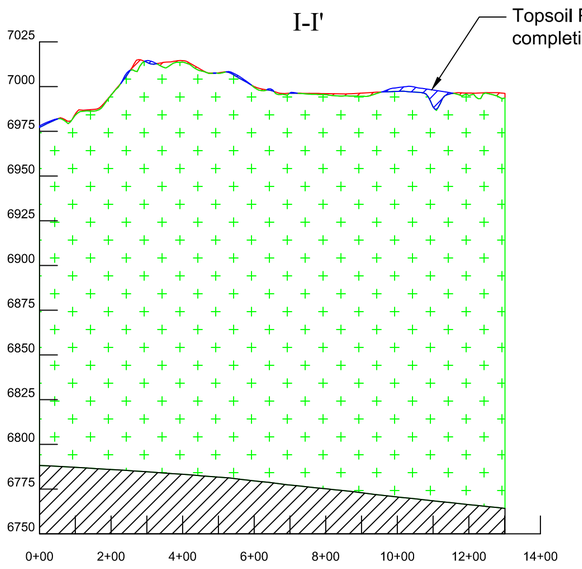
ANDREW R. CHRISTENSEN
STATE OF UTAH

Alton Coal Development
Coal Hollow Project
463 North 100 West, Suite 1
Cedar City, Utah 84721
Phone (435)867-5331
Fax (435)867-1192

I-I'



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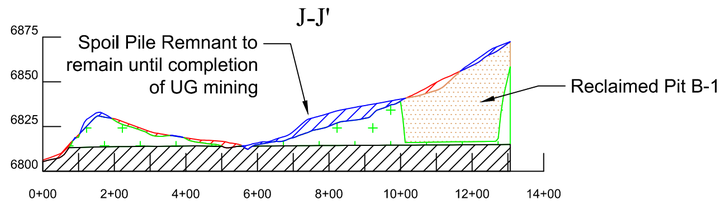

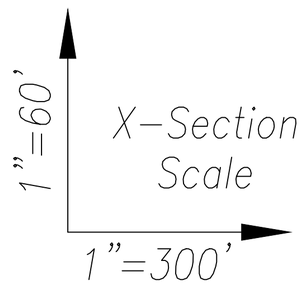

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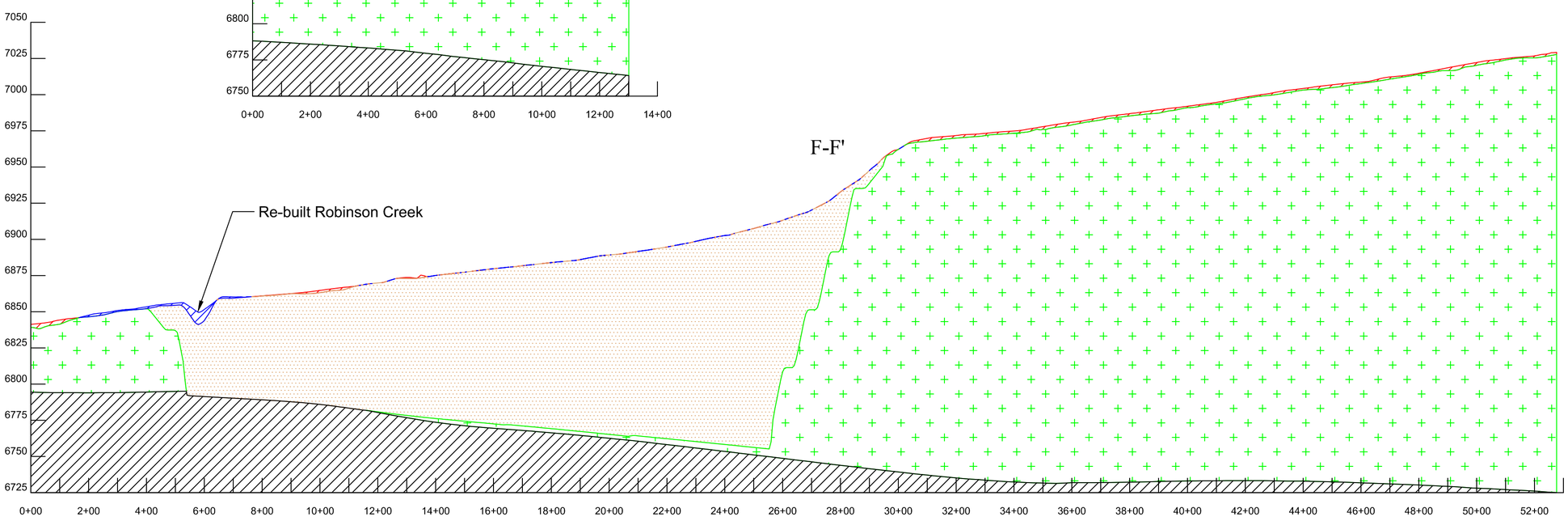

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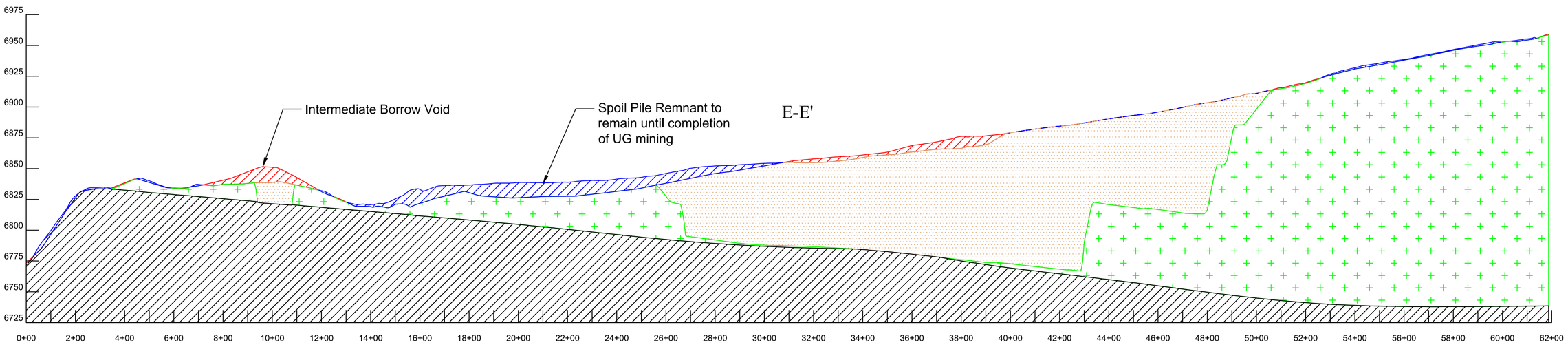

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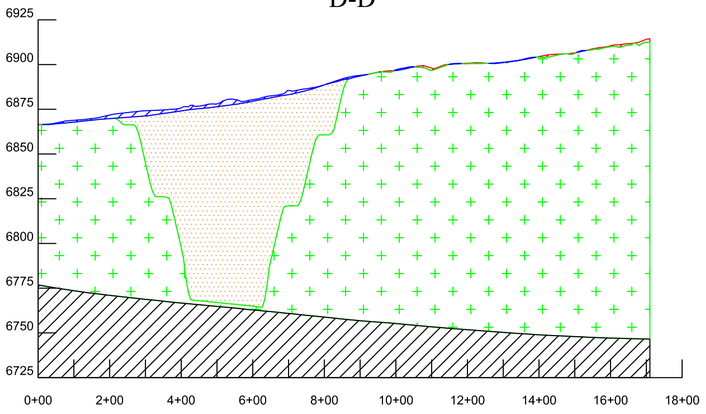

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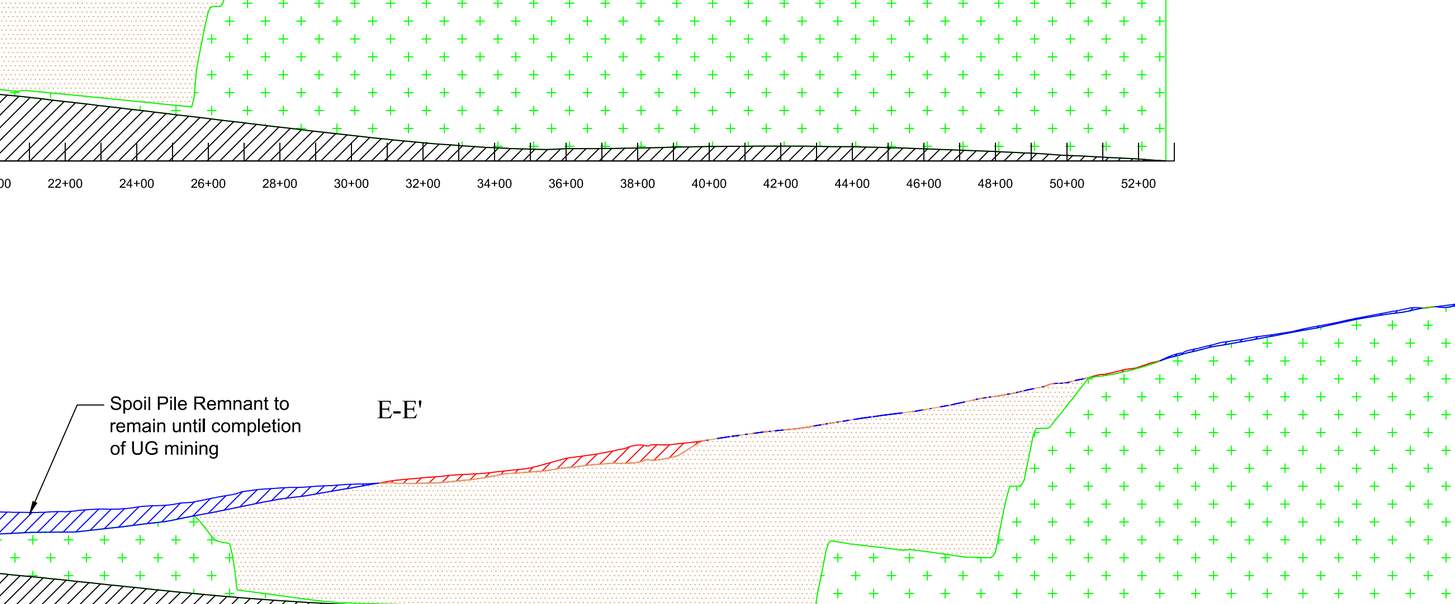

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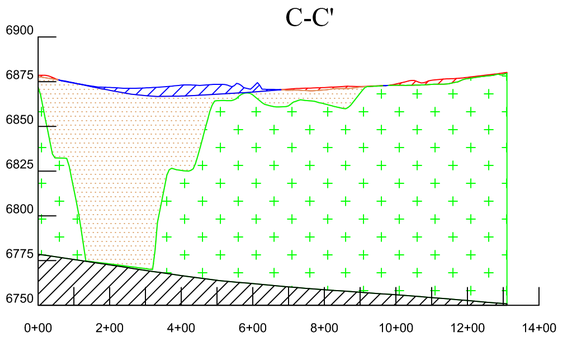

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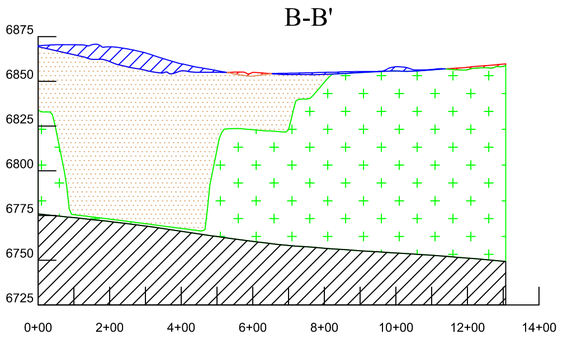

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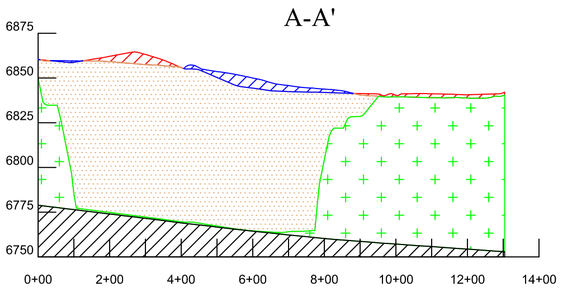

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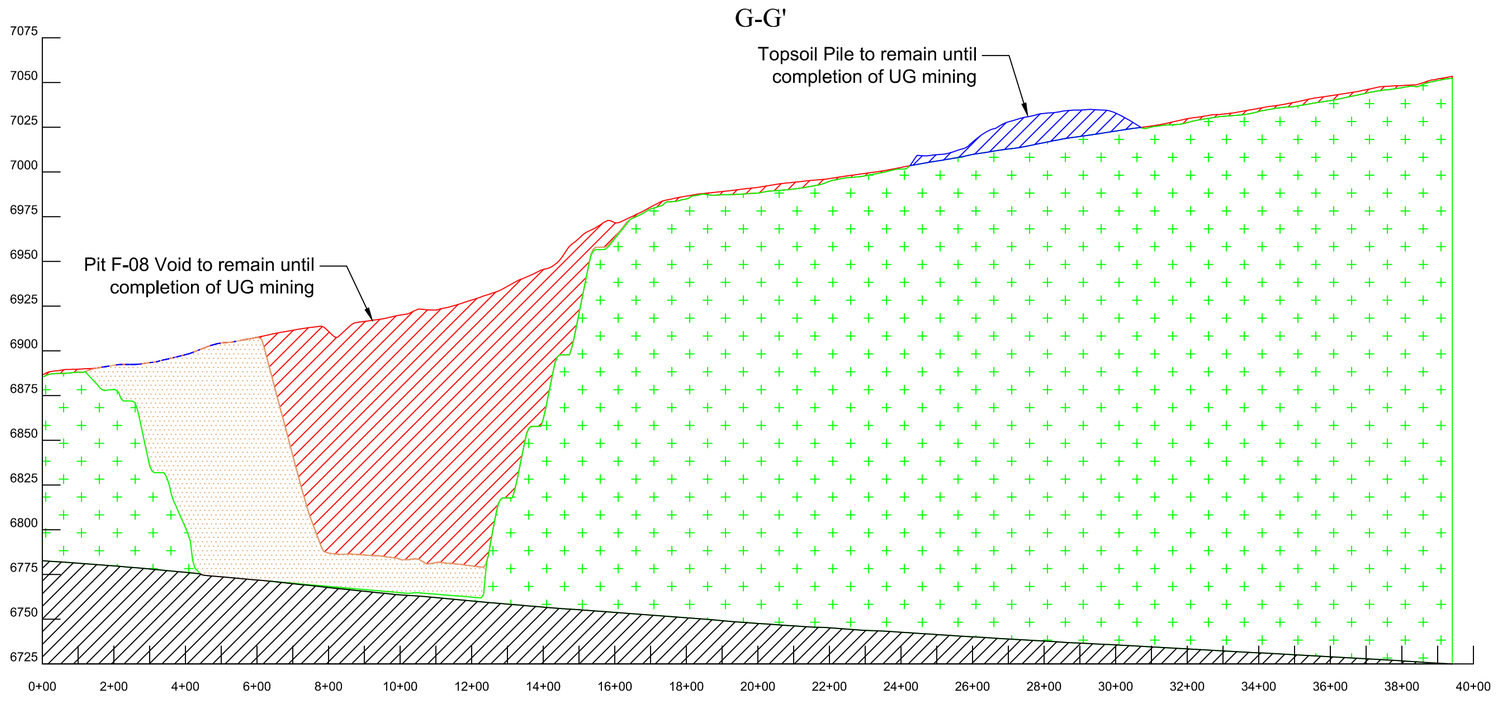

LEGEND:

FILL ABOVE ORIGINAL CONTOUR

VOID BELOW ORIGINAL CONTOUR

BACKFILL

UNMINED TROPIC SHALE / ALLUVIUM

DAKOTA FORMATION

DRAWN BY:	CHECKED BY:
A. CHRISTENSEN	BKN
DRAWING: 5-36	DATE: 6/6/2016
	SCALE: 1" = 300' on 24" X 36" paper
JOB NUMBER: 1400	SHEET

REVISIONS

DATE:	BY:
08/01/2016	AC
09/20/2016	AC
08/09/2018	AC
10/12/2018	AC

INTERMEDIATE TOPOGRAPHY

CROSS SECTIONS

COAL HOLLOW PROJECT
ALTON, UTAH

DRAWING: 5-36

PROFESSIONAL ENGINEER
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Cedar City, Utah 84721
Phone (435)867-5331
Fax (435)867-1192

Existing County Road 136

Range 6 West
Range 5 West

Road to East Pugh Property

Water Well

Road to Swapp Ranch

3:1 Max. Final Slope along current Disturbance Boundary

Township 39 South

CONTOURS ARE AT 2' INTERVALS.

0 500 1000 1500

LEGEND:

- PROJECT BOUNDARY
- PRIVATE COAL OWNERSHIP
- COAL LINE BOUNDARY
- COAL RECOVERY LINE
- SECTION LINE
- FOUND SECTION CORNER
- FOUND PROPERTY CORNER

DRAWN BY: A. CHRISTENSEN	CHECKED BY: BKN
DRAWING: 5-37	DATE: 11/20/08
	SCALE: 1" = 500' on 24" X 36" paper
JOB NUMBER: 1400	SHEET

REVISIONS

DATE:	BY:
10/18/13	LWJ
01/18/15	KN
02/22/16	AC
06/06/16	AC
08/01/16	AC
09/20/16	AC
08/08/18	AC

POST MINING TOPOGRAPHY

COAL HOLLOW PROJECT
ALTON, UTAH

DRAWING: 5-37

PROFESSIONAL ENGINEER
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Coal Hollow Project
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Cedar City, Utah 84721
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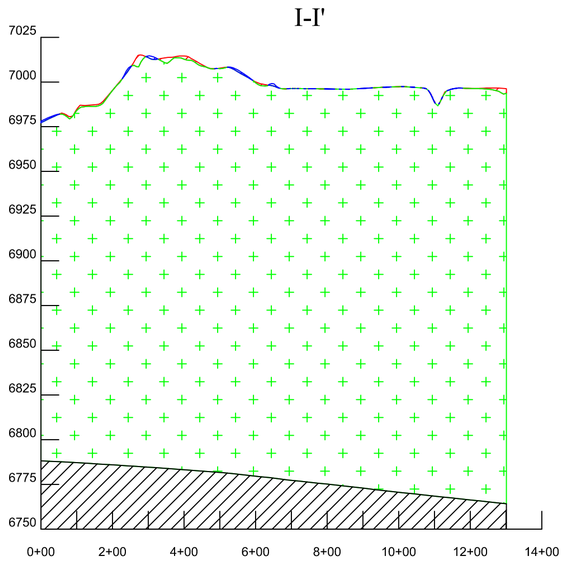
Fax (435)867-1192

I-I'



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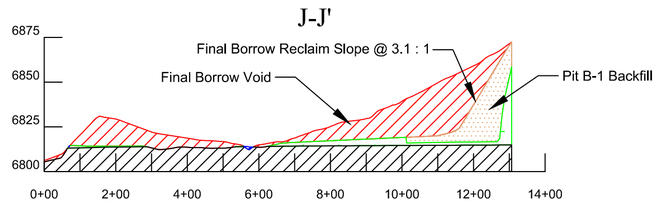

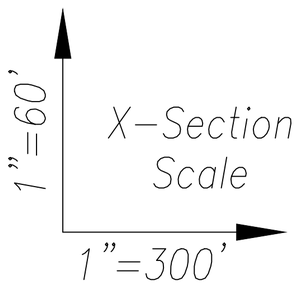

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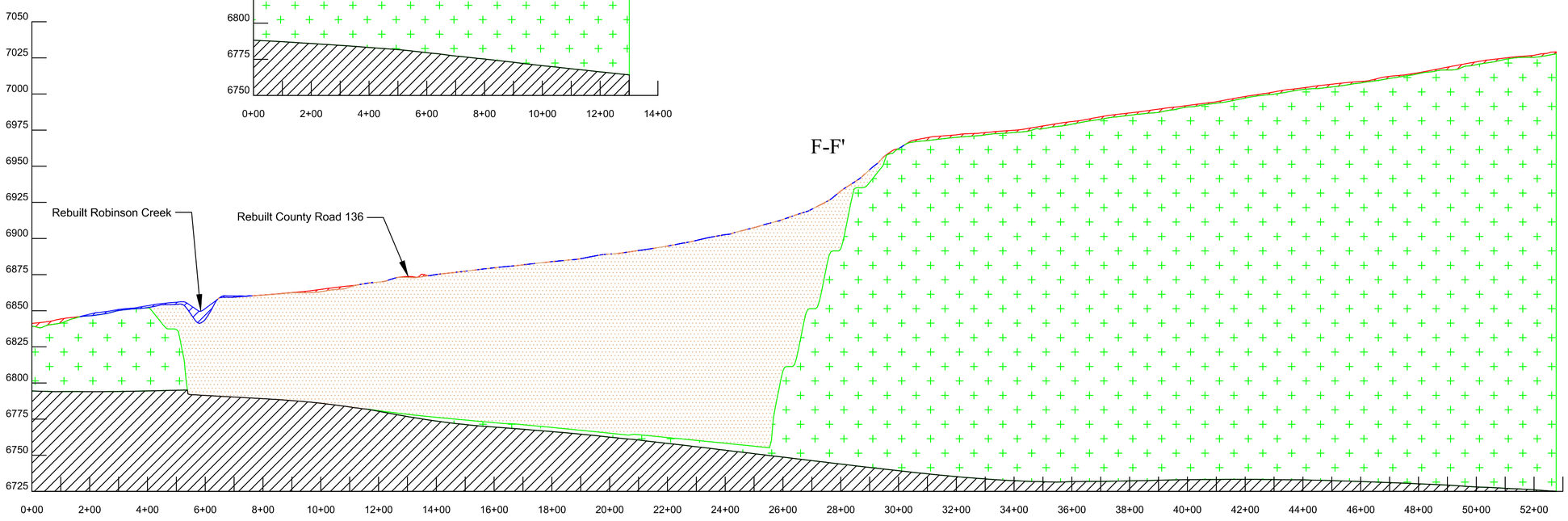

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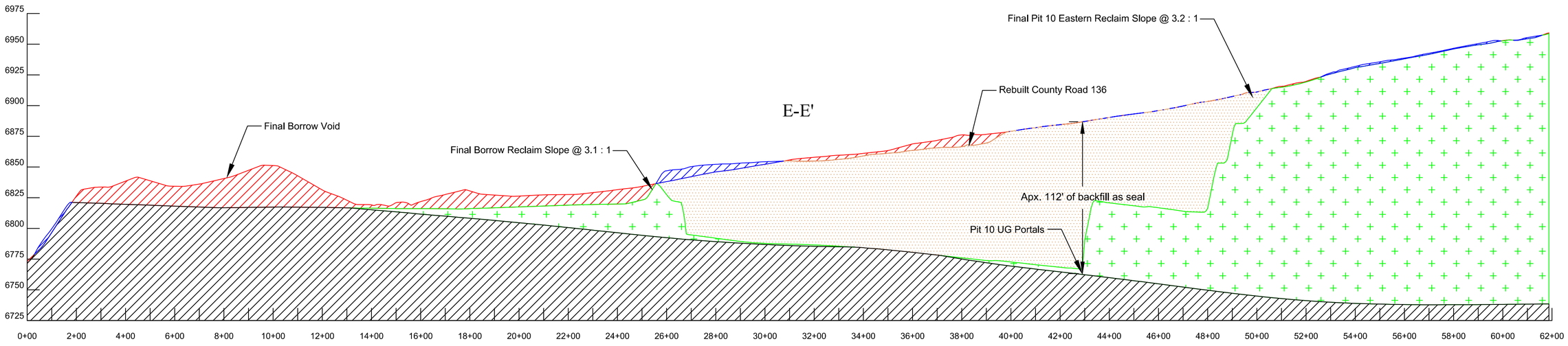

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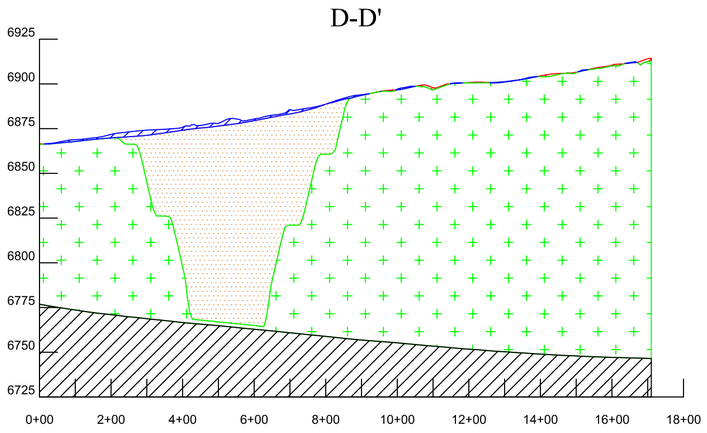

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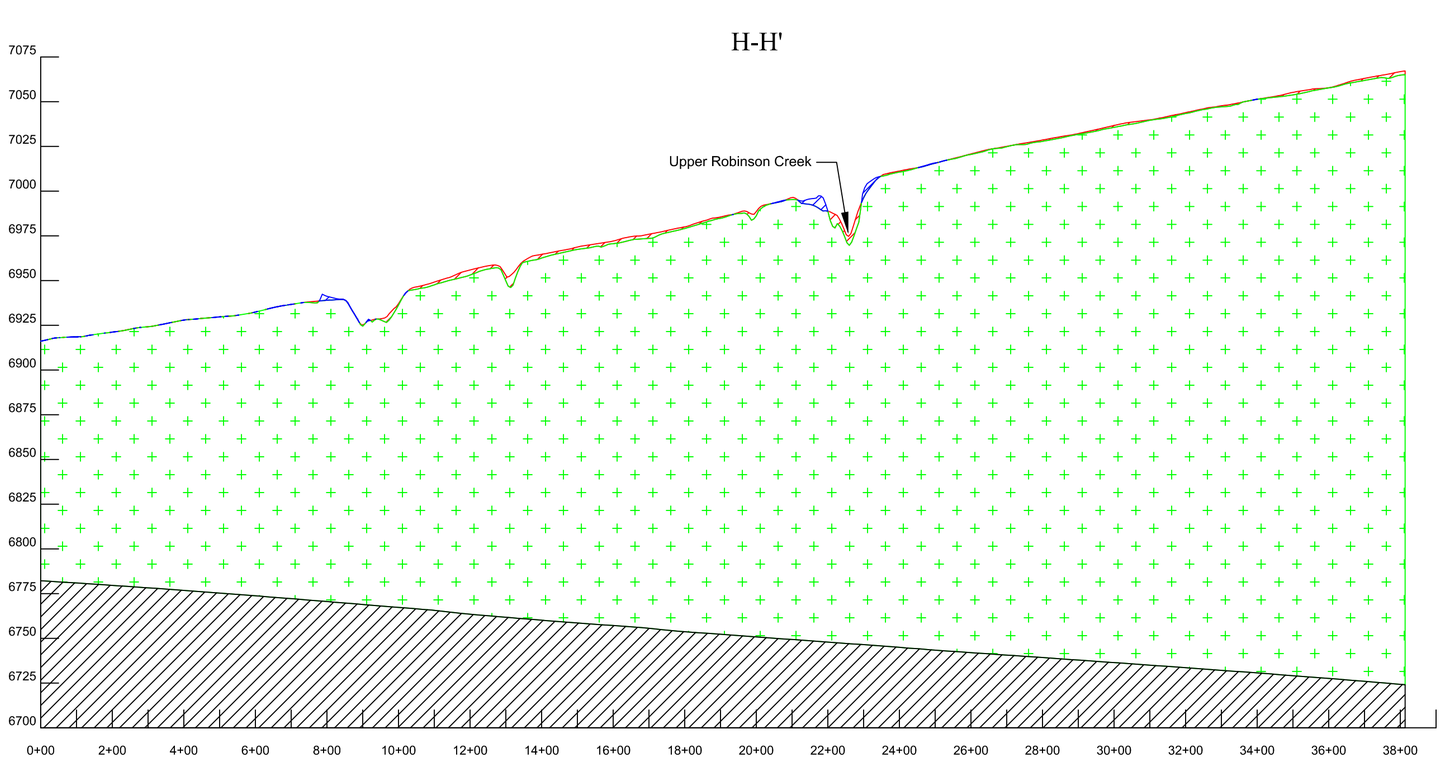

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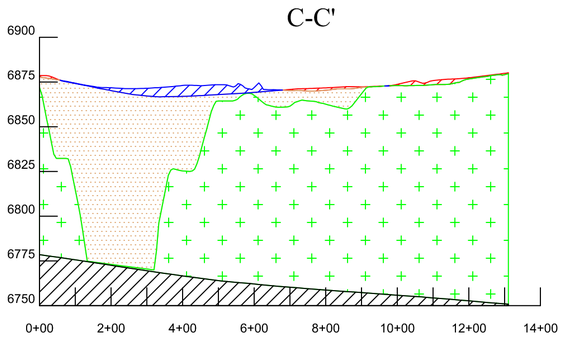

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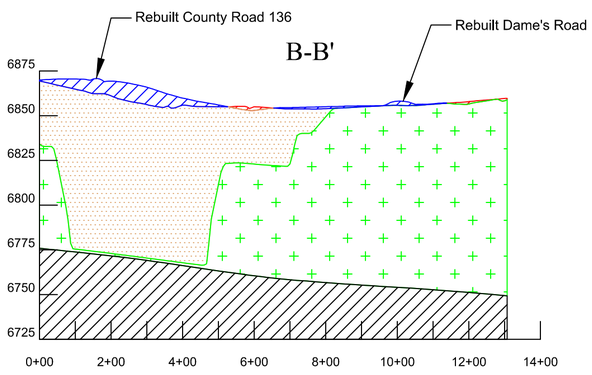

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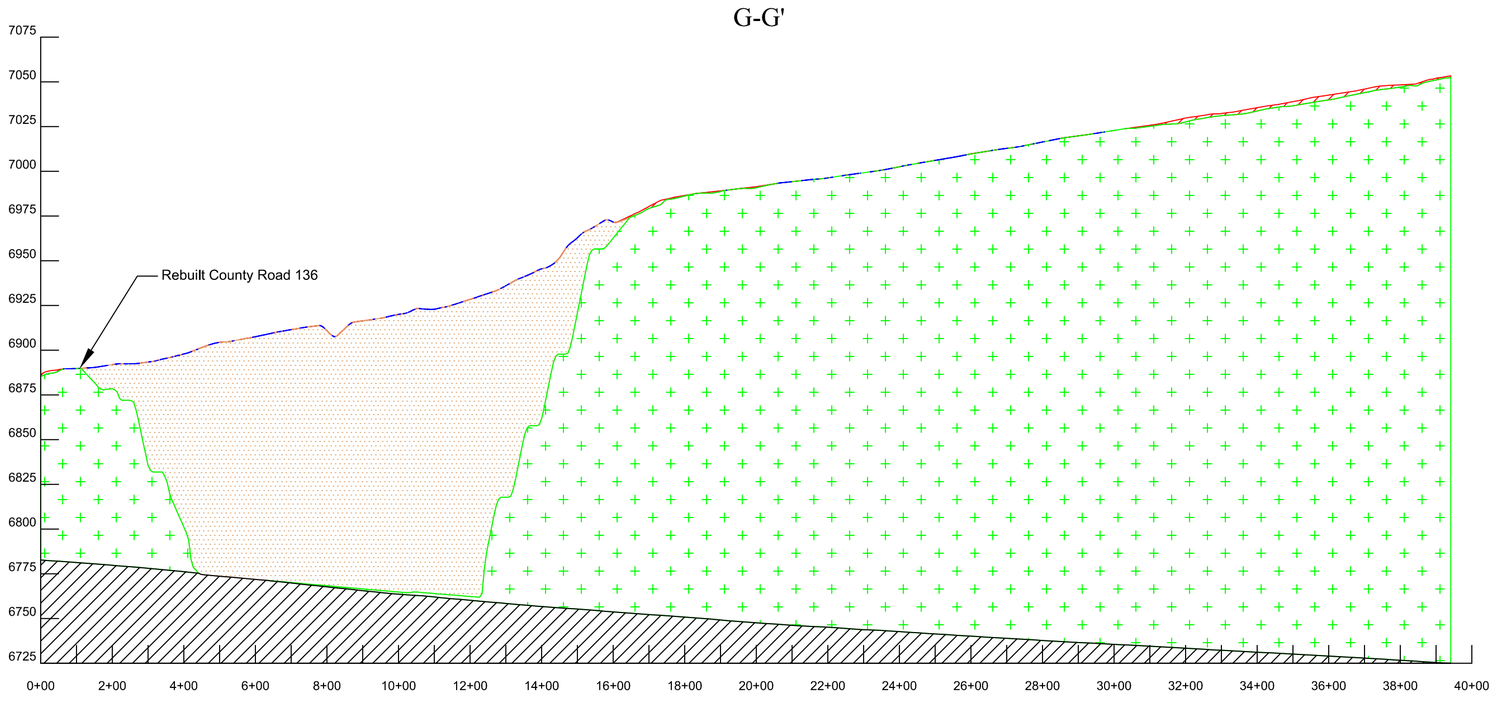

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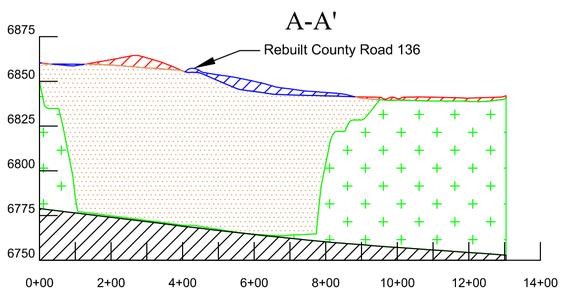

LEGEND:

- FILL ABOVE ORIGINAL CONTOUR
- VOID BELOW ORIGINAL CONTOUR
- BACKFILL
- UNMINED TROPIC SHALE / ALLUVIUM
- DAKOTA FORMATION

DRAWN BY:	CHECKED BY:
A. CHRISTENSEN	BKN
DRAWING: 5-37A	DATE: 11/20/08
	SCALE: 1" = 300' on 24" X 36" paper
JOB NUMBER: 1400	SHEET

REVISIONS

DATE:	BY:
03/22/2016	AC
06/06/2016	AC
07/19/2016	AC
08/01/2016	AC
09/20/2016	AC
08/09/2018	AC
10/12/2018	AC

POST MINING TOPOGRAPHY

CROSS SECTIONS

COAL HOLLOW PROJECT
ALTON, UTAH

DRAWING: 5-37A

PROFESSIONAL ENGINEER
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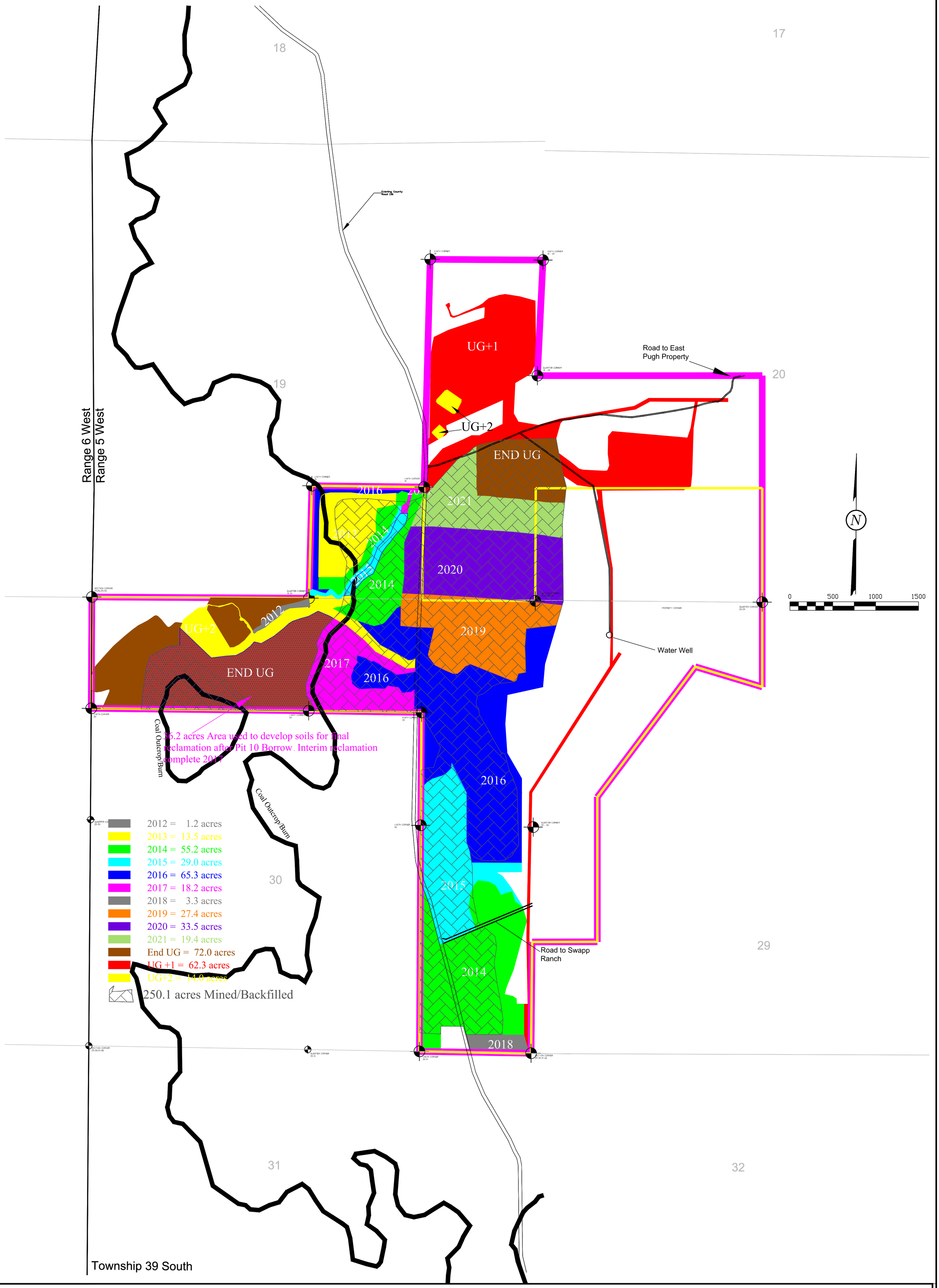
Phone (435)867-5331
Fax (435)867-1192



LEGEND:

- PERMIT BOUNDARY
- PRIVATE COAL OWNERSHIP
- SECTION LINE
- FOUND SECTION CORNER
- FOUND PROPERTY CORNER
- POSTMINING ROADS

DRAWN BY:	CHECKED BY:
K. NICHOLES	LWJ
DRAWING: 5–38	DATE: 12/18/2014
	SCALE: 1" = 500'
JOB NUMBER: 1400	SHEET

REVISIONS

DATE:	BY:
03/05/14	KN
04/11/16	KN
07/29/16	KN
08/01/16	KN
03/31/17	KN
03/22/18	KN
8/9/18	AC

RECLAMATION SEQUENCE

COAL HOLLOW PROJECT
ALTON, UTAH

DRAWING: 5-38

PROFESSIONAL ENGINEER
10230818
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Alton Coal Development
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Fax (435)867-1192

CHAPTER 7

R645-301-700. HYDROLOGY

711. GENERAL REQUIREMENTS

711.100 – 711.500 Contents

This chapter provides a description of the hydrology and hydrogeology of the Coal Hollow Mine permit and adjacent area (including the 85.88-acre Dame Lease IBC area and the proposed North Private Lease area). Specifically, this permit section includes descriptions of existing hydrologic resources according to R645-301-720, proposed operations and potential impacts to the hydrologic balance according to R645-301-730, methods and calculations utilized to achieve compliance with the hydrologic design criteria and plans according to R645-301-740, applicable hydrologic performance standards according to R645-301-750, and reclamation activities according to R645-301-760.

This information is presented in subsequent sections of this chapter and in Appendix 7-1. Appendix 7-1 includes a comprehensive characterization of groundwater and surface-water systems in the Coal Hollow permit and adjacent areas (including the 85.88-acre Dame Lease IBC), recommendations for groundwater and surface-water monitoring, and the results of a field investigation regarding the potential for alluvial valley floors in the Coal Hollow Mine permit and adjacent area. It should be noted that Appendix 7-1 may be updated periodically in the future as additional hydrologic and hydrogeologic data become available. A characterization of groundwater and surface-water systems in the proposed North Private Lease area is presented in Appendix 7-16 (Petersen Hydrologic, 2015). Appendix 7-16 also includes recommendations for groundwater and surface-water monitoring in the proposed North Private Lease area. Appendix 7-18 provides further characterization of alluvial groundwater systems in the North Private Lease area.

712 CERTIFICATION

All cross sections, maps, and plans have been prepared per R645-301-512. Compliance with this section has been completed and certifications are available on all Drawings. The cross sections and maps that are included in this permit application and are required to be certified have been prepared by or under the direction of a qualified, registered, professional engineer or a professional geologist, with assistance from experts in related fields such as hydrology, geology and landscape architecture.

713 INSPECTION

Impoundments will be inspected as described under R645-301-514.300. Designs for impoundments in the Coal Hollow permit area are shown in Drawings 5-25 through 5-31 and Appendices A5-1 and A5-2. Designs for proposed impoundments in the North Private Lease are shown in Drawings 5-65 through 5-71A. No impoundments or sedimentation ponds meeting the size or other qualifying criteria of MSHA, 30 CFR 77.216(a) exist or are planned within the Coal Hollow Mine permit area including the proposed North Private Lease area.

A professional engineer or specialist experienced in the construction of impoundments will inspect impoundments. Inspections will be made regularly during construction, upon completion of construction, and at least yearly until removal of the structure or release of the performance bond. The qualified registered professional engineer will promptly, after each inspection, provide to the Division, a certified report that the impoundment has been constructed and maintained as designed and in accordance with the approved plan and the R645 Rules. The report will include discussion of any appearances of instability, structural weakness or other hazardous conditions, depth and elevation of any impounded waters, existing storage capacity, any existing or required monitoring procedures and instrumentation and any other aspects of the structure affecting stability. A copy of the report will be retained at or near the mine site.

720 ENVIRONMENTAL DESCRIPTION

721 GENERAL REQUIREMENTS

The existing, pre-mining hydrologic resources within the permit and adjacent areas that may be affected by coal mining and reclamation operations (including the 85.88-acre Dame Lease IBC and the proposed new North Private Lease area) are described in Appendix 7-1, Appendix 7-16 and Appendix 7-18 and are summarized below.

Groundwater Resources

A spring and seep survey of the Coal Hollow Mine permit and surrounding area (that includes the 85.88-acre Dame Lease IBC) has been conducted by Petersen Hydrologic, LLC (see sub-appendix B of Appendix 7-1). The locations of springs and seeps in the permit and adjacent area are shown on Drawing 7-1. The results of a spring and seep survey conducted by Petersen Hydrologic in the new North Private Lease area are presented in Appendix 7-16. Seasonal discharge and field water quality measurements for springs and seeps in the Coal Hollow Mine permit and adjacent area have been submitted electronically to the Utah Division of Oil, Gas and Mining Utah Coal Mining

Water Quality Database (UDOGM, 2007). Baseline discharge and water quality data for groundwater resources in the Coal Hollow Mine permit and adjacent area are have also been submitted electronically to the Utah Division of Oil, Gas and Mining, Utah Coal Mining Water Quality Database (UDOGM, 2007). Locations of baseline monitoring stations are shown on Drawing 7-2. Locations of water rights in and adjacent to the Coal Hollow Mine permit area (including the 85.88-acre Dame Lease IBC area) are shown on Drawing 7-3. Locations of water rights in the North Private Lease and adjacent area are shown on Drawing 7-3N. Water rights data from the Coal Hollow Mine permit and adjacent area are detailed in Appendix 7-3. Water rights data from the proposed North Private Lease and adjacent area are shown in Appendix 7-3N. A plot showing potentiometric levels in alluvial groundwater systems in the Coal Hollow Mine permit and adjacent area (including the 85.88-acre Dame Lease IBC) is presented in Drawing 7-13. Potentiometric levels and the direction of shallow groundwater flow in the alluvial groundwater systems in the proposed North Private Lease area are presented in Appendix 7-16 and Appendix 7-18.

There are no domestic water supply springs or wells in the mine disturbance area. However, springs that provide water for domestic and livestock use are located on and adjacent to the permit area (See Drawing 7-2 and Appendix 7-3). Spring SP-23 (Spring House Spring) is located on the eastern boundary of the Coal Hollow Mine permit area. Spring SP-23 is a groundwater seepage area with both discrete and diffuse flow with a total discharge that is usually about one gallon per minute or less. Historically, this seepage area was used as a domestic water source for the Pugh property (personal communication, Burton Pugh, 2008). However, water from SP-23, which is not developed, has not been used for this purpose for many years.

Spring SP-35 is located along the eastern boundary of the Coal Hollow Mine permit area. Discharge from SP-35 averages less than 0.25 gallons per minute and is occasionally used for drinking water during camping trips or visits to the Pugh property (personal communication, Burton Pugh, 2008). However, there is apparently no associated domestic water right associated with this spring.

Two additional springs, which are located more distant from the proposed mining areas are also used for domestic water supply sources. These include SP-40, which is located at the Sorensen property, and SP-33, which is located at the Johnson property. Springs with stockwatering rights are listed in Appendix 7-3.

As described in Appendix 7-16, only one spring has been identified within the proposed North Private Lease permit area. This spring (Coyote Seep) discharges from the alluvial groundwater system at less than one gallon per minute. There is no water right associated with this spring. There are no Utah state appropriated groundwater rights within the North Private Lease area.

Some lands east of and adjacent to the Coal Hollow Mine permit area have historically been irrigated using water from alluvial springs. However, irrigation from these springs was apparently limited to home gardens and a few fruit trees. No irrigation of these lands

(other than some yard watering at the Swapp Ranch house) is currently occurring nor has it occurred in at least the past 10 years (Personal communication, Burton Pugh, 2008; Richard Dames, 2007). Additionally, limited irrigation of lands occurs east of the Coal Hollow permit area using surface waters derived from runoff from the adjacent Paunsaugunt Plateau area. Irrigation of these lands is largely limited to years with appreciable precipitation and stream runoff (Personal communication, Darlynn Sorensen, 2008).

Groundwater discharge occurs from springs and seeps in the upland areas of the Paunsaugunt Plateau east of the permit area (Tilton, 2001; Appendix 6-3). However, these springs discharge from rock strata that are topographically and stratigraphically up-gradient of and considerable distances from the Coal Hollow Mine permit area and the North Private Lease area. Consequently, groundwater systems in these areas will not be impacted by mining activities and these are not considered further here.

Groundwater resources in the Tropic Shale and underlying Dakota Formation in the permit and adjacent area and the North Private Lease area are not appreciable. During drilling activities in the Coal Hollow Mine permit and adjacent area, appreciable groundwater inflows were not encountered in the Tropic Shale. Other than a single seep (SP-37; Drawing 7-1) which discharges at a rate of less than 0.05 gpm from an apparent fracture system in a sandy horizon along the eastern margin of lower Sink Valley, no springs or seeps with measurable discharge have been identified in the Tropic Shale. The lack of appreciable groundwater discharge in the Tropic Shale is a result of the poor water transmitting properties of the marine shale unit. While sandstone units occur stratigraphically higher in the Tropic Shale in the surrounding area, in areas proposed for surface mining, the unit present consists of a fairly uniform sequence of soft shale, silty shale, and claystone with minor siltstone horizons. Competent sandstone strata in the Tropic Shale overlying proposed mining areas were not observed during drilling. The Tropic Shale acts as a barrier impeding downward migration of groundwater in the Coal Hollow Mine permit and adjacent area where it is present. The unit also forms a basal confining layer for alluvial groundwater systems in the permit area. Similar hydrogeologic properties in the Tropic Shale were noted during drilling activities in the proposed North Private Lease area.

Groundwater discharge from the Dakota Sandstone in the permit and adjacent area is also meager. The Dakota Formation consists of shaley strata interbedded with lenticular, fine- to medium-grained sandstone and coal. Because of the pervasiveness of interbedded low-permeability horizons in the formation and the vertical and lateral discontinuity of sandstone horizons, the potential for vertical and horizontal movement of groundwater is limited. While no springs discharge from the Dakota Formation in the permit area, a spring with a discharge of about 1 gpm and displaying little seasonal variability in discharge (SP-4; Drawing 7-1) discharges from an apparent fault zone in the Dakota Formation approximately 1.1 miles south of the existing Coal Hollow permit area. Additionally, two seeps with discharges of less than 0.05 gpm (SP-27 and SP-34; Drawing 7-1) seep from the Dakota Formation in lower Sink Valley more than ½ mile south of the Coal Hollow Mine permit area. The results of slug testing performed on

wells screened in the Smirl coal seam indicate relatively low values of hydraulic conductivity for the coal seam (Table 7-8). In much of the mining area, the coal seam is dry (UDOGM, 2007). Thus, appreciable migration of groundwater through the Smirl coal seam is not anticipated.

In the proposed North Private Lease area, there are no springs or seeps discharging from the Dakota Formation (Appendix 7-16). The lack of springs in the Dakota Formation is likely attributable to 1) the presence of Tropic Shale bedrock overlying the formation, which limits the potential for vertical recharge to the formation, 2) the limited surface exposure of the formation, and 3) the overall poor water transmitting potential of the Dakota Formation (Appendix 7-1).

It should be noted that there are springs that discharge below irrigated fields near the town of Alton, Utah west of the proposed North Private Lease mining areas (Appendix 7-16). These springs, which are isolated from the proposed mining areas by upland areas of low-permeability Tropic Shale bedrock, discharge at locations that are stratigraphically near the Tropic Shale/Dakota Formation contact. The bedrock in these areas has apparently been altered as a result of near-surface burning of the Smirl coal seam, which can alter the water bearing and water transmitting characteristics of the bedrock relative to the unaltered bedrock petrology. Appreciable faulting associated with the Sevier Fault Zone has also been mapped in the area to the west of the spring discharge locations (Tilton, 2001).

No water wells are known to exist in the Tropic Shale or Dakota Formation in the Coal Hollow Mine permit and adjacent area (including the 85.88-acre Dame Lease IBC area and the proposed North Private Lease area), demonstrating the inability of these formations to transmit useful quantities of water to wells. Groundwaters from the Tropic Shale and Dakota Formation do not contribute measurable baseflow to streams in the Coal Hollow Mine permit and adjacent area and the North Private Lease area (at least at the surface in stream channels).

Groundwater discharging from springs below the town of Alton, Utah do contribute to the baseflow discharge in the Simpson Hollow tributary to Kanab Creek (Appendix 7-16) west of the proposed North Private Lease area.

Natural groundwater discharge in the existing Coal Hollow Mine permit and adjacent area occurs primarily from alluvial sediments. Alluvial discharge occurs both as discrete springs and seeps (Drawing 7-1) and also locally as diffuse seepage to the surface. Groundwater discharge areas in the Coal Hollow Mine permit and adjacent area are shown on Drawing 7-4 (see also photograph section). The area of most appreciable alluvial groundwater discharge occurs in central Sink Valley in the northwest quarter of Section 29, T39S, R5W (see Drawing 7-4; groundwater discharge area A). The alluvial groundwater system in this area exists under artesian conditions, resulting from the presence of a considerable thickness of sloping, low permeability clayey sediments overlying coarser, water-bearing alluvial sediments at depth (See Drawing 6-3). The artesian alluvial groundwater system in Sink Valley is likely recharged via mountain-

front-recharge along the flanks of the Paunsaugunt Plateau to the east and north of the Coal Hollow Mine permit area. This artesian alluvial groundwater system that exists along the eastern margins of Sink Valley is likely continuous from near mountain-front recharge areas southward along the eastern margins of Sink Valley to the lower portion of Sink Valley. Discharge from the alluvial groundwater systems in and adjacent to the Coal Hollow Mine permit area occurs primarily in two areas (Drawing 7-4). In the northwest quarter of Section 29, T39S, R5W, considerable natural discharge from the alluvial groundwater system occurs through springs and seeps (Drawing 7-4; groundwater discharge area A). Minor discharge from several flowing artesian wells also occurs in this area. The artesian alluvial groundwater system in eastern Sink Valley also likely provides recharge to the clayey alluvial sediments in the southwestern portion of the valley in the Coal Hollow Mine permit area. Discharge from the alluvial groundwater system in groundwater discharge area A area results in decreases to the amount of water in storage in the alluvial groundwater system and also decreases in artesian hydraulic pressure in the aquifer.

Appreciable discharge from the alluvial groundwater system also occurs in lower Sink Valley in the northwest quarter of Section 32, T39S, R5W (see Drawing 7-4; groundwater discharge area B). Sink Valley constricts markedly in this area, which forces shallow alluvial groundwaters flowing down the valley to discharge at the land surface as springs, seeps, and diffuse discharge to the surface (i.e., there is a significant decrease in the cross-sectional area of the alluvial sediments). Groundwater discharge in this area occurs from diffuse seepage to the surface and also as discharges to two springs and several small seeps (Drawing 7-1).

Much of the alluvial groundwater in Sink Valley likely ultimately leaves the valley via evapotranspiration. This conclusion is based on the observation that there is very rarely any discharge of surface water (at least at the surface in the channel) in Sink Valley Wash below Sink Valley (See site SW-9; Drawing 7-2; UDOGM, 2007). The clayey, low-permeability sediments present at the surface over most of Sink Valley also impede appreciable infiltration of precipitation and snowmelt waters into the deeper subsurface. Hence, groundwater recharge to the lower half of the Sink Valley sediments (including the Coal Hollow Mine permit area) likely occurs primarily via horizontal migration of alluvial groundwaters from up-gradient areas.

Flowing artesian groundwater conditions are also observed in monitoring wells screened near the base of the alluvial sediments in the northwest corner of Section 32 T39S, R5W. It is probable that the artesian alluvial groundwater system in Section 29, T39S, R5W is continuous with that in the northwest corner of Section 32. It should be noted that within the Coal Hollow permit area, artesian conditions were not observed in monitoring wells. While the thickness of the alluvial sediments in the artesian groundwater system east of the Coal Hollow permit area range up to 150 feet thick, the thickness of alluvium overlying areas with mineable coal in the Coal Hollow permit area generally does not exceed about 50 feet and in many locations it is considerably thinner.

Natural discharge of alluvial groundwater in the Robinson Creek drainage area is meager. This condition is largely due to the presence of the elevated ridge of impermeable Tropic Shale bedrock associated with the Sink Valley Fault that dissects and effectively isolates the alluvium east of the fault from that west of the fault (See Drawing 6-1). Because of the low permeability of the Tropic Shale, this condition apparently forces alluvial groundwater east of the Tropic Shale ridge to flow to the south toward Sink Valley that would otherwise report to the Robinson Creek drainage. During high flow conditions in the alluvial groundwater system east of the Tropic Shale ridge, minor amounts of groundwater "overtop" the bedrock ridge and drain via surface flow over the Tropic Shale bedrock, where it either recharges shallow alluvial sediments to the west of the fault or is lost to evapotranspiration. The influence of the Tropic Shale ridge is readily evident in field observations, with marked differences in vegetation and soil moisture being apparent on opposite sides of the ridge. During low-flow conditions, discharge from the overtopping of the bedrock ridge has generally not been observed. Isolated areas of soil wetness and shallow perched alluvial groundwater systems that exist west of the bedrock ridge in the northeast corner of Section 30 and the southeast corner of Section 19, T39S, R5W are likely sourced via this mechanism.

Seepage of alluvial groundwater into the deeply incised lower Robinson Creek stream channel occurs near the contact with the underlying Dakota Formation in the southeast quarter of Section 19, T39S, R5W. This water is likely related to saturated alluvial deposits underlying the Robinson Creek stream channel. The alluvial groundwater emerges near where the stream channel intersects the alluvial groundwater system. It is noteworthy that the location of the emergence of alluvial water in the channel has varied somewhat over time. The bank seepage water is likely alluvial groundwater that seeps to the surface where the incised stream channel intersects the potentiometric surface of the alluvial groundwater system. Typically, this is near the contact with the underlying Dakota Formation bedrock in the bottom of the stream channel. Because of the seasonal changes in the elevation of the potentiometric head in the alluvial groundwater system, the location of the bank seepage is variable over time (i.e. the variability in the bank seepage locations are likely controlled primarily by temporal variability in potentiometric levels in the alluvial groundwater system rather than by fixed, permeability-controlled groundwater preferential pathways in the aquifer skeleton). Consequently, the bank seepage locations are not well-defined point sources, but rather dynamic seepage fronts along this general reach of the stream.

The Robinson Creek stream channel above this location is almost always dry (except for in direct response to torrential precipitation events or during the springtime runoff season during wet years. This seepage of alluvial water in the Lower Robinson Creek channel is typically about 5 to 10 gpm or less and is routinely monitored at monitoring station SW-5 (Drawing 7-2).

Information on water quality for groundwaters and surface-waters has been uploaded into the Utah Division of Oil, Gas and Mining, Utah Coal Mining Water Quality Database (UDOGM, 2007) and is summarized and described in Appendix 7-1.

Appreciable spatial variability exists in water quality in groundwaters and surface waters in the Coal Hollow permit and adjacent area. Stiff diagrams depicting solute compositions and overall water quality for groundwaters and surface waters in the Coal Hollow Mine permit and adjacent area are shown in Appendix 7-1. Important water quality characteristics for groundwaters are summarized below.

Groundwater Source	**Chemical type**	**TDS (mg/L)**
Alluvial groundwaters, coarse-grained system east of permit area	Calcium-magnesium-bicarbonate	380 mg/L to 500 mg/L typically, Little seasonal variability
Alluvial groundwaters in south sink valley	Variable, magnesium-bicarbonate sulfate, calcium-magnesium-bicarbonate	450 mg/L to 3,600 typically, Highly variable based on season and climate for shallow systems, less variability in deeper system
Dakota Formation, fault groundwater system south of permit area	Sodium-bicarbonate	500 mg/L to 600 mg/L typically, Little seasonal variability

Water quality characteristics for groundwaters in the proposed North Private Lease area are summarized in Appendix 7-16 as well as Appendix 7-18. It is apparent that the overall water quality of alluvial groundwater degrades from the mountain-front recharge water to the artesian groundwater system east of the Coal Hollow permit area to the non-artesian shallow alluvial groundwater systems located in the more distal portions of Sink Valley. These changes are due to groundwater interaction with soluble minerals in the primarily Tropic Shale-derived sediments that make up the shallow alluvial materials in the permit area.

This down-gradient degradation in water quality is shown graphically on Drawing 7-5. In Drawing 7-5, the average specific conductance values in μS/cm for representative springs and seeps in the Sink Valley drainage are plotted on the map as circles with the circle areas being proportional to the specific conductance average for the spring or seep. The specific conductance information used in generating Drawing 7-5 has been submitted electronically to the Division's hydrology database (UDOGM, 2007). It is readily apparent from Drawing 7-5 that the specific conductance (which is a reflection of the dissolved solids concentration) is degraded from the mountain-front recharge water (represented by stream SW-8) to the artesian alluvial groundwater system in the northwest quarter of Section 29, T5W, R39S, to the alluvial groundwaters in the southern portion of Sink Valley below the Coal Hollow Mine permit area.

Specific conductance values were used for plotting in Drawing 7-5 because specific conductance values are available for all springs and seeps, while laboratory chemical analyses are available for only some of the springs and seeps. Stiff (1951) diagrams for

selected springs along this geochemical evolutionary pathway are shown on Figure 14 of Appendix 7-1. It is apparent from the Stiff diagrams and from geochemical information submitted to the Division (UDOGM, 2007) that the mountain-front recharge water (represented by monitoring site SW-8 in upper Swapp Hollow) is of the calcium-magnesium-bicarbonate chemical type with an average TDS concentration of 333 mg/L. Groundwater downgradient of the mountain-front recharge areas in the artesian alluvial groundwater system in Section 29, T5W, R39S, is also of the calcium-magnesium-bicarbonate chemical type, with an average TDS concentration at artesian well Y-61 of 400 mg/L. Further downgradient in the artesian alluvial groundwater system in Section 29, the geochemical composition at SP-8 is of the calcium-magnesium-bicarbonate chemical type with a somewhat increased TDS concentration of 425 mg/L. In the lower portions of Sink Valley in Section 32, T5W, R39S, the chemical quality of the alluvial groundwater is appreciably degraded relative to that in the upper portions of the groundwater system. At spring SP-6, the composition of the alluvial groundwater is seasonally variable and is of the magnesium-bicarbonate-sulfate, or calcium-magnesium-bicarbonate-sulfate chemical type. The TDS concentrations at SP-6 average 970 mg/L. The chemical composition of alluvial groundwater at SP-33 is of a geochemical type similar to that at SP-6, although TDS concentrations are somewhat lower, averaging 795 mg/L. The spatial variability apparent in the TDS concentrations in the alluvial groundwater in Section 32 is likely related to flushing effects resulting from higher groundwater fluxes through zones of increased permeability in the alluvium. It is noteworthy that groundwater in the gravelly zones in the deeper alluvium east of the permit area in Section 32 monitored at the 85-foot deep well LS-85 is considerably lower in TDS concentration with an average of 457 mg/L. The lower TDS concentrations of artesian alluvial groundwater in the deeper, coarser-grained portions of the alluvium are likely attributable to the isolation of these groundwaters from the shallow, clayey, Tropic Shale derived alluvial sediment in the near-surface alluvial groundwaters.

The appreciable temporal variability in the solute geochemical compositions of the shallow alluvial groundwaters in Section 32 is likely attributable to seasonal and climatic variability in the groundwater flux rate through these systems and corresponding variability in rock/water ratios and residence time in the evaporate mineral rich Tropic Shale derived shallow alluvial sediments present in this portion of Sink Valley. Alluvial groundwaters in the deeper portions of Sink Valley to the east in Section 32 are part of a larger, more continuous groundwater system that is hydraulically isolated from overlying shallow recharge sources, and consequently have not exhibited similar temporal variability in solute geochemical composition.

Surface Water Resources

Surface-water resources in the Coal Hollow Mine permit and adjacent area (including the 85.88-acre Dame Lease IBC) are described in Appendix 7-1 and are summarized below. Surface-water resources in the proposed North Private Lease area are described in Appendix 7-16 and Appendix 7-18.

Surface waters in the Coal Hollow Mine permit and adjacent area and the proposed North Private Lease area are tributary to Kanab Creek. Surface waters in the northern portion of the existing permit and adjacent area drain into the Robinson Creek and upper Kanab Creek drainages. Surface waters in the southern portion of the permit and adjacent area drain into the Sink Valley Wash drainage which is tributary to Kanab Creek about 6 miles below the Coal Hollow Mine permit area. Surface-water drainages in the permit and surrounding areas are shown in Appendix 7-1. Surface-water drainages in the proposed North Private Lease area are shown in Appendix 7-16. Surface-water baseline monitoring stations are shown on Drawing 7-2. Locations of surface-water water rights in and adjacent to the Coal Hollow Mine permit and adjacent area are shown on Drawing 7-3. Locations of surface-water rights in and adjacent to the proposed North Private Lease are shown on Appendix 7-3N. Water rights data from the Coal Hollow Mine permit and adjacent area are detailed in Appendix 7-3. Water rights data from the proposed North Private Lease and adjacent area are detailed in Appendix 7-3N. Information regarding alluvial groundwater systems and Kanab Creek in the North Private Lease are presented in Appendix 7-18.

Information on water quality for groundwaters and surface-waters has been uploaded into the Utah Division of Oil, Gas and Mining, Utah Coal Mining Water Quality Database (UDOGM, 2007) and is summarized and described in Appendix 7-1 and Appendix 7-16, Appendix 7-16 and Appendix 7-18.

Surface waters in Kanab Creek are used for stock watering and crop irrigation in the irrigable lands adjacent to Kanab Creek west of the Coal Hollow Mine permit area. Discharge in Kanab Creek measured near the town of Alton (SW-1) is seasonally dependent and largely influenced by upstream water use. Discharge in Kanab Creek monitored at SW-1 typically ranges from 10 cfs or less during the springtime runoff period to 1 cfs or less during the summertime.

Discharge in Lower Robinson Creek drainage is meager. Other than during the springtime runoff event in wet years or during torrential precipitation events, flow has not been observed at monitoring stations SW-4 and SW-101 (Drawing 7-2). Discharge at the lower monitoring site on Lower Robinson Creek (SW-5; Drawing 7-2) is meager. The small discharge occasionally present at SW-5 is derived from the seepage of alluvial groundwater into the Lower Robinson Creek stream channel between monitoring sites SW-101 and SW-5.

Tributaries to the Sink Valley Wash drainage in the Coal Hollow Mine permit and adjacent areas include (from north to south) Water Canyon, an unnamed drainage south of Water Canyon in Section 21 T39S, R5W, and Swapp Hollow. Discharge rates in these drainages are highly seasonally dependent (UDOGM, 2007; Appendix 7-1). Discharges in the Water Canyon and Swapp Hollow drainages are intermittent or perennial in nature with discharge peaks occurring during the springtime runoff season and much lower flows occurring during the late summer and fall months. Discharge in the unnamed drainage in Section 21 T39S, R5W is ephemeral.

The water quality and discharge characteristics of surface waters in the Coal Hollow Mine permit and adjacent area are presented in UDOGM (2007) and described in Appendix 7-1. The water quality and discharge characteristics of surface waters in the proposed North Private Lease area are described in Appendix 7-16 and Appendix 7-18. Solute compositions of stream waters are also depicted graphically as Stiff diagrams in Appendix 7-1 and Appendix 7-16. The solute compositions of surface waters in the Coal Hollow Mine permit and adjacent area are summarized below. Solute compositions of surface waters in the proposed North Private Lease and adjacent areas are summarized in Appendix 7-16. Information regarding groundwater-surface-water interactions along Kanab Creek in the North Private Lease is presented in Appendix 7-18.

Source	Chemical type	TDS (mg/L)
Robinson Creek/Dry Fork	Calcium-magnesium-bicarbonate	300 mg/L typical
Lower Robinson Creek	Variable, magnesium-sulfate-bicarbonate	300 – 3,500 mg/L typical, dependent on discharge
Swapp Hollow	Calcium-magnesium-bicarbonate	250-350 mg/L typical
Kanab Creek	Magnesium-calcium-bicarbonate-sulfate during high flow, variable during low-flow, variability likely due largely to interaction with Tropic Shale soils and irrigation return flows	500-1,300 mg/L typical, Variable dependent on season and irrigation use
Sink Valley Wash	Magnesium-calcium-bicarbonate	600 -1,500 mg/L typical, variable dependent on discharge

Considerable seasonal variability exists in the solute compositions of stream waters in Kanab Creek in the Coal Hollow Mine permit and adjacent area (UDOGM, 2007; Appendix 7-1). During low-flow conditions, interactions between stream waters and Tropic Shale or Tropic Shale-derived alluvial sediments likely result in increased TDS concentrations. Return flow from irrigated fields and interactions with soils rich in soluble minerals also likely contribute to increased TDS concentrations in the summertime. During the spring runoff season, high surface-water flows that originate from the adjacent upland areas dominate the flow in the channel. The TDS concentrations of Kanab Creek waters during high-flow conditions are thus lower than during the low-flow season. Much less seasonal variability in solute content in surface water flows from the mountain stream in Swapp Hollow (UDOGM, 2007; Appendix 7-1). This condition is likely attributable to the fact that the stream in Swapp Hollow, which originates on geologic formations overlying the Tropic Shale, has considerably less contact with the Tropic Shale than does Kanab Creek. Additionally, there are no known irrigation diversions or returns above the stream monitoring point (SW-8; Drawing 7-2) in Swapp Hollow.

722 CROSS SECTIONS AND MAPS

722.100 A map showing the locations of springs and seeps in the Coal Hollow Mine permit and adjacent area (including the 85.88-acre Dame Lease IBC area) is presented in Drawing 7-1. A map showing the locations of springs and seeps in the North Private Lease area is provided in Appendix 7-16. A map showing potentiometric levels in alluvial groundwater systems in the Coal Hollow and adjacent areas (including the 85.88-acre Dame Lease IBC) is presented in Drawing 7-13. A Map showing potentiometric levels in the North Private Lease area is provided in Appendix 7-16. Additional information from the alluvial groundwater system in the North Private Lease is provided in Appendix 7-18. It is important to note that the alluvial groundwater potentiometric contours depicted in Drawing 7-13 are not representative of a laterally or vertically continuous groundwater system. Within the Coal Hollow Mine permit and adjacent area, appreciable portions of the alluvial sediments are not saturated. Additionally, perched groundwater conditions are present in many locations in the alluvium in the area. In other words, the alluvial groundwater systems in the Coal Hollow Mine permit and adjacent area are not a single, interconnected aquifer. Rather, there exist several areas of saturated alluvium, which may or may not be in good hydraulic communication with adjacent areas. Consequently, it is not possible or meaningful to construct a true potentiometric contour map in the strict sense. Consequently, it is not appropriate to evaluate regional potentiometric trends over large distances or to infer precise groundwater flow directions or hydraulic gradients in the alluvial groundwater system based on Drawing 7-13. The alluvial groundwater system potentiometric map presented in Drawing 7-13 is useful for evaluating approximate local potentiometric conditions and general saturation trends.

722.200 Location of surface water bodies

Within the Coal Hollow Mine permit and adjacent area, no significant natural ponds or lakes occur. The locations of springs and streams are shown in Drawing 7-1. The locations of springs and streams in the North Private Lease area are shown in Appendix 7-16. Many small earthen impoundments and ponds have been created to store surface-water runoff and spring discharge water for stock watering and irrigation use. Some of these impoundments were created by constructing straight or semi-circular berms across ephemeral surface water drainages to impound surface runoff. Because of the character of the alluvial sediments, some of the

ponds have become filled with sediment over time and the holding capacities have diminished. The locations of ponds and associated conveyance ditches are shown on Drawing 7-7.

722.300 Baseline monitoring stations

Baseline monitoring stations are shown on Drawing 7- 2. A map showing the locations of monitoring wells in the Coal Hollow permit and adjacent area is presented in Drawing 7-12 and on Figure 12 of Appendix 7-1. The locations and completion details of monitoring wells in the North Private Lease area are provided in Appendix 7-16 and Appendix 7-18. Drawing-7-12 also shows monitoring stations from which baseline hydrologic data were collected in previous studies. Monitoring station locations, elevations, and other details are presented in Table 7-1 and Appendix 7-16 Appendix 7-18.

722.400 Location of water wells

Water well locations are shown in Drawing 7-2 and Drawing 7-12. Well construction details and locations are presented in Table 7-2. Locations and construction details of water wells in the North Private Lease area are shown in Appendix 7-16 and Appendix 7-18.

722.500 Contour map(s) of disturbed area(s)

Surface contours representing the existing land surface configuration of the Coal Hollow permit area (including potentially disturbed areas) are shown on Drawing 5-1 and the post mining land configuration is shown on 5-37. Cross sections with both these landforms are shown on Drawing 5-37A. Surface contours representing the existing land surface configuration of the North Private Lease permit area (including potentially disturbed areas) are shown on Drawing 5-45 and the post mining land configuration is shown on 5-74. Cross sections with both these landforms are shown on Drawing 5-75. The premining landform, with exception of the Facilities area and Lower Robinson Creek, are from an aerial flight that was limited to a five foot contour interval. Therefore, contours have been interpolated down to a 2 foot level using the available aerial flight information. This interpolation provides accuracy for the Division to make the necessary determinations. The Facilities area and portions of Lower Robinson Creek are actual survey data to the accuracy of 2-foot contours.

723 SAMPLING AND ANALYSIS

Water quality sampling and analyses have been and will be conducted according to the "Standard Methods for the Examination of Water and Wastewater" or EPA methods listed in 40 CFR Parts 136 and 434. Information regarding laboratory analytical methods utilized in performing water quality analyses at the analytical laboratories has been submitted to the Utah Division of Oil, Gas and Mining, Utah Coal Mining Water Quality Database (UDOGM, 2007).

724 BASELINE INFORMATION

Baseline groundwater, surface-water, geologic, and climatologic data (including information for the 85.88-acre Dame Lease IBC area) are described in Appendix 7-1 and summarized below. Baseline information for the North Private Lease area are provided in Appendix 7-16 and Appendix 7-18.

724.100 Groundwater Information

The location of wells and springs in the Coal Hollow Mine permit and adjacent area (including the 85.88-acre Dame Lease IBC) are shown on Drawings 7-1 (Spring and seep survey map), 7-2 (Baseline monitoring locations), and 7-12 (Monitoring well location map). Groundwater rights in and around the Coal Hollow Mine permit area are shown on Drawing 7-3 and tabulated in Appendix 7-3. Groundwater rights information for the North Private Lease area are provided in Appendix 7-3N and shown on Drawing 7-3N.

Seasonal quality and quantity of groundwater and usage is presented in Appendix 7-1 and UDOGM (2007). Baseline discharge and water quality data have been submitted electronically to the Utah Division of Oil, Gas and Mining, Utah Coal Mining Water Quality (UDOGM, 2007).

Baseline monitoring of groundwater resources in and around the Coal Hollow permit area have been carried out by several entities. Previous hydrologic studies of the region have been made in the Alton Coal Field area by Goode (1964, 1966), Sandberg (1979), Cordova (1981), and Plantz (1983). Selected hydrologic data collected in conjunction with these studies have been incorporated into the hydrologic analysis and baseline data included in this permit application.

During the 1980's, extensive monitoring of groundwater resources in the permit and surrounding areas was performed by Utah International, Inc. Utah International Inc.'s groundwater monitoring activities included the construction of numerous groundwater monitoring wells, aquifer testing activities, and the performance of discharge, water level, and field and laboratory water quality monitoring of springs, seeps, and wells. These baseline monitoring activities were performed as part of a proposed coal mine permitting

action in the Alton Coal Field. Ultimately, the proposed coal mining action did not proceed. Relevant monitoring information from the Utah International, Inc. baseline monitoring activities have been included as supplemental baseline data included in this permit application.

Commencing in the 2nd quarter of 2005, regular quarterly baseline monitoring of groundwater resources has been commissioned by Alton Coal Development, LLC. Baseline monitoring of springs, seeps, and groundwater wells in and around the Coal Hollow Mine permit area have been routinely performed. Data collected in the baseline monitoring activities have been submitted electronically to the Utah Division of Oil, Gas and Mining, Utah Coal Mining Water Quality Database (UDOGM, 2007).

Baseline potentiometric information from wells has been input into the DOGM database. For non-flowing-artesian wells, this information has been input in a depth-to-water-relative-to-the-top-of-the-well-casing format using units of feet. For wells experiencing flowing artesian conditions, the potentiometric data are reported to the database in feet as a height-of-the-potentiometric-surface-above-the-top-of-the-well-casing format expressed as a negative number (which makes the flowing-artesian and non-flowing-artesian potentiometric measurements directly comparable). For both conditions, the reported measurements can be directly converted to an absolute water elevation by subtracting the reported value from the elevation of the top of the well casing.

The potentiometric head in monitoring wells experiencing flowing-artesian conditions is measured either 1) by temporarily extending the height of the well casing and allowing the water level to stabilize and the performing a height of the water column measurement (where the artesian pressure is small), or 2) by using a pressure gauge to measure the shut-in artesian pressure in the well and then converting that number to an equivalent height in feet.

During December 2006 and January 2007 an extensive drilling and monitoring well construction program was implemented. This hydrogeologic program included the installation of 30 groundwater monitoring wells in and adjacent to the Coal Hollow Mine permit area. The focus of the drilling program was to characterize the stratigraphy and hydrogeologic properties of alluvial groundwater systems in and adjacent to mining areas. Aquifer characterization of the alluvial groundwater system was also performed using pump testing and slug testing techniques. Investigative methods utilized and the results of the analysis of the data are described in Appendix 7-1.

Descriptions of alluvial groundwater systems in the mine permit and surrounding areas, including information on quantity and quality of alluvial groundwaters, are presented in Appendix 7-1. Estimated rates of alluvial groundwater inflow into the mine are presented in Table 7-9. Additional information on alluvial groundwater inflows is provided in Section 728.333.

As indicated in the Alluvial Groundwater Management Plan for the Coal Hollow Mine (See Appendix 7-9), the land surface overlying proposed alluvial groundwater interceptor

drains will be contoured to match the existing surrounding topography. Accordingly, alterations of existing surface-water drainage patterns should not occur.

Water monitoring information provided to the Division demonstrates that water levels in shallow alluvial groundwater systems in the Coal Hollow Mine area do respond to seasonal and climatic variability. However, as described in Appendix 7-1, the shallow alluvial sediments in the Coal Hollow Mine area are dominated by silts, clays, and fine-grained sands which generally do not have appreciable hydraulic conductivity. Because of the overall pervasiveness of silts, clays, and fine-grained sands in the alluvial system in the mine permit area, rates of alluvial groundwater migration are generally not rapid (See information provided in Table 7-9). (It should be emphasized that alluvial groundwater flow velocities in the coarser-grained alluvial systems in areas adjacent to proposed mining areas generally to the east and south are known to be appreciably greater). In cross-sectional exposures of saturated alluvial deposits in the up-gradient highwalls at the Coal Hollow Mine, only modest quantities of groundwater discharge have been observed. Although the alluvial sediments are largely saturated, where the saturated alluvial sediments have been exposed, sustained discharges of alluvial groundwater of more than a few gallons per minute are generally not observed. While discharges on the magnitude of a few gallons per minute have been observed in a fluvial channel system intercepted by the mine (which deposits contained sands, silts, and gravels), the much more pervasive fine-grained alluvial sediments where exposed were observed to weep only very minor, un-measurable quantities of water through the highwall. During a site visit on June 2, 2011, Petersen Hydrologic (2011) estimated that the total flow from the 600-foot-long exposure of clayey, silty alluvium in the mine highwall was less than 1 gpm. The total discharge from the exposed fluvial channel system was measured at 5.5 gpm. The total flow from a recently constructed, 870-foot-long up-gradient alluvial groundwater intercept trench was only 13.4 gpm. What this demonstrates is that, while the alluvial sediments adjacent to the mine openings are largely saturated, the presence of low permeability sediments in the alluvium limits the potential for the alluvial groundwaters to rapidly flow into the mine pit areas.

It should be emphasized here, however, that although highly permeable, saturated, coarse-grained alluvial sediments have not been intersected at the Coal Hollow Mine to date, the potential for intercepting such sediments is always present in heterogeneous mountain-front alluvial deposits. Appreciably greater inflow volumes are possible from such sediments were they to be encountered unexpectedly at the Coal Hollow Mine.

The overall low hydraulic conductivity of most of the alluvial sediments in proposed mining areas generally precludes the effective dewatering of saturated alluvial deposits adjacent to proposed mining areas through the use of vertical dewatering wells. For this reason, as described in the proposed alluvial groundwater management plan for the Coal Hollow Mine, horizontal drain systems (with large, long horizontal “screened” intervals in targeted strata to collect intercepted alluvial groundwater) are proposed for use in dewatering the alluvial sediments adjacent to proposed mining areas.

724.200 Surface Water Information

The locations of streams, stock watering ponds, and conveyance ditches in the Coal Hollow Mine permit and adjacent area (including the 85.88-acre Dame Lease IBC area) are shown on Drawing 7-7. Surface-water information for the North Private Lease area are provided in Appendix 7-16 and additionally in Appendix 7-18. Surface-water rights in and adjacent to the Coal Hollow Mine permit area are shown on Drawing 7-3 and tabulated in Appendix 7-3. Surface-water rights information for the North Private Lease area are provided in Appendix 7-3N and shown on Drawing 7-3N. Surface-water discharge rates and water quality data have been submitted electronically to the Utah Division of Oil, Gas and Mining, Utah Coal Mining Water Quality Database (UDOGM, 2007). Additional surface-water information is provided in Appendix 7-1.

It is not anticipated currently that discharge from the Coal Hollow Mine will be necessary. Where necessary, alluvial groundwater that may be intercepted by mining will be placed in drains and diverted away from disturbed areas and discharged (i.e., as groundwater dewatering). However, a Utah UPDES discharge permit will be obtained so that if discharge of mine water becomes necessary, it can be discharged in accordance with the UPDES discharge permit. The exact locations of mine water discharge points will be established upon issuance of the UPDES discharge permit. Any mine discharge water will be placed in either the Lower Robinson Creek drainage or the Sink Valley Wash drainage. Both of these drainages are tributary to Kanab Creek.

As described in R645-301-728.320, acid drainage is not expected from the proposed mining operation (including the proposed operations in the North Private Lease area). This is due to the pervasiveness of carbonate minerals in the mine environment that will neutralize any acid produced.

Seasonal quality and quantity of groundwater and usage is described herein and in Appendix 7-1, Appendix 7-16 and Appendix 7-18. Baseline discharge and water quality data have been submitted electronically to the Utah Division of Oil, Gas and Mining, Utah Coal Mining Water Quality (UDOGM, 2007).

Baseline monitoring of surface-water resources in and around the Coal Hollow permit area have been carried out by several entities. Previous hydrologic studies of the have been made in the Alton Coal Field area by Goode (1964, 1966), Sandberg (1979), Cordova (1981), and Plantz (1983). Selected hydrologic data collected in conjunction with these studies have been incorporated into the baseline data as part of this permit application.

During the 1980's, extensive monitoring of surface water resources in the permit and surrounding areas was performed by Utah International, Inc. Utah International Inc.'s surface-monitoring activities included the operation of continuous recording stations on selected streams, and the performance of routine surface-water discharge measurements and field and laboratory water quality analyses. These baseline monitoring activities were performed as part of a proposed coal mine permitting action in the Alton Coal Field.

Ultimately, the proposed coal mining action did not proceed. Relevant monitoring information from the Utah International, Inc. baseline monitoring activities have been included as supplemental baseline data as part of this permit application. Commencing in the 2nd quarter of 2005, regular quarterly baseline monitoring of surface-water resources has been commissioned by Alton Coal Development, LLC. Baseline monitoring of surface-waters in and around the Coal Hollow permit area, including surface-water discharge measurements and field and laboratory water quality analyses, have been routinely performed.

All surface waters in the Coal Hollow Mine permit (including the proposed North Private Lease area) and adjacent area are tributary to the Kanab Creek drainage. Surface-water monitoring stations from which baseline data have been collected are shown on Drawing 7-2 and include the following:

Sink Valley Wash drainage

SW-8 (Swapp Hollow above proposed mining areas), SW-7 (unnamed drainage in Section 21, T39S, R5W), RID-1 (irrigation diversion of water from Water Canyon drainage above proposed mining areas), SW-6 (headwaters of unnamed tributary to lower Sink Valley Wash), SW-9 (Sink Valley Wash below proposed mining areas), SW-10 (unnamed tributary to Sink Valley Wash approximately 1.7 miles south of proposed mining areas), SVWOBS-1 (Sink Valley Wash above proposed mining areas, and SVWOBS-2 (Sink Valley Wash east of proposed mining areas).

Lower Robinson Creek drainage

SW-4 (Robinson Creek above proposed mining areas), SW-101 (Lower Robinson Creek near proposed mining areas), BLM-1 (Lower Robinson Creek adjacent to proposed mining areas) and SW-5 (Lower Robinson Creek below proposed mining areas).

Kanab Creek drainage

SW-1 (Kanab Creek near Alton, Utah; above proposed mining areas), SW-3 (Kanab Creek above proposed mining areas), and SW-2 (Kanab Creek below Lower Robinson Creek and below proposed mining areas). Additionally baseline hydrologic data from Lamb Canal, which is an irrigation ditch that conveys water from a diversion in Kanab Creek to irrigated lands adjacent to Kanab Creek west of proposed mining areas, is also collected.

724.300 Geologic Information

Geologic information in sufficient detail to determine the probable hydrologic consequences of mining and determine whether reclamation as required by R645 can be accomplished is given in Chapter 6 of this permit application package and in Appendix 7-1, Appendix 7-16 and Appendix 7-18.

724.400 Climatological Information

Climatological information, including temperature and precipitation data, have been routinely measured and recorded at the Alton, Utah weather station (420086) since 1928. The station is located in the town of Alton, approximately two miles north of the Coal Hollow Mine permit area. Climatological data collected at the Alton station for the 77 year period from 1928 to 2005 are summarized in Table 7-3. Climatological data from the Coal Hollow Mine permit and adjacent area are plotted in Drawing 7-8.

An automated weather station was installed in the Coal Hollow Mine permit area in December 2005. The station is configured to continuously monitor and record temperature, wind velocity, and wind direction data. The station is also configured to continuously measure and record precipitation, although the tipping rain-gauge is not operative during winter months. Climate data from the Coal Hollow Mine and adjacent area are also presented in Appendix 7-6.

724.411 Seasonal precipitation

Precipitation data from the Alton, Utah weather station indicates average annual precipitation of 16.38 inches per year. Doelling (1972) reports average annual precipitation in the Alton Coal Field area ranging from 9 to 20 inches annually with slightly higher increments likely in the higher parts of the plateau (Doelling, 1972). There are generally two annual wet periods in the region. During the wintertime, cyclonic storms bring precipitation (mainly snowfall) to the region. During the summertime, storms originating from convection of air from the Gulf of Mexico or the Pacific Ocean bring rains to the region. Of the two annual wet cycles, the summer rainfall is most reliable. Average monthly precipitation at the Alton station ranges from a low of 0.57 inches in June to a maximum of 1.80 inches in February. Daily temperature and precipitation data recorded at the Coal Hollow Project weather station during 2006 and early 2007 are presented in Appendix 7-6.

The Palmer Hydrologic Drought Index (PHDI; NCDC, 1997) indicates long-term climatic trends for the region. The PHDI is a monthly value generated by the National Climatic Data Center (NCDC) that indicates the severity of a wet or dry spell. The PHDI is computed from climatic and hydrologic parameters such as temperature, precipitation, evapotranspiration, soil water recharge, soil water loss, and runoff. Because the PHDI takes into account parameters that affect the balance between moisture supply and moisture demand, the index is a useful for evaluating the long-term relationship between climate and groundwater recharge and discharge. A plot of the PHDI for Utah Region 4 (which includes the Coal Hollow Mine permit and surrounding area) is shown in Drawing 7-9. It is apparent in Drawing 7-9 that the region has experienced cyclical periods of drought and wetness since 1980. Baseline hydrologic monitoring performed by Utah International, Inc in 1987 and 1988 occurred during a period of near normal wetness. Recent baseline hydrologic monitoring conducted in 2005 and 2006 occurred during a period of moderate to severe wetness, with 2005 being wetter than 2006.

724.412 Wind direction and velocity

Wind data have been collected at the Coal Hollow Project weather station since December 2005. Monthly wind data from the Coal Hollow Project weather station are available from January 2006 through March 2006, and from November 2006 through May 2007. Monthly wind data are plotted as wind rose diagrams, which depict the average direction and velocity of prevailing winds, in Appendix 7-1. Based on recent data from the Coal Hollow Project weather station, it is apparent that the predominant wind direction in the Coal Hollow Mine permit area (during the months for which data are available) are from the northeast, with secondary peaks from the north and south-southwest (Appendix 7-6). Surface winds recorded at the Coal Hollow Project weather station averaged about 6.4 miles per hour. Tabulated hourly wind data from the Coal Hollow Project weather station are maintained on file at Alton Coal Development, LLC.

Wind data have also been collected historically at nearby locations by governmental and other entities. The regionally predominant direction of winds in the region is southwest through west. Secondary peaks are from southeast and northwest. Surface winds in the area average approximately 8 miles per hour. Higher wind speeds are associated with fronts and storms and generally occur during the springtime.

724.413 Seasonal temperature ranges

Temperature data from the region are summarized in Table 7-3. Temperatures in the permit area vary greatly. Temperature data from the Alton station (1928-2005) indicate that monthly average low temperatures are below freezing for the 6-month period from November to April. Monthly average minimum temperatures range from a low of 15.1 °F during January to a high of 49.8 °F in July. Monthly average maximum temperatures range from a low of 39.5 °F in January to a high of 82.6 °F in July. Daily maximum and minimum temperature data collected at the Coal Hollow Project weather station during 2006 through August 2015 are presented in Appendix 7-6. The maximum temperature recorded during this period was 94.1 °F in June 2013. The minimum temperature recorded during this period was -8.4 °F in January 2011.

724.500 Supplemental Information

Other than the possible short-term diminution in discharge rates from alluvial groundwater systems, including the potential short-term diminution of discharge rates from some springs and seeps in Sink Valley, adverse impacts to the hydrologic balance, either on or off the permit area are not expected to occur. Significant adverse impacts to the hydrologic balance in the North Private Lease are likewise not anticipated, although one seep that discharges at less than 1 gpm is planned to be intercepted by the mine workings. It is not anticipated that acid- and toxic-forming materials will cause significant contamination of groundwater or surface-water supplies in either the existing mine area or at the proposed North Private Lease. Any discharges of mine waters to surface-water systems will be regulated under and meet the criteria of a UPDES discharge permit. The mining and reclamation plan for the existing mine area and the proposed North Private Lease has been designed to minimize the potential for disturbance

or disruption of the hydrologic balance and to protect groundwater and surface-water resources in the area.

If substantial alluvial groundwater inflows into mining areas occur as mining progresses in close proximity to alluvial springs and seeps in the eastern ¼ of Section 30, T39S, R5W and the northwest ¼ of Section 29, T39S, R5W or in close proximity to coarse-grained alluvial sediments in the artesian groundwater system along the eastern side of Sink Valley, Alton Coal Development, LLC will evaluate hydrogeologic conditions at the time such may occur. It should be noted that very large discharges into mine workings are not anticipated based on the results of recent drilling and aquifer testing performed in these areas (see Appendix 7-1). Based on the hydrogeologic conditions encountered, where necessary Alton Coal Development, LLC will use a suitable technique to minimize groundwater inflow rates into the mine, which may include the use of bentonite or natural clay filled cutoff walls or other means where appropriate to protect groundwater resources up-gradient of mining activities. The potential for success of such protective measures in minimizing drainage of alluvial deposits up-gradient of proposed mining areas is believed to be good, given that the thickness of the alluvium in these areas is generally on the order of about 20 to 50 feet and these sediments are directly underlain by essentially impermeable Tropic Shale in proposed mining areas. It is important to note that while temporary impacts to groundwater discharge rates from alluvial springs and seeps could possibly occur, these impacts will likely be short-lived. This conclusion is based on the fact that individual mine pits in most instances will remain open for no more than about 60 to 120 days (measured from the time the mining of the pit is completed to the time the pit is backfilled). The variability in the time individual pits remain open is related to the thickness of overburden at the pit and the state of the overall spoil balance. It should be noted that these times could be somewhat greater if the mining production rate is less than the currently anticipated rate (in the event that contracts for the full 2 million tons of coal per year are not in place). However, the backfilling and rough grading requirements of R645-301.553 will be met (except where a variance to this regulation has been requested to assist with the transition to the adjacent federal coal reserves in the south pits area). After mine pits are backfilled and reclaimed, the potential for appreciable continued drainage of up-gradient alluvial groundwater through the backfilled pits in that area is low. When mining is complete in an area, seasonal recharge to alluvial groundwater systems will gradually replenish groundwater to the alluvial groundwater system. Large-scale dewatering of the alluvial groundwater system, such that appreciable compaction of the aquifer skeleton could occur, is not anticipated (see Appendix 7-1).

If diminution of discharge rates from seeps and springs does occur as a consequence of mining and reclamation activities in either the existing mining area or the proposed North Private Lease, any lost water will be replaced according to all applicable Utah State laws and regulations using the water replacement source specified in R645-301-727. The quantity and quality of replacement water detailed in R645-301-727 will be suitable for the existing premining uses and approved postmining land uses.

It should be noted that the Coal Hollow Mine plan calls for the temporary diversion of a reach of the Lower Robinson Creek stream channel approximately 2,000 feet in length in the southeast ¼ of Section 19, T39S, R5W. Details of the proposed diversion are given in Chapter 5, Section 527.220 of this MRP. If this action results in diminution of groundwater or surface-water resources, where required a suitable mitigation for this potential impact will be designed and implemented in consultation with the Division of Oil, Gas and Mining.

If excess groundwater were to be encountered during mining operations in the existing permit area or in the proposed North Private Lease such that it could not be adequately managed or discharged in compliance with the Utah UPDES discharge permit (which is considered unlikely), Alton Coal Development, LLC may when necessary and with the approval of the Utah Division of Oil, Gas and Mining construct supplemental containment and settlement ponds in which mine discharge waters may be held for treatment (where necessary) and subsequent discharge through UPDES discharge points in compliance with the UPDES discharge permit.

Mining in the Coal Hollow project area will be a combination of surface mining, either open pit or highwall mining, and underground mining. Both the highwall mining and underground mining are designed such that subsidence is not expected to occur or have a negative impact on renewable resources lands.

724.700 Alluvial Valley Floor Determination

A field investigation has been performed in the Coal Hollow Mine permit and adjacent area to provide to the Division the information required to make an evaluation regarding the existence of a probable alluvial valley floor in the Coal Hollow Mine permit and adjacent area. The results of this field investigation and related information is provided in Appendix 7-1. Additional information regarding potential alluvial valley floors in the area is provided in Appendix 7-7.

A report detailing the findings of a previous field investigation performed by Water Engineering & Technology, Inc., entitled “Geomorphological and sedimentological characteristics of Sink Valley, Kane County, Utah” is included as Appendix 7-4.

A field investigation has been performed in the North Private Lease Area and adjacent area to provide to the Division the information required to make an evaluation regarding the existence of a probable alluvial valley floor in the North Private Lease permit and adjacent area. The results of this field investigation and related information is provided in Appendix 7-17.

725 BASELINE CUMULATIVE IMPACT AREA INFORMATION

Appendix 7-1 contains the results of a comprehensive investigation of groundwater and surface-water systems in the Coal Hollow Mine permit and adjacent area (including the 85.88-acre Dame Lease IBC area and the proposed North Private Lease area). Appendix

7-1 also includes information regarding the probable hydrologic consequences of coal mining in the Coal Hollow Mine permit area and recommendations for hydrologic monitoring. Appendix 7-1 also includes the results of a field investigation performed in the Coal Hollow Mine permit and adjacent area to provide to the Division of Oil, Gas and Mining the information required to make an evaluation regarding the existence of a probable alluvial valley floor in the Coal Hollow Mine permit and adjacent area. This Information together with the information submitted herein can be used to assess the probable cumulative hydrologic impacts of coal mining and reclamation operations in the Coal Hollow Mine permit and adjacent area (including the 85.88-acre Dame Lease IBC area) as required by R645-301-729. The results of a field investigation regarding potential alluvial valley floors in the proposed North Private Lease area was previously provided to the Division and is included in the MRP as Appendix 7-17. The AVF report includes baseline information for the North Private Lease area including groundwater and surface-water quality information . The report also includes geologic information including maps of geology and geomorphology of the North Private Lease and Adjacent area.

Information on groundwater and surface-water systems in the North Private Lease area at the North Private Lease area is provided in Appendix 7-16 (Petersen Hydrologic, 2015) and Appendix 7-18. Appendix 7-16 includes a map showing hydrologic baseline monitoring locations as well as a map showing spring and seep locations in the North Private Lease and adjacent areas. A plot of the Palmer Hydrologic Drought Index and a geologic map of the North Private Lease and adjacent area are provided in Appendix 7-16. Appendix 7-16 also provides a series of hydrogeologic cross-sections through the North Private Lease and adjacent area that show water levels under seasonal conditions. Discharge hydrographs for springs and streams and water level hydrographs for wells are provided in Appendix 7-16. Baseline water quantity and water quality data for springs, streams, and wells in the North Private Lease and surrounding areas are tabulated in Appendix 7-16. A map showing Stiff diagrams that depict solute geochemical compositions for groundwaters and surface waters in the North Private Lease and surrounding areas is provided in Appendix 7-16. A map showing the locations of ponds and ditches is also provided. Plots of TDS concentrations in Kanab Creek during high flow and low flow conditions are provided in Appendix 7-16, as is a graph of discharge rates plotted versus TDS in the creek. A water table map is also provided in Appendix 7-16. Monitoring well details for wells in the North Private Lease area are also provided in Appendix 7-16. A map showing the proposed hydrologic monitoring locations associated with the North Private Lease area is also provided in Appendix 7-16. The results of a comprehensive drilling and well installation program in the alluvial groundwater system in the North Private Lease during 2016 is presented in Appendix 7-18. Monitoring well completion data and geologic borehole logs for North Private Lease alluvial monitoring wells is provided in Appendix 7-18. Water-quality data from the alluvial monitoring wells are also provided in Appendix 7-18. Appendix 7-18 also includes the results of an aquifer pumping test in the North Private Lease area. Time drawdown plots and tabulated drawdown data for monitored wells from the pumping test are provided in Appendix 7-18. An analytical modeling simulation in the alluvial groundwater system in the North Private Lease was performed to project likely groundwater drawdowns

associated with the proposed mining activities in the North Private Lease. The results of these simulations are provided in Appendix 7-18.

A Petersen Hydrologic, LLC report of an investigation of groundwater flow rates in alluvial groundwater systems near the southern permit boundary of the North Private Lease is provided as Appendix 7-19. That investigation incorporated the results of an alluvial groundwater well drilling and well construction program, routine monitoring of alluvial groundwater levels in monitoring wells, and the results of a May 2017 aquifer pumping test conducted in the alluvial groundwater sediment near the southern boundary of the North Private Lease. It was calculated in the Petersen Hydrologic report that, based on an analysis of the available information, the subsurface flow of alluvial groundwater exiting the North Private Lease area beneath the 160-foot wide Kanab Creek stream channel is likely on the order of 5 gallons per minute. The discharge measured in Kanab Creek at monitoring station Kanab Creek @ C.R. at the time of the May 2017 aquifer pumping test was 330 gpm. Thus the total volume of surface-water and groundwater outflow from the area was calculated to be about 335 gpm based on the calculations presented in the Petersen Hydrologic report (Appendix 7-19). From these calculations, it is apparent that the amount of alluvial groundwater subsurface outflow at the time the testing was performed is small relative to the total surface-water outflow (less than 2%). Under low-flow conditions, the alluvial underflow might constitute a more substantial portion of the total surface-water and groundwater outflow from the valley.

The surface-water discharge rates measured at station Kanab Creek @ C.R. and SW-3 on 9 May 2017 were 330 gpm and 316 gpm, respectively. The lack of an appreciable gain in flow between monitoring station Kanab Creek @ C.R. and the down-stream monitoring station SW-3 (Appendix 7-19) supports the conclusion that there was not a large flux of groundwater flowing beneath the stream channel at that time (i.e. no significant quantity of alluvial groundwater upwelled to the surface in the stream drainage for a distance of at least 0.5 miles downstream of the North Private Lease boundary). Rather, the flow at SW-3 was slightly lower (but within the anticipated margin of measurement error) than that measured at Kanab Creek @ C.R. (330).

R645-301-726 Modeling

No numerical models have been created for the permit area. Analytical modeling of alluvial groundwater systems in the North Private Lease area was performed. Details of this modeling activity are presented in Appendix 7-18.

The analytical groundwater model will be updated every mid-term. The model update will consider the water levels in backfilled mine pits and the surrounding undisturbed alluvial aquifer to the extent that such information is available. Where such information is not available, reasonable projections will be made. Where feasible, it will also calculate the groundwater recharge rate of backfilled sediments and the surrounding alluvial aquifer. From these activities, in conjunction with all available data, updated

estimates of the time it will take for the alluvial aquifer to reach pre-mining aquifer characteristics of water table elevation and recharge/discharge rates will be made.

727 ALTERNATIVE WATER SOURCE INFORMATION

This section provides information on the alternative water source that will be used to replace water from groundwaters or surface waters should they be impacted by mining and reclamation activities in the Coal Hollow Mine permit and adjacent area (including the 85.88-acre Dame Lease IBC area and the North Private Lease area).

The alternative water source is a water production well that was constructed on private land leased by Alton Coal Development, LLC in the northwest quarter of Section 29, Township 39 South, Range 5 West. The location for the well, which is situated within the Coal Hollow Mine permit area, is shown on Drawing 5-8C. The well produces water from the alluvial groundwater system in Sink Valley in locations up-gradient of proposed mining operations. Based on aquifer testing performed in the alluvial groundwater system near the proposed water well (using the existing well Y-61 as a pump testing well), it is believed that adequate water can be produced from the new well to satisfy the potential water replacement needs of the mine. Details of the aquifer testing and information on the hydrogeologic characteristics of the Sink Valley alluvial groundwater system are presented in Appendix 7-1.

Water quality data from the Sink Valley alluvial groundwater system near the location of the new water well have been collected from well Y-102 and have been submitted electronically to the Utah Division of Oil, Gas and Mining Utah Coal Mining Water Quality Database (UDOGM, 2007). The quantity and quality of water produced from the new water production well has been suitable for the existing premining uses and approved postmining land uses. Well testing performed on the new water well indicated a yield of 150 gpm (see well driller's report for well ID 434305 and water right 85-774 on file at the Utah Division of Water Rights and at waterrights.utah.gov).

It should be noted that the water replacement well source produces water from the coarse-grained alluvial groundwater system in Sink Valley. Nearby springs that could potentially be impacted by mining and reclamation activities are supported by the same alluvial groundwater system. However, while modest decreases in the artesian hydraulic pressures in the alluvial groundwater system could potentially result in diminution of spring flows, the planned new water well will likely be approximately 100 feet deep and will be equipped with an electric well pump giving it the capacity to produce groundwater from the alluvial system even if the hydraulic head in the area were to be diminished such that artesian flow conditions temporarily ceased to exist.

An analysis of the total average discharge of state appropriated groundwaters from the permit and adjacent area has been performed to determine whether the quantity of water

that could likely be produced from the new water replacement well will be adequate for potential replacement needs. Based on baseline spring discharge data submitted to the Division (UDOGM, 2007), it is determined that the average discharge of all state appropriated groundwater from groundwater discharge area A (Drawing 7-3, Drawing 7-4) is approximately 35 gpm. The state appropriated waters in groundwater discharge Area A include most of the significant springs in the area and essentially all of the largest springs in the area (Drawing 7-3; Appendix 7-3). The average discharge of all state appropriated groundwater from groundwater discharge area B (Drawing 7-4) is approximately 17 gpm. Using an unlikely worst-case scenario and assuming that all springs with state appropriated waters in both Areas A and B were to cease flowing, a total replacement of approximately 52 gpm would be required. The proposed new water well located in Section 29, Township 39 South, Range 5 West will be designed to produce water at that quantity and, therefore, should be able to provide adequate replacement water in even this worst-case scenario (which is not considered likely). Aquifer analysis described in Appendix 7-1 suggests that the yield of the alluvial groundwater system in which the new water well will be constructed should be capable of sustaining discharges of the required magnitude and for the lengths of time that the need for replacement water would be likely. It should be noted that if the need arises to provide replacement water for impacted state appropriated waters, the duration of the need will likely be of a relatively short duration (see Section 728 below).

Alton Coal Development, LLC has entered into a written agreement with the town of Alton, Utah to transfer the point of diversion for 50 acre-feet of water for use at the Coal Hollow Mine. A copy of this agreement is included in Appendix 7-8 (in confidential binder). This water available for all uses at the mine including potential use for water replacement. The new water well has been constructed on lands currently leased by Alton Coal Development, LLC. Consequently, no new landowner access agreement will be required for the drilling of the well.

728 PROBABLE HYDROLOGIC CONSEQUENCES (PHC) DETERMINATION

This section describes the probable hydrologic consequences of surface coal mining in the Coal Hollow Mine permit area. This determination is based on data presented herein and on information provided in Appendix 7-1. The probable hydrologic consequences associated with proposed highwall mining activities within the 85.88-acre Dame Lease IBC area are presented in Appendix 7-4. The probable hydrologic consequences associated with the proposed underground mining activities at the Coal Hollow Mine are presented in Appendix 7-15. The probable hydrologic consequences of proposed coal mining and reclamation activities in the North Private Lease area are presented in Appendix 7-16 and further characterization and analysis of the alluvial groundwater systems in the North Private Lease are shown in Appendix 7-18. This mining and reclamation plan has been designed to minimize potential adverse impacts to the hydrologic balance. Information regarding pre- and post-mining potentiometric levels and groundwater flow conditions, including the potential for impacts to surrounding groundwater systems, is provided in Appendix 7-20. It should be noted that this PHC and also Appendix 7-1 may be updated periodically as required as additional hydrogeologic information and mining data become available in the future.

728.310 Potential adverse impacts to the hydrologic balance

Other than the possible short-term diminution in discharge rates from alluvial groundwater systems, including the potential short-term diminution of discharge rates from some springs and seeps in Sink Valley, appreciable adverse impacts to the hydrologic balance, either on or off the permit area are not expected to occur. The basis for this determination is discussed below.

As discussed in Section 721 above, minimal groundwater resources exist in the Tropic Shale, which directly overlies the coal reserves in proposed mining areas. Groundwater in the Tropic Shale does not provide measurable baseflow discharge to streams in the area. The lack of appreciable groundwater flow in the Tropic Shale is a result of the poor water transmitting properties of the marine shale unit. Consequently, it is anticipated that little groundwater will be encountered in the Tropic Shale in mining areas. Thus, the potential for adverse impacts to the hydrologic balance resulting from mining through the Tropic Shale in the Coal Hollow Mine permit area is minimal.

Similarly, as described in Section 722 above, groundwater resources in the Dakota Formation underlying the coal seam to be mined are not appreciable. This condition is fundamentally a result of the heterogeneity of the rock strata in the Dakota Formation which impedes the ability of the formation to transmit groundwaters significant distances vertically or horizontally. The presence of the essentially impermeable Tropic Shale on top of the Dakota Formation also minimizes the potential for vertical recharge to the Dakota Formation. Mining operations will remove the overlying Tropic Shale rock strata from the Dakota Formation in addition to the Smirl coal seam deposit at the top of the Dakota Formation in mined areas. However, because the pre-mining hydraulic

communication between the Tropic Shale and the underlying Dakota Formation in planned mining areas is believed to be minimal, the removal of the Tropic Shale overburden and Smirl coal seam from the Dakota Formation, followed by the rapid backfilling of pit areas with low-permeability fill materials should not result in adverse impacts to the hydrologic balance in the Dakota Formation (i.e., the post-mining degree of hydraulic communication between the Dakota Formation and the overlying low-permeability backfill material will be similar to that of the pre-mined condition).

It should be noted that the first water-bearing strata underlying the coal seam to be mined in the Coal Hollow Mine permit area from which appreciable quantities of groundwater can be produced is the Navajo Sandstone. The Navajo Sandstone aquifer is of regional significance in that it provides groundwater of good quality to domestic, agricultural, and municipal wells regionally and provides baseflow to springs and streams. The Navajo Sandstone does not crop out in the Coal Hollow Mine permit and adjacent area. The formation is effectively isolated from proposed mining areas by more than 1,000 feet of rock strata of the Dakota and Carmel Formations (which includes large thicknesses of low-permeability shales and siltstones). The Navajo Sandstone aquifer will not be impacted by proposed mining operations. It should be noted that some previously proposed mining operations in the Alton Coal Field have proposed drilling and pumping of large amounts of groundwater from high-capacity production wells in the Navajo Sandstone aquifer for operational use. No such wells are planned in the Coal Hollow Mine permit and adjacent area.

Of primary importance to the hydrologic balance in the Coal Hollow Mine permit and adjacent area are alluvial groundwater systems. As discussed in Section 722 and in Appendix 7-1, alluvial groundwater systems in the area support springs, seeps, diffuse groundwater discharge, and a limited number of wells. The bulk of the alluvial groundwater flux through the area occurs in alluvial sediments that include coarse-grained and finer-grained sediments near the eastern margins of Sink Valley, east of the Coal Hollow Mine permit area. Lesser quantities of alluvial groundwater migrate through finer-grained alluvial sediments (predominantly clays, silts, and sands) in the western portions of Sink Valley and in the Lower Robinson Creek drainage within the Coal Hollow Mine permit area. Discharges from alluvial groundwater systems in Sink Valley do not contribute measurable quantities of baseflow to streams (at least at the surface in the stream channel). Alluvial groundwater systems in the Lower Robinson Creek area are much less extensive than the alluvial groundwater systems in Sink Valley. Other than the emergence of small quantities of alluvial groundwater from the stream banks where the stream channel intersects the alluvial groundwater system, discharge from the alluvial groundwater system as springs or seeps in Lower Robinson Creek is generally not observed. Perched groundwater conditions exist locally in the alluvial groundwater system in the Lower Robinson Creek drainage.

In the general sense, surface coal mining activities in the Coal Hollow Mine permit area have the potential to impact groundwater systems primarily through three mechanisms:

1) Where water-bearing strata in proposed mining areas are mined through, groundwater systems within these strata will obviously be directly intercepted,
2) Where groundwater flow paths through mine openings are interrupted, groundwater flow in down-gradient areas could be diminished, and
3) Where mine openings intercept permeable strata, groundwater resources in up-gradient areas could potentially be diminished if appreciable quantities of groundwater were to be drained from up-gradient areas.

The potential for the occurrence of each of these potential impacts are described in the following.

Direct Interception of Groundwater Resources

As discussed above, groundwater resources in the relatively impermeable Tropic Shale in the proposed permit area are meager. Consequently, it is improbable that direct interception of appreciable groundwater in the Tropic Shale will occur. Additionally, because Tropic Shale groundwater systems generally do not support discharges to springs or provide baseflow to streams, the potential interception of limited quantities of groundwater in the Tropic Shale will not adversely impact the hydrologic balance. Similarly, groundwater resources in the Dakota Formation (including within the Smirl coal seam) are meager. While the Smirl coal seam will be extracted through mining operations, the underlying strata of the Dakota Formation will not be disturbed. Consequently, adverse impacts to groundwater systems in the Dakota Formation through direct interception of groundwater resources are not anticipated.

Alluvial groundwater systems in planned mining areas in the Coal Hollow Mine permit area will be directly intercepted by the mine openings. It is not anticipated that the direct interception of shallow alluvial groundwater will adversely impact the overall hydrologic balance in the region. This is because no substantial springs, seeps or other important groundwater resources have been identified in proposed mine pit areas (Drawing 7-1). In the pre-mining condition, any diffuse groundwater discharge to the ground surface that occurs is primarily lost to evapotranspiration and does not contribute appreciably to the overall hydrologic balance in the area.

Because of the prevailing low-permeabilities of the alluvial sediments within the proposed mine disturbance area, it is unlikely that the direct mining of the alluvial groundwater system within these areas could cause impacts to subirrigation and soil moisture contents in up-gradient areas.

It is considered likely that the average hydraulic conductivity of the placed run-of-mine backfill material will be low. This is because of the pervasiveness of low-permeability, clay-rich materials in the mine overburden and the anisotropic nature of the placed fill material. Consequently, the potential for the migration of appreciable quantities of groundwater through the fill is considered low. Accordingly, the potential for impacts to subirrigation and soil moisture in the lands up-gradient of mining areas will be minimized by the placement of the low-permeability backfill.

An engineered low-permeability barrier previously planned for the eastern edge of pit 15 will no longer be necessary and will not be constructed. The original purpose of the proposed engineered barrier was to minimize the potential for long-term impacts to the alluvial groundwater system in Sink Valley up-gradient of mining areas that could occur as a result of the long-term draining of alluvial groundwater into the pit backfill area. Because surface (pit) mining in those areas adjacent to the Sink Valley alluvial groundwater systems (pits13, 14, and 15) is no longer planned, such a barrier will not be necessary.

The potential for short-term impacts to subirrigation and soil moisture in the lands up-gradient of proposed mining areas will be minimized through the implementation of the hydrology resource contingency plan described in Appendix 7-9.

As has been the case generally at previous mining areas at the Coal Hollow Mine, it is anticipated that within the North Private Lease mining areas, that hydraulic conductivity of the placed run-of-mine backfill material will likely be low. This is because of the pervasiveness of low-permeability, clay-rich materials in the mine overburden in the North Private Lease and the nature of the mixed, anisotropic nature of placed backfill material.

As was the case during mining operations at the existing Coal Hollow Mine (south) area, mining in the North Private Lease will include excavating and handling overburden consisting of Tropic Shale bedrock and unconsolidated sediments consisting of clays, silts, sands, and gravels in varying proportions. A mixture of these materials will comprise the material backfilled into the completed surface mining pits. It is anticipated that the composition of the backfill vary from location to location depending on the character of the materials being excavated at active mining areas at the time that the backfilling of the completed mining pits occurs.

Predicted mine pit backfill final aquifer hydraulic properties

In the absence of specific information on the hydrologic properties of future mine pit backfills (i.e. because the backfilled pits do not currently exist), it is difficult to make definitive determinations about what the final hydraulic properties of the placed backfill will be. However, using published ranges of values for various types of rocks and sediments, it is possible to estimate hydraulic conductivity of materials that are anticipated to comprise the material used to backfill mine pits at the North Private Lease area. Based on the pervasiveness of silty and clayey materials in the lease area, and the likelihood that the run-of-mine backfill will contain appreciable quantities of these fine-grained materials, it is anticipated that hydraulic conductivities of the mixed backfill may fall in the lower range of silty sand or the range of silt, which is on the order of perhaps 10^{-5} to 10^{-6} cm/sec (Freeze and Cherry, 1979).

A sample of Tropic Shale bedrock was collected from the Coal Hollow Mine for laboratory testing of hydraulic conductivity. A drilling core consisting of unweathered Tropic Shale was analyzed at the laboratory to determine its hydraulic conductivity. The core sample was remolded and compacted at the laboratory prior to the analysis. The

measured hydraulic conductivity of this sample was 8.24×10^{-8} cm per second. This value of hydraulic conductivity likely represents a lower limit to the projected range of hydraulic conductivity for the backfill material (i.e. this could be similar to the hydraulic conductivity of the backfill if it were to be composed entirely of soft Tropic Shale bedrock that became tightly compacted within the backfill – which is considered to be an unlikely occurrence.

It is anticipated that groundwater that may potentially become present within the placed backfill will occur under unconfined or semi-confined conditions. This is because in order for the backfill sediments to become saturated, downward vertical groundwater flow (recharge) of the sediments would need to occur (i.e.

Time to saturate backfilled pit areas

In the absence of specific information on the hydrologic properties of future mine pit backfills (i.e. because the backfilled pits do not currently exist), it is difficult to make definitive determinations of the time it will take for the placed backfill in reclaimed mine pits to become water saturated. However, information useful in making as a first order approximation is presented below.

The rate at which the backfilled mine pits will become saturated is related to the amount of recharge water available, the hydraulic conductivity of the backfill sediments, and the effective porosity of the sediments. As indicated in Section 724.411, precipitation in the Coal Hollow Mine region averages about 16 inches annually. If it is arbitrarily assumed that of this total, 90 percent is lost to surface-water runoff and evapotranspiration in the clayey sediments of the mine environment, 10% (1.6 inches or 0.666 feet) of recharge water could be available to recharge underlying backfilled mine pit area. Assuming that the porosity of the placed backfill could be on the order of 0.15 (in the typical range for unconsolidated deposits), the 1.6 inches of infiltrating precipitation water could saturate a soil thickness of about 10.7 inches (0.89 feet) each year. Using this relationship, a first order approximation of the time to fill a mine pit 100 feet deep could be determined by dividing the total number of feet of backfill thickness by the per-year infiltration rate. In this arbitrary example, the time required to saturate the backfill would be 100 feet of thickness divided by 0.88 feet of infiltration per year, or about 114 years. Similarly, using the same methods, if the average percentage of the annual precipitation water available for groundwater recharge were doubled to 20%, a time to fill for a 100-foot deep mine pit would be 57 years.

In making these rough projections, it is important to consider that other factors may also significantly influence the time required for backfilled pits to eventually re-saturate. Some of these include the existing saturation state of the materials at the time the materials are placed as backfill, and the potential that infiltrating precipitation waters could be held under perched conditions on impermeable strata, or the downward migration rates could be so slow that it could take many years for the water to migrate

vertically to the base of the backfilled pit, resulting in discontinuous zones of saturation. Additionally, in low-lying areas where ponding of surface runoff can occur, a greater percentage of the precipitation water could infiltrate into the underlying backfill areas. Contrastingly, in sloped areas where the runoff of precipitation is favored, infiltration rates could be significantly lower.

It is considered unlikely that the backfilled mine pit areas in the North Private Lease will act as "aquifers". Rather, the heterogeneous mixture of shales, clays, silts, sands, and gravels will more likely as aquitards. Consequently, alluvial groundwaters flowing in close proximity to Kanab Creek will likely tend to remain in the undisturbed sediments adjacent to the stream channel rather than spreading out into the surrounding low-permeability mine backfill areas.

In order to better characterize the actual aquifer conditions in backfilled mine pit areas in the North Private Lease, Alton Coal Development proposes to construct a monitoring well (if it is possible to do so) within the backfill of mine pit 12 when the mining in that area is complete and the pit is backfilled. This well may then be used for the purposes of 1) monitoring the rate at which the backfilled material re-saturates over time, and 2) eventually for the purpose of performance of aquifer testing to determine the aquifer characteristics of the placed backfill material after the sediments have become adequately saturated for such tests to occur.

Diminution of down-gradient groundwater resources

Where groundwater flow paths that convey groundwater to down-gradient areas exist in areas that will be mined, there is the potential that diminution of down-gradient groundwater resources could occur. In the Coal Hollow Mine permit area, it is considered unlikely that appreciable diminution of down-gradient resources will occur as a result of mining and reclamation activities. The basis of this conclusion is presented below.

Groundwater resources in the Tropic Shale are meager and groundwater flow rates are very slow through the marine shale unit. Groundwater systems in the Tropic Shale do not support appreciable spring or seep discharge nor do they provide measurable baseflow to streams down-gradient of mining areas. Consequently, the potential for adverse impacts to the hydrologic balance as a result of mining through Tropic Shale is considered minimal.

Similarly, groundwater resources in the Dakota Formation are meager. The potential for lateral and vertical migration of groundwater through the formation is limited by the pervasiveness of low-permeability shaley strata in the formation and the lateral discontinuity of permeable strata. Groundwater systems in the Dakota Formation do not support appreciable spring or seep discharge nor do they provide measurable baseflow to streams down gradient of mining areas. Additionally, with the exception of the relatively low-permeability Smirl coal seam located at the top of the formation, groundwater systems in Dakota Formation rock strata below the coal seam will not be disturbed by

mining and reclamation activities. Consequently, the potential for adverse impacts to the hydrologic balance as a result of mining through Dakota Formation strata is considered minimal. It should be noted that spring SP-4 discharges at about 1 gpm approximately 1.1 miles south of the Coal Hollow Mine permit area from an apparent fault/fracture system in the Dakota Formation that may be related to the Sink Valley Fault. It is unlikely that appreciable migration of groundwater through the Sink Valley Fault system in the relatively impermeable Tropic Shale or shallow alluvium in the Coal Hollow Mine permit area occurs. Consequently, it is considered unlikely that mining and reclamation activities in the Coal Hollow Mine permit area will cause a diminution of discharge from spring SP-4.

Alluvial groundwater systems in proposed mining areas area supported primarily by clays, silts, and fine-grained sands. In proposed mining areas in Sink Valley, appreciable coarse-grained alluvial sediments were not encountered in drill holes or back-hoe excavations. Significant layers of clean coarse alluvium, which could rapidly convey significant amounts of groundwater, were likewise not observed. The results of slug testing performed on wells in and adjacent to proposed mining areas likewise suggest that the potential for rapid migration of groundwaters through alluvial sediments in proposed mining areas is low (Tables 7-8 and 7-9). These data and observations suggest that the flux of groundwater migrating through the alluvial sediments in proposed mining areas in Sink Valley (that could support down-gradient groundwater systems) is not large. Much of the groundwater migrating through the alluvial sediments in proposed mining areas (in the East ¼ of Section 30, T39S, R5W) likely leaves the groundwater system through diffuse discharge to the land surface and is lost evapotranspiration and does not contribute to the overall hydrologic balance in the area. In Sink Valley, a preferential pathway for alluvial groundwaters through deep coarse-grained alluvial sediments likely exists along the east side of Sink Valley. While the thickness of the alluvium in proposed mining areas in Sink Valley generally does not exceed 50 feet (and in many locations is much less), the alluvial sediments along the eastern side of Sink Valley adjacent to proposed mining areas range from about 120 to 140 feet. Of the total flux of groundwater through the alluvial groundwater systems in Sink Valley, most of the flux is likely through this coarse-grained portion of the system. The percentage of the total flux that migrates through clayey and silty alluvial sediments in proposed mining areas along the western flanks of Sink Valley is likely much less.

It should be noted that highly permeable strata were encountered from about 60 to 75 feet depth just above the bedrock interface at the SS well cluster (monitoring well SS-75; Table 7-2). This well is screened in an area of burned or eroded coal (the coal is absent) and consequently, mining will not occur at this location. The coal seam is present at the nearby C9 cluster area. Were mining operations to intercept this highly permeable zone, substantial groundwater inflows into the mine openings could occur. Consequently, prior to surface mining in this area, the boundary between the competent coal seam and the area of burned or eroded coal will be more precisely defined by drilling or other suitable techniques such that mine openings can be designed to avoid these areas of potentially large groundwater inflows.

As discussed in Section 722 above, alluvial groundwater from Sink Valley discharges to several springs and seeps and as diffuse discharge to the ground surface in the northwest ¼ of Section 32, T39S, R5W (see Drawing 7-4; groundwater discharge area B). This groundwater discharge is likely a result of the constriction in Sink Valley in this area and the corresponding decrease in the cross-sectional area of the alluvial sediments in the valley, which forces groundwater to discharge at the surface. Most of the groundwater discharge in this area is likely derived from the up-gradient alluvial groundwater systems in the eastern portion of the valley (i.e., the coarse-grained portion of the alluvial groundwater system), which is situated east of the Coal Hollow Mine permit area. This conclusion is based on 1) the substantially larger cross-sectional area of the alluvium in the deeper eastern portion of the valley relative to that in proposed mining areas near the western margins of the valley, 2) the higher hydraulic conductivity of the sediments in the coarse-grained part of the alluvial system, and 3) the lack of other apparent discharge mechanisms for the coarse-grained system further downstream in Sink Valley Wash (i.e., there are no significant alluvial springs or seeps further downstream in Sink Valley Wash and the system apparently does not contribute measurable baseflow to Sink Valley Wash further downstream (at least at the surface in the stream channel, as evidenced by the lack of baseflow in the wash monitored at SW-9).

Because most of the alluvial groundwater discharge supporting springs and seeps in this area is likely not derived from groundwater systems that underlie planned mining areas in the Coal Hollow Mine permit area, it is considered unlikely that discharges from the springs and seeps in northwest ¼ of Section 32 T39S, R5W will be appreciably diminished as a result of the proposed mining and reclamation activities. While considered unlikely, some temporary impacts to discharge rates from springs and seeps in this area are possible. In particular, it should be noted that mining in the southernmost portions of the Coal Hollow Mine permit area has a somewhat greater potential to decrease groundwater discharge rates at spring SP-6, which is located about 600 feet below the southernmost proposed mining areas (Drawing 7-2). SP-6 is an alluvial seep which has been impounded with an earthen dam from which measurable discharge is generally not present.

It is critical to note that individual mine pits in this area will remain open for short lengths of time, generally no more than about 60 to 120 days (measured from the time the mining of the pit is completed to the time the pit is backfilled). Mining operations in the vicinity near the alluvial groundwater discharge area in the northwest ¼ of Section 32 T39S, R5W are planned to be completed in about 1 year. Thus, any potential impacts to discharge rates from down-gradient groundwater systems will be short-lived. Following the backfilling and reclamation of mine openings, the potential for interception or re-routing of alluvial groundwater away from the groundwater discharge area in northwest ¼ of Section 32 T39S, R5W will be negligible. As stated above, most of the flux through the Sink Valley alluvial groundwater system that supports springs and seeps in the area occurs in the eastern portion of the valley, which will not be impacted by mining and reclamation activities. Consequently, long-term impacts to discharge rates from springs and seeps in this area are not anticipated. It should also be noted that if increased quantities of groundwater were to be encountered in mine workings in lower Sink Valley

such that the water would need to be discharged to surface drainages, the mine water will ultimately be discharged to the Sink Valley Wash drainage (i.e., the water will remain in its drainage basin).

Alluvial groundwater systems in the Lower Robinson Creek area are much less extensive than the alluvial groundwater system in Sink Valley. Perched groundwater conditions exist locally in the alluvial groundwater system in the Lower Robinson Creek drainage. Other than the re-emergence of alluvial groundwater flowing beneath the Lower Robinson Creek stream channel where the stream channel exists directly on bedrock substrate, discharges from the alluvial groundwater system as springs or seeps in Lower Robinson Creek are not observed. Consequently, mining operations in the Lower Robinson Creek drainage will likely not result in diminution of down-gradient groundwater resources.

It should be noted that the Coal Hollow Mine plan calls for the temporary diversion of a reach of the Lower Robinson Creek stream channel approximately 2,000 feet in length in the southeast ¼ of Section 19, T39S, R5W. Details of the diversion are given in Chapter 5, Section 527.220 of this MRP. If this action results in diminution of groundwater or surface-water resources, where required a suitable mitigation for this potential impact will be designed and implemented in consultation with the Division of Oil, Gas and Mining.

If any Utah State appropriated water rights are impacted by mining and reclamation operations in the Coal Hollow Mine, these will be replaced according to all applicable Utah State laws and regulations using the designated water replacement source described in Section 727 above.

Draining of up-gradient groundwater resources

Where surface mining occurs adjacent to up-gradient groundwater systems, there is a potential that draining of groundwater from the up-gradient groundwater system into the mine voids could occur. This condition could occur if a sufficiently large and permeable stratum were to be intercepted that is in good hydraulic communication with the up-gradient groundwater system through which appreciable quantities of water could be transmitted.

To more fully evaluate the potential for draining of up-gradient groundwater resources, a field investigation was performed during the winter of 2006-2007 that was designed to facilitate the characterization of the alluvial groundwater system in the Coal Hollow Mine permit and adjacent area. Specifically, this program was designed 1) to better define the vertical and lateral extent of permeable, coarse-grained sediments in the alluvial groundwater system, 2) to characterize the water bearing and water transmitting properties of alluvial sediments, and 3) to evaluate the degree of hydraulic communication between the coarse-grained portion of the alluvial system in Sink Valley and the clayey alluvial sediments in proposed mining areas.

This field investigation included 1) the drilling and installation of 30 monitoring wells, 2) the performance of a 28-hour pumping and recovery test on the alluvial testing production well Y-61 (which is a 6.625-inch well constructed in 1980 as part of a previous coal mining application for groundwater pumping for alluvial aquifer testing) with contemporaneous measuring of water levels in the monitoring well network and contemporaneous measuring of spring discharge rates at three alluvial springs, and 3) the slug testing of 20 monitoring wells to determine approximate values of hydraulic conductivity. The results of the field investigation including analysis of the data collected in the investigation are presented in Appendix 7-1 and are summarized below.

Other than occasional pebbles or small rocks, coarse-grained sediments (i.e., gravels and coarse sands) were not encountered in the drilling of wells along the eastern margins of proposed mining areas in Sink Valley (C1, C2, C3, and C4 well clusters). (It should be noted that the C2 well cluster is located west of the eastern limit of the mine disturbance. The mine openings will intercept the C2 well cluster and the area to the east to locations west of well Y-102). Rather, the sediments encountered in the drilling of these wells were dominated by clays and silts with subordinate amounts of fine-grained sand. Similarly, coarse-grained deposits were not encountered in well clusters C6, C7, C8, and C9. There was no indication during drilling of any appreciable thickness of highly permeable strata through which groundwater could rapidly be transmitted (although it should be noted that the presence of thin sand layers are difficult to identify in wet auger drilling returns). Similarly, appreciable amounts of high-permeability coarse-grained alluvial sediments were not noted in alluvial sediments investigated in backhoe excavated pits and erosional escarpments in Sink Valley.

The hydraulic heads measured in alluvial monitoring wells near proposed mining areas in Sink Valley (C2, C3, C4, C7, C8, and C9) did not indicate artesian pressures. Rather, marked upward or downward vertical hydraulic gradients were not observed in any of these areas and water levels were consistently within several feet of the ground surface.

The results of pump testing in the alluvial groundwater system demonstrate that the springs in the northwest ¼ of Section 29, T39S, R5W are in direct hydraulic communication with the coarse-grained alluvial groundwater system in which the pumping well Y-61 is screened. Discharge rates (or water levels at Sorensen Spring) measured at each of the four springs (SP-8, SP-14, SP-20, and Sorensen spring) monitored during the 28-hour pumping test responded to pumping at the well. Monitoring wells at clusters C2, C3, and C4 near the easternmost proposed mining areas also showed small, muted responses, with declines measured in water levels during the 28-hour test ranging from about 0.05 to 0.10 feet. Other monitoring wells in proposed mining areas did not respond measurably to pumping at Y-61. It should be noted that after the pumping well was turned off at the end of the 28-hour pumping test, spring discharge rates and water levels in alluvial monitoring wells recovered to approximate pre-testing levels.

The results of slug testing of wells in the Coal Hollow Mine and adjacent area are presented in Table 7-8. Using these hydraulic conductivity values together with

measured thicknesses of saturated alluvial sediments determined during drilling, and hydraulic gradient values determined from water levels measured in monitoring wells, rates of estimated groundwater inflows to mine openings have been calculated using Darcy's Law (Table 7-9).

Darcy's Law may be expressed as.

$$Q = KIA$$

Where	Q	=	groundwater discharge rate
	K	=	hydraulic conductivity
	I	=	hydraulic gradient
	A	=	cross-sectional area

The values listed in Table 7-9 are reported as inflow rates per 100 lineal feet of mine openings oriented perpendicular to the groundwater flow direction. Calculations at individual locations are adjusted for the thickness of the saturated alluvium at that location. For all calculations in Table 7-9, a gradient of 0.10 has been used, which is considered a conservative estimate for the alluvial groundwater system in the vicinity of the planned Coal Hollow Mine workings. It is important to note that while values for saturated aquifer thickness and local hydraulic gradient in the alluvial groundwater system can be determined relatively precisely, hydraulic conductivity values determined from slug testing methods are generally considered as order-of-magnitude estimates. Consequently, the information from Table 7-9 should be used for general purposes only. The estimated groundwater inflow rates presented in Table 7-9 suggest that copious, unmanageable amounts of alluvial groundwater will likely not be encountered. It should be noted, however, that alluvial sediments located east of the C2 well cluster may contain coarser grained sediments similar to those intercepted in well Y-102. Special mining protocols will be employed (See Appendix 7-9) when mining in this area (pit15; see Section 728.333) to minimize the potential for interception of large groundwater inflows.

As described in Appendix 7-11, Table 7-9 has been updated to reflect the current pit mine-inflow conditions in the Pit #2 and adjacent areas.

As surface mining operations advance toward the alluvial groundwater discharge area in the northwest ¼ of Section 29, T39S, R5W (See Drawing 7-4; groundwater discharge area A), the information in Table 7-9 suggests that groundwater inflow rates in this area will be modest, generally on the order of a few tens of gallons per minute or less per 100 lineal feet of mine opening. However, it should be noted that, as discussed above, if mine openings in this area were to intersect a substantial thickness of coarse-grained alluvial material that was in good hydraulic communication with the coarse-grained alluvial system located along the eastern margins of Sink Valley, substantially greater rates of groundwater inflow could occur. Based on the information in Tables 7-8 and 7-9, this is not considered likely.

As mining operations advance toward the alluvial groundwater discharge area in the northwest ¼ of Section 29, T39S, R5W (See Drawing 7-4; groundwater discharge area A) and groundwater discharge from up-gradient alluvial groundwater systems occurs, there is the potential that discharge rates from alluvial springs in this area could be diminished. The magnitude of this potential impact will be largely dependent on the drainage rate and volume of groundwater that may be drained from the up-gradient alluvial groundwater system.

The potential for diminution of discharge from alluvial springs near proposed mining areas near the northwest ¼ of Section 29, T39S, R5W will be minimized because:

1) As mining progresses toward the groundwater discharge area in the northwest ¼ of Section 29, T39S, R5W (see Drawing 7-4, groundwater discharge area A), groundwater inflows into mine openings and discharge rates from the nearby alluvial springs will be closely monitored. If groundwater inflow rates into mine openings are excessive, where necessary Alton Coal Development, LLC will use a suitable technique to minimize groundwater inflow rates into the mine. These techniques may include the use of bentonite or natural clay filled cutoff walls or other means where appropriate to isolate and protect groundwater resources up-gradient of mining activities, and

2) Individual mine pits in the Coal Hollow Mine will remain open for short lengths of time, generally no more than about 60 to 120 days (measured from the time the mining of the pit is completed to the time the pit is backfilled). Consequently, any potential impacts to spring discharge rates in the alluvial groundwater system in this area will likely be short-lived. Because the alluvial groundwater recharge areas are located well up-gradient of proposed mining areas (mountain-front recharge) and will not be impacted, recharge to the alluvial system should continue uninterrupted, it is anticipated that water levels in the artesian groundwater system should recover from any mining-related declines in hydraulic head subsequent to the completion of mining in the area.

Groundwater discharge from the springs in the northwest ¼ of Section 29, T39S, R5W (See Drawing 7-4; groundwater discharge area A) do not contribute any measurable baseflow discharge to streams in the area. This conclusion is based on the lack of any baseflow discharge in streams down-gradient of this area in Sink Valley (see monitoring data for SW-6 and SW-9). Rather, most of this discharge is likely ultimately lost to evapotranspiration as the water migrates across the low-permeability, near-surface clayey sediments in Sink Valley. Consequently, the potential temporary diminution of discharge from alluvial springs in the northwest ¼ of Section 29, T39S, R5W would not result in appreciable adverse impacts to the surrounding hydrologic balance.

It is considered likely that the average hydraulic conductivity of the placed run-of-mine backfill material will be low. This is because of the pervasiveness of low-permeability, clay-rich materials in the mine overburden and the anisotropic nature of the placed fill material. Consequently, the potential for the migration of appreciable quantities of

groundwater through the fill is considered low. Accordingly, the potential for impacts to subirrigation and soil moisture in the lands up-gradient of mining areas will be minimized by the placement of the low-permeability backfill.

The potential for short-term impacts to subirrigation and soil moisture in the lands up-gradient of proposed mining areas will be minimized through the implementation of the hydrology resource contingency plan described in Appendix 7-9.

The Coal Hollow Mine has designed a plan to divert upgradient alluvial groundwater through an alluvial groundwater interceptor drain system. This plan is designed to minimize the potential for the interception of alluvial groundwater in the mine pit areas and to protect alluvial groundwater quality. The details of this plan are described in the Coal Hollow Mine Alluvial Groundwater Management Plan, which is presented in Appendix 7-9.

If any Utah State appropriated water rights are impacted by mining and reclamation operations in the Coal Hollow Mine, these will be replaced according to all applicable Utah State laws and regulations using the designated water replacement source described in Section 727 above.

728.320 Presence of acid-forming or toxic-forming materials

Chemical information on the acid- and toxic-forming potential of earth materials naturally present in the proposed permit area are presented in Appendix 6-2. Chemical information on the low-sulfur Smirl coal seam proposed for mining is presented in Appendix 6-1 (confidential binder). Based on laboratory analytical data, it is apparent that acid-forming and toxic-forming materials that could result in the contamination of surface-water or groundwater supplies in the Coal Hollow Mine permit and adjacent area are generally not present.

Total selenium (with a 5 mg/kg laboratory lower detection limit) was not detected in any of the samples from the Coal Hollow Mine permit area. Water-extractable selenium concentrations were also generally low (see Section 728.332 below). Likewise, concentrations of water-extractable boron were also low, being less than 3 mg/kg in all samples analyzed. The pH of groundwaters in and around the Coal Hollow Mine permit area are moderately alkaline (UDOGM, 2007). Data in Appendix 6-2 likewise indicate moderately alkaline conditions in sediments in the permit area. The solubility of dissolved trace metals is usually limited in waters with alkaline pH conditions. Consequently, high concentrations of these metal constituents in groundwaters and surface waters with elevated pH levels are not anticipated. Additionally, most of the materials that will be handled as part of mining and reclamation activities in the Coal Hollow Mine area are of low hydraulic conductivity (i.e. clays, silts, shales, siltstones, claystones, etc.). Consequently, it is anticipated that groundwater seepage volumes through low-permeability backfill and reclaimed land surfaces in reclaimed mine pit areas and excess spoils storage areas will not be large. Additionally, reclaimed areas will be regraded, sloped, and otherwise managed to minimize the potential for land erosion, to

restore approximate surface-water drainage patterns, and also to minimize the potential for ponding of surface waters on reclaimed areas (other than "roughening" or "gouging" of some areas to enhance reclamation). Thus, the potential for interactions between large amounts of disturbed earth materials and groundwaters and surface waters, which could result in leaching of chemical constituents into groundwater and surface-water resources, will be minimized.

Additionally, the mining plan calls for the emplacement of 40 inches of suitable cover material over backfilled areas made up of material types which could appreciably impact vegetation (materials with elevated SAR ratios or other physical or chemical characteristics that could adversely impact vegetation).

The neutralization potential greatly exceeded the acid potential in all overburden and underburden samples analyzed, with the neutralization potential commonly exceeding the acid potential by many times, suggesting that acid-mine-drainage will not be a concern at the Coal Hollow Mine (see Section 728.332 below for a further discussion) Acid-forming materials in western coal mine environments often consist of sulfide minerals, commonly including pyrite and marcasite, which, when exposed to air and water, are oxidized causing the liberation of H^+ ions (acid) into the water. Oxidation of sulfide minerals may occur in limited amounts in the mine pits where oxygenated water encounters sulfide minerals. However, the acid produced by pyrite oxidation is quickly consumed by dissolution of abundant, naturally occurring carbonate minerals (Appendix 6-2). Dissolved iron is readily precipitated as iron-hydroxide in well aerated waters, and consequently excess iron is not anticipated in mine discharge water.

Other acid-forming materials or toxic-forming materials have not been identified in significant concentrations nor are such suspected to exist in materials to be disturbed by mining.

Because of the overall low-permeability of the rock strata and sediments surrounding the mine workings (primarily the shales and claystones of the lower Tropic Shale), the potential for seepage of mine water outward into adjacent stratigraphic horizons is low. Additionally, because the floors of the mine pits need to be accessible in order to extract the coal, the mining operations will be carried out in such a manner that the accumulation of large amounts of water in the mine pits will be avoided.

728.331 Sediment yield from the disturbed area.

Erosion from disturbed areas will be minimized through the use of silt fences and other sediment control devices. Surface runoff occurring on disturbed areas will be collected and treated as necessary to remove suspended matter. Four diversion ditches along with four sediment impoundments are proposed for the permit area. In addition, miscellaneous controls such as silt fence and berms are also proposed for specific areas. The proposed locations for these structures are shown on Drawing 5-3. Details associated with these structures can be viewed on Drawings 5-25 through 5-34 and Appendix 5-2.

The smallest practicable area, consistent with reasonable and safe mine operational practices will be disturbed at any one time during the mining operation and reclamation phases. This will be accomplished through progressive backfilling, grading, and prompt revegetation of disturbed areas. The backfilled material will be stabilized by grading to promote a reduction of the rate and volume of runoff in accordance with the applicable requirements. The excess spoil and fill above approximate original contour will be graded to a maximum 3h:1v slope and revegetated to minimize erosion.

Cut ditches will be established on the shoulders of all primary roads to control drainage and erosion. Cut and fill slopes along the primary roads will be minimal and are not expected to cause significant erosion. In locations where there are culvert crossings (i.e. Lower Robinson Creek), the fills slopes will be stabilized by utilizing standard methods such as grass matting or straw wattles. The location and details for roads can be viewed on Drawings 5-3 and 5-22 through 5-24.

Through the implementation of these sediment control measures, it is anticipated that sediment yield from disturbed areas in the Coal Hollow Mine permit area will be minimized.

728.332 Impacts to important water quality parameters

As discussed above, appreciable quantities of groundwater are not anticipated to be intercepted in the Tropic Shale overlying proposed mining areas. Consequently, discharge of Tropic Shale groundwaters from mining areas is not anticipated. Because of the very low hydraulic conductivity of the marine Tropic Shale unit which immediately overlies the coal in proposed mining areas, the lateral migration of appreciable amounts of groundwater outward from proposed mine pit areas is not anticipated. Therefore, no impacts to important water quality parameters in surrounding groundwater and surface-water resources that could result from the interception of Tropic Shale groundwaters are anticipated.

Similarly, appreciable quantities of groundwater are not expected to emanate from the Dakota Formation in the mine floor into the mine openings. This conclusion is based on the fact that 1) vertical and horizontal groundwater flow in the Dakota Formation is impeded by the presence of low-permeability shales that encase the interbedded lenticular sandstone strata in the formation (i.e., the formation is not a good aquifer), 2) appreciable natural discharge from the Dakota Formation in the surrounding area to springs or streams is not observed, supporting the conclusion that the natural flux of groundwater through the formation is meager, and 3) mining will commence near the truncated up-dip end of the formation, minimizing the potential for elevated hydraulic head in the Dakota Formation. The results of slug testing performed on wells screened in the Smirl coal seam indicate relatively low values of hydraulic conductivity for the coal seam (Table 7-8). In much of the proposed mining area, the coal seam is dry. Thus, large inflows of groundwater from the coal seam into mine workings are not anticipated. Likewise, the potential for seepage out of mine pits through the coal seam is minimal. Consequently,

impacts to important water-quality parameters in the Dakota Formation potentially resulting from mining operations are not anticipated, nor are impacts to important water-quality parameters in surrounding groundwater and surface-water systems anticipated as a result of interactions with intercepted Dakota Formation groundwater.

The water quality of groundwaters in the alluvial groundwater system up-gradient of mining operations will likely not be impacted by mining and reclamation activities in the Coal Hollow Mine. Were alluvial groundwaters intercepted by mine openings allowed to flow into the mine pits, there would be the potential for substantially increased TDS concentrations as the water interacts with the marine Tropic Shale and the Smirl coal seam. This occurrence will be avoided.

As groundwater naturally migrates through the shallow, fine-grained alluvial sediments in the Coal Hollow Mine permit and adjacent area (most evident in Sink Valley), the quality of the water is naturally degraded (see Appendix 7-1). In the distal portions of Sink Valley, most notably concentrations of magnesium, sulfate, and bicarbonate are elevated in the alluvial groundwater.

The potential for TDS increases associated with interaction of waters with the Tropic Shale can be minimized by avoiding contact where practical between water sources and earth materials containing soluble minerals. Where possible, in the existing mine area and in the proposed North Private Lease, groundwater that will be encountered in alluvial sediments along the margins of mine pit areas will be routed through pipes, ditches or other conveyance methods away from mining areas via gravity drainage so as to prevent or minimize the potential for interaction with sediments disturbed by mining operations (including contact with the mined coal seam). If diverted alluvial groundwater were allowed to interact extensively with the Tropic Shale bedrock or Tropic Shale-derived alluvial sediments, similar increases in magnesium, sulfate, bicarbonate, and TDS concentrations would be anticipated. Consequently, where intercepted groundwaters will be routed around disturbed areas through pipes or well-constructed and maintained ditches, it is anticipated that detrimental impacts to important water quality parameters in these waters will be minimal.

The pumping and discharging of mine water from mine pits at the Coal Hollow Mine permit area is not anticipated. The impoundment of substantial quantities of water within the mine pits would likely result in degradation of groundwater quality and is also not compatible with the proposed surface mining technique (the coal extraction operations occur at the bottom of the mine pit and thus they cannot be performed in flooded mine pits). As discussed above, the only likely foreseeable source of appreciable quantities of groundwater is from the alluvial groundwater systems overlying the low-permeability Tropic Shale in proposed mining areas. Where this alluvial groundwater is encountered in mining areas, it will be diverted away from mine workings prior to significant interaction with sediments in disturbed areas. Any discharge from the mine pits that does occur will be regulated under a Utah UPDES discharge permit.

Acid mine drainage is not anticipated at the Coal Hollow Mine permit area. This is due primarily to the relatively low sulfur content of the coal (see Appendix 6-1; confidential binder) and rock strata in the permit and adjacent area, and to the pervasiveness of carbonate minerals in the soil and rock strata which neutralize the acidity of the water if it occurs. If sulfide mineral oxidation and subsequent acid neutralization via carbonate dissolution were to occur, increases in TDS, calcium, magnesium, sulfate, and bicarbonate concentrations (and possibly also sodium concentrations via ion-exchange with calcium or magnesium on exchangeable clays) would be anticipated.

An analysis of the acid/base potential of samples collected from the overburden and underburden in the proposed mining area indicates that acid mine drainage will be unlikely to occur at the Coal Hollow Mine. The results of laboratory analysis of the acid/base potential of samples collected from the overburden, underburden, and Smirl coal zone are presented in Appendix 6-2. None of the overburden or underburden samples were acid forming, as each of the intervals sampled showed excess neutralization potential. Taken as a whole, the un-weighted composite average acid/base potential of the 57 overburden and underburden samples indicates a net neutralization potential of 174 tons per kiloton. The neutralization potential of the composite overburden/underburden (180 tons per kiloton) exceeds the acid potential (5.5 tons per kiloton) by more than 32 times. A general consensus opinion mentioned by the National Mine Land Reclamation Center (OSM, 1998) is that if the net acid/base potential exceeds 30 tons per kiloton, and the ratio of neutralization potential to acid potential exceeds two, then *alkaline* water will be generated and acid mine drainage will not occur. The acid/base characteristics of composite overburden and underburden in the Coal Hollow Mine area greatly exceed both of these two criteria, suggesting the strong likelihood that acid mine drainage will not be an issue at the Coal Hollow Mine.

Because of the net neutralization potential of the composite overburden/underburden in the Coal Hollow Mine area described above, the pH values of groundwater in fill areas will likely be neutral to alkaline. Accordingly, the solubility of dissolved trace metal species in the alkaline water will likely be low. Consequently, the potential for the mobilization and transport of trace metals in groundwater in the fill will likely also be low. Concentrations of total selenium, water extractable selenium, water extractable boron and other important chemical species in the overburden samples from the Coal Hollow Mine area are generally low. Water extractable selenium concentrations in the analyzed Dakota Formation underburden samples range from 0.05 to 0.2 mg/kg (see Appendix 6-2). Water extractable boron concentrations in the Dakota Formation underburden in a single location (CH-08; 6.5 mg/kg) marginally exceed the Division standard of 5 mg/kg. The limited quantities of material containing water extractable selenium and boron in these concentration ranges in backfill materials are not anticipated to result in appreciably elevated selenium or boron concentrations in groundwater or surface water supplies. Because the hydraulic conductivity of the composite run-of-mine backfill material (which will be rich with clays, silts, and shale) is expected to be low, the flux of groundwater that might migrate through the backfilled pit areas is likely to be low. Additionally, the reclaimed land surface will be graded to promote runoff of surface waters overlying backfilled areas, thus minimizing the potential for infiltration of surface

waters into backfilled areas. Consequently, the potential for acid mine drainage or toxic drainage from backfilled areas to surrounding groundwater and surface-water supplies will be minimized.

Similar conditions are anticipated to occur within mining areas at the North Private Lease area. The hydraulic conductivity of the composite run-of-mine backfill material in the North Private Lease (which will be rich with clays, silts, and soft, waxy shale) is expected to be low. Consequently, the flux of groundwater that might migrate through the backfilled pit areas is likely to be low. Lateral migration of groundwaters that could potentially accumulate in reclaimed mine pit areas outward into surrounding aquifers will be minimized by the presence of Tropic Shale bedrock where it is present in the pit walls. The Tropic Shale is the bedrock unit that overlies the Smirl coal seam to be mined and is known to be of low hydraulic conductivity. The presence of undisturbed Tropic Shale bedrock where it is present in mine pit walls will tend to contain accumulating groundwaters in the backfilled pits and prevent lateral migration of these waters to surrounding aquifers.

Reclaimed land surfaces in the North Private Lease will be graded to promote runoff of surface waters overlying backfilled areas, thus minimizing the potential for infiltration of precipitation waters into backfilled areas.

To further minimize the potential for water quality in North Private Lease alluvial groundwaters to become degraded as a result of interactions with soluble minerals in the run-of-mine backfill material in reclaimed mine pit areas, Alton Coal Development, LLC will, where reasonably feasible, place low-permeability materials (likely clayey alluvium or Tropic Shale bedrock) along the margins of the mine pits adjacent to Kanab Creek alluvium. It is anticipated that the TDS concentrations of groundwaters that may accumulate in the reclaimed mine pits will be higher than those of surrounding alluvial groundwater systems. Through the placement of a low-permeability barrier along the margins of the mine pit areas, alluvial groundwaters in the undisturbed alluvial groundwater systems near the Kanab Creek stream channel will be largely isolated from the reclaimed mining areas. In other words, the potential for lateral migration of undisturbed alluvial groundwaters away from the Kanab Creek stream channel into higher-TDS pit backfill areas (or flow from the higher TDS backfill areas towards Kanab Creek) will be minimized.

As outlined in the topsoil and subsoil sampling plan in Chapter 2 of this MRP, materials with poor quality SAR, elevated selenium or boron concentrations, or poor pH as defined by Division guidelines will not be placed in the upper four feet of the reclaimed surface. These materials will also not be placed in the backfill within the top four feet of ephemeral drainages with 100 year flood plains, or in the top four feet in surface water impoundments, or in the top four feet in intermittent or perennial drainages including 100 year flood plains as outlined in the Division guidelines. Materials placed in the top four feet will be sampled to ensure that only suitable materials are placed in the top four feet of the reclaimed surface.

It is noteworthy that in the neighboring state of Wyoming, a water extractable selenium standard of 0.3 mg/kg is considered suitable for topsoil and topsoil substitutes, with concentrations ranging from 0.3 to 0.8 mg/kg being considered marginally suitable for topsoil and topsoil substitute.

As is typical with coal seams regionally, laboratory analyses of coal samples from the Coal Hollow Mine area indicates that there is a net acid forming potential in the coals of the Smirl coal zone (see Appendix 6-2). However, the mining plans call for the mining and removal of 95% of the total coal seam thickness from mining areas, leaving only minor amounts of coal in backfilled areas. Consequently, the potential contribution to the overall acid/base potential of the composite backfill material would be small. Assuming a worst-case-scenario – that all the coal would be retained in the backfill material – the calculated acid/base potential of the composite backfill material is still well within the limits suggested by OSM (1998) to indicate that alkaline discharge without acid mine drainage would be likely.

As described in Chapter 5, Section 532, surface runoff that occurs on disturbed areas will be treated through sedimentation ponds or other sediment-control devices and particulate matter will be allowed to settle prior to the discharging of the water to the receiving water, thus controlling suspended solids concentrations.

At any mining operation there is the potential for contamination of soils, surface-water and groundwater resources resulting from the spillage of hydrocarbons. Diesel fuels, oils, greases, and other hydrocarbons products will be stored and used at the mine site for a variety of purposes. A spill Prevention Control and Countermeasure Plan will be implemented that will help minimize any potential detrimental impacts to the environments.

Spill control kits will be provided on all mining equipment and personnel will be trained to properly control spills and dispose of any contaminated soils in an appropriate manner.

Based on these findings, it is concluded that the potential for mining and reclamation activities in the Coal Hollow Mine permit area to cause detrimental impacts to important water quality parameters is minimal.

728.333 Flooding or streamflow alteration

As described above, appreciable groundwater inflow from the Tropic Shale and Dakota Formation into mine pits at the Coal Hollow Mine are not anticipated. Appreciable groundwater inflows are anticipated only from the relatively thin, overlying alluvial groundwater systems. The thicknesses of the alluvium adjacent to mine openings in the proposed mining areas is generally less than 40 to 50 feet. The hydraulic conductivities of the predominantly clayey and silty alluvial sediments are low, and consequently, very large or sudden groundwater inflows into mine openings are not anticipated. Where appreciable alluvial groundwater is encountered adjacent to mine openings, it will be routed away from mining areas through ditches or other conveyance mechanisms.

Details of the Coal Hollow Mine Alluvial Groundwater Management Plan are provided in Appendix 7-9. Consequently, discharge of mine water from the mine pits is not anticipated. The rates of alluvial groundwater drainage that could occur will likely not be of a magnitude that could potentially cause flooding or streamflow alteration in either the Sink Valley Wash or Lower Robinson Creek drainages.

If excess groundwater were to be encountered during mining operations at the existing mine area or in the proposed North Private Lease such that it could not be adequately managed or discharged in compliance with the Utah UPDES discharge permit (which is considered unlikely), Alton Coal Development, LLC may when necessary construct supplemental containment and settlement ponds in which mine discharge waters may be held for treatment (where necessary) and subsequent discharge through UPDES discharge points in compliance with the UPDES discharge permit, minimizing the potential for flooding or streamflow alteration in areas adjacent to mining.

When coal mining near the eastern edge of the Coal Hollow Mine permit area occurs (mine pits 13-15), special measures will be taken to minimize the potential for the interception by the mine openings of large quantities of groundwater from artesian groundwater system in the northwest ¼ of Section 29, T5W, R39S, and to adequately deal with groundwater inflows if such occur. Details of the contingency plan for this occurrence are provided in Appendix 7-9.

When mining operations advance toward the eastern edge of the permit boundary in pit 15, material excavating in the alluvial sediments will be performed incrementally and with caution. As excavation proceeds, if coarse, water-bearing alluvial sediments (gravels) are encountered, overburden removal in that area will be stopped. The excavation equipment operator will recover the exposed gravel zone with local impermeable sediments (abundant in the alluvium in the area) to halt groundwater inflow if possible. The hydrogeologist will be called to the site to access the hydrogeologic conditions. An investigation of the situation will be performed and a suitable work plan will be developed prior to the resumption of overburden removal in that area. The work plan will be designed to minimize the potential for intercepting unacceptably large inflows of groundwater into the mine pits. The work plan will most likely involve trenching in the alluvium in zones up-gradient of the mine pit area and the emplacement of a low-permeability cut-off wall. The cut-off wall would be emplaced in the excavated trench using acceptable native low-permeability materials. The cut-off wall would be designed to isolate the mine openings from the coarse-grained alluvial groundwater system sufficient to decrease mine inflows to acceptable levels (i.e. so as to minimize the potential for detrimental impacts to the hydrologic balance and to minimize the potential for flooding of mine pits or causing flooding or stream alteration).

As a temporary measure to manage any potential large groundwater inflows that may occur in these areas prior to the installation of a suitable up-gradient hydraulic barrier, the intercepted alluvial groundwaters would be routed along mine benches that “daylight” to the natural land surface in areas to the south. The water would be diverted into pond 4 which has an appreciable storage capacity and discharge structure.

It should be noted that the interception of moderate amounts of groundwater from shallow alluvial groundwater systems in these areas is considered likely. Modest inflows of shallow groundwater intercepted by the mine workings in these areas would be manageable and not of significant concern. The objective of the work plan would be to ensure that strong hydrodynamic communication between the coarse-grained artesian alluvial groundwater systems in the eastern portion of Sink Valley with the Coal Hollow Mine workings is not established.

The rate at which alluvial groundwater will be intercepted by the Coal Hollow Mine will be variable by location and time in permit area. Because of the heterogeneity inherent in most alluvial deposits, the quantifying of precise aquifer parameters in the various mining areas is not straightforward. Additionally, the geometry of the mine openings including the horizontal lengths and heights of mine pit faces adjacent to saturated groundwater systems that are exposed at any point in time are dynamic variables in the surface mining environment. Consequently, precise quantifications of mine groundwater interception rates are not readily obtainable. However, using the estimated mine pit groundwater inflow rates presented as discharge per linear foot of open pit in Table 7-9, it is considered likely that mine interception will be on the order of a few tens of gallons per minute in dry areas and at times when open pit sizes are small, to several hundred gallons per minute in wetter areas and at times when the open pit size is large. It is important to note that inflows into individual pit areas will be short lived, as the individual pits will commonly remain open for a few weeks to a few months.

The reasonably foreseeable maximum quantity of water that could be intercepted by the Coal Hollow Mine is largely a function of the manner in which coal mining operations are conducted in areas where the potential for encountering appreciable groundwater inflows is greatest. If large areas of water-bearing coarse-grained sediments were to be rapidly exposed in mine pit areas, large quantities of water would be anticipated (likely several thousands of gallons per minute). However, as described above, mining operations will be carried out in these areas using the special mining protocols described above. Consequently, large cross-sectional exposures of water-bearing coarse-grained alluvial sediments will not be allowed to be exposed to the mine pits and large inflows of groundwater on that magnitude are not anticipated.

In the unanticipated event that excessive quantities of water were to flow into the mine pits by any mechanism, the water would be pumped from the pits using a suitable pump and piping equipment that will be located on-site at the Coal Hollow Mine for such a contingency. Such water would be managed appropriately as required by all applicable State and Federal regulations. It should be noted that it is not in the mine's interest to allow excessive water to flow into the mine pits. All reasonable efforts will be taken to minimize the potential for flooding of the mine pits (an event that is not considered reasonably foreseeable or probable to occur).

Through the implementation of the above described mining protocols in areas where potentially large groundwater inflows could reasonably be anticipated to occur, the

potential for the interception of large quantities of water by the mine is minimized. Consequently, the potential for flooding or streamflow alteration that could occur as a result of intercepting and discharging large quantities of water will be minimized and is considered unlikely.

The principal surface-water drainages in and adjacent to the Coal Hollow Mine permit area are in many locations not stable in their current configurations (see photograph section). Currently, these stream drainages are actively eroding their channels during precipitation events, resulting in down-cutting and entrenchment of stream channels, the formation of unstable near-vertical erosional escarpments adjacent to stream channels (which occasionally spall off into the stream channel), aggressive headward erosion of stream channels and side tributaries, and the transport of large quantities of sediment associated with torrential precipitation events. These processes are currently actively ongoing in the proposed permit and adjacent area and the upper extents of these erosional processes are in many locations migrating upward in stream channels, resulting in increasing lengths of unstable stream channels.

Hereford (2002) suggests that the valley fill alluviation in the southern Colorado Plateau occurred during a long-term decrease in the frequency of large, destructive floods, which ended in about 1880 with the beginning of the historic arroyo cutting. Hereford (2002) further suggests that the shift from deposition to valley entrenchment coincided with the beginning of an episode of the largest floods in the preceding 400-500 years, which was probably caused by an increased recurrence and intensity of flood-producing El Nino Southern Oscillation events beginning at ca. A.D. 1870.

The exact causes of the entrenchment of stream channels and the creation of the numerous arroyos currently in existence in the southwestern United States are not completely understood. Vogt (2008) suggests that three primary factors resulted in the arroyo formation. These factors included 1) changes in climate that produced heavy rainfall, 2) land-use practices such as livestock grazing, and 3) natural cycles of erosion and deposition caused by internal adjustments to the channel system. The temporal coincidence of the causes may have magnified the effect of each factor.

Each of these factors likely contributed to the formation of the entrenched stream drainages and arroyos in the Coal Hollow Project area. Gregory (1917) states that historical evidence indicates that the cutting of Kanab Creek began when a large storm occurred on 29 July 1883, and that unusually large amounts of precipitation were received in 1884-85. In this period the Kanab Creek channel was down-cut by 60 feet and widened by 70 feet for a distance of about 15 miles. The lowering of Kanab Creek may have resulted in a lowering of the local base level and consequent incision of both Sink Valley Wash and Lower Robinson Creek. As suggested by Vogt (2008), other factors, such as the heavy livestock grazing in the local area, which was occurring contemporaneously with the heavy thunderstorm events, likely also contributed to the overall conditions that brought about the stream down-cutting episode in the late 1800s.

While the precise sequence of events and conditions that triggered the arroyo formation and stream entrenchment in the principle surface drainages in and adjacent to the Coal Hollow Project area is not known, it is readily apparent that the principle surface water drainages are not currently in a condition of equilibrium. Stream head-cutting (headward erosion), bank erosion, and spalling of the steep stream channel walls are ongoing processes in the Coal Hollow Project area.

The mining and reclamation plan for the Coal Hollow Mines has been designed to minimize the potential for sediment yield and erosion in the mine permit areas. Accordingly, the mining and reclamation plan minimizes the potential for stream channel erosion and instability within the permit area. No mining-related activities are planned that would likely result in a worsening of the current instability of the surface water drainages in the permit and adjacent area.

The Coal Hollow Mine mining and reclamation plan calls for reclamation activities concurrent with mining progression, which results in the smallest disturbed area footprint and minimizes the length of time that the land surface is susceptible to erosion. The plan also calls for soil tackifiers to be used as a temporary soil stabilizer on reclamation areas prior to seeding. Seeded areas will be mulched. Vegetation established in final reclamation areas will minimize the potential for sediment yield and stream erosion in the long term.

The potential for erosion on the planned excess spoils pile will likewise be minimized. The design plans for the excess spoils pile call for the side slopes exceeding 60 feet in height to be constructed with concave slopes to promote slope stability and to minimize the erosion potential. The excess spoils pile will also be revegetated to minimize the erosion potential.

The Lower Robinson Creek reconstruction will likewise be constructed to promote stability and resistance to erosion. Details of the Lower Robinson Creek reconstruction are shown on Drawings 5-20A and 5-21A. The construction of the channel will include riprap of the channel bottom and the inclusion of an inner flood plane to minimize erosion during flooding events. The stream channel will be revegetated to minimize erosion potential. The Lower Robinson Creek reconstruction is designed to leave the drainage in a condition at final bond release that is at least as stable as the current pre-mining condition.

Following reclamation, stream channels will be returned to a stable state to the extent possible given the currently unstable state of natural drainage channels in the area. Stream channels will be designed to withstand anticipated storm events, thus minimizing the potential of flooding in the reclaimed areas.

The overall condition of the land surface and the surface-water drainages within the permit area at final bond release will likely meet or exceed the current pre-mining conditions. However, it should be noted that Alton Coal Development, LLC will have no control over the land management practices and landowner activities that may be

implemented on the privately owned lands of the reclaimed Coal Hollow Mine area after final bond release. Accordingly, the degree of erosional stability and overall conditions in the reclaimed lands and stream drainages in the post bond-release period is not in the control of Alton Coal Development, LLC.

The existing principle surface-water drainages adjacent to the Coal Hollow Mine permit area have large discharge capacities (lower Sink Valley Wash below the County Road 136 crossing, Lower Robinson Creek, and Kanab Creek). These drainages periodically convey large amounts of precipitation runoff water associated with torrential precipitation events. The anticipated discharge rates from alluvial groundwater drainage and the maximum reasonably foreseeable amount of mine discharge water that could potentially be required to be discharged from mine pits is much less than that periodically occurring during major torrential precipitation events. The addition of modest amounts of sediment-free water into these stream channels has the potential to cause minor increases in channel erosion. However, the magnitude of this potential impact will likely be small relative to that occurring during torrential precipitation events.

Most precipitation waters falling on disturbed areas will be contained in diversion ditches and routed to sediment impoundments that are designed to impound seasonal water and storms. Sediment control facilities will be designed and constructed to be geotechnically stable. This will minimize the potential for breaches of sediment control structures, which if they occur could result in down-stream flooding and increases in stream erosion and sediment yield. Emergency spillways will be part of the impoundment structures to provide a non-destructive discharge route should capacities ever be exceeded.

Details associated with these structures at the existing Coal Hollow can be viewed on Drawings 5-25 through 5-34 and Appendix 5-2, the structures at the North Private Lease can be viewed on Drawing 5-67 through 5-71 and Appendix 5-12.

It should be noted that during the startup and construction phase of the mine operation, while the ditches and sediment control ponds are being constructed, temporary silt control measures will be utilized. These measures may include the use of silt fences or other appropriate sediment control measures as necessary.

As shown on Drawing 5-26 for the Coal Hollow Mine, there are two sediment impound watershed areas within the mine permit area (Watershed 5 and Watershed 6) from which precipitation runoff water will not be routed through sediment ponds.

Watershed 5 area includes 28 acres near the Sink Valley Wash/Lower Robinson Creek drainage divide. The land surface in Watershed 5 is relatively flat, sloping at about a one percent grade. Because of the flatness of the land surface in Watershed 5, it is not practical to construct ditches to convey water from this area to a sediment pond. Consequently, control of sediment in runoff water from Watershed 5 will be accomplished through the use of a silt fence or other appropriate sediment control measure placed along the western permit boundary adjacent to Watershed 5 (see Drawing 5-26). Precipitation water falling on Watershed 5 will be retained as soil moisture,

retained in the lowest portions of the watershed and allowed to evaporate or infiltrate or, after treatment with silt fences or other appropriate sediment control measures, allowed to flow down gradient onto lower lying adjacent areas.

Watershed 6 includes 19 acres located within the permit boundary east of the proposed Lower Robinson Creek reconstruction (see Drawing 5-26). The land surface in this area slopes gently toward the west at an approximately three to four percent grade. The Watershed 6 area will be isolated from a sediment pond by the reconstructed Lower Robinson Creek stream channel. Control of sediment in Watershed 6 will be accomplished through the installation of a silt fence or other appropriate sediment control measure along the margin of the watershed as shown on Drawing 5-26. The soils on the post-mining land surface in Watershed 6 will initially be stabilized with the use of tackifiers. Subsequent revegetation of the land surface in Watershed 6 will minimize the potential for erosion. After treatment with silt fences or other appropriate sediment control measures, precipitation water falling on Watershed 6 will be allowed to flow down-gradient toward adjacent lands or toward the Lower Robinson Creek stream channel.

The potential for flooding or streamflow alteration resulting from mining and reclamation activities at the Coal Hollow Mine permit area is considered minimal.

728.334 Groundwater and surface water availability

Groundwater use in the Coal Hollow Mine permit and adjacent area is generally limited to stock watering and domestic use in Sink Valley. Some limited use of spring discharge water for irrigation has occurred in Sink Valley, although such irrigation is not occurring presently nor has it occurred in at least the past 10 years. The areas of groundwater use in the Coal Hollow Mine permit and adjacent area are located in the northwest ¼ of Section 29, T39S, R5W (see Drawing 7-4; groundwater discharge area A), and in the northwest ¼ of Section 32, T39S, R5W (see Drawing 7-4; groundwater discharge area B). The likely future availability of groundwater in each of these areas is discussed below.

Groundwater discharge area A (Northwest ¼, Section 29, T39S, R5W)

Groundwater use in area A occurs from several alluvial springs and seeps that are used for stock watering and limited domestic use. As described in Section 728.311 above, short-term diminution in discharge rates from springs in northwest ¼ of Section 29, T39S, R5W are possible as mining operations advance toward these springs. This potential impact is associated with the possible drainage of up-gradient alluvial groundwater into mine openings as mining advances toward groundwater discharge area A. Because individual mine pits will typically remain open for less than about 60 to 120 days (measured from the time the mining of the pit is completed to the time the pit is backfilled) before subsequently being backfilled and reclaimed, the potential for long-term drainage of alluvial groundwater into the mine voids is negligible, and thus any

potential decreases in alluvial discharge in groundwater discharge area A is anticipated to be short-lived.

If groundwater inflow rates into mine openings in this area are excessive, such that appreciable impacts to the springs and seeps in groundwater discharge area A are likely, where necessary Alton Coal Development, LLC will use a suitable technique to minimize groundwater inflow rates into the mine voids. These techniques may include the use of bentonite or natural clay filled cutoff walls or other means where appropriate to isolate and protect groundwater resources up-gradient of mining activities. Consequently, the potential that groundwater could become unavailable in this area is minimal. Additionally, if alluvial groundwater resources were to become unavailable in this area due to mining and reclamation activities in the Coal Hollow Mine permit area, groundwater will be replaced according to all applicable State laws and regulations using the replacement water source described in Section 727 above. Details of the contingency plan for this occurrence are provided in Appendix 7-9.

It should be noted that the proposed water replacement source is a new well that will produce groundwater from the coarse-grained alluvial groundwater system in Sink Valley. Nearby springs that could potentially be impacted by mining and reclamation activities are supported by the same alluvial groundwater system. However, while modest decreases in the artesian hydraulic pressures in the alluvial groundwater system could potentially result in diminution of spring flows, the new well will be equipped with an electric well pump providing the capability to produce groundwater from the alluvial system even if the hydraulic head in the alluvial groundwater system were to be diminished such that artesian flow conditions temporarily ceased to exist.

Groundwater discharge area B (Northwest ¼, Section 32, T39S, R5W)

Groundwater use in groundwater discharge area B occurs at alluvial springs and seeps located southeast of the Coal Hollow Mine permit area that are used for stock watering and limited domestic use. As described in Section 728.311 above, although some temporary and short-lived diminution in discharge rates from springs in northwest ¼ of Section 29, T39S, R5W is possible, this potential impact is not considered likely.

In the event that alluvial groundwater resources were to become unavailable in this area due to mining and reclamation activities in the Coal Hollow Mine permit area, groundwater will be replaced according to all applicable State laws and regulations using the replacement water source described in Section 727 above.

Surface-water availability

Surface-water use in the Coal Hollow Mine permit and adjacent area occurs in the Sink Valley Wash drainage and in Lower Robinson Creek. Surface waters in the Sink Valley Wash drainage (primarily from Water Canyon via an irrigation diversion and from Swapp Hollow; appreciable discharge in Sink Valley Wash below Section 29 T39S, R5W is usually absent) are utilized for both stock watering and limited irrigation use. Stream

water in the Sink Valley Wash drainage is derived from runoff from the adjacent Paunsaugunt Plateau area. Because the surface water in the drainage originates from areas up-gradient areas located large distances from proposed mining areas, and because the stream channel is entirely outside the permit area and will not be impacted by mining and reclamation activities, there is essentially no probability that surface water availability in the Sink Valley Wash drainage could become unavailable as a result of mining and reclamation activities.

Discharge in Lower Robinson Creek immediately above the Coal Hollow Mine permit area typically occurs only in direct response to significant precipitation or snowmelt events. Thus, surface-water availability is currently limited in this drainage prior to any mining activities.

Seepage of alluvial groundwater into the deeply incised lower Robinson Creek stream channel occurs near the contact with the underlying Dakota Formation in the southeast quarter of Section 19, T39S, R5W. This water is likely related to saturated alluvial deposits directly underlying the Robinson Creek stream channel and emerges near where the stream channel intersects the alluvial groundwater system. This seepage of alluvial water is usually about 5 - 10 gpm or less and is routinely monitored at monitoring station SW-5 (Drawing 7-2).

It should be noted that the Coal Hollow Mine plan calls for the temporary diversion of a reach of the Lower Robinson Creek stream channel approximately 2,000 feet in length in the southeast ¼ of Section 19, T39S, R5W. Details of the proposed diversion are given in Chapter 5, Section 527.220 of this MRP. If this action results in diminution of the meager discharge of surface water in the drainage below the planned diversion, where required a suitable mitigation for this potential impact will be designed and implemented in consultation with the Division of Oil, Gas and Mining.

The information presented above suggests that the potential for significant impacts to groundwater and surface-water availability resulting from mining and reclamation activities in the Coal Hollow Mine permit and adjacent systems in the region is low.

728.340 Whether mining and reclamation activity will result in contamination, diminution or interruption of State-appropriated waters

State appropriated water rights in the Coal Hollow Mine permit and adjacent area are shown on Drawing 7-3 and tabulated in Appendix 7-3.

Appropriated groundwaters include alluvial springs and seeps in the northwest ¼ of Section 29, T39S, R5W (groundwater discharge area A), springs and seeps in the northwest ¼ of Section 32, T39S, R5W (groundwater discharge area B). State appropriated surface waters include reaches of Sink Valley Wash east of the Coal Hollow Mine permit area, and reaches of Lower Robinson Creek.

The potential for mining and reclamation activities at the Coal Hollow Mine permit area to result in contamination, diminution or interruption of State-appropriated water in the Coal Hollow Permit and adjacent area are described in detail in Sections 728.310, 728.320, 728.332, and 728.334.

With the possible exception of short-term diminution in discharge rates from springs and seeps in the northwest ¼ of Section 29, T39S, R5W, Contamination, diminution, or interruption of State-appropriated waters in the Coal Hollow Mine permit and adjacent area are not anticipated. It should be noted that if groundwater inflow rates into mine openings in this area are excessive, such that appreciable impacts to the springs and seeps in groundwater discharge area A are likely, where necessary Alton Coal Development, LLC will use a suitable technique to minimize groundwater inflow rates into the mine voids. These techniques may include the use of bentonite or natural clay filled cutoff walls or other means where appropriate to isolate and protect groundwater resources up-gradient of mining activities, minimizing the potential for diminution of discharge rates from these springs.

Additionally, it should be noted that the Coal Hollow Mine plan calls for the temporary diversion of a reach of the Lower Robinson Creek stream channel approximately 2,000 feet in length in the southeast ¼ of Section 19, T39S, R5W. Details of the proposed diversion are given in Chapter 5, Section 527.220 of this MRP. If this action results in diminution of the meager discharge of surface water in the drainage below the planned diversion, where required a suitable mitigation for this potential impact will be designed and implemented in consultation with the Division of Oil, Gas and Mining.

In the event that any State appropriated waters were to be contaminated, diminished, or interrupted due to mining and reclamation activities in the Coal Hollow Mine permit area, groundwater will be replaced according to all applicable State laws and regulations using the replacement water source described in Section 727 above.

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730 OPERATION PLAN

Coal mining in the Coal Hollow Mine permit area will occur using surface and underground mining techniques. Planned coal mining operations in the North Private Lease area will be conducted using conventional pit surface mining and highwall mining techniques. All coal mining and reclamation operations will be conducted to minimize disturbance to the hydrologic balance within the permit and adjacent areas, to prevent material damage to the hydrologic balance outside the permit area and support approved postmining land uses in accordance with the terms and conditions of the approved permit and the performance standards of R645-301 and R645-302. Operations will be conducted to assure the protection or replacement of water rights in accordance with the terms and conditions of the approved permit and the performance standards of R645-301 and R645-302.

In order to maximize the use and conservation of the coal resource, coal will be recovered using a combination of large hydraulic backhoes or front end loaders and off-road trucks, highwall mining and underground mining equipment. Mined coal will be hauled to a central coal processing area for crushing and placement into a stockpile. Coal from the stockpile will be transferred into a bin and loaded into over the road trucks for transport.

The plan, with Drawings, cross sections, narrative, descriptions, and calculations indicates how the relevant requirements will be met. The lands subject to coal mining and reclamation operations over the estimated life of the operations are identified and briefly described. All appropriate information is located in the subsequent sections and Drawings 5-1 through 5-39 and Appendices A5-1 through A5-3.

731 GENERAL REQUIREMENTS

Operations will be conducted to assure protection or replacement of water rights in accordance with the terms and conditions of the approved permit and the performance standards of R645-301 and R645-302.

Groundwater and Surface-Water Protection

To protect the hydrologic balance, coal mining and reclamation operations will be conducted to handle earth materials and runoff in a manner that minimizes acid, toxic, or other harmful infiltration to the groundwater system. Additionally, excavations, and disturbances will be managed to prevent or control discharges of pollutants to the groundwater.

Products including chemicals, fuels, and oils used in the mining process will be stored and used in a manner that minimizes the potential for these products entering groundwater systems. Concrete oil and fuel containments will be constructed as shown on Drawings 5-3 and 5-8.

A facilities spill plan for the Coal Hollow Mine is provided in Appendix 7-5. When operations begin, there will be an EPA SPCC plan available on site for inspection.

The wash bay sump sludge will be removed as necessary and transported off site to an approved hazardous waste disposal facility.

The wash bay at the mine site will include a closed circuit water recycle system. This system will eliminate and store water impurities and reroute water back through the wash bay for cleaning equipment, thus minimizing water consumption the potential for contamination of groundwater resources. Details for this structure can be viewed on Drawings 5-3, and 5-8.

As mining operations approach springs and seeps in the northwest ¼ of Section 29, T39S, R5W (See Drawing 7-4; groundwater discharge area A), there is the potential for drainage of up-gradient into mine openings to cause short-lived diminution of discharge from these springs. If groundwater inflow rates into mine openings in this area are excessive, such that appreciable impacts to the springs and seeps in groundwater discharge area A are likely, where necessary Alton Coal Development, LLC will use a suitable technique to minimize groundwater inflow rates into the mine voids. These techniques may include the use of bentonite or natural clay filled cutoff walls or other means where appropriate to isolate and protect groundwater resources up-gradient of mining activities, minimizing the potential for diminution of discharge rates from these springs. Details of the contingency plan for this occurrence are provided in Appendix 7-9.

The mine will replace loss of water identified for protection in this MRP that are impacted by mining and reclamation operations.

To protect the hydrologic balance, coal mining and reclamation operations will be conducted to handle earth materials and runoff in a manner that minimizes acidic or toxic drainage, prevents to the extent possible, additional contributions of suspended solids to streamflow outside the permit area and otherwise prevents water pollution. Runoff and sediment control measures are described in detail in Chapter 5 of this MRP. The mine will maintain adequate runoff- and sediment-control facilities to protect local surface waters.

Discharge of mine water that has been disturbed by coal mining and reclamation operations is not anticipated. However, any discharges of water from areas disturbed by coal mining and reclamation operations that do occur will be made in compliance with all Utah and federal water quality laws and regulations and with effluent limitations for coal mining promulgated by the U.S. Environmental Protection Agency set forth in 40 CFR part 434. Discharge of mine waters will be regulated by a Utah UPDES discharge permit.

Water pollution associated with mining and reclamation activities within the permit areas will be controlled by:

- Construction of berms and/or diversion ditches to control runoff from all facilities areas.
- Roads will be constructed with ditches to capture runoff
- Diversion ditches will be constructed as necessary around active mining and reclamation areas to capture runoff from those areas.
- Sedimentation impoundments will be constructed to control discharges
- In areas where impoundments or diversions are not suitable to the surrounding terrain, silt fence or straw bales will be utilized to control sediment discharge from the permit area.

In order to accomplish these objectives for the Coal Hollow Mine, watershed analysis of the permit and adjacent areas has been completed and specific designs are established for each water pollution control structure. Primary control structures include five sediment impoundments, four diversion ditches and miscellaneous berms. The locations of these structures can be viewed on Drawing 5-3. The detailed analysis for these structures and specific designs can be viewed on Drawings 5-25 through 5-34. In addition, a geotechnical analysis of the impoundments to ensure stability can be viewed in Appendix 5-1. The watershed and structure sizing analysis can be viewed in Appendix 5-2. In addition to these primary structures, temporary diversions and impoundments may also be implemented, as necessary, in mining areas to further enhance pollution controls.

Sediment control measures will be located, maintained, constructed and reclaimed according to plans and designs given under R645-301-732, R645-301-742 and R645-301-760. Siltation structures and diversions will be located, maintained, constructed and reclaimed according to plans and designs given under R645-301-732, R645-301-742 and R645-301-763. Storm water and snow melt that occurs within the facilities area will be routed to an impoundment that will contain sediment. This impoundment will have a drop-pipe spillway installed that will allow removal of any oil sheens that may result from parking lots or maintenance activities by using absorbent materials to remove the sheen. Details for this impoundment can be viewed on Drawings 5-28.

There are five sediment impoundments proposed for the permit area. These structures will be constructed using a combination of dozers and backhoes. The structures have been designed to contain the required storm events as specified in Appendix 5-2. The structures will have sediment removed as necessary to ensure the required capacities. Details for these structures can be viewed on Drawings 5-25, 5-26 and 5-28 through 5-32. Calculations and supporting text can be viewed in Appendix 5-2.

Six diversion ditches along with five sediment impoundments are proposed for the permit area. In addition, miscellaneous controls such as silt fence and berms are also proposed for specific areas. The proposed locations for these structures are shown on Drawing 5-3. Details associated with these structures can be viewed on Drawings 5-25 through 5-34 and Appendix 5-2.

In order to accomplish these objectives for the North Private Lease, watershed analysis of the permit and adjacent areas has been completed and specific designs are established for each water pollution control structure. Primary control structures include five sediment impoundments, fifteen diversion ditches. The locations of these structures can be viewed on Drawing 5-65. The detailed analysis for these structures and specific designs can be viewed on Drawings 5-67 through 5-71. In addition, a geotechnical analysis of the impoundments to ensure stability can be viewed in Appendix 5-11. The watershed and structure sizing analysis can be viewed in Appendix 5-12. In addition to these primary structures, temporary diversions and impoundments may also be implemented, as necessary, in mining areas to further enhance pollution controls. While approval of Areas 2 and 3 are dependent on the timely approval of permits from the U.S. Army Corps of Engineers, Area 1 extended for pits 7, 8 and 9 will require the use of two temporary diversions and an impoundment. The detailed analysis for these structures and specific designs can be viewed on Drawings 5-65A, 5-71A and 5-73. The watershed and structure sizing analysis can be viewed in Appendix 5-12A. Once approval to proceed into Areas 2 and 3 are acquired, these temporary features will no longer be necessary and will be mined through.

Sediment control measures will be located, maintained, constructed and reclaimed according to plans and designs given under R645-301-732, R645-301-742 and R645-301-760. Siltation structures and diversions will be located, maintained, constructed and reclaimed according to plans and designs given under R645-301-732, R645-301-742 and R645-301-763.

As shown on Drawing 5-64 for the North Private Lease, there is one watershed areas within the mine permit area (ASCA-1) from which precipitation runoff water will not be routed through sediment ponds.

ASCA-1 area includes 3.1acres of access road to the North Private Lease that will not flow to a sediment impoundment. Consequently, control of sediment in runoff water from ASCA-1 will be accomplished by routing runoff from the road to a row of straw bales for treatment. These straw bales surround a drop box to a culvert flowing under the road (see Appendix 5-13).

The smallest practicable area, consistent with reasonable and safe mine operational practices will be disturbed at any one time during the mining operation and reclamation phases. This will be accomplished through progressive backfilling, grading, and prompt revegetation of disturbed areas.

There are no other coal processing waste banks, dams or embankments proposed within the permit area.

Diesel fuels, oils, greases, and other hydrocarbons products will be stored and used at the mine site for a variety of purposes. A spill Prevention Control and Countermeasure Plan will be implemented that will help minimize any potential detrimental impacts to the environments.

Products including potentially hazardous chemicals, fuels, and oils used in the mining process will be stored and used in a manner that minimizes the potential for these products to contaminate surface-water resources. Concrete oil and fuel containments will be constructed as shown on Drawings 5-3 and 5-8.

The wash bay at the mine site will include a closed circuit water recycle system. This system will eliminate and store water impurities and reroute water back through the wash bay for cleaning equipment, thus minimizing water consumption the potential for contamination of surface-water resources. Details for this structure can be viewed on Drawings 5-3, 5-8, and Appendix 5-4. .

Roads will be located, designed, constructed, reconstructed, used, maintained and reclaimed according to R645-301-732.400, R645-301-742.400 and R645-301-762. The specific plan for road locations and design are presented in R645-301-534. The location and details for roads can be viewed on Drawings 5-3 and 5-22 through 5-24 for the Coal Hollow Mine and on Drawings 5-47 and 5-58 through 5-64 for the North Private Lease.

Roads will be located, designed, constructed, reconstructed, used, maintained and reclaimed to control or prevent additional contributions of suspended solids to stream flow or runoff outside the permit area; Neither cause nor contribute to, directly or indirectly, the violation of effluent standards given under R645-301-751; minimize the diminution to or degradation of the quality or quantity of surface- and ground-water systems; and refrain from significantly altering the normal flow of water in streambeds or drainage channels. No acid- or toxic-forming substances will be used in road surfacing.

All roads for the Coal Hollow Mine will be removed and reclaimed according to Drawings 5-37 and 5-37A. The estimated timetable for removing these roads is shown on Drawing 5-38. All roads for the North Private Lease will be removed and reclaimed according to Drawings 5-74 and 5-75. The estimated timetable for removing these roads is shown on Drawing 5-76. Cut ditches will be established on the shoulders of all primary roads to control drainage and erosion. Cut and fill slopes along the primary roads will be minimal and are not expected to cause significant erosion. In locations where there are culvert crossings (i.e. Lower Robinson Creek), the fills slopes will be stabilized by utilizing standard methods such as grass matting or straw wattles.

All wells will be managed to comply with R645-301-748 and R645-301-765. Water monitoring wells will be managed on a temporary basis according to R645-301-738.

Wells constructed for monitoring groundwater conditions in the Coal Hollow Mine permit and adjacent area, including exploration holes and boreholes used for water wells or monitoring wells, will be designed to prevent contamination of groundwater and surface-water resources and to protect the hydrologic balance. A diagram depicting typical monitoring well construction methods is shown in Drawing 7-11. Monitoring wells will include a protective hydraulic seal immediately above the screened interval, an annular seal plugging the borehole above the hydraulic seal to near the ground surface, and a concrete surface seal extending from the top of the hydraulic seal to the ground

surface which is sloped away from the well casing to prevent the entrance of surface flows into the borehole area. Well casings will protrude above the ground surface a sufficient height so as to minimize the potential for the entrance of surface water or other material into the well. A steel surface protector with a locking cover will be installed at monitoring wells to prevent access by unauthorized personnel. Where there is potential for damage to monitoring wells, the wells will be protected through the use of barricades, fences, or other protective devices. These protective devices will be periodically inspected and maintained in good operating conditions. Monitoring wells will be locked in a closed position between uses.

When no longer needed for monitoring or other use approved by the Division upon a finding of no adverse environmental or health and safety effects, or unless approved for transfer as a water well under R645-301-731.100 through R645-301-731.522 and R645-301-731.800, each well will be capped, sealed, backfilled, or otherwise properly managed, as required by the Division in accordance with R645-301-529.400, R645-301-631.100, and R645-301-748. Permanent closure measures will be designed to prevent access to the mine workings by people, livestock, fish and wildlife, machinery and to keep acid or other toxic drainage from entering ground or surface waters.

If a water well is exposed by coal mining and reclamation operations, it will be permanently closed unless otherwise managed in a manner approved by the Division.

Permanent closure and abandonment of water wells greater than 30 feet in depth will be in accordance with the requirements of "Administrative Rules for Water Well Drillers", State of Utah, Division of Water Rights or other applicable state regulations. Abandonment of wells will be performed by a licensed water well driller. The wells to be abandoned will be completely filled using neat cement grout, sand cement grout, unhydrated bentonite, or bentonite grout, or other materials approved by the Utah State Engineer's office. Alternatively, the well may be abandoned using a different procedure upon approval from the Utah State Engineer's office.

Abandonment materials will be introduced at the bottom of the well or required sealing interval and placed progressively upward to the top of the well. The casing will be severed a minimum of 2 feet below the ground surface. A minimum of 2 feet of compacted native material will be placed above the abandoned well upon completion.

The locations of wells that are planned to be removed by intercepting mining operations in the North Private Lease are shown on Figure 20 of Appendix 7-16. Monitoring wells to be removed by mining operations in the North Private Lease that are deeper than the depths of the advancing mine working will be plugged and abandoned prior to their interception by the mining operations. Shallow monitoring wells that will be completely excavated by mine disturbance will not be plugged/abandoned because the entire well/borehole length will be removed by mining operations and thus plugging and abandoning these wells serves no purpose.

The six monitoring wells that are planned to be removed by mining operations are not planned to be replaced. Monitoring of the alluvial groundwater system within the North Private Lease after mining is completed will be accomplished using the monitoring wells that are not planned to be intercepted by mining (see Figure 20 of Appendix 7-16) and also using additional monitoring wells proposed for construction in the North Private Lease. As directed by the Division, ACD has proposed the construction of up to 30 additional alluvial monitoring wells in locations within and adjacent to the North Private Lease that are to remain after mining is complete. Monitoring of alluvial groundwater quantity and quality can be accomplished using these wells.

Within 30 days of the completion of well abandonment procedures, a report will be submitted to the State Engineer by the responsible licensed driller giving data related to the abandonment of the well. This shall include the name of the licensed driller or other person(s) performing abandonment procedures, name of well owner at the time of abandonment, the address or location of the well by section, township, and range, abandonment materials and equipment used, water right or file number covering the well, the final disposition of the well, and the date of completion.

Water wells less than thirty feet deep are not regulated by the Utah Division of Water Rights. The permanent closure and abandonment of water wells less than 30 feet deep will be accomplished by filling the well casing with neat cement grout, sand cement grout, unhydrated bentonite, or bentonite grout, or other appropriate materials. The well casing will then be cut off below the ground surface and native materials placed over the abandoned well site.

Exploration holes and boreholes will be backfilled, plugged, cased, capped, sealed, or otherwise managed to prevent acid or toxic contamination of water resources and to minimize disturbance to the prevailing hydrologic balance. Exploration holes and boreholes will be managed to ensure the safety of people, livestock, fish and wildlife, and machinery.

If a water well is exposed by coal mining and reclamation operations, it will be permanently closed unless otherwise managed in a manner approved by the Division.

If any exploration boreholes are to be used as monitoring wells or water wells, these will meet the provisions of R645-301-731 and be managed according to the following.

Boreholes will be backfilled to within 1 foot of the land surface with concrete or other materials approved by the Division as necessary to prevent contamination of groundwater or surface-water resources or to protect the prevailing hydrologic balance. The upper approximately 1 foot will be backfilled with native materials to facilitate reclamation (see Drawing 6-11). Exploration holes and boreholes that may be uncovered during mining and reclamation activities will be permanently closed unless approved for water monitoring or otherwise managed in a manner approved by the Division.

If mining and reclamation activities result in the contamination, diminution, or interruption of State appropriated groundwater or surface-water sources, replacement water will be provided using the alternate water source described in R645-301-727.

Seasonal baseline water monitoring information for all water rights that could be affected by mining in the permit and adjacent area have been submitted electronically to the Division's on-line hydrology database.

731.200 Water Monitoring

This section describes the hydrologic monitoring plan (including that for the 85.88-acre Dame Lease IBC). The hydrologic monitoring plans for groundwaters and surface waters in the proposed North Private Lease area are provided in Appendix 7-16 and Appendix 7-18. Locations of surface-water and groundwater monitoring sites are indicated on Drawing 7-10. Hydrologic monitoring protocols, sampling frequencies, and sampling sites are described in Table 7-4. Groundwater and surface-water monitoring locations are listed in Table 7-5. Operational field and laboratory hydrologic monitoring parameters for surface water are listed in Table 7-6, and for groundwater in Table 7-7. The hydrologic monitoring plan during reclamation will be the same as during the operational phase. The hydrologic monitoring parameters have been selected in consultation with the Division's directive Tech-006, *Water Monitoring Programs for Coal Mines.*

The groundwater and surface-water monitoring plan is extensive and includes more than 50 monitoring sites. The monitoring plan is designed to monitor groundwater and surface-water resources for any potential impacts that could potentially occur as a result of mining and reclamation activities in the Coal Hollow Mine permit and adjacent area. Each of the sampling locations and their monitoring purpose are described below.

Streams

Kanab Creek will be monitored at sites SW-3 (above the permit area), and SW-2 (below the permit area). Lower Robinson Creek will be monitored at sites SW-4 (above the permit area), SW-101 (within the permit area), and SW-5 (below the permit area above the confluence with Kanab Creek). The irrigation water near SW-4 will also be monitored at site RID-1. Swapp Hollow creek will be monitored above the permit area at site SW-8. Sink Valley Wash will be monitored at SW-6 (a small tributary to the wash immediately below the permit area) and at SW-9, located in the main drainage below the permit area. All of these locations, with the exception of RID-1) will be monitored for

discharge and water quality parameters specified in Table 7-6 quarterly, when reasonably accessible. Additionally, Lower Robinson Creek will be monitored at site BLM-1, which is near the location of alluvial groundwater emergence in the bottom of the stream channel. RID-1 will be monitored for discharge and field water quality parameters. BLM-1 will be monitored for discharge and water quality parameters specified in Table 7-6 quarterly. Monitoring sites BLM-1, SW-5, SW-6, and SW-9 will also be monitored for total and dissolved selenium quarterly.

Surface-water monitoring stations from the North Private Lease are included in the Coal Hollow Mine monitoring plan. These include SW-1A, SW-1M, SW-1, Kanab Creek @ C.R., and SW-3 on the main stem of Kanab Creek; Priscilla Creek, April Creek, and SW-15 on Simpson Hollow Creek; RSD-1 and SW-11, which are tributaries to Kanab Creek in and adjacent to the North Private Lease area; and EW-1, which is an ephemeral wash adjacent to the permit area. Monitoring protocols for these surface water monitoring sites are as listed in Tables 7-6. We recommend the monitoring of SW-1, Kanab Creek @ C.R., SW-3, SW-11, April Creek, and SW-15 for discharge rate and field and laboratory water quality measurements. We recommend that monitoring at the other surface-water monitoring sites be for discharge rate and for field water quality parameters only.

Springs

Eight springs from alluvial groundwater area A will be monitored including SP-8, SP-14, SP-16, SP-19, SP-20, SP-22, SP-24 and Sorensen Spring. Spring SP-8 is a developed spring in area A that provides culinary water for the Swapp Ranch house. SP-8 will be monitored for discharge and operational laboratory water quality measurements quarterly when reasonably accessible. Springs SP-14, SP-16, SP-19, SP-20, SP-22, SP-24 and Sorensen Spring springs will be monitored for discharge and field water quality measurements quarterly when reasonably accessible.

Springs SP-4 and SP-6, and SP-33, which are located in Sink Valley below the proposed mining area, will also be monitored. SP-6 is an area of diffuse seepage above an earthen impoundment in the wash immediately below the permit area. Spring SP-33 is a developed spring that discharges into a pond below the permit area and provides culinary water to two adjacent cabins. Each of these Springs SP-6 and SP-33 will be monitored for discharge and operational laboratory water quality measurements quarterly when reasonably accessible. SP-4 discharges from a fault/fracture system in the Dakota Formation near the canyon margin in Sink Valley Wash below the permit area. Spring SP-4 will be monitored for discharge and field water quality measurements quarterly when reasonably accessible. Spring SP-3 discharges from pediment alluvium in the upland area above Sink Valley Wash more than a mile from the permit area. It is extremely unlikely that discharge rates or water quality at this spring could be impacted as a result of mining-related activities in the mine permit area. However, this spring will

be monitored for discharge and field water quality measurements quarterly, primarily to provide background data from springs in the region.

The Coal Hollow Mine monitoring plan includes six springs and seeps in and around the North Private Lease area. These include Coyote Seep (which is located within the lease boundary area), Seep Z, Alkali Seep, and Dakota Seep (which are located adjacent to the lease area), and Pond Spring and Hill Spring (which are located below the town of Alton west of the lease area). Impacts to Coyote Seep are anticipated to occur because the seep area is situated within the planned location of a mine pit. Impacts to the other springs and seeps are not anticipated, but are proposed for monitoring 1) to verify that impacts do not occur, and 2) to document any influence of seasonal variability on water quantity and water quality at these locations. It is noted that upper Dakota Formation strata at Pond Spring and Hill Spring are up-gradient from the elevation of the Dakota Formation strata in proposed mining areas in the North Private Lease area (i.e. the stratigraphic dip is toward the east or northeast). Accordingly, impacts to these springs are not anticipated. However, because these springs are associated with Utah state-appropriated water rights and have importance to agriculture, we recommend the monitoring of these two springs. We recommend the monitoring of Pond Spring and Coyote Seep for discharge rate and field and operational laboratory water quality measurements. The other spring locations are recommended for discharge rate and field water quality measurements only.

Coyote Seep is an alluvial groundwater seepage zone that is located in the bottom of a deeply incised surface-water drainage/erosional scour in the soft alluvial sediments in the North Private Lease. The soils at the Coyote Seep location have been previously excavated, creating a small pool/pond at the seep. The elevation of the pool at Coyote Seep approximately coincides with the local alluvial groundwater elevation, suggesting the likelihood that the pool at Coyote Seep is a surface expression of the local alluvial groundwater surface. Accordingly, to fully monitor groundwater quantity at the seep, discharge monitoring at Coyote Seep will include 1) a measurement of the discharge rate of groundwater outflow from the pool, and 2) a measurement of the water elevation at the Coyote Seep pool using a staff gauge installed at the seep for that purpose. The staff gauge will be surveyed to enable accurate determinations of the water level elevations at the seep.

Wells

Wells Y-98 (Robinson Creek alluvium above the permit area), Y-45 (coal seam well in Swapp Hollow above permit area), Y-102 (flowing alluvial well in alluvial groundwater discharge area A), Y-36 (coal seam well in Sink Valley above the permit area), Y-38 (coal seam well in Sink Valley permit area), Y-61 (alluvial well at the Sorenson Ranch), and C5-130 (new monitoring well in alluvial groundwater discharge A) will be monitored quarterly when reasonable accessible. Well Y-61 will be monitored for groundwater operational laboratory water quality parameters to monitor groundwater quality in alluvial groundwater discharge area A. The other wells will be monitored for water level only.

Additionally, 19 newly constructed monitoring wells constructed in the Sink Valley alluvial groundwater system will be monitored quarterly. These include C2-15, C2-28, C2-40, C3-15, C3-30, C3-40, C4-15, C4-30, C4-50, C7-20, C9-15, C9-25, C9-40, LS-28, LS-60, LS-85, SS-15, SS-30, and SS-75. All of these wells will be monitored quarterly for water level. Additionally, wells LS-85 and SS-30 will be monitored for groundwater operational laboratory water quality measurements.

Additionally two wells in the Lower Robinson Creek alluvium will be monitored for water level and groundwater operational laboratory chemistry. These include UR-70 located above proposed mining locations in the Lower Robinson Creek drainage, and LR-45, located below proposed mining areas adjacent to Lower Robinson Creek. It should be noted that LR-45 is located near a proposed sediment pond impoundment. Consequently, if this well becomes unsuitable for monitoring, an alternate location will be used to monitor the Lower Robinson alluvial groundwater system in this area.

Wells C0-18 and C0-54 are located near the initial proposed mining areas in the Lower Robinson Creek drainage. These will be monitored for water level quarterly.

It should be noted that many of the wells specified for monitoring in this monitoring plan will at some point be destroyed or rendered inoperable as the mine workings precede through the area. These wells will be monitored until such a time as they are destroyed or become inoperable.

The possible need for an additional monitoring well located along the east-west permit boundary in Section 30, T39S, R4W has been evaluated. As described in Section 728.332, based on the laboratory analyses of acid and toxic forming materials in the overburden, coal seam, and underburden, it has been determined that discharges from the mine areas will likely be alkaline in character and acid mine drainage will likely not occur. Similarly, the potential for toxic drainage is not anticipated (see Section 728.332). Additionally, given the general east to northeasterly direction of the bedrock dip in the mine area, groundwater migrating through the pit backfill areas after mining will likely migrate down slope in those same directions (to the east). Because the lower portions of the highwalls surrounding the mine pit areas consist of relatively impermeable Tropic Shale bedrock, the potential for migration of appreciable quantities of groundwater from the mine pit fill areas into surrounding unmined areas is low (see Section 728.320). Shallow alluvial groundwater that could potentially migrate to the west is monitored for laboratory water quality parameters at well LR-45. Surface runoff from these areas is monitored for laboratory water quality parameters at site SW-5, which is located in Lower Robinson Creek below the proposed mining areas. For these reasons, the installation and monitoring of an additional monitoring well is not deemed necessary at this time.

Monitoring wells in the North Private Lease and adjacent areas are included in the monitoring plan for the Coal Hollow Mine. The monitoring wells are monitored quarterly when reasonably accessible. These include Y-103, NLP-1, NLP-2, NLP-3,

NLP-4, NLP-5, NLP-6, NLP-7, NLP-8, NLP-9, NLP-10, NLP-11, CN0-60, CN1-43, CN1-58, CN2-70, CN3-69, CN3-80, CN3-81, CN3-93, CN3-98, CN4-49, CN5-52, CN5-58, CN7-70, CLEM-1, CLEM-2, CLEM-3, and CLEM-4 which are monitoring wells completed in the alluvial groundwater system in the Kanab Creek valley in and around the permit area. Monitoring well NLP-13 is located in the Simpson Hollow drainage below mining areas and is also included in the mining plan. Of these wells, Y-103, NLP-4, NLP-5, CN0-60, CN1-58, CN2-70, CN3-98, CN4-49, and CN7-70 will be monitored for water levels and field and operational laboratory water quality measurements. The other alluvial monitoring wells are to be monitored for water level measurements only. Monitoring wells Y-53, Y-55, Y-69, and Y-70 monitor groundwater in the Smirl coal seam. These wells will be monitored for water level only.

The post-mining monitoring network will include a minimum of one backfill monitoring well. Alton Coal Development, LLC will, if possible, construct a new monitoring well in a suitable backfilled mine pit area east of Kanab Creek in the North Private Lease. The proposed future well is designated as BW-1 in the Coal Hollow Mine monitoring plan. The projected location of the backfill monitoring well is in Pit 12. The proposed construction designs for BW-1 include drilling the borehole to the base of the backfilled area and constructing the well with the screens extending upward from the bottom of the well.

If upon completion of the mining and backfilling in the Pit 12 area it is determined by ACD that the Pit 12 area is not a suitable location for BW- well, an alternate site will be selected in consultation with the Division of Oil, Gas and Mining.

Alton Coal Development will provide an updated map of potentiometric levels in the alluvial groundwater system in the North Private Lease and adjacent area during operational and reclamation phases at least every three years. The map will be an update to the map included as Figure 18 of Appendix 7-16. The alluvial groundwater contour map will be updated using all available monitoring data, which will include potentiometric data collected from wells completed in the alluvial groundwater systems within and adjacent to the North Private Lease, potentiometric data collected from the proposed mine pit backfill well BW-1 (when it becomes available), and any other relevant potentiometric data that may be available at the time of the map update

Groundwater and surface-water monitoring will continue through the post-mining periods until bond release. The monitoring requirements, including monitoring sites, analytical parameters and the sampling frequency may be modified in the future in consultation with the Division if the data demonstrate that such a modification is warranted.

85.88-acre Dame Lease IBC

In conjunction with highwall mining activities within the 85.88-acre Dame Lease IBC, supplemental water monitoring activities will be performed at selected nearby springs and wells. This will include weekly monitoring of spring discharge rates at sites SP-8, SP-14, SP-20, SP-22, and SP-40, and weekly measurements of water levels in monitoring wells C4, C2, C3, C5, and Y-61. The weekly monitoring at these sites will begin one month prior to the commencement of highwall mining in the 85.88-acre Dame Lease IBC and will continue until one month after highwall mining in the IBC is concluded. Following the period of weekly monitoring, the above specified stations will be monitored monthly for a period of six months. The flow and water level data generated during this period of accelerated monitoring will be sent to the Division of Oil, Gas and Mining as a spreadsheet via e-mail at the end of each month.

In accordance with R645-302.245.230 all holes discharging water will be sealed within 72 hours after completion with impervious and noncombustible material. However, in the approved Ground Control Plan for CHM, MSHA requires the adjacent hole remain open for monitoring of the web. Thus, if an adjacent hole is discharging water and needs to be kept open for web monitoring then the discharge will be tested to determine if it contains acid or toxic-forming material and approval to keep this hole open for web monitoring will be requested from the Division in accordance with R645-302.245.230.

In order to verify that the highwall mining holes excavated into the 85.88-acre Dame Lease IBC do not cause depletion of the overlying shallow alluvial groundwater systems, the groundwater discharge rate (if any) that occurs from the mouths of the holes within the Dame Lease IBC will be monitored daily. The daily monitoring will commence upon completion of the hole excavation and continue until the hole is sealed. Where it is reasonably possible to do so, the discharge rate measurements will be performed using an appropriate field flow measurement technique (i.e. pipe and a calibrated container, flume, weir, etc.). In areas where the performance of a field discharge measurement is not reasonably possible (i.e. under diffuse seepage conditions or where unconcentrated dispersed flow conditions exist) the discharge rate will be estimated. Discharge rate measurements from the highwall holes will not be performed in areas where such measurements cannot be performed safely. In those areas where the discharge rates cannot safely be measured, this will be noted in the flow record and, where possible, a visual estimate of the discharge rate will be made. Upon approval from the Division, at times when no discharge is occurring from any of the open highwall mining holes in the Dame Lease IBC, discharge measurements will be performed daily on those days that the mine is operating (generally Monday through Friday). Under conditions where measurable flows are present at any open highwall mining hole in the 85.88-acre Dame Lease IBC, the flow measurements will be performed on a continuous daily basis (7 days a week) until the hole is sealed. The flow data for each hole will be sent to the Division as a spreadsheet via e-mail at the end of each month.

The details of the hydrologic monitoring plan for the North Private Lease area are provided in Appendix 7-16 and are summarized in Tables 7-4, 7-5, 7-6 and 7-7. The

locations of surface-water and groundwater monitoring sites in the North Private Lease are shown in Appendix 7-16.

Instruction for the use of the groundwater and surface-water monitoring plans

The hydrologic monitoring plans for groundwaters and surface-waters at the Coal Hollow Mine (including the North Private Lease area) may be used to detect potential impacts to groundwater and surface-water systems that could occur as a result of the proposed operations. Prior to the performance of coal mining and reclamation activities at the mine, baseline monitoring of groundwater and surface-water resources was performed. This has included monitoring water quantity (stream and spring discharge rates and water levels in wells), and water quality (both field and laboratory water quality measurements). The monitoring data may be used by comparing the water quantity and water quality characteristics of groundwaters and surface-waters measured during the operational mining and post-mining periods with that measured during the baseline monitoring period for any parameter of interest to evaluate the nature and magnitude of any potential impacts (i.e. changes would be indicated by differences between the baseline data and the operational or reclamation phase data). In evaluating potential impacts, it is important that all potential factors which could potentially cause variability in water quantity and/or water quality characteristics be considered. These factors could include short-term or long-term variability in climatic conditions (which may conveniently be evaluated using the Palmer Hydrologic Drought Index as described in Appendix 7-1), changes in land use practices over time, or several other factors. A convenient way to evaluate the water quality characteristics and detect potential impacts to water quality of groundwaters and surface waters is through the use of Stiff diagrams (see Appendix 7-1 for further explanation). Information is also provided by the Utah Division of Oil, Gas and Mining regarding the use of Stiff diagrams (Utah.gov).

731.300. Acid- and Toxic-Forming Materials.

At the existing Coal Hollow Mine and the proposed North Private lease area, drainage from acid- and toxic-forming materials and underground development waste into surface water and ground water will be avoided by identifying and burying and/or treating, when necessary, materials which may adversely affect water quality, or be detrimental to vegetation or to public health and safety if not buried and/or treated.

Materials will be stored in a manner that will protect surface water and ground water by preventing erosion, the formation of polluted runoff and the infiltration of polluted water. Storage will be limited to the period until burial and/or treatment first become feasible, and so long as storage will not result in any risk of water pollution or other environmental damage.

Storage, burial or treatment practices will be consistent with other material handling and disposal provisions of R645 Rules.

During the period of operation of the Coal Hollow Mine, the observed pH of the water that has infrequently been discharged through the UPDES discharge points has consistently been alkaline in nature (UDOGM, 2015). No acid mine discharge has been observed at the Coal Hollow Mine. Measured concentrations of selenium and

manganese in the mine discharge water have consistently been low (near the lower laboratory detection limits). Similarly, concentrations of total iron have also usually been low, although on a few occasions slightly elevated concentration of total iron (<1.61 mg/L) in the mine discharge water has been measured. These total iron concentrations are generally associated with suspended solids associated with storm water runoff or snowmelt events.

Based on the overall similarities in the geologic environments at the existing Coal Hollow Mine permit area and the proposed North Private lease area, it is considered likely that mine discharge waters that could potentially be discharged from the North Private Lease would have similar water quality characteristics (i.e. no acid mine drainage and no appreciable toxicity).

731.400. Transfer of Wells

Before final release of bond, exploratory or monitoring wells will be sealed in a safe and environmentally sound manner in accordance with R645-301-631, R645-301-738, and R645-301-765. With the prior approval of the Division, wells may be transferred to another party for further use. However, at a minimum, the conditions of such transfer will comply with Utah and local laws and the permittee will remain responsible for the proper management of the well until bond release in accordance with R645-301-529, R645-301-551, R645-301-631, R645-301-738, and R645-301-765.

731.530 State-appropriated water supply

A water supply well was constructed in the Sink Valley Alluvial groundwater system in October of 2010. The water well is being used as a water supply source for the mine and can also be used for water replacement if needed (also for use if needed as a replacement water source for mining in the 85.88-acre Dame Lease IBC).

731.600 Stream Buffer Zones

Any perennial or intermittent streams in the mine area will be protected by 100 foot stream buffer zones on either side of these streams. Coal mining and reclamation operations will not cause or contribute to the violation of applicable Utah or federal water standards and will not adversely affect the water quality and quantity or other environmental resources of the stream.

Temporary or permanent stream channel diversion will comply with R645-301-742-300. It should be noted that the Coal Hollow Mine plan calls for the temporary diversion of a reach of the Lower Robinson Creek stream channel approximately 2,000 feet in length in the southeast ¼ of Section 19, T39S, R5W. Details of the proposed diversion are given in Chapter 5, Section 527.220 of this MRP. If this action results in diminution of the meager discharge of surface water in the drainage below the planned diversion, where

required a suitable mitigation for this potential impact will be designed and implemented in consultation with the Division of Oil, Gas and Mining.

The areas surrounding the streams that are not to be disturbed will be designated as buffer zones, and will be marked as specified in R645-301-521.260.

731.700 Cross sections and Maps

The locations of springs and seeps identified in the Coal Hollow Mine permit and adjacent area are shown in Drawing 7-1. The locations of springs and seeps in the North Private Lease area are shown in Appendix 7-16. The locations of baseline hydrologic monitoring locations (including those for the North Private Lease) are shown on Drawing 7-2. Monitoring well locations in the North Private Lease and adjacent areas are shown in Appendix 7-16 and Appendix 7-18. The locations of water rights in the Coal Hollow permit and adjacent area are provided on Drawing 7-3. Water rights in the North Private Lease area are shown on Drawing 7-3N. Cross-sections depicting the stratigraphy and hydrostratigraphy of the Coal Hollow Mine permit and adjacent area are presented in Chapter 6, Drawing 6-2 and in Appendix 7-16. Designs for impoundments in the Coal Hollow permit area are shown in Drawings 5-25 through 5-31 and impoundments in the North Private Lease area are shown in Drawings 5-65 through 5-67.

731.800 Water Rights and Replacement

Alton Coal Development, LLC commits to replace the water supply of an owner of interest in real property who obtains all or part of his or her supply of water for domestic, agricultural, industrial, or other legitimate use from the underground or surface source, where the water supply has been adversely impacted by contamination, diminution, or interruption proximately resulting from the surface mining activities. Baseline hydrologic information required in R645-301-624.100 through R645-301-624.200, R645-301-625, R645-301-626, R645-301-723 through R645-301-724.300, R645-301-724.500, R645-301-725 through R645-301-731, and R645-301-731.210 through R645-301-731.223 will be used to determine the extent of the impact of mining upon ground water and surface water.

Sorensen Spring (SP-40) is the current domestic water supply for the Sorensen Ranch (Personal communication, Darlynn Sorensen, 2008). There is currently no development at the spring that would convey water to the ranch house. Rather, water from the spring is obtained directly from the spring for use at the ranch. Monitoring of discharge rate and water quality is included in the proposed water monitoring plan for the Coal Hollow Mine. The operational and reclamation phase water monitoring protocols for this spring are listed in Tables 7-5 and 7-7A. Should the water source be interrupted, diminished, or contaminated, replacement water will be provided from the new water well that will be constructed prior to the beginning of overburden removal for pits 13, 14, and 15 (see description in section R645-301-727 above, and Drawing 5-8C) or other suitable water replacement source as approved by the Division.

There are no state-appropriated groundwater rights in the North Private Lease area.

As specified in R645-301-112, groundwater quantity will be protected by handling earth materials and runoff in a manner that will restore approximate premining recharge capacity of the reclaimed area as a whole, excluding coal mine waste disposal areas and fills, so as to allow the movement of water to the groundwater system.

732 Sediment Control Measures

Sediment control measures have been designed, constructed and maintained to prevent additional contributions of sediment to streamflow or to runoff outside the permit area.

732.100 Siltation Structures

Siltation structures within the permit area are described in Section 732.200

732.200 Sedimentation Ponds

~~Six~~ Nine diversion ditches along with five sediment impoundments are proposed for the Coal Hollow permit area. As mining advances into the federal coal, the open pits will mine out Pond 2 and Ditch 2. These structures will not be rebuilt following backfill and reclamation. In addition, miscellaneous controls such as silt fence and berms are also proposed for specific areas. The proposed locations for these structures are shown on Drawing 5-3. Details associated with these structures can be viewed on Drawings 5-25 through 5-34 and Appendix 5-2.

Fifteen diversion ditches along with five sediment impoundments are proposed for the North Private Lease permit area. In addition, miscellaneous controls such as berms are also proposed for specific areas. The proposed locations for these structures are shown on Drawing 5-47. Details associated with these structures can be viewed on Drawings 5-67 through 5-71 and Appendix 5-12. While approval of Areas 2 and 3 are dependent on the timely approval of permits from the U.S. Army Corps of Engineers, Area 1extended for pits 7, 8 and 9 will require the use of two temporary diversions and an impoundment. The detailed analysis for these structures and specific designs can be viewed on Drawings 5-65A, 5-71A and 5-73. The watershed and structure sizing analysis can be viewed in Appendix 5-12A. Once approval to proceed into Areas 2 and 3 are acquired, these temporary features will no longer be necessary and will be mined through.

Sedimentation ponds have been designed in compliance with the requirements of R645-301-356.300, R645-301-356.400, R645-301-513.200, R645-301-742.200 through R645-301-742.240, and R645-301-763.

No sedimentation ponds or earthen structures that will remain open are planned.

The sedimentation plan has been designed to comply with the MSHA requirements given under R645-301-513.100 and R645-301-513.200.

732.300 Diversions

The runoff control plan is designed to isolate, to the maximum degree possible, runoff from disturbed areas from that of undisturbed areas. Where possible, this has been accomplished by allowing up-stream runoff to bypass the disturbed area, and routing any runoff from undisturbed areas that enter the disturbed area into a sediment control system.

~~Six~~ Nine diversion ditches along with five sediment impoundments are proposed for the Coal Hollow permit area. As mining advances into the federal coal, the open pits will mine out Pond 2 and Ditch 2. These structures will not be rebuilt following backfill and reclamation. In addition, miscellaneous controls such as silt fence, berms and temporary diversion ditches are also proposed for specific areas. The proposed locations for these structures are shown on Drawing 5-3. Details associated with these structures can be viewed on Drawings 5-25 through 5-34 and Appendix 5-2. A segment of Diversion Ditch 4 (DD4), due to premining contours, was not constructed until fill from the spoils pile attained an elevation that allowed positive flow. Prior to disturbances and until completion of DD4, a silt fence provided protection from offsite impacts. During reclamation, Pit 10 will be the final pit backfill requiring the remaining spoil stockpiled to be relocated, thus DD4 will be relocated with the Pit 10 borrow operations. All borrow activity will occur south of DD4 until elevations south of DD4 cause a positive flow directly to Sediment Pond 3. At this time DD4 can be realigned allowing final removal of Pit 10 borrow material. All temporary ditches will meet the design requirements of Diversion Ditch 4 (designed for the 10~~0~~-year, ~~24~~ 6 hour storm) and will be adjusted within the permitted active mining area in relation to the active pit, currant spoils pile configuration and reclamation.

Fifteen diversion ditches along with five sediment impoundments are proposed for the North Private Lease permit area. In addition, miscellaneous controls such as silt fences, berms and temporary diversion ditches are also proposed for specific areas. The proposed locations for these structures are shown on Drawing 5-63. Details associated with these structures can be viewed on Drawings 5-67 through 5-71 and Appendix 5-12. While approval of Areas 2 and 3 are dependent on the timely approval of permits from the U.S. Army Corps of Engineers, Area 1 extended for pits 7, 8 and 9 will require the use of two temporary diversions and an impoundment. The detailed analysis for these structures and specific designs can be viewed on Drawings 5-65A, 5-71A and 5-73. The watershed and structure sizing analysis can be viewed in Appendix 5-12A. Once approval to proceed into Areas 2 and 3 are acquired, these temporary features will no longer be necessary and will be mined through.

732.400 Road Drainage

All roads will be constructed, maintained and reconstructed to comply with R645-301-742.400. Road drainage facilities include diversion ditches, culverts, containment berms, and/or water bars. Specific plans for road drainage, road construction, and road maintenance are presented in Chapter 5, Section 534 of this MRP.

A description of measures to be taken to obtain division approval for alteration or relocation of a natural drainage way will be presented to the Division when necessary.

A description of measures to be taken to protect the inlet end of a ditch relief culvert will be submitted to the Division when necessary.

All road drainage diversions will be maintained and repaired to operational condition following the occurrence of a large storm event. Culvert inlets and outlets will be kept clear of sediment and other debris.

733 IMPOUNDMENTS

733.100 General Plans

A professional engineer experienced in the design and construction of impoundments with assistance from a geotechnical expert has used current, prudent, engineering practices to design the proposed impoundments.

The plans for the Coal Hollow Mine have been certified and a detailed geotechnical analysis has been provided in Appendix 5-1. The certifications, drawings and cross sections can be viewed in Drawings 5-25 through 5-31 and Appendices 5-1 and 5-2. The plans for the North Private Lease have been certified and a detailed geotechnical analysis has been provided in Appendix 5-11. The certifications, drawings and cross sections can be viewed in Drawings 5-67 through 5-71 and Appendices 5-12.

As requested by the Division, the design criteria of the mine site sediment ponds have been reevaluated in light of groundwater that is being encountered at the site (see Appendix 7-11). It was the determination of this reevaluation that the sediment ponds currently in place meet or exceed the minimum requirements of the Utah Coal Mining Rules and that the construction of additional ponds or the redesigning of existing ponds is not required at this time. Accordingly, the small ephemeral channel tributary to Lower

Robinson Creek near the toe of the spoils pile mentioned in the Division Deficiency List (Task No. 3799) has been evaluated as a potential sediment pond site, but the construction of a sediment pond in that location is not required at the current time.

As indicated in Section 728.332, where appreciable alluvial groundwater inflows into the mine pit areas occur and where deemed necessary and possible, alluvial groundwater inflows into the mine pit areas will be diverted away from the mine pit areas through pipes, ditches, or other conveyance methods, minimizing the need for the pumping of mine discharge waters to the sediment ponds. Groundwater that interacts with the Tropic Shale and the Smirl coal seam in the mine pits is considered as mine water and accordingly it will be either routed to Pond #3 or Pond #4 in the Coal Hollow Permit and Pond #7 in the North Private Lease and subsequently discharged under the approved Coal Hollow Mine UPDES discharge permit, or it will be contained and managed within the pit areas and not discharged.

Depending on prevailing climatic conditions and on the nature and quantity of encountered mine waters, at times it may periodically be necessary to discharge water from the Coal Hollow Mine sediment ponds. The discharges from the ponds at the Coal Hollow Mine will occur in compliance with the approved Coal Hollow Mine UPDES permit (see Appendix 7-12).

Five impoundments are proposed to control storm water runoff and sediment from disturbed areas of the Coal Hollow Mine. Each impoundment is designed to contain the run off from a 10~~0~~ year, 24 hour duration storm event. The locations of the impoundments and the associated watersheds can be viewed on Drawing 5-26. The following table summarizes the final capacity results for each impoundment:

Coal Hollow Mine Sedimentation Impoundment Capacities				
Structure	Storage Required (ac/ft)	Design Storage* (ac/ft)	Percent of requirement	Additional Storage (ac/ft)
1	2.~~6~~86	3.~~2~~1	~~123~~108	0.~~6~~2
2	1.7	2.3	135	0.6
3	~~6.3~~14.89	~~12.6~~15.0	~~200~~101	~~6.3~~0.1
4	~~2.1~~4.83	5.5	~~261~~114	~~3.4~~0.7
1B	0.~~5~~66	0.8	~~160~~121	0.~~3~~1

Structure 1 is a rectangular impoundment approximately 127 feet long by 82 feet wide and 9 feet in depth. This impoundment will control storm water run off from the facilities area. The impoundment will be constructed with a 24” drop pipe spillway in order to prevent any oil sheens that may occur from discharging. This impoundment will be incised into the existing ground. Part of the excavated material will be utilized to construct an embankment on the down grade side to provide a minimum of 3 feet freeboard. This pond will control storm water from a watershed of approximately 27 acres. The cleanout and spillway elevation are 6911’ and 6920’, respectively. The top of the embankment is at elevation 6924’. Details for the design can be viewed on Drawing 5-28.

Structure 1B is a small rectangular impoundment that is approximately 40 feet long by 20 feet wide. This impoundment will control storm water run off from the facilities access road system. The impoundment will be constructed with a 24" drop pipe spillway in order to prevent any oil sheens that may occur from discharging. This impoundment will be incised into the existing ground. Part of the excavated material will be utilized to construct an embankment on the down grade side to provide a minimum of 2 feet freeboard. This pond will control storm water from a watershed of approximately 5 acres. The cleanout and spillway elevation are 6894' and 6906', respectively. The top of the embankment is at elevation 6908'. Details for the design can be viewed on Drawing 5-28B.

Structure 2 is a rectangular impoundment approximately 188 feet long by 36 feet wide and 9 feet in depth. This impoundment will control storm water runoff from the disturbed areas immediately south of Lower Robinson Creek. The impoundment will be constructed with a 24" drop pipe spillway. Part of the excavated material will be utilized to construct an embankment on the down grade side to provide a minimum 3 feet freeboard. This pond will control storm water runoff from a watershed of approximately 74 acres. The cleanout and spillway elevation are 6891' and 6900', respectively. Top of the embankment is at elevation 6903'. Details for the design can be viewed on Drawing 5-29.

Structure 3 is a valley fill impoundment that will impound an area approximately 472 feet long by 229 feet wide and 9 feet deep. The fill for the impoundment will be constructed from an excavation 378 feet wide by 229 feet long and 8 feet deep. The embankment will be constructed in 2 foot lifts utilizing a dozer. The top of the embankment will be a minimum 12 feet wide. This pond will have a decant pipe install at the 6808' elevation that allows for the pond level to be managed and to still be able to contain the 10 year 24 hour event. Also, this pond has a secondary open channel spillway that will have rip-rap min. 6" underlain with erosion control fabric. This pond will control storm water runoff from a watershed of approximately 388 acres post mining, it will also be capable of receiving ground water from the underground in the event it cannot be managed at the underground operation (not considered likely). The cleanout and spillway elevation are 6801' and 6811', respectively. Top of the embankment is at 6813'. Details for the design can be viewed on Drawing 5-30.

Structure 4 is a rectangular pond located at the south end of the permit area that is approximately 90 feet wide by 582 feet long and 12 feet deep. This impoundment will be incised into the existing ground. Part of the excavation will be used to construct a 12 foot wide embankment. The spillway will be an open channel that will have rip-rap min. 6". This pond will control storm water runoff from a watershed of approximately 96 acres. The cleanout and spillway elevation are 6822' and 6834', respectively. Top of the embankment is at elevation 6838'. Details for the design can be viewed on Drawing 5-31.

Open channel spillway details for impoundments 3 and 4 are provided in Drawing 5-32. These spillways are designed for emergencies and are not expected to be used during normal operations.

Six impoundments (one temporary for Area 1 expanded) are proposed to control storm water runoff and sediment from disturbed areas of the North Private Lease. Each impoundment is designed to contain the run off from a 10 year, 24 hour duration storm event. The locations of the impoundments and the associated watersheds can be viewed on Drawing 5-65. The following table summarizes the final capacity results for each impoundment:

North Private Lease Sedimentation Impoundment Capacities				
Structure	Storage Required (ac/ft)	Design Storage* (ac/ft)	Percent of requirement	Additional Storage (ac/ft)
5	1.28	1.55	122	0.28
6	1.43	3.15	220	1.71
7	8.07	19.26	239	11.19
8	1.66	7.49	450	5.81
9	2.73	3.42	125	0.68
T1	0.81	1.50	185	0.69

Structure 5 is a trapezoid impoundment 8 feet in depth. This impoundment will control storm water runoff from the western side of the permit area were mining will begin. The impoundment will be constructed with an 18" primary spillway with an oil skimmer and an open channel secondary spillway that will have 6" D50 rip-rap. This impoundment will be incised into the existing ground. Part of the excavated material will be utilized to construct an embankment on the down grade side to provide a minimum of 2 feet freeboard. This pond will control storm water from a watershed of approximately 18.8 acres. The cleanout and spillway elevation are 6840' and 6848' respectively. The top of the embankment is at elevation 6850'. Details for the design can be viewed on Drawing 5-67.

Structure 6 is a trapezoid impoundment 8 feet in depth. This impoundment will control storm water runoff from the western side of the permit area were mining will begin. The impoundment will be constructed with an 18" primary spillway with an oil skimmer and an open channel secondary spillway that will have 6" D50 rip-rap. This impoundment will be incised into the existing ground. Part of the excavated material will be utilized to construct an embankment on the down grade side to provide a minimum of 2 feet freeboard. This pond will control storm water from a watershed of approximately 24.0 acres. The cleanout and spillway elevation are 6858' and 6866' respectively. The top of the embankment is at elevation 6868'. Details for the design can be viewed on Drawing 5-68.

Structure 7 is a square impoundment 8 feet in depth. This impoundment will control storm water runoff from the western side of the permit area were mining will begin. The

impoundment will be constructed with a 24" primary spillway with an oil skimmer and an open channel secondary spillway that will have 9" D50 rip-rap. This impoundment will be incised into the existing ground. Part of the excavated material will be utilized to construct an embankment on the down grade side to provide a minimum of 2 feet freeboard. This pond will control storm water from a watershed of approximately 133.9 acres. The cleanout and spillway elevation are 6840' and 6848' respectively. The top of the embankment is at elevation 6850'. Details for the design can be viewed on Drawing 5-69.

Structure 8 is a triangle impoundment 10 feet in depth. This impoundment will control storm water runoff from the western side of the permit area were mining will begin. The impoundment will be constructed with an 18" primary spillway with an oil skimmer and an open channel secondary spillway that will have 6" D50 rip-rap. This impoundment will be incised into the existing ground. Part of the excavated material will be utilized to construct an embankment on the down grade side to provide a minimum of 2 feet freeboard. This pond will control storm water from a watershed of approximately 28.4 acres. The cleanout and spillway elevation are 6884' and 6894' respectively. The top of the embankment is at elevation 6896'. Details for the design can be viewed on Drawing 5-70.

Structure 9 is a triangle impoundment 8 feet in depth. This impoundment will control storm water runoff from the western side of the permit area were mining will begin. The impoundment will be constructed with an 18" primary spillway with an oil skimmer and an open channel secondary spillway that will have 6" D50 rip-rap. This impoundment will be incised into the existing ground. Part of the excavated material will be utilized to construct an embankment on the down grade side to provide a minimum of 2 feet freeboard. This pond will control storm water from a watershed of approximately 23.6 acres. The cleanout and spillway elevation are 6856' and 6864' respectively. The top of the embankment is at elevation 6866'. Details for the design can be viewed on Drawing 5-71.

Structure T1 is a trapezoid impoundment 8 feet in depth. This temporary impoundment will control storm water runoff from Area 1 expanded for pits 7, 8, and 9. The impoundment is intended to be total containment, and therefore, will not be equipped with a spillway. Instead, the impoundment will be drained as necessary via an engineered pump and pipeline system, and discharged into existing structure 6. This impoundment will be incised into the existing ground. Part of the excavated material will be utilized to construct an embankment on the down grade side to provide a minimum of 2 feet freeboard. This pond will control storm water from a watershed of approximately 14.4 acres. The top of the embankment is at elevation 6874'. Details for the design can be viewed on Drawing 5-71A.

The outer slopes of the impoundments will be sloped to a maximum grade of 3h:1v. Inside slopes will be graded to a maximum 2h:1v. The slopes will be graded and revegetated for erosion control.

No underground mine workings exist near or under the impoundment structures; therefore subsidence surveys are not provided.

Geologic data for the area where impoundments will be located consists of mainly fine grained alluvium with high clay content. Seepage from the impoundments is expected to be minimal based on the high clay content of the existing materials. Characterization of the soils is contained in Chapter 2. Acid and Toxic analysis of the soils indicates that water seeping through the alluvium layer will not result in reducing water quality. The acid and toxic analysis for the alluvium can be viewed in Appendix 6-2.

Hydrologic data for the permit area is provided in Appendix 7-1. This data indicates that there will be some seepage through the subsurface that may travel to adjacent drainages. The quantities for this seepage are expected to be minimal and will have minimal impact to the overall hydrologic balance. Even though seepage may occur, analysis of the soils indicates that water quality will not be diminished.

The above information provides a summary of all the impoundment structures that are for the Coal Hollow Project and North Private Lease. Detailed designs and calculations are provided in this section, Drawings 5-26 through 5-32 and Appendix 5-2. No other impoundments are anticipated.

At some times it may be necessary to discharge water from the sediment ponds at the Coal Hollow Mine. The approved Coal Hollow UPDES permit (Appendix 7-12) allows for discharges.

733.200 Permanent and Temporary Impoundments

All impoundments have been designed and constructed using current, prudent engineering practices and have been designed to comply with the requirements of R645-301-512.240, R645-301-514.300, R645-301-515.200, R645-301-533.100 through R645-301-533.600, R645-301-733.220 through R645-301-733.226, R645-301-743.240, and R645-301-743.

No impoundments or sedimentation ponds meeting the size or other qualifying criteria of MSHA, 30 CFR 77.216(a) exist or are planned within the Mine Permit Area. Should impoundments and sedimentation ponds meeting the size or other qualifying criteria of MSHA, 30 CFR 77.216(a) become necessary, compliance with the requirements of MSHA, 30 CFR 77.216 will be met.

All eleven planned impoundments have been evaluated by a professional engineer to ensure stability of each structure. The stability analysis performed resulted in a static safety factor of at least 2.2 for each structure. The details for this analysis can be viewed in Appendix 5-1 for the Coal Hollow Mine and Appendix 5-12 & 5-12A for the North Private Lease.

No permanent impoundments are planned in the project area.

If any examination or inspection discloses that a potential hazard exists, the person who examined the impoundment will promptly inform the Division according R645-301-515.200.

734 Discharge Structures

Discharge structures will be constructed and maintained to comply with R645-301-744.

The proposed impoundments are designed to temporarily store water from storm events and snow melt. Long term standing water in the impoundments is anticipated to be seasonal and sediment will be removed as necessary to provide the required storage capacities. Emergency spillways have been included in the designs to provide a non-destructive discharge route should the capacities ever be exceeded. Surveys of these impoundments will be regularly conducted to ensure that the required design capacities are available.

Impoundments 3 and 4 will be constructed with open channel spillways. These spillways are designed to discharge a 6 hour duration, 100 year storm event even though they are not expected to be used. They will have rip-rap min 6" to minimize erosion and spillway slopes will not exceed 3h:1v. Drawing 5-32 provides the details for the open channel spillways. Also, impoundment 3 will have a decant installed at the 6808 elevation that will allow for the pond level to be managed and to still be able to contain the 100 year 24 hour event.

Impoundments 1, 1B, 2, 5, 6, 7, 8 and 9 will be constructed with a drop pipe spillway system. Storm water and snow melt that occurs within the associated watersheds will be routed to these impoundments to contain sediment. These impoundments will have the drop-pipe spillways installed which will allow removal of any oil sheens that may result from parking lots, primary roads or maintenance activities by using absorbent materials to remove the sheen. The drop-pipe spillways are 24" diameter pipes that are vertical in the impoundment. These pipes have a metal cover over the end. This cover is recessed over the pipe by at least an inch, with a gap between the cover and the pipe. This leaves a route for water to discharge once the impoundment is full but prevents debris or pollutants located on the water surface from discharging. This system was chosen for these three impoundments based on their locations in relation to the facilities and primary roads. This discharge system will be constructed for precautionary measures only since pollutants are not expected in the impoundments during normal operations.

Impoundment T1 will not be equipped with a spillway. Instead, the impoundment will be drained as necessary via an engineered pump and pipeline system, and discharged into existing structure 6.

Disposal of Excess Spoil

Areas designated for the disposal of excess spoil and excess spoil structures will be constructed and maintained to comply with R645-301-745.

Details of proposed excess spoil disposal plans are presented in Chapter 5, Section 535 of this MRP and are summarized below.

A geotechnical analysis has been completed for the proposed excess spoil structure. This analysis estimates the long-term safety factor to be 1.6 to 1.7 based on the proposed design. Following proper construction practices of building the structure in maximum four foot lifts and meeting 85% compaction based on the standard Procter will ensure that the structure will be stable under all conditions of construction. This construction will occur only in the designated excess spoil area as shown on Drawing 5-3 and 5-35. The fill will be placed with end dump haul trucks and lifts will be constructed using dozers. High precision GPS systems will be regularly utilized to check grades and appropriate lift thickness. The geotechnical analysis for this structure can be viewed in Appendix 5-1.

The excess spoil is planned to be placed in an area where natural grades range from 0 to 5%. This is one of the most moderately sloping locations in the Permit Area. Stability of this structure is estimated to be 1.6 to 1.7 based on the Appendix 5-1.

Geotechnical borings were completed in the foundation of the proposed disposal area. Laboratory analysis of these borings has also been completed. Details of this analysis can be viewed in Appendix 5-1.

Permanent slopes for the proposed excess spoil will not exceed 3h:1v (33 percent), therefore no keyway cuts have been proposed in the design. Appendix 5-1 details the stability analysis for the proposed structure.

Excess spoil will not be disposed of in underground mine workings.

Horizontal lifts will not exceed four feet in thickness unless otherwise approved by the Division. The lifts will be concurrently compacted to meet 85% of the standard Procter. The geotechnical analysis (Appendix 5-1), provides information showing that these construction standards will provide mass stability and will prevent mass movement during and after construction. The excess spoil will be graded to provide drainage similar to original flow patterns. Topsoil and subsoil as designated in Chapter 2 will be removed and separated from other materials prior to placement of spoil.

A description of the character of the bedrock and any adverse geologic conditions in presented in Appendix 5-1.

Spring and seep survey information is provided on Drawing 7-1. There are no springs or seeps identified in the excess spoil area.

There are no historical underground mining operations in the proposed excess spoil area. There are future underground operations proposed.

There are no rock chimneys or drainage blankets proposed.

A stability analysis including strength parameters, pore pressures and long-term seepage conditions is presented together with all supporting data in Appendix 5-1.

Neither rock-toe buttresses nor key-way cuts are required under R645-301-535.112 or R645-301-535.113.

No valley fills or head-of-hollow fills are proposed.

No durable rock fills are proposed.

No disposal of waste on preexisting benches is planned

The excess spoil structure and fill above approximate original contour are the only alternative specifications proposed. A geotechnical analysis has been completed for this proposal and can be viewed in Appendix 5-1. All other mined areas will be restored to approximate original contour.

735 Coal Mine Waste

Areas designated for disposal of coal mine waste and coal mine waste structures will be constructed and maintained to comply with R645-301-746.

No structures for the disposal of coal mine waste are planned.

736 Noncoal Mine Waste

Noncoal mine waste will be stored and final disposal of noncoal mine waste will comply with R645-301-747

Noncoal mine waste, including but not limited to grease, lubricants, paints, flammable liquids, garbage, machinery, lumber and other combustible materials generated during coal mining and reclamation operations will be temporarily stored in a controlled manner. Final disposal of noncoal mine wastes will consist of removal from the project area and transportation to a State-approved solid waste disposal area.

Only sizing of the coal is proposed. This process will not produce any waste.

At no time will any noncoal mine waste be deposited in a refuse pile or impounding structure, nor will any excavation for a noncoal mine waste disposal site be located within eight feet of any coal outcrop or coal storage area.

Notwithstanding any other provision to the R645 Rules, any noncoal mine waste defined as "hazardous" under 3001 of the Resource Conservation and Recovery Act (RCRA)

(Pub. L. 94-580, as amended) and 40 CFR Part 261 will be handled in accordance with the requirements of Subtitle C of RCRA and any implementing regulations.

Debris, acid-forming, toxic-forming materials and materials constituting a fire hazard will be identified and disposed of in accordance with R645-301-528.330, R645-301-537.200, R645-301-542.740, R645-301-553.100 through R645-301-553.600, R645-301-553.900, and R645-301-747. Appropriate measures will be implemented to preclude sustained combustion of such materials.

Plans do not include using dams, embankments or other impoundments for disposal of coal, overburden, excess spoil or coal mine waste.

738 Temporary Casing and Sealing of Wells

Wells constructed for monitoring groundwater conditions in the Coal Hollow Mine permit and adjacent area, including exploration holes and boreholes used for water wells or monitoring wells, will be designed to prevent contamination of groundwater and surface-water resources and to protect the hydrologic balance. A diagram depicting typical monitoring well construction methods is shown in Drawing 7-11. Monitoring wells will include a protective hydraulic seal immediately above the screened interval, an annular seal plugging the borehole above the hydraulic seal to near the ground surface, and a concrete surface seal extending from the top of the hydraulic seal to the ground surface which is sloped away from the well casing to prevent the entrance of surface flows into the borehole area. Well casings will protrude above the ground surface a sufficient height so as to minimize the potential for the entrance of surface water or other material into the well. A steel surface protector with a locking cover will be installed at monitoring wells to prevent access by unauthorized personnel. Where there is potential for damage to monitoring wells, the wells will be protected through the use of barricades, fences, or other protective devices. These protective devices will be periodically inspected and maintained in good operating conditions. Monitoring wells will be locked in a closed position between uses.

When no longer needed for monitoring or other use approved by the Division upon a finding of no adverse environmental or health and safety effects, or unless approved for transfer as a water well under R645-301-731.100 through R645-301-731.522 and R645-301-731.800, each well will be capped, sealed, backfilled, or otherwise properly managed, as required by the Division in accordance with R645-301-529.400, R645-301-631.100, and R645-301-748. Permanent closure measures will be designed to prevent access to the mine workings by people, livestock, fish and wildlife, machinery and to keep acid or other toxic drainage from entering ground or surface waters.

If a water well is exposed by coal mining and reclamation operations, it will be permanently closed unless otherwise managed in a manner approved by the Division.

Permanent closure and abandonment of water wells greater than 30 feet in depth will be in accordance with the requirements of "Administrative Rules for Water Well Drillers", State of Utah, Division of Water Rights or other applicable state regulations. Abandonment of wells will be performed by a licensed water well driller. The wells to be abandoned will be completely filled using neat cement grout, sand cement grout, unhydrated bentonite, or bentonite grout, or other materials approved by the Utah State Engineer's office. Alternatively, the well may be abandoned using a different procedure upon approval from the Utah State Engineer's office.

Abandonment materials will be introduced at the bottom of the well or required sealing interval and placed progressively upward to the top of the well. The casing will be severed a minimum of 2 feet below the ground surface. A minimum of 2 feet of compacted native material will be placed above the abandoned well upon completion.

Within 30 days of the completion of well abandonment procedures, a report will be submitted to the State Engineer by the responsible licensed driller giving data related to the abandonment of the well. This shall include the name of the licensed driller or other person(s) performing abandonment procedures, name of well owner at the time of abandonment, the address or location of the well by section, township, and range, abandonment materials and equipment used, water right or file number covering the well, the final disposition of the well, and the date of completion.

Exploration holes and boreholes will be backfilled, plugged, cased, capped, sealed, or otherwise managed to prevent acid or toxic contamination of water resources and to minimize disturbance to the prevailing hydrologic balance. Exploration holes and boreholes will be managed to ensure the safety of people, livestock, fish and wildlife, and machinery.

If any exploration boreholes are to be used as monitoring wells or water wells, these will meet the provisions of R645-301-731

Boreholes will be backfilled to within 1 foot of the land surface with concrete or other materials approved by the Division as necessary to prevent contamination of groundwater or surface-water resources or to protect the prevailing hydrologic balance. The upper approximately 1 foot will be backfilled with native materials to facilitate reclamation (see Drawing 6-11). Exploration holes and boreholes that may be uncovered during mining and reclamation activities will be permanently closed unless approved for water monitoring or otherwise managed in a manner approved by the Division.

740 DESIGN CRITERIA AND PLANS

741 GENERAL REQUIREMENTS

742 SEDIMENT CONTROL MEASURES

742.100 General Requirements

742.110 Design

Appropriate sediment control measures will be designed, constructed and maintained using best technology currently available to prevent to the extent possible, contributions of sediment to stream flow or to runoff outside the permit area; meet the effluent limitations under R645-301-751; and minimize erosion to the extent possible.

~~Six~~ Nine diversion ditches along with five sediment impoundments are proposed for the Coal Hollow permit area. As mining advances into the federal coal, the open pits will mine out Pond 2 and Ditch 2. These structures will not be rebuilt following backfill and reclamation. In addition, miscellaneous controls such as silt fence and berms are also proposed for specific areas. The proposed locations for these structures are shown on Drawing 5-3. Details associated with these structures can be viewed on Drawings 5-25 through 5-34 and Appendix 5-2. These impoundments in combination with the ditches will be the primary method that will be used to control sediment resulting from disturbed areas. In addition to the drawings and Appendix 5-2 , the following is a description of the structures:

A professional engineer experienced in the design and construction of impoundments with assistance from a geotechnical expert has used current, prudent, engineering practices to design the proposed impoundments.

The plans have been certified and a detailed geotechnical analysis has been provided in Appendix 5-1. The certifications, drawings and cross sections can be viewed in Drawings 5-25 through 5-31 and Appendices 5-1 and 5-2.

Five impoundments are proposed to control storm water runoff and sediment from disturbed areas. Each impoundment is designed to contain the run off from a 10~~0~~ year, 24 hour duration storm event. The locations of the impoundments and the associated watersheds can be viewed on Drawing 5-26. The following table summarizes the final capacity results for each impoundment:

Coal Hollow Mine Sedimentation Impoundment Capacities				
Structure	Storage Required (ac/ft)	Design Storage* (ac/ft)	Percent of requirement	Additional Storage (ac/ft)
1	~~2.6~~2.86	3.~~2~~1	~~123~~108	0.~~6~~2
2	1.7	2.3	135	0.6
3	~~6.3~~14.89	~~12.6~~15.0	~~200~~101	~~6.3~~0.1
4	~~2.1~~4.83	5.5	~~261~~114	~~3.4~~0.7
1B	0.~~5~~66	0.8	~~160~~121	0.~~3~~1

Structure 1 is a rectangular impoundment approximately 127 feet long by 82 feet wide and 9 feet in depth. This impoundment will control storm water run off from the facilities area. The impoundment will be constructed with a 24" drop pipe spillway in order to prevent any oil sheens that may occur from discharging. This impoundment will be incised into the existing ground. Part of the excavated material will be utilized to construct an embankment on the down grade side to provide a minimum of 4 feet freeboard. This pond will control storm water from a watershed of approximately 27 acres. The cleanout and spillway elevation are 6911' and 6920', respectively. The top of the embankment is at elevation 6924'. Details for the design can be viewed on Drawing 5-28.

Structure 1B is a small rectangular impoundment that is approximately 40 feet long by 20 feet wide. This impoundment will control storm water run off from the facilities access road system. The impoundment will be constructed with a 24" drop pipe spillway in order to prevent any oil sheens that may occur from discharging. This impoundment will be incised into the existing ground. Part of the excavated material will be utilized to construct an embankment on the down grade side to provide a minimum of 2 feet freeboard. This pond will control storm water from a watershed of approximately 5 acres. The cleanout and spillway elevation are 6894' and 6906', respectively. The top of the embankment is at elevation 6908'. Details for the design can be viewed on Drawing 5-28B.

Structure 2 is a rectangular impoundment approximately 188 feet long by 36 feet wide and 9 feet in depth. This impoundment will control storm water runoff from the disturbed areas immediately south of Lower Robinson Creek. The impoundment will be constructed with a 24" drop pipe spillway. Part of the excavated material will be utilized to construct an embankment on the down grade side to provide a minimum 3 feet freeboard. This pond will control storm water runoff from a watershed of approximately 74 acres. The cleanout and spillway elevation are 6891' and 6900', respectively. Top of the embankment is at elevation 6903'. Details for the design can be viewed on Drawing 5-29.

Structure 3 is a valley fill impoundment that will impound an area approximately 472 feet long by 229 feet wide and 9 feet deep. The fill for the impoundment will be constructed from an excavation 198 feet wide by 229 feet long and 8 feet deep. The embankment

will be constructed in 2 foot lifts utilizing a dozer. The top of the embankment will be a minimum 12 feet wide. This pond will have a decant pipe install at the 6808' elevation that allows for the pond level to be managed and to still be able to contain the 10 year 24 hour event. Also, this pond has a secondary open channel spillway that will have rip-rap min. 6 underlain with erosion control fabric. This pond will control storm water runoff from a watershed of approximately 388 acres post mining, it will also be capable of receiving ground water from the underground in the event it cannot be managed at the underground operation (not considered likely). The cleanout and spillway elevation are 6801' and 6810', respectively. Top of the embankment is at 6814'. Details for the design can be viewed on Drawing 5-30.

Structure 4 is a rectangular pond located at the south end of the permit area that is approximately 90 feet wide by 582 feet long and 12 feet deep. This impoundment will be incised into the existing ground. Part of the excavation will be used to construct a 12 foot wide embankment. The spillway will be an open channel that will have rip-rap min. 6. This pond will control storm water runoff from a watershed of approximately 96 acres. The cleanout and spillway elevation are 6822' and 6834', respectively. Top of the embankment is at elevation 6838'. Details for the design can be viewed on Drawing 5-31.

Open channel spillway details for impoundments 3 and 4 are provided in Drawing 5-32. These spillways are designed for emergencies and are not expected to be used during normal operations.

Six impoundments (one temporary for Area 1 expanded) are proposed to control storm water runoff and sediment from disturbed areas of the North Private Lease. Prior to removal of topsoil and construction of these impoundments, silt fences will be installed at the down gradient disturbance boundary for each impoundment. Once construction has been completed these silt fences can be replaced with excelsior logs for long term sediment control. Each impoundment is designed to contain at minimum the run off from a 10 year, 24 hour duration storm event. The locations of the impoundments and the associated watersheds can be viewed on Drawing 5-65 and 5-65A. Additionally, as depicted on drawings 5-47, 5-48, 5-48A and 5-65, a silt fence or berm will be constructed along the eastern boarder of Area 1.

The following table summarizes the final capacity results for each impoundment:

North Private Lease Sedimentation Impoundment Capacities				
Structure	Storage Required (ac/ft)	Design Storage* (ac/ft)	Percent of requirement	Additional Storage (ac/ft)
5	1.28	1.55	122	0.28
6	1.43	3.15	220	1.71
7	8.07	19.26	239	11.19
8	1.66	7.49	450	5.81
9	2.73	3.42	125	0.68
T1	0.81	1.85	139	0.69

Structure 5 is a trapezoid impoundment 8 feet in depth. This impoundment will control storm water runoff from the western side of the permit area were mining will begin. The impoundment will be constructed with an 18" primary spillway with an oil skimmer and an open channel secondary spillway that will have 6" D50 rip-rap. This impoundment will be incised into the existing ground. Part of the excavated material will be utilized to construct an embankment on the down grade side to provide a minimum of 2 feet freeboard. This pond will control storm water from a watershed of approximately 18.8 acres. The cleanout and spillway elevation are 6840' and 6848' respectively. The top of the embankment is at elevation 6850'. Details for the design can be viewed on Drawing 5-67.

Structure 6 is a trapezoid impoundment 8 feet in depth. This impoundment will control storm water runoff from the western side of the permit area were mining will begin. The impoundment will be constructed with an 18" primary spillway with an oil skimmer and an open channel secondary spillway that will have 6" D50 rip-rap. This impoundment will be incised into the existing ground. Part of the excavated material will be utilized to construct an embankment on the down grade side to provide a minimum of 2 feet freeboard. This pond will control storm water from a watershed of approximately 24.0 acres. The cleanout and spillway elevation are 6858' and 6866' respectively. The top of the embankment is at elevation 6868'. Details for the design can be viewed on Drawing 5-68.

Structure 7 is a square impoundment 8 feet in depth. This impoundment will control storm water runoff from the western side of the permit area were mining will begin. The impoundment will be constructed with a 24" primary spillway with an oil skimmer and an open channel secondary spillway that will have 9" D50 rip-rap. This impoundment will be incised into the existing ground. Part of the excavated material will be utilized to construct an embankment on the down grade side to provide a minimum of 2 feet freeboard. This pond will control storm water from a watershed of approximately 133.9 acres. The cleanout and spillway elevation are 6840' and 6848' respectively. The top of the embankment is at elevation 6850'. Details for the design can be viewed on Drawing 5-69.

Structure 8 is a triangle impoundment 10 feet in depth. This impoundment will control storm water runoff from the western side of the permit area were mining will begin. The impoundment will be constructed with an 18" primary spillway with an oil skimmer and an open channel secondary spillway that will have 6" D50 rip-rap. This impoundment will be incised into the existing ground. Part of the excavated material will be utilized to construct an embankment on the down grade side to provide a minimum of 2 feet freeboard. This pond will control storm water from a watershed of approximately 28.4 acres. The cleanout and spillway elevation are 6884' and 6894' respectively. The top of the embankment is at elevation 6896'. Details for the design can be viewed on Drawing 5-70.

Structure 9 is a triangle impoundment 8 feet in depth. This impoundment will control storm water runoff from the western side of the permit area were mining will begin. The impoundment will be constructed with an 18" primary spillway with an oil skimmer and an open channel secondary spillway that will have 6" D50 rip-rap. This impoundment will be incised into the existing ground. Part of the excavated material will be utilized to construct an embankment on the down grade side to provide a minimum of 2 feet freeboard. This pond will control storm water from a watershed of approximately 23.6 acres. The cleanout and spillway elevation are 6856' and 6864' respectively. The top of the embankment is at elevation 6866'. Details for the design can be viewed on Drawing 5-71.

Structure T1 is a trapezoid impoundment 8 feet in depth. This temporary impoundment will control storm water runoff from Area 1 expanded for pits 7, 8, and 9. The impoundment will not be equipped with a spillway. Instead, the impoundment will be drained as necessary via an engineered pump and pipeline system, and discharged into existing structure 6. This impoundment will be incised into the existing ground. Part of the excavated material will be utilized to construct an embankment on the down grade side to provide a minimum of 2 feet freeboard. This pond will control storm water from a watershed of approximately 14.4 acres. The top of the embankment is at elevation 6874'. Details for the design can be viewed on Drawing 5-71A.

The outer slopes of the impoundments will be sloped to a maximum grade of 3h:1v. Inside slopes will be graded to a maximum 2h:1v. The slopes will be graded and revegetated for erosion control.

No underground mine workings exist near or under the impoundment structures; therefore, subsidence surveys are not provided.

Geologic data for the area where impoundments will be located consists of mainly fine grained alluvium with high clay content. Seepage from the impoundments is expected to be minimal based on the high clay content of the existing materials. Characterization of the soils is contained in Chapter 2. Acid and Toxic analysis of the soils indicates that water seeping through the alluvium layer will not result in reducing water quality. The acid and toxic analysis for the alluvium can be viewed in Appendix 6-2.

Hydrologic data for the permit area is provided in Appendix 7-1. This data indicates that there will be some seepage through the subsurface that may travel to adjacent drainages. The quantities for this seepage are expected to be minimal and will have minimal impact to the overall hydrologic balance. Even though seepage may occur, analysis of the soils indicates that water quality will not be diminished.

Sedimentation ponds have been designed in compliance with the requirements of R645-301-356.300, R645-301-356.400, R645-301-513.200, R645-301-742.200 through R645-301-742.240, and R645-301-763.

No sedimentation ponds or earthen structures that will remain open are planned.

The sedimentation plan has been designed to comply with the MSHA requirements given under R645-301-513.100 and R645-301-513.200.

The diversions ditches for the Coal Hollow Mine will be utilized to direct runoff from disturbed areas to the sediment impoundments. The channel sizing for the four diversion ditches has been evaluated using the TR-55 method to determine peak flows and the Manning's Equation (ME) to determine appropriate dimensions. The TR-55 method of analysis is the same method used to size impoundments and was utilized in this case to provide a peak flow for each diversion during a 10~~0~~ year, ~~24~~ 6 hour storm event. This peak flow was then input into the ME to determine an appropriate open channel design for minimizing the effects of erosion during peak flows. Similar to the impoundment sizing, the Carlson Software Hydrology module was utilized to perform these calculations. The ditch locations, designs and cross sections can be viewed on Drawings 5-33 and 5-34.

The following table summarizes the inputs and results for each diversion based on flows during a 10~~0~~ year, ~~24~~ 6 hour storm event:

Coal Hollow Mine Diversion Ditch Summary							
Ditch	*Base (ft)	Manning's n	Average Slope (%)	Peak Flow (cfs)	Flow Depth (ft)	Velocity (fps)	Freeboard (ft)
1	~~3.0~~0.0	0.~~020~~025	2.~~8~~33	~~14.8~~0.72	0.~~5~~11	~~6.8~~2.00	0.~~3~~5
2	2.5	0.020	3.5	6.9	0.4	6.0	0.3
3	~~4.5~~0.0	0.~~020~~025	2.4	~~16.7~~0.48	0.~~5~~.07	~~6.3~~1.51	0.~~3~~5
4	~~5.0~~0.0	0.~~020~~025	~~1.8~~3.09	~~19.8~~3.30	0.~~6~~.19	~~5.4~~3.26	0.~~3~~5
4-A-D	0.0	0.025	2.86	3.25	0.62	4.27	0.5
4-A-R	0.0	0.025	1.18	0.84	0.44	2.19	0.5
4-A-U	0.0	0.025	1.41	0.37	0.31	1.90	0.5
B-1T-U	0.0	0.~~020~~025	1.0	~~11.42~~2.87	~~1.1~~0.75	~~4.7~~2.87	0.5
B-1T-L	0.0	0.~~020~~025	4.8	**~~32.45~~6.68	~~1.2~~0.82	~~10.9~~6.68	0.5

*All side slopes are 2h:1v
**Total flow from both watersheds

The diversions ditches for the North Private Lease will be utilized to direct runoff from disturbed areas to the sediment impoundments. The channel sizing for the fifteen diversion ditches, with two temporary diversion ditches that will be mined through in Area 1 once Area 2 is approved, has been evaluated using the TR-55 method to determine peak flows and the Manning's Equation (ME) to determine appropriate dimensions. The TR-55 method of analysis is the same method used to size impoundments and was utilized in this case to provide a peak flow for each diversion during a 10 year, 6 hour storm event. This peak flow was then input into the ME to determine an appropriate open channel design for minimizing the effects of erosion during peak flows. The ditch locations, designs and cross sections can be viewed on Drawings 5-65, 5-65A, 5-72 and 5-73. Of special note, the evacuated material for UD-14 will be placed on the disturbed

area side of the ditch to form a berm which will provide a distinct boundary between disturbed and undisturbed.

The following table summarizes the inputs and results for each diversion based on flows during a 10 year, 6 hour storm event:

North Private Lease Diversion Ditch Summary							
Ditch	*Base (ft)	Manning's n	Average Slope (%)	Peak Flow (cfs)	Flow Depth (ft)	Velocity (fps)	Freeboard (ft)
DD-5	0.0	0.025	5.21	0.60	0.29	3.50	0.71
DD-6	0.0	0.025	6.22	0.20	0.19	2.85	0.81
DD-7	0.0	0.025	4.84	0.28	0.22	2.82	0.78
DD-8	0.0	0.025	5.16	0.28	0.22	2.89	0.78
DD-9	0.0	0.025	8.42	0.80	0.30	4.51	0.70
DD-10	0.0	0.025	2.67	0.80	0.37	2.93	0.63
DD-11	0.0	0.025	6.07	0.51	0.27	3.56	0.83
DD-12	0.0	0.025	7.00	1.15	0.35	4.61	0.65
DD-13	0.0	0.025	2.23	3.77	0.68	4.04	0.82
UD-14	0.0	0.025	0.27	1.07	0.63	1.34	0.87
UD-15	0.0	0.025	7.35	0.10	0.14	2.55	0.86
DD-16	0.0	0.025	2.15	4.54	0.74	4.17	0.76
DD-17	0.0	0.025	2.12	1.28	0.46	3.02	0.34
UD-18	0.0	0.025	12.06	0.20	0.17	3.65	0.83
UD-19	0.0	0.025	1.99	0.59	0.35	2.43	0.65
DD-T1-01	0.0	0.025	4.00	0.17	0.19	2.32	0.69
DD-T1-02	0.0	0.025	2.86	0.35	0.27	2.45	0.77

*All side slopes are 2h:1v

The sedimentation plan has been designed to comply with the MSHA requirements given under R645-301-513.100 and R645-301-513.200.

These structures will retain sediment within the disturbed area. The diversion ditches are designed in manner that will minimize erosion of the channels and will divert runoff from disturbed areas to the impoundments. These sediment control measures are designed to meet the effluent limitations under R645-301-751.

742.126

Water encountered underground will be stored and treated as needed in underground sumps. It is anticipated most or all of such water would be utilized in the underground mining operation. Excess water would only be discharged after meeting applicable UPDES standards.

742.200 Siltation Structures

Siltation structures have been designed in compliance with the requirements of R645-301-742.

Miscellaneous controls such as silt fence and berms are proposed for specific areas. The proposed locations for these structures are shown on Drawing 5-26. Details associated with these structures can be viewed on Drawings 5-25 through 5-34 and Appendix 5-2 for the Coal Hollow Mine. The proposed locations for these structures are shown on Drawing 5-47. Details associated with these structures can be viewed in Appendix 5-13 for the North Private Lease.

742.210 General Requirements

Additional contributions of suspended solids and sediment to streamflow or runoff outside the permit area will be prevented to the extent possible using the best technology currently available. Siltation structures for an area will be constructed before beginning any coal mining and reclamation operations in that area and, upon construction, will be certified by a qualified registered professional engineer to be constructed as designed and as approved in the reclamation plan. Any siltation structures which impounds water will be designed, constructed and maintained in accordance with R645-301-512.240, R645-301-514.300, R645-301-515.200, R645-301-533.100 through R645-301-533.600, R645-301-733.220 through R645-301-733.224, and R645-301-743.

The primary controls for limiting suspended solids and sediment to stream flow and runoff outside the permit area is sediment impoundments and diversions ditches. The proposed system described in section 742.110 is designed to control storm water/runoff discharges from the disturbed areas. Discharges from this system are expected to be minimal and infrequent. Discharges that may occur will comply with R645-301-751.

The impoundment and ditch system will be inspected regularly and discharges will be sampled for water quality purposes.

742.212

Siltation structures including ponds and ditches will be the first features built when beginning a new area.

742.214

Water encountered underground will be stored and treated as needed in underground sumps. It is anticipated most or all of such water would be utilized in the underground mining operation. Excess water would only be discharged after meeting applicable UPDES standards.

742.220 Sedimentation Ponds.

742.221.1 The proposed sediment ponds are designed to be used individually

742.221.2 The locations for the sediment ponds were selected to be as near as possible to the disturbed areas and are not located in perennial streams

742.221.3 The ponds are designed and will be constructed and maintained to:

742.221.31 The ponds for the Coal Hollow Mine have been designed with excess capacity ~~by at least 15% to allow~~ for at least 3 years ~~adequate~~ calculated sediment storage volume. The following table provides the design capacities in relation to a 24 hour duration, 10~~0~~ year storm event:

Coal Hollow Mine Sedimentation Impoundment Capacities				
Structure	Storage Required (ac/ft)	Design Storage* (ac/ft)	Percent of requirement	Additional Storage (ac/ft)
1	2.~~6~~86	3.~~2~~1	~~123~~108	0.62
2	1.7	2.3	135	0.6
3	~~6.3~~14.89	~~12.6~~15.0	~~200~~101	~~6.3~~0.1
4	~~2.1~~4.83	5.5	~~261~~114	~~3.4~~0.7
1B	0.~~5~~66	0.8	~~160~~121	0.~~3~~1

The ponds for the North Private Lease have been designed with excess capacity to allow for 3 years of sediment storage volume. The following table provides the design capacities in relation to a 24 hour duration, 10 year storm event:

North Private Lease Sedimentation Impoundment Capacities				
Structure	Storage Required (ac/ft)	Design Storage* (ac/ft)	Percent of requirement	Additional Storage (ac/ft)
5	1.28	1.55	122	0.28
6	1.43	3.15	220	1.71
7	8.07	19.26	239	11.19
8	1.66	7.49	450	5.81
9	2.73	3.42	125	0.68
T1	0.81	1.50	185	0.69

These sedimentation ponds will be surveyed at least annually to ensure that sufficient sediment storage is available in the impoundment. Sediment will be removed from the ponds as required based on results from the surveys. Calculations related to these design capacities can be viewed in Appendix 5-2 for the Coal Hollow Mine and in Appendix 5-12 &5-12A for the North Private Lease. Stage-Storage curves for each pond can be viewed on Drawings 5-28 through 5-31 and 5-67 through 5-71A.

742.221.32 The sedimentation ponds in the Coal Hollow Mine are designed to provide detention for a 10~~0~~ year, 24 hour duration storm event. Calculations for this design can be viewed in Appendix 5-2. The sedimentation ponds in the North Private Lease are designed to provide detention for a 10 year, 24 hour duration storm event. Calculations for this design can be viewed in Appendix 5-12 & 5-12A. This design standard is expected to keep discharges from the structure at a minimum and allow adequate settlement time to meet Utah and federal effluent limitations. In the event it becomes necessary to decant water to satisfy the required storage volumes, ACD will use a 4" gasoline driven pump to decant excess water. Temporary Pond T1 has additional specifications for the pumping system; the pipeline will be 4" black polyethylene pipe approximately 1760' in length, pump will be capable of moving a minimum of 0.5 cfs of water at a total head of 75' and pipe will discharge onto existing rip-rap in Sediment Pond 6 as found in Appendix 5-12A. Water will be required to remain in the pond for a minimum of 24 hours prior to the beginning of decant operations and be discharged through the discharge point approved under UPEDES permit No. UTG25992 following all applicable monitoring protocol under this permit.

742.221.33 The sedimentation ponds at the Coal Hollow Mine are designed for a 10~~0~~ year, 24 hour storm event ~~which significantly exceeds a 10 year, 24 hour precipitation event~~. ~~The 100 year, 24 hour event in the Alton area is 3.1 inches of precipitation.~~ The sedimentation ponds at the North Private Lease are designed for a 10 year, 24 hour storm event. The 10 year, 24 hour precipitation event in this same location is approximately 2.~~0~~ 39 inches of precipitation. ~~The design standard used for the Coal Hollow project is 155% of the precipitation for the required "design event".~~

742.221.34 Each pond will be constructed with an emergency spillway, should the capacities of the ponds ever be exceeded with the exception of temporary pond T1A which will be equipped with a pumping system (Appendix 5-12A). These spillways will provide a nondestructive route for storm water discharge, though the capacities of the ponds are not expected to be exceeded. The design capacities of the ponds are expected to contain each storm event and therefore will provide sufficient detention time to meet Utah and federal effluent limitations. The following is a description of each spillway:

Impoundments 3 and 4 will be constructed with open channel spillways. These spillways are designed to discharge a 24 hour duration, 100 year storm event even though they are not expected to be used during normal operations. They will have rip-rap min. 6" to minimize erosion and spillway slopes will not exceed 3h:1v. Drawing 5-32 provides the details for the open channel spillways.

Impoundments 1, 1B, and 2 will be constructed with a drop pipe spillway system. Storm water and snow melt that occurs within the associated watersheds will be routed to these impoundments to contain sediment. These impoundments will have the drop-pipe spillways installed which will allow removal of any oil sheens that may result from parking lots, primary roads or maintenance activities by using absorbent materials to remove the sheen. The drop-pipe spillways are 24" diameter pipes that are vertical in the impoundment. These pipes have a metal cover over the end. This cover is recessed over the pipe by at least an inch, with a gap between the cover and the pipe. This leaves a route for water to discharge once the impoundment is full but prevents debris or pollutants located on the water surface from discharging. This system was chosen for these two impoundments based on their locations in relation to the facilities and primary roads. This discharge system will be constructed for precautionary measures only since pollutants are not expected in the impoundments during normal operations.

Impoundments 5, 6, 7, 8 and 9 will be constructed with a drop pipe primary spillway and an open channel emergency spillways system. Storm water and snow melt that occurs within the associated watersheds will be routed to these impoundments to contain sediment. The drop-pipe spillways are 18" diameter pipes for impoundments 5, 6, 8 and 9 and a 24" diameter pipe for impoundment 7 that are vertical in the impoundment. These pipes have a metal cover over the end. This cover is recessed over the pipe by at least an inch, with a gap between the cover and the pipe. This leaves a route for water to discharge once the impoundment is full but prevents debris or pollutants located on the water surface from discharging. The open channel emergency spillways are designed to discharge a 6 hour duration, 25 year storm event even though they are not expected to be used during normal operations. Impoundments 5, 6, 8 and 9 will have 6" rip-rap (D-50) and impoundment 7 will have 9" rip-rap (D-50) with erosion control fabric beneath to minimize erosion and spillway slopes will not exceed 3h:1v

Impoundment T1 will not be equipped with a spillway. Instead, the impoundment will be drained as necessary via an engineered pump and pipeline system, and discharged into existing structure 6. Details can be found in Appendix 5-12A.

742.221.35 Regular inspections of the sediment pond system during construction and operations will identify any deficiencies that could cause short circuiting. Design standards for the system will ensure proper functioning during extreme storm events which makes it highly unlikely that issues related to short circuiting could occur during normal operations.

742.221.36 Surveys of the pond system will be conducted at least annually. These surveys will be compared against the required "design event" capacity for each pond. Sediment removal will occur as needed to maintain the required capacity.

742.221.37 Geologic conditions in the areas where sediment ponds will be constructed are suitable to the proposed use. Excessive settling of the ponds is not expected based on the high clay content of the soils. Embankments will be constructed in maximum two foot lifts to promote compaction during the construction process, reducing settling during operations. Supporting data for compaction can be viewed in Appendix 5-1.

742.221.38 Any sod, large roots, and/or frozen soil will be removed from sedimentation ponds. No coal processing will be conducted as part of the Coal Hollow Project; therefore wastes from this type of process will not be present.

742.221.39 Embankments will be constructed in maximum two foot lifts to promote compaction during the construction process, reducing settling during operations. Supporting data for this compaction method can be viewed in Appendix 5-1.

742.222 Sedimentation ponds for the Coal Hollow Mine or the North Private Lease do not meet the size or other qualifying standard for MSHA, 30 CFR 77.216(a).

742.223 Each sedimentation pond at the Coal Hollow Mine will be constructed with a spillway that will function as both the emergency and principle spillway. Each of these spillways will safely discharge a 25 year, 6 hour precipitation event. The following table summarizes the spillway discharge designs in relation to the 25 year, 6 hour precipitation event:

Sediment Impoundment – Spillway Flow Capacities		
Impoundment	Required Spillway Discharge (cfs)	Designed Spillway Discharge (cfs)
1	30.4	37.4
2	0.8	30.5
3	2.8	11.5
4	2.4	11.5
1B	6.06	23.9

The drop pipe spillways for impoundments 1, 1B, and 2 will be of nonerodible construction. The open channel spillways for impoundments 3 and 4 will be rip-rap min. 6" and are designed to carry short-term,

infrequent flows at non erosive velocities where sustained flows are not expected.

742.224 Each sedimentation pond at the North Private Lease will be constructed with a principle spillway and an emergency spillway with the exception of T1 which will have an pumping system (Appendix 5-12A). Each of these spillways will safely discharge a 25 year, 6 hour precipitation event. The following table summarizes the spillway discharge designs in relation to the 25 year, 6 hour precipitation event:

Sediment Impoundment – Primary Spillway Flow Capacities		
Impoundment	Required Spillway Discharge (cfs)	Designed Spillway Discharge (cfs)
5	2.23	9.66
6	2.85	9.66
7	10.11	20.80
8	3.42	9.66
9	3.60	9.66

The drop pipe spillways for all impoundments will be of nonerodible construction. The open channel spillways for impoundments 5, 6, 8 and 9 will be rip-rap (D50) 6" underlain with erosion fabric and are designed to carry sustained flows. The open channel spillways for impoundment 7 will be rip-rap (D50) 9" underlain with erosion fabric and is designed to carry sustained flows. Impoundment T1 will not be equipped with a spillway. Instead, the impoundment will be drained as necessary via an engineered pump and pipeline system, and discharged into existing structure 6. Details can be found in Appendix 5-12A.

742.225 Either the requirements of 742.223.1 or 742.223.2 will be met for each sediment impoundment.

742.226 No exceptions to the sediment pond location guidance are requested

742.230 Other Treatment Facilities

If other treatment facilities become necessary, they will be designed to treat the 10-year, 24-hour precipitation event unless a lesser design event is approved by the Division based on terrain, climate, other site-specific conditions and a demonstration by the operator that the effluent limitations of R645-301-751 will be met.

No other treatment facilities are planned for the Coal Hollow Project.

742.240 Exemptions

Not Applicable

742.300 Diversions

742.310 General Requirements

742.311 There are no flows from mined areas that have been abandoned prior to May 3, 1978 at the Coal Hollow Project. Diversions at the Coal Hollow Project are planned to minimize water from disturbed areas from directly discharging into drainages without first being treated and to also prevent water from upland, adjacent areas from entering the project area. Four temporary diversion ditches are planned and one temporary diversion of Lower Robinson Creek. Two diversions will be primarily used to route water from upland, undisturbed areas away from the planned disturbed areas. Diversion ditch 2 has been split to minimize the amount of water from upland routed to Pond 2 (see drawing 5-34), 2B will route water from upland to Lower Robinson Creek and 2A will route water from disturbed area to Pond 2. Diversion ditch 4 is planned to direct water from disturbed areas into sediment impoundment Pond 4. The temporary diversion of Lower Robinson Creek is for maximum recovery of coal and will route flows around the mining area. Each temporary diversion has been designed to only carry runoff from areas that will or potentially could be affected by the mining operations, except Lower Robinson Creek diversion which will carry intermittent flows from the upstream watershed. Diversion locations were selected to generally carry runoff to the drainage paths that the precipitation would originally follow. These parameters were followed in the designs to minimize impacts to the overall hydrological balance within the permit and adjacent areas. Diversions will not be used to route water into underground mines. Specific design parameters are discussed in the following sections (R645-301-742.312.1 to 742.314). There are no flows from mined areas that have been abandoned prior to May 3, 1978 at the North Private Lease. Diversions at the North Private Lease are planned to minimize water from disturbed areas from directly discharging into drainages without first being treated and to also prevent water from upland, adjacent areas from entering the project area. Fifteen temporary diversion ditches are planned. Four diversions will be primarily used to route water from upland, undisturbed areas away from the planned disturbed areas. Each temporary diversion has been designed to only carry runoff from areas that will or potentially could be affected by the mining operations. Diversion locations were selected to generally carry runoff to the drainage paths that the precipitation would originally follow. These parameters were followed in the designs to minimize impacts to the overall hydrological balance within the permit and adjacent areas. Diversions will not be used to route water into

underground mines. Specific design parameters are discussed in the following sections (R645-301-742.312.1 to 742.314).

742.312

The construction of and the operational activities at the proposed alluvial groundwater interceptor trench systems will be performed according to good engineering practices and in compliance with all applicable State and Federal rules. To ensure the safety of construction personnel during construction of the drain systems, work will be performed primarily by the equipment operators from within the operator compartments of the employed equipment. Equipment operators will be adequately trained on the hazards associated with the excavation work at the drain sites. Construction personnel will not be allowed to enter excavated trench areas during the drain construction operations other than as allowed by applicable State and Federal laws and regulations. Where necessary, work outside of equipment operator compartments will be performed in a prudent and safe manner. The excavated drain areas will be promptly backfilled after the drain construction materials have been emplaced.

A physical barrier will be constructed and maintained at alluvial groundwater interceptor drain discharge structures to prevent mine personnel from falling into the discharge structure.

742.312 Each diversion in the Coal Hollow Mine was designed to ensure stability and to minimize erosion. In order to accomplish this standard, the diversions were each designed for peak flows during a 10~~0~~ year, 24 hour storm event. The following summarizes the steps used:

The channel sizing for the ~~six~~ nine proposed temporary diversion ditches has been evaluated using the TR-55 method to determine peak flows and the Manning's Equation (ME) to determine appropriate dimensions. The TR-55 method of analysis is the same method used to size impoundments and was utilized in this case to provide a peak flow for each diversion during a 10~~0~~ year, ~~24~~ 6 hour storm event. This peak flow was then input into the ME to determine an appropriate open channel design for minimizing the effects of erosion during peak flows. Similar to the impoundment sizing, the Carlson Software Hydrology module was utilized to perform these calculations. The ditch locations, designs and cross sections can be viewed on Drawings 5-33 and 5-34.

The following table summarizes the inputs and results for each diversion based on flows during a 10~~0~~ year, ~~24~~ 6 hour storm event:

Diversion Ditch Summary							
Ditch	*Base (ft)	Manning's n	Average Slope (%)	Peak Flow (cfs)	Flow Depth (ft)	Velocity (fps)	Freeboard (ft)
1	~~3.0~~0.0	0.~~020~~025	2.~~8~~33	~~14.8~~0.72	0.~~5~~11	~~6.8~~2.00	0.~~3~~5
2	2.5	0.020	3.5	6.9	0.4	6.0	0.~~3~~5
3	~~4.5~~0.0	0.~~020~~025	2.4	~~16.7~~0.48	0.~~5~~07	~~6.3~~1.51	0.~~3~~5
4	~~5.0~~0.0	0.~~020~~025	~~1.8~~3.09	~~19.8~~3.30	0.~~6~~19	~~5.4~~3.26	0.~~3~~5
	0.0	0.025	2.86	3.25	0.62	4.27	0.5
	0.0	0.025	1.18	0.84	0.44	2.19	0.5
	0.0	0.025	1.41	0.37	0.31	1.90	0.5
B-1T-U	0.0	0.020	1.0	~~11.42~~2.87	~~1.1~~0.75	~~4.7~~2.87	0.5
B-1T-L	0.0	0.020	4.8	**~~32.45~~6.68	~~1.2~~0.82	~~10.9~~6.68	0.5

*All side slopes are 2h:1v
**Total flow from both watersheds.

The diversions ditches for the North Private Lease will be utilized to direct runoff from disturbed areas to the sediment impoundments. The channel sizing for the fifteen diversion ditches, with two temporary diversion ditches that will be mined through in Area 1 once Area 2 is approved, has been evaluated using the TR-55 method to determine peak flows and the Manning's Equation (ME) to determine appropriate dimensions. The TR-55 method of analysis is the same method used to size impoundments and was utilized in this case to provide a peak flow for each diversion during a 10 year, 6 hour storm event. This peak flow was then input into the ME to determine an appropriate open channel design for minimizing the effects of erosion during peak flows. The ditch locations, designs and cross sections can be viewed on Drawings 5-65, 5-72 and 5-73. . Of special note, the evacuated material for UD-14 will be placed on the disturbed area side of the ditch to form a berm which will provide a distinct boundary between disturbed and undisturbed.

The following table summarizes the inputs and results for each diversion based on flows during a 10 year, 6 hour storm event:

North Private Lease Diversion Ditch Summary							
Ditch	*Base (ft)	Manning's n	Average Slope (%)	Peak Flow (cfs)	Flow Depth (ft)	Velocity (fps)	Freeboard (ft)
DD-5	0.0	0.025	5.21	0.60	0.29	3.50	0.71
DD-6	0.0	0.025	6.22	0.20	0.19	2.85	0.81
DD-7	0.0	0.025	4.84	0.28	0.22	2.82	0.78
DD-8	0.0	0.025	5.16	0.28	0.22	2.89	0.78
DD-9	0.0	0.025	8.42	0.80	0.30	4.51	0.70
DD-10	0.0	0.025	2.67	0.80	0.37	2.93	0.63
DD-11	0.0	0.025	6.07	0.51	0.27	3.56	0.83

DD-12	0.0	0.025	7.00	1.15	0.35	4.61	0.65
DD-13	0.0	0.025	2.23	3.77	0.68	4.04	0.84
UD-14	0.0	0.025	0.27	1.07	0.63	1.34	0.87
UD-15	0.0	0.025	7.35	0.10	0.14	2.55	0.86
DD-16	0.0	0.025	2.15	4.54	0.74	4.17	0.76
DD-17	0.0	0.025	2.12	1.28	0.46	3.02	0.34
UD-18	0.0	0.025	12.06	0.20	0.17	3.65	0.83
UD-19	0.0	0.025	1.99	0.59	.035	2.43	0.65
DD-T1-01	0.0	0.025	4.00	0.17	0.19	2.32	0.69
DD-T1-02	0.0	0.025	2.86	0.35	0.27	2.45	0.77

*All side slopes are 2h:1v

As shown in the above tables, flow depths will be shallow, flow velocity will be manageable for temporary flow conditions and sufficient freeboard will be present during a flood event. These conditions will provide diversion stability, protection against flooding and prevent to the extent possible additional contributions of suspended solids to streamflow outside the permit area. These diversions are designed to comply with all applicable local, Utah and federal laws and regulations. Further details related to the temporary diversion designs can be viewed in Appendix 5-2, Appendix 5-12 and Appendix 5-12A.

Based on the size of the watershed for Lower Robinson Creek, a different method of analysis was used than the method used for the other diversions. The HEC-1 program was used for this analysis and extra erosion protection has been included as part of the design. The channel was designed to safely handle the flows from a 100 year, 6 hour storm event. This diversion will be further discussed in section 742.320 Diversion of Perennial and Intermittent Streams.

742.313 The ~~six~~ nine temporary diversions at the Coal Hollow Mine will be reclaimed when they are no longer necessary. This will occur once final reclamation is determined to be - sufficient within the project area and the sediment impoundments are no longer needed. This is anticipated to occur in the fourth year of operations.

The Lower Robinson Creek temporary diversion will be constructed in a responsible manner. This diversion will experience some erosion during flood events but erosion rates are expected to be generally less than those in the original channel above and below the diversion. The detailed design for this diversion can be viewed in Drawings 5-20 and 21. Calculations related to this diversion design can be viewed in Appendix 5-3.

The fifteen temporary diversions at the North Private Lease will be reclaimed when they are no longer necessary. This will occur once final reclamation is determined to be sufficient within the project area and the sediment impoundments are no longer needed. This is anticipated to occur in the sixth year of operations. Two temporary diversion ditches associated with Area 1 will be mined through when Area 2 is approved and pond 7 is established.

742.320 Diversion of Perennial and Intermittent Streams.

742.321 Temporary diversion of one intermittent stream is planned for the Coal Hollow Project. The planned diversion is in a length of the stream that appreciable flows only occur during storm events and snow melt periods. This diversion is necessary to recover coal located in the northwest corner of the project area. The diversion would provide mining in an area that is 22 acres and contains approximately 400,000 tons of recoverable coal. Without this diversion, most of this area could not be mined.

742.322 The original unmodified channel immediately upstream and downstream from the Lower Robinson Creek diversion has excessive erosion and is not in stable condition. The channel has incised deeply and has developed into a channel that has a capacity significantly greater than any anticipated storm events. Since these conditions are not desirable for the area, the diversion design instead has dimensions that are suitable to pass a 100 year, 6 hour storm event in compliance with R645-301-742.323.

742.323 The temporary Lower Robinson Creek diversion has been designed to safely pass a 100 year, 6 hour storm event. The watershed for this drainage is 3.64 square miles and has a peak flow of 83.5 cubic feet per second during a 100 year, 6 hour event. Minimum dimensions for carrying this flow was found to be a channel that has the following dimensions:

Bottom width: 2 feet
Side slopes: 3h:1v
Minimum slope height: 3 feet (1 foot freeboard added)

Details related to the design calculations are provided in Appendix 5-3. Rip-rap will be appropriately placed to minimize erosion of the channel.

Cross sections of the channel design are shown in Drawing 5-21. As shown in the drawing, all sections of the diversions exceed the minimum design standard. A plan view of the diversion design can be viewed in Drawing 5-20.

Design drawings for post-mining drainage channels in the North Private Lease area are shown on Drawing 5-79. Typical channel sections are shown on Drawings 5-72 and 5-73. Channel calculations are shown in Appendix 5-12. As shown on Drawing 5-79, engineered channels include minimum 6-inch D50 Rip-Rap placed over erosion control fabric in steep stream reaches that would be susceptible to erosion.

742.324 Design of the Lower Robinson Creek Diversion has been certified by a qualified registered professional engineer.

742.330 Diversion of Miscellaneous Flows.

742.323

As part of the reclamation process, Lower Robinson Creek will be reconstructed to its approximate original location. The design for this reconstruction is shown on Drawings 5-20A and 5-21A. This design includes considerable improvements to the channel compared to the channel's current condition. The current condition is such that less than 25% of the channel within the disturbed area has a flood plain present and most of the slopes are near the angle of repose with fair to poor vegetative cover. The reconstructed sides of the channel for the entire length reconstructed. Sharp corners in the original alignment have been rounded to sinuous curve shapes and rip-rap will be installed in the bottom section of the channel to minimize erosion. The flood plain will be seeded and covered with erosion matting to control erosion until natural vegetative condition can be attained.

742.331 Diversion of miscellaneous flows at the Coal Hollow Mine is planned using ~~six~~ nine diversion ditches. Two diversions will be primarily used to route runoff from upland, undisturbed areas away from the planned disturbed areas. Diversion ditch 2 has been split to minimize the amount of water from upland routed to Pond 2 (see drawing 5-34), 2B will route water from upland to Lower Robinson Creek and 2A will route water from disturbed area to Pond 2. Diversion ditch 4, B-1T-U and B-1T-L are planned to direct water from disturbed areas into sediment impoundment Pond 3. The locations of these diversions along with the associated watersheds can be viewed on Drawings 5-27, 5-33 and 5-34. Calculations related to the diversions can be viewed in Appendix 5-2.

Diversion of miscellaneous flows at the North Private Lease is planned using fifteen diversion ditches. Four diversions will be primarily used to route runoff from upland, undisturbed areas away from the planned disturbed areas. The locations of these diversions along with the associated watersheds can be viewed on Drawings 5-63, and 5-64. Calculations related to the diversions can be viewed in Appendix 5-12.

742.332 Each diversion at the Coal Hollow Mine was designed for stability and to minimize erosion. In order to accomplish this standard, the diversions were each designed for peak flows during a 10~~0~~ year, ~~24~~ 6 hour storm event. The following summarizes the steps used:

The channel sizing for the ~~six~~ nine proposed temporary diversion ditches has been evaluated using the TR-55 method to determine peak flows and the Manning's Equation (ME) to determine appropriate dimensions. The TR-55 method of analysis is the same method used to size impoundments and was utilized in this case to provide a peak flow for each diversion during a 10~~0~~ year, ~~24~~ 6 hour storm event. This peak flow was then input into the ME to determine an appropriate open channel design for minimizing the effects of erosion during peak flows. Similar to the impoundment sizing, the Carlson Software Hydrology module was utilized to perform these calculations. The ditch locations, designs and cross sections can be viewed on Drawings 5-33 and 5-34.

The following table summarizes the inputs and results for each diversion based on peak flows during a 10~~0~~ year, ~~24~~ 6 hour storm event:

Diversion Ditch Summary							
Ditch	*Base (ft)	Manning's n	Average Slope (%)	Peak Flow (cfs)	Flow Depth (ft)	Velocity (fps)	Freeboard (ft)
1	~~3.0~~0.0	0.~~020~~025	2.~~8~~33	~~14.8~~0.72	0.~~5~~11	~~6.8~~2.00	0.~~3~~5
2	2.5	0.020	3.5	6.9	0.4	6.0	0.3
3	~~4.5~~0.0	0.~~020~~025	2.4	~~16.7~~0.48	0.~~5~~07	~~6.3~~1.51	0.~~3~~5
4	~~5.0~~0.0	0.~~020~~025	~~1.8~~3.09	~~19.8~~3.30	0.~~6~~19	~~5.4~~3.26	0.~~3~~5
4-A-D	0.0	0.025	2.86	3.25	0.62	4.27	0.5
4-A-R	0.0	0.025	1.18	0.84	0.44	2.19	0.5
4-A-U	0.0	0.025	1.41	0.37	0.31	1.90	0.5
B-1T-U	0.0	0.~~020~~025	1.0	~~11.42~~2.87	~~1.1~~0.75	~~4.7~~2.87	0.5
B-1T-L	0.0	0.~~020~~025	4.8	**~~32.45~~6.68	~~1.2~~0.82	~~10.9~~6.68	0.5

*All side slopes are 2h:1v
** Total flow from both watersheds

The diversions ditches for the North Private Lease will be utilized to direct runoff from disturbed areas to the sediment impoundments. The channel sizing for the fifteen diversion ditches, with two temporary diversion ditches that will be mined through in Area 1 once Area 2 is approved, has been evaluated using the TR-55 method to determine peak flows and the Manning's Equation (ME) to determine appropriate dimensions. The TR-55 method of analysis is the same method used to size impoundments and was utilized in this case to provide a peak flow for each diversion during a 10 year, 6 hour storm event. This peak flow was then input into the ME to determine an appropriate open channel design for minimizing the effects of erosion

during peak flows. The ditch locations, designs and cross sections can be viewed on Drawings 5-65, 5-72 and 5-73. . Of special note, the evacuated material for UD-14 will be placed on the disturbed area side of the ditch to form a berm which will provide a distinct boundary between disturbed and undisturbed.

The following table summarizes the inputs and results for each diversion based on flows during a 10 year, 6 hour storm event:

North Private Lease Diversion Ditch Summary							
Ditch	*Base (ft)	Manning's n	Average Slope (%)	Peak Flow (cfs)	Flow Depth (ft)	Velocity (fps)	Freeboard (ft)
DD-5	0.0	0.025	5.21	0.60	0.29	3.50	0.71
DD-6	0.0	0.025	6.22	0.20	0.19	2.85	0.81
DD-7	0.0	0.025	4.84	0.28	0.22	2.82	0.78
DD-8	0.0	0.025	5.16	0.28	0.22	2.89	0.78
DD-9	0.0	0.025	8.42	0.80	0.30	4.51	0.70
DD-10	0.0	0.025	2.67	0.80	0.37	2.93	0.63
DD-11	0.0	0.025	6.07	0.51	0.27	3.56	0.83
DD-12	0.0	0.025	7.00	1.15	0.35	4.61	0.65
DD-13	0.0	0.025	2.23	3.77	0.68	4.04	0.84
UD-14	0.0	0.025	0.27	1.07	0.63	1.34	0.87
UD-15	0.0	0.025	7.35	0.10	0.14	2.55	0.86
DD-16	0.0	0.025	2.15	4.54	0.74	4.17	0.76
DD-17	0.0	0.025	2.12	1.28	0.46	3.02	0.34
UD-18	0.0	0.025	12.06	0.20	0.17	3.65	0.83
UD-19	0.0	0.025	1.99	0.59	.035	2.43	0.65
DD-T1-01	0.0	0.025	4.00	0.17	0.19	2.32	0.69
DD-T1-02	0.0	0.025	2.86	0.35	0.27	2.45	0.77

*All side slopes are 2h:1v

As shown in the above tables, flow depths will be shallow, flow velocity will be manageable for temporary flow conditions and sufficient freeboard will be present during a flood event. These conditions will provide diversion stability, protection against flooding and prevent to the extent possible additional contributions of suspended solids to stream flow outside the permit area. These diversions are designed to comply with all applicable local, Utah and federal laws and regulations. Further details related to the temporary diversion designs can be viewed in Appendix 5-2 for the Coal Hollow Mine and Appendix 5-12 & 5-12A for the North Private Lease.

742.333 All ~~six~~ nine miscellaneous flow diversions planned for the Coal Hollow Mine are temporary and will be reclaimed when no longer necessary for sediment and storm water control. Therefore, the channels must safely pass the peak runoff from a 2 year, 6 hour event. As previously described, these diversions have been designed to pass a 10~~0~~ year, ~~24~~ 6 hour storm event ~~which significantly exceeds this required design standard~~. Precipitation from a 10~~0~~ year, ~~24~~ 6 hour storm event for this area is ~~3.1~~1.41 inches ~~while precipitation for the 2 year, 6 hour event is less than 1 inch~~.

All fifteen miscellaneous flow diversions planned for the North Private Lease are temporary and will be reclaimed when no longer necessary for sediment and storm water control. Two temporary diversion ditches associated with Area 1 expanded will be mined through when Area 2 is approved and pond 7 is established. Therefore, the channels must safely pass the peak runoff from a 2 year, 6 hour event. As previously described, these diversions have been designed to pass a 10 year, 24 hour storm event which significantly exceeds this required design standard. Precipitation from a 10 year, 24 hour storm event for this area is 2.39 inches while precipitation for the 2 year, 6 hour event is less than 1 inch.

742.400 Road Drainage

742.410 All Roads

742.411 To ensure environmental protection and safety appropriate for the planned duration and use, limits have been incorporated in the road designs for the Coal Hollow Project and the North Private Lease. These limits are applied to drainage control and culvert placement/sizing. These limits take into consideration the type and size of equipment planned for the operation. The following is a description of roads along with the design limits and standards that will be incorporated into construction:

Three primary Mine Haul roads at the Coal Hollow Mine are planned within the permit area. The first road extends from the coal unloading area to the first series of pits along the west side of the property. This road will be utilized for access to pits (pits shown on Drawing 5-10). This road will be approximately 1,~~400~~ 100 feet in length and will be utilized mainly during the first two years of mining. There will be ~~three~~ four culverts installed along this road all sized for a 100 year, ~~6~~ 24 hour storm event. The first culvert will be across a tributary of Lower Robinson Creek and will be a 36 inch corrugated steel pipe. The second culvert is the main crossing over Lower Robinson Creek and is a 96 inch

corrugated steel pipe. Both of these culverts have been sized based on analysis of the Lower Robinson Creek watershed. This analysis can be viewed in Appendix 5-3. The third culvert is a crossing over a diversion ditch that will route water mainly from disturbed areas along the south side of Lower Robinson Creek to a sediment impoundment. This culvert will be a 24 inch corrugated steel pipe.

The second road extends from the first road and proceeds southwest to join and run along a 1,200' section of the rebuilt County Road 136. ~~This section of road will be single lane travel only for all production equipment. The road then continues to the southwest to provide access to Pit B-1.~~ This road is approximately ~~4,750~~2,900 feet in total length. There are two culvert crossings along the County Road 136 portion of this road that are placed to match the original county specifications. These culverts will be 18 inch culverts sized to match the County Road 136 culverts originally in place.

The following specifications apply to these two Primary Mine Haul roads:

1) Roads will be approximately 80' in width
2) Approximately a 2% crown
3) Approximately one foot deep cut ditches along shoulders for controlling storm water
4) 18" of crushed rock or gravel for road surfacing, except for the section of the Pit B-1 access extending from County Road 136 to the pit. This section of road will utilize approximately 6" of crushed rock or gravel for road surfacing. This shallower depth of gravel will still provide the necessary benefits of dust control and sediment control for surface water runoff during a short usage life. For this section of road will be utilized for coal haulage for only around 2-3 months and the western half of it will be eventually mined out as part of the borrow area.
5) Cut and fill slopes of 1.5h:1v
6) Minimum fill over each culvert will be 2 times diameter of culvert
7) Berms placed as necessary along fills

The underground mine portal access and haul road ~~in Pit 10~~ will also be a primary road. This road is accessed from the main haul road from the coal unloading area. The underground access/haul road will be approximately 1,500' in length and will be constructed to the same specifications for the haul roads above, except that the road may be narrowed to a 40 foot width. A plan & profile of the as-built configuration for the underground access road is provided in Drawing 5-22I. This drawing will be updated when the portal area is re-established in subsequent Federal Block pits.

The ancillary roads will have similar specifications except surfacing will occur only as needed and may be narrowed to a 40 foot road width.

The location and details for all these roads can be viewed on Drawings 5-3 and 5-22 through 5-24.

In addition to the two primary Mine Haul roads, the road located within the facilities area is also classified as a primary road. This road is planned to be 24 feet wide with 24 inches of compacted sub base and 8 inches of compacted 1 inch minus gravel as surfacing. This road system will have six culverts and selectively located berms to appropriately route water to the two sediment impoundments for the facilities area. The location of these culverts and berms is shown on Drawing 5-3. This road is referred to as "Facilities Roadway" and more details are described in 527.200 along with Drawings 5-22A and 5-22B.

The ramps, benches and equipment travel paths within the active surface mining area are temporary in nature and will be relocated frequently as mining progresses. These temporary travelways are considered part of the pit due to their short term use, and are not individually designed nor engineered. They will be built and maintained to facilitate safe and efficient mine and reclamation operations.

All roads will be maintained on an as needed basis using motor graders, water trucks for dust suppression, and other equipment as necessary. Crushed stone and/or gravel will be used as a surface course for primary roads outside the active mining area, and may be used as needed for ramps and travelways within the pit. Should the roads be damaged by a catastrophic event, such as an earthquake or a flood, repairs will be made as soon as possible after the damage has occurred or the road will be closed and reclaimed.

Cut and fill slopes along the primary roads will be minimal and are not expected to cause significant erosion. The water from roads in the project area will not directly discharge to drainages outside the project area without first being treated by flowing through a sediment impoundment. In locations where there are culvert crossings (i.e. Lower Robinson Creek), the fills slopes will be stabilized by utilizing standard methods such as grass matting or straw wattles.

Transportation facilities for the North Private Lease will consist of two primary road, and miscellaneous ancillary/temporary roads. Drawings detail the designs and specifications for each one of the proposed facilities. The following is a description of each facility and a reference for the associated drawings:

- Roads: A primary haul road will extend from the entrance to the permit area to the North end of Pit 6. This road is approximately 1755 feet in length. This road is referred as the "North Pits Haul Road". The second primary haul road "Kanab Creek Crossing" extends from an intersection with the North Pits Haul Road and cross to the East side of Kanab Creek. This road is approximately 700 feet in length. There is one culvert crossing along this road to cross Kanab Creek. This culvert will be a 172 inch culvert sized for maximum anticipated flows in Kanab Creek.

The following specifications apply to these Primary mine haul roads:
1) Roads will be approximately 80' in width
2) Approximately a 2% crown
3) Approximately one foot deep cut ditches along shoulders for controlling storm water
4) 18" of crushed rock or gravel for road surfacing
5) Cut and fill slopes of 1.5 h:1v
6) Berms placed as necessary along fills

The ancillary roads will have similar specifications except surfacing will occur only as needed and may be narrowed to a 40 foot road width. A typical cross section for the ancillary roads can be viewed on Drawing 5-24.

The location and details for the Primary Mine Haul road can be viewed on Drawings 5-58, through 5-64.

The ramps, benches and equipment travel paths within the active surface mining area are temporary in nature and will be relocated frequently as mining progresses. These temporary travel ways are considered part of the pit due to their short term use, and are not individually designed nor engineered. They will be built and maintained to facilitate safe and efficient mine and reclamation operations.

742.412 No roads will be located in the channel of an intermittent or perennial stream.

742.413 Primary roads constructed utilized during mining operations have been designed and located to route runoff from the roads to the sediment impoundment system. By routing the runoff to this system, sedimentation and flooding downstream resulting from the roads will be minimized. All other roads located within the active mining area will also follow this standard and runoff from the roads will not be directly discharged to drainages outside the permit area.

742.420 Primary Roads

742.421 To minimize erosion, primary roads will be constructed with a rock surface with minimal cut and fill slopes. These roads are located in the most practicable, stable areas within the permit boundary and mostly outside of the designed pits. These locations can be reviewed on Drawing 5-22 through 5-22G. Further descriptions of these roads can be viewed in Section 742.423.1 and 742.111.

742.422 There are no stream fords by primary roads at the Coal Hollow Project.

742.423 Drainage Control

- 742.423.1 Three primary Mine Haul roads are planned within the permit area. The first road extends from the coal unloading area to the first series of pits along the west side of the property. This road will be utilized for access to pits (pits shown on Drawing 5-10). This road will be approximately 1,400 feet in length and will be utilized throughout mining. There will be three culverts installed along this road all sized for a 100 year, 24 hour storm event. The first culvert will be across a tributary of Lower Robinson Creek and will be a 36 inch corrugated steel pipe. The second culvert is the main crossing over Lower Robinson Creek and is a 96 inch corrugated steel pipe. Both of these culverts have been sized based on analysis of the Lower Robinson Creek watershed. This analysis can be viewed in Appendix A5-3. The third culvert is crossing over a diversion ditch that will route water mainly from disturbed areas along the south side of Lower Robinson Creek to a sediment impoundment. This culvert will be a 24 inch corrugated steel pipe.

  The second road extends from the first road and proceeds southwest to join and run along a 1,200' section of the rebuilt County Road 136. This section of road will be single lane travel only for all production equipment. The road then continues to the southwest to provide access to Pit B-1. This road is approximately 4,750 feet in total. There are two culvert crossings along the County Road 136 portion of this road that are placed to match the original county. These culverts will be 18 inch culverts sized to match the County Road 136 culverts originally in.

  The following specifications apply to these Primary mine haul roads:

  1) Roads will be approximately 80' in width
  2) Approximately a 2% crown
  3) Approximately one foot deep cut ditches along shoulders for controlling storm water
  4) 18" of crushed rock or gravel for road surfacing, except for the Pit B-1 access extending from County Road 136 to the pit. This section of the road will utilize approximately 6" of crushed rock or gravel for road surfacing. This shallower depth of gravel will still provide the necessary benefits of dust control and sediment control for surface water runoff during the short usage life. For this section of road will be utilized for coal haulage for only around 2-3 months and the western half of it will be eventually mined out as part of the borrow area.

5) Cut and fill slopes of 1.5 h:1v
6) Minimum fill over each culvert will be 2 times diameter of culvert
7) Berms placed as necessary along fills

The location and details for Primary Mine Haul roads can be viewed on Drawings 5-3 and 5-22 and 5-23.

In addition to the two roads primary Mine Haul roads, the road located within the facilities area is also classified as a primary road. This road is planned to be 24 feet wide with 24 inches of compacted sub base and 8 inches of compacted 1 inch minus gravel as surfacing. This road system will have four culverts and selectively located berms appropriately placed to route water to the two sediment impoundments for the facilities area. The location of these culverts and berms is shown on Drawing 5-3. This road is referred to as "Facilities Roadway" and more details are described in 527.200 along with Drawings 5-22A and 5-22B.

In addition to the primary roads that will be present during active mining, four additional roads are planned to exist postmining and are also classified as primary roads for this reason.

Roads that will remain postmining are the following:

- Road to Water Well with details shown on Drawing 5-22D
- Road to east C. Burton Pugh property with details shown on Drawing 5-22C
- County Road 136 (K3900) with details on Drawing 5-22E, 5-22F and 5-22G. This County road will be reconstructed within the permit area by Kane County. This reconstruction will occur concurrently with the final stage of reclamation as scheduled on Drawing 5-38 and is expected to be completed by the end of Year 4.
- Road to Swapp Ranch (same specification as the Water Well Road)

The location of these roads is shown on Drawings 5-37 along with the post mining topography. With the exception of the County Road, each road will be graded to complement the surrounding topography and drainages. Details for these roads are provided in the above referenced drawings.

County Road 136 will have a cut ditch on the up gradient side of the road as appropriate. The culvert located at the crossing of Lower Robinson Creek will remain. One culvert will be added at Station 21+66 as shown on Drawing 5-22E and two at Station 13+50 & 22+51 as shown on Drawing 5-22. For further details related to reestablishment of County Road 136, refer Drawings 5-22 through 5-22G and 5-35.

Transportation facilities for the North Private Lease will consist of two primary road, and miscellaneous ancillary/temporary roads. Drawings detail the designs and specifications for each one of the proposed facilities. The following is a description of each facility and a reference for the associated drawings:

- Roads: A primary haul road will extend from the entrance to the permit area to the North end of Pit 6. This road is approximately 1755 feet in length. This road is referred as the "North Pits Haul Road". The second primary haul road "Kanab Creek Crossing" extends from an intersection with the North Pits Haul Road and cross to the East side of Kanab Creek. This road is approximately 700 feet in length. There is one culvert crossing along this road to cross Kanab Creek. This culvert will be a 172 inch culvert sized for maximum anticipated flows in Kanab Creek.

  The following specifications apply to this Primary mine haul roads:

  1) Roads will be approximately 80' in width
  2) Approximately a 2% crown
  3) Approximately one foot deep cut ditches along shoulders for controlling storm water
  4) 18" of crushed rock or gravel for road surfacing
  5) Cut and fill slopes of 1.5 h: 1v
  6) Berms placed as necessary along fills

  The location and details for the Primary Mine Haul road can be viewed on Drawings 5-56 thru 5-58.
  The ramps, benches and equipment travel paths within the active surface mining area are temporary in nature and will be relocated frequently as mining progresses. These temporary travelways are considered part of the pit due to their short term use, and are not individually designed nor engineered. They will be built and maintained to facilitate safe and efficient mine and reclamation operations.

  In addition to the primary roads that will be present during active mining, two roads are planned to exist postmining and are also classified as primary roads for this reason.

  Roads that will remain postmining are the following:

  - County Road 136 (K3900) with details on Drawing 5-61. This County road will be reconstructed within the permit area by Kane County. This reconstruction will occur concurrently with the final stage of reclamation as scheduled on Drawing 5-76 and is expected to be completed by the end of Year 6.
  - McDonalds Road (same specification as the County Road 136) with details on Drawing 5-62. This reconstruction will occur concurrently with the final stage of reclamation as scheduled on Drawing 5-76 and is expected to be completed by the end of Year 6.

  The location of these roads is shown on Drawings 5-74 along with the post mining topography. With the exception of the County Road, each road will be graded to complement the surrounding topography and drainages. Details for these roads are provided in the above referenced drawings.

  742.423.2 Drainage pipes and culverts will be constructed on a minimum 2% grade to avoid plugging. Minimum fill over culverts will be 2 times

the diameter of the culvert itself to avoid collapsing. Grades going in and out of each culvert will be similar to the grade of the culvert itself to avoid erosion at the inlet and outlet.

742.423.3 Drainage ditches have been designed to pass a 100 year 24 hour storm event which will prevent uncontrolled drainage over the road surface and embankment. The watersheds associated with drainage in the project area are each relatively small (less than 400 acres) and are not expected to sustain flows that would carry significant debris through the project area. Therefore, trash racks and debris basins are not expected to be necessary at the Coal Hollow Project.

742.423.4 One natural intermittent stream channel is planned to be diverted. This channel is referred to as Lower Robinson Creek and this diversion will be temporary. A section of this stream runs across an area that is planned for mining.

The Lower Robinson Creek diversion has been designed to safely pass a 100 year, 6 hour storm event. The watershed for this drainage is 3.64 square miles and has a peak flow of 83.5 cubic feet per second during a 100 year, 6 hour event. Minimum dimensions for carrying this flow were found to be a channel that has the following dimensions:

Bottom width: 2 feet
Side slopes: 3h:1v
Minimum slope height: 3 feet (1 foot freeboard added)

Details related for the design calculations are provided in Appendix 5-3. Rip-rap will be appropriately placed to minimize erosion of the channel.

Cross sections of the channel design are shown in Drawing 5-21. As shown in the drawing, all sections of the diversions exceed the minimum design standard. A plan view of the diversion design can be viewed in Drawing 5-20. This diversion design is in accordance with R645-301-731.100 through R645-301-731.522, R645-301.600, R645-301-731.800, R645-301-742.300, and R645-301-751.

Design of the Lower Robinson Creek Diversion has been certified by a qualified registered professional engineer.

742.423.5 All stream crossings are planned to be culverts designed to pass the 100 year, 6 hour storm event. There are no plans to use fords as stream crossings. Calculations for culvert sizing can be found in Appendix 5-3 for the Coal Hollow Mine and in Appendix 5-12 for the North Private Lease.

743 IMPOUNDMENTS

743.100 General Requirements

Five temporary impoundments are planned at the Coal Hollow Project and ~~six~~ nine temporary impoundments for the North Private Lease. Design for these structures are shown in Drawings 5-28 through 5-32 and 5-67 thru 5-71A. These impoundments do not meet the criteria for Class B or C dams as specified in the U.S. Department of Agriculture, Natural Resources Conservation Service Technical Release 60.

743.110 None of the impoundments meet the criteria of MSHA, 30 CFR 77.216(a).

743.120 A professional engineer experienced in the design and construction of impoundments with assistance from a geotechnical expert has used current, prudent, engineering practices to design the proposed impoundments.

The plans have been certified and a detailed geotechnical analysis has been provided in Appendix 5-1 for the Coal Hollow Mine and Appendix 5-11 for the North Private Lease. The certifications, drawings and cross sections can be viewed in Drawings 5-25 through 5-31for the Coal Hollow Mine and Drawings 5-67 through 5-71A and Appendices 5-1, 5-2, 5-11, 5-12 and 5-12A for each area.

Each impoundment is designed with a minimum freeboard of 2 feet. Based on the size of the impoundments and the relatively small size of the associated watersheds, this amount of freeboard will be sufficient to prevent overtopping from waves and/or storm events. These impoundments do not meet the criteria for Class B or C dams.

743.130

Each impoundment with the exception of T1, will be constructed with a spillway that will function as both the emergency and principle spillway. Each of these spillways will safely discharge a 25 year, 6 hour precipitation event. The following table summarizes the spillway discharge designs in relation to the 25 year, 6 hour precipitation event:

Sediment Impoundment – Spillway Flow Capacities		
Impoundment	Required Spillway Discharge (cfs)	Designed Spillway Discharge (cfs)
1	30.4	37.4
2	0.8	30.5
3	2.8	11.5
4	2.4	11.5
1B	6.06	23.9
5	2.23	9.66
6	2.85	9.66
7	10.11	20.80
8	3.42	9.66

9	3.60	9.66

The drop pipe spillways for impoundments 1, 1B, 2, 5, 6 and 7 will be of nonerodable construction. The open channel spillways for impoundments 3 and 4 will be 6" minimum Rip Rap lined and are designed to carry short-term, infrequent flows at non erosive velocities where sustained flows are not expected. Impoundment T1A will not be equipped with a spillway. Instead, the impoundment will be drained as necessary via an engineered pump and pipeline system, and discharged into existing structure 6. Details can be found in Appendix 5-12A.

The impoundments at the Coal Hollow project do not meet the criteria for either Class B or C dams or MSHA CFR 77.216 (a).

743.140

A professional engineer or specialist experienced in the construction of impoundments will inspect impoundments. Inspections will be made regularly during construction, upon completion of construction, and at least yearly until removal of the structure or release of the performance bond. The qualified registered professional engineer will promptly, after each inspection, provide to the Division, a certified report that the impoundment has been constructed and maintained as designed and in accordance with the approved plan and the R645 Rules. The report will include discussion of any appearances of instability, structural weakness or other hazardous conditions, depth and elevation of any impounded waters, existing storage capacity, any existing or required monitoring procedures and instrumentation and any other aspects of the structure affecting stability. A copy of the report will be retained at or near the mine site.

The MRP does not contemplate construction of any impoundments meeting the NRCS Class B or C criteria for dams in TR-60, or the size or other criteria of 30 CFR Sec. 77.216.

743.200

No permanent impoundments are planned.

743.300

Design capacities for spillways exceed the 25 year, 6 hour event. The design capacities are provided in the table located in section R645-301-743.130.

744 DISCHARGE STRUCTURES

744.100

Each pond, with the exception of T1, will be constructed with an emergency spillway, should the capacities of the ponds ever be exceeded. These spillways will provide a nondestructive route for storm water discharge, though the capacities of the ponds are not expected to be exceeded. The design capacities of the ponds are expected to contain each storm event and therefore will provide sufficient detention time to meet Utah and federal effluent limitations. The following is a description of each spillway:

Impoundments 3 and 4 will be constructed with open channel spillways. These spillways are designed to discharge a 24 hour duration, 100 year storm event even though they are not expected to be used during normal operations. They will have rip-rap min. 6" to minimize erosion and spillway slopes will not exceed 3h:1v. Drawing 5-32 provides the details for the open channel spillways.

Impoundments 1, 1B, 2, 5, 6, 7, 8 and 9 will be constructed with a drop pipe spillway system. Storm water and snow melt that occurs within the associated watersheds will be routed to these impoundments to contain sediment. These impoundments will have the drop-pipe spillways installed which will allow removal of any oil sheens that may result from parking lots, primary roads or maintenance activities by using absorbent materials to remove the sheen. The drop-pipe spillways are 24" diameter pipes for impoundments 1,1B, 2 & 7 and 18" for impoundments 5, 6, 8 and 9 that are vertical in the impoundment. These pipes have a metal cover over the end. This cover is recessed over the pipe by at least an inch, with a gap between the cover and the pipe. This leaves a route for water to discharge once the impoundment is full but prevents debris or pollutants located on the water surface from discharging. This system was chosen for these two impoundments based on their locations in relation to the facilities and primary roads. This discharge system will be constructed for precautionary measures only since pollutants are not expected in the impoundments during normal operations.

The drop pipe spillways for impoundments 1, 1B, 2, 5, 6, 7, 8 and 9 will be of nonerodible construction. The open channel spillways for impoundments 3 and 4 will be rip-rap min. 6" and are designed to carry short-term, infrequent flows at non erosive velocities where sustained flows are not expected. The open channel spillways for impoundments 5, 6, 8 and 9 will be rip-rap (D50) 6", impoundment 7 will be rip-rap (D50) 9" and are designed to carry short-term, infrequent flows at non erosive velocities where sustained flows are not expected. These designs will minimize erosion and disturbance to the hydrologic balance.

Details related to these designs can be viewed in Drawings 5-28 through 5-32 for the Coal Hollow and Drawings 5-67 through 5-71 for the North Private Lease.

Impoundment T1 will not be equipped with a spillway. Instead, the impoundment will be drained as necessary via an engineered pump and pipeline system, and discharged into existing structure 6. Details can be found in Appendix 5-12A.

744.200

Standard engineering design procedures have been used in the design of the discharge structures along with standard mining industry best management practices that are commonly used at surface mining operations.

745 Disposal of Excess Spoil

745.100 General Requirements

Excess spoil will be placed in designated disposal areas within the permit area, in a controlled manner to minimize the adverse effects of leachate and surface water runoff from the fill on surface and ground waters; ensure permanent impoundments are not located on the completed fill. Small depressions may be created if approved by the Division if they are needed to retain moisture or minimize erosion, create and enhance wildlife habitat or assist revegetation, and if they are not incompatible with the stability of the fill; and adequately cover or treat excess spoil that is acid- and toxic-forming with nonacid nontoxic material to control the impact on surface and ground water is accordance with R645-301-731.300 and to minimize adverse effects on plant growth and the approved postmining land use.

If the disposal area contains springs, natural or manmade water courses or wet weather seeps, the fill design will include diversions and underdrains as necessary to control erosion, prevent water infiltration into the fill and ensure stability.

Details of proposed excess spoil disposal plans are presented in Chapter 5, Section 535 of this MRP and are summarized below.

A geotechnical analysis has been completed for the proposed excess spoil structure. This analysis estimates the long-term safety factor to be 1.6 to 1.7 based on the proposed design. Following proper construction practices of building the structure in maximum four foot lifts and meeting 85% compaction based on the standard Procter will ensure that the structure will be stable under all conditions of construction. This construction will occur only in the designated excess spoil area as shown on Drawing 5-3 and 5-35. The fill will be placed with end dump haul trucks and lifts will be constructed using dozers. High precision GPS systems will be regularly utilized to check grades and appropriate lift thickness. The geotechnical analysis for this structure can be viewed in Appendix 5-1.

The excess spoil is planned to be placed in an area where natural grades range from 0 to 5%. This is one of the most moderately sloping locations in the Permit Area. Stability of this structure is estimated to be 1.6 to 1.7 based on the Appendix 5-1.

Geotechnical borings were completed in the foundation of the proposed disposal area. Laboratory analysis of these borings has also been completed. Details of this analysis can be viewed in Appendix 5-1 for the Coal Hollow Mine and in Appendix 5-11 for the North Private Lease.

Permanent slopes for the proposed excess spoil will not exceed 3h:1v (33 percent), therefore no keyway cuts have been proposed in the design. Appendix 5-1 details the stability analysis for the proposed structure.

Excess spoil will not be disposed of in underground mine workings.

Horizontal lifts will not exceed four feet in thickness unless otherwise approved by the Division. The lifts will be concurrently compacted to meet 85% of the standard Procter. The geotechnical analysis (Appendix 5-1), provides information showing that these construction standards will provide mass stability and will prevent mass movement during and after construction. The excess spoil will be graded to provide drainage similar to original flow patterns. Topsoil and subsoil as designated in Chapter 2 will be removed and separated from other materials prior to placement of spoil.

A description of the character of the bedrock and any adverse geologic conditions in presented in Appendix 5-1.

Spring and seep survey information is provided on Drawing 7-1. There are no springs or seeps identified in the excess spoil area.

There are no historical underground mining operations in the proposed excess spoil area. There are also no future underground operations proposed.

There are no rock chimneys or drainage blankets proposed.

A stability analysis including strength parameters, pore pressures and long-term seepage conditions is presented together with all supporting data in Appendix 5-1.

Neither rock-toe buttresses nor key-way cuts are required under R645-301-535.112 or R645-301-535.113.

No valley fills or head-of-hollow fills are proposed.

No durable rock fills are proposed.

No disposal of waste on preexisting benches is planned

The excess spoil structure and fill above approximate original contour are the only alternative specifications proposed. A geotechnical analysis has been completed for this proposal and can be viewed in Appendix 5-1. All other mined areas will be restored to approximate original contour.

745.200 Valley Fills and Head-of-Hollow Fills

Valley fills and head-of-hollow fills are not anticipated in the Coal Hollow Mine permit area.

745.300. Durable Rock Fills.

Durable rock fills are not anticipated in the Coal Hollow Mine permit area.

745.400. Preexisting Benches.

The disposal of excess spoil through placement on preexisting benches is not anticipated in the Coal Hollow Mine permit area.

746. COAL MINE WASTE

746.100. General Requirements.

No coal mine waste is anticipated.

746.200. Refuse Piles.

No refuse piles associated with coal mine waste are anticipated.

746.300. Impounding structures.

No impounding structures associated with coal mine waste are anticipated.

746.330. Drainage control.

No coal mine waste and associated drainage control is anticipated.

746.400. Return of Coal Processing Waste to Abandoned Underground Workings.

No coal mine processing waste is anticipated to be placed in underground workings.

747. DISPOSAL OF NONCOAL WASTE

747.100

Noncoal mine waste, including but not limited to grease, lubricants, paints, flammable liquids, garbage, machinery, lumber and other non combustible materials generated during coal mining and reclamation operations will be temporarily placed in covered dumpsters.

This waste will be regularly removed from the project area and disposed of at a state approved solid waste disposal site outside the project area.

747.200

Noncoal mine waste will be stored in a metal, covered dumpster which will prevent storm precipitation or runoff from coming in contact with the waste.

747.300

No noncoal mine waste will be disposed of within the permit area with the exception perforated piping used in the construction of Alluvial Ground Water Drains . This will be left in place as mining advances. This perforated piping will be covered in place approximately 20' to 30' below the final reclaimed surface. All other waste materials (ie. metal culvert) associated with the Alluvial Ground Water Drains will be removed and disposed of in a State-approved solid waste disposal site. Also, concrete pads for the generator and fan utilized in the underground operation will remain and will be covered with approximately 120' of overburden.

748. Casing and Sealing of Wells.

Wells constructed for monitoring groundwater conditions in the Coal Hollow Mine permit and adjacent area, including exploration holes and boreholes used for water wells or monitoring wells, will be designed to prevent contamination of groundwater and surface-water resources and to protect the hydrologic balance. A diagram depicting typical monitoring well construction methods is shown in Drawing 7-11. Monitoring wells will include a protective hydraulic seal immediately above the screened interval, an annular seal plugging the borehole above the hydraulic seal to near the ground surface, and a concrete surface seal extending from the top of the hydraulic seal to the ground surface which is sloped away from the well casing to prevent the entrance of surface flows into the borehole area. Well casings will protrude above the ground surface a sufficient height so as to minimize the potential for the entrance of surface water or other material into the well. A steel surface protector with a locking cover will be installed at monitoring wells to prevent access by unauthorized personnel. Where there is potential for damage to monitoring wells, the wells will be protected through the use of barricades, fences, or other protective devices. These protective devices will be periodically inspected and maintained in good operating conditions. Monitoring wells will be locked in a closed position between uses.

When no longer needed for monitoring or other use approved by the Division upon a finding of no adverse environmental or health and safety effects, or unless approved for transfer as a water well under R645-301-731.100 through R645-301-731.522 and R645-301-731.800, each well will be capped, sealed, backfilled, or otherwise properly managed, as required by the Division in accordance with R645-301-529.400, R645-301-631.100, and R645-301-748. Permanent closure measures will be designed to prevent access to the mine workings by people, livestock, fish and wildlife, machinery and to keep acid or other toxic drainage from entering ground or surface waters.

If a water well is exposed by coal mining and reclamation operations, it will be permanently closed unless otherwise managed in a manner approved by the Division.

Permanent closure and abandonment of water wells greater than 30 feet in depth will be in accordance with the requirements of "Administrative Rules for Water Well Drillers", State of Utah, Division of Water Rights or other applicable state regulations. Abandonment of wells will be performed by a licensed water well driller. The wells to be abandoned will be completely filled using neat cement grout, sand cement grout, unhydrated bentonite, or bentonite grout, or other materials approved by the Utah State Engineer's office. Alternatively, the well may be abandoned using a different procedure upon approval from the Utah State Engineer's office.

Abandonment materials will be introduced at the bottom of the well or required sealing interval and placed progressively upward to the top of the well. The casing will be severed a minimum of 2 feet below the ground surface. A minimum of 2 feet of compacted native material will be placed above the abandoned well upon completion.

Within 30 days of the completion of well abandonment procedures, a report will be submitted to the State Engineer by the responsible licensed driller giving data related to the abandonment of the well. This shall include the name of the licensed driller or other person(s) performing abandonment procedures, name of well owner at the time of abandonment, the address or location of the well by section, township, and range, abandonment materials and equipment used, water right or file number covering the well, the final disposition of the well, and the date of completion.

Exploration holes and boreholes will be backfilled, plugged, cased, capped, sealed, or otherwise managed to prevent acid or toxic contamination of water resources and to minimize disturbance to the prevailing hydrologic balance. Exploration holes and boreholes will be managed to ensure the safety of people, livestock, fish and wildlife, and machinery.

If a water well is exposed by coal mining and reclamation operations, it will be permanently closed unless otherwise managed in a manner approved by the Division.

If any exploration boreholes are to be used as monitoring wells or water wells, these will meet the provisions of R645-301-731

Boreholes will be backfilled to within 1 foot of the land surface with concrete or other materials approved by the Division as necessary to prevent contamination of groundwater or surface-water resources or to protect the prevailing hydrologic balance. The upper approximately 1 foot will be backfilled with native materials to facilitate reclamation (see Drawing 6-11). Exploration holes and boreholes that may be uncovered during mining and reclamation activities will be permanently closed unless approved for water monitoring or otherwise managed in a manner approved by the Division.

750 PERFORMANCE STANDARDS

All coal mining and reclamation operations will be conducted to minimize disturbance to the hydrologic balance within the permit and adjacent areas, to prevent material damage to the hydrologic balance outside the permit area and support approved postmining land uses in accordance with the terms and conditions of the approved permit and the performance standards of R645-301 and R645-302. Mining operations will be conducted to assure the protection or replacement of water rights in accordance with the terms and conditions of the approved permit and the performance standards of R645-301 and R645-302.

751. Water Quality Standards and Effluent Limitations.

Discharges of water from areas disturbed by coal mining and reclamation operations will be made in compliance with all Utah and federal water quality laws and regulations and with effluent limitations for coal mining promulgated by the U.S. Environmental Protection Agency set forth in 40 CFR Part 434.

Discharges from the Coal Hollow project are expected to be minimal based on the storm water and runoff controls that are described in R645-301-740. These structures are designed to contain large storm events without discharging runoff. Any runoff that does discharge will be treated through the sediment pond system.

Discharges from the proposed alluvial groundwater interceptor drain systems will be made in compliance with all applicable Utah and federal water quality laws and regulations. The proposed drain systems have been designed to intercept and discharge natural, un-contaminated up-gradient alluvial groundwater. The water from the alluvial groundwater intercept drain system will be collected in a gravel-packed underground drainage collection system and conveyed through pipes to a steel/concrete discharge structure from which the water will be discharged via pumping through a discharge hose to the discharge location. By managing the water in this matter, the potential for contamination of the water will be minimized. Prior to the initial discharge of water from newly constructed alluvial groundwater interceptor trench systems to receiving waters, the system will be adequately developed/pumped to remove residual fine-grained sediments that might be present in the system prior to discharge to receiving waters. Only suitable, uncontaminated groundwater will be discharged to the outfall location. The water quality and discharge rates from the alluvial groundwater intercept system will be monitored as per the requirements of the UPDES permit.

752. Sediment Control Measures

Sediment control measures will be located, maintained, constructed and reclaimed according to the plans and designs given under sections R645-301-732, R645-301-742 and R645-301-760. Plans and designs are described in these sections.

752.100

Siltation structures and diversions will be located, maintained, constructed and reclaimed according to plans and designs given under R645-301-732, R645-301-742 and R645-301-763. Plans and designs are described in these sections.

752.200. Road Drainage

Roads will be located, designed, constructed, reconstructed, used, maintained and reclaimed according to R645-301-732.400, R645-301-742.400 and R645-301-762 and to achieve the following:

Control or prevent erosion, siltation and the air pollution attendant to erosion by vegetating or otherwise stabilizing all exposed surfaces in accordance with current, prudent engineering practices;

Control or prevent additional contributions of suspended solids to stream flow or runoff outside the permit area;

Neither cause nor contribute to, directly or indirectly, the violation of effluent standards given under R645-301-751;

Minimize the diminution to or degradation of the quality or quantity of surface- and ground-water systems; and

Refrain from significantly altering the normal flow of water in streambeds or drainage channels.

All plans and designs to meet these standards are described in the above referenced sections and on Drawings 5-22 through 5-24.

753. Impoundments and Discharge Structures

Impoundments and discharge structures will be located, maintained, constructed and reclaimed to comply with R645-301-733, R645-301-734, R645-301-743, R645-301-745 and R645-301-760. Plans and designs are described in these sections.

754. Disposal of Excess Spoil, Coal Mine Waste and Noncoal MineWaste.

Disposal areas for excess spoil, coal mine waste and noncoal mine waste will be located, maintained, constructed and reclaimed to comply with R645-301-735, R645-301-736, R645-301-745, R645-301-746, R645-301-747 and R645-301-760. Plans and designs are described in these sections.

755. Casing and Sealing of Wells

All wells will be managed to comply with R645-301-748 and R645-301-765. Water monitoring wells will be managed on a temporary basis according to R645-301-738.

Wells constructed for monitoring groundwater conditions in the Coal Hollow Mine permit and adjacent area, including exploration holes and boreholes used for water wells or monitoring wells, will be designed to prevent contamination of groundwater and surface-water resources and to protect the hydrologic balance. A diagram depicting typical monitoring well construction methods is shown in Drawing 7-11. Monitoring wells will include a protective hydraulic seal immediately above the screened interval, an annular seal plugging the borehole above the hydraulic seal to near the ground surface, and a concrete surface seal extending from the top of the hydraulic seal to the ground surface which is sloped away from the well casing to prevent the entrance of surface flows into the borehole area. Well casings will protrude above the ground surface a sufficient height so as to minimize the potential for the entrance of surface water or other material into the well. A steel surface protector with a locking cover will be installed at monitoring wells to prevent access by unauthorized personnel. Where there is potential for damage to monitoring wells, the wells will be protected through the use of barricades, fences, or other protective devices. These protective devices will be periodically inspected and maintained in good operating conditions. Monitoring wells will be locked in a closed position between uses.

When no longer needed for monitoring or other use approved by the Division upon a finding of no adverse environmental or health and safety effects, or unless approved for transfer as a water well under R645-301-731.100 through R645-301-731.522 and R645-301-731.800, each well will be capped, sealed, backfilled, or otherwise properly managed, as required by the Division in accordance with R645-301-529.400, R645-301-631.100, and R645-301-748. Permanent closure measures will be designed to prevent access to the mine workings by people, livestock, fish and wildlife, machinery and to keep acid or other toxic drainage from entering ground or surface waters.
Water wells less than thirty feet deep are not regulated by the Utah Division of Water Rights. The permanent closure and abandonment of water wells less than 30 feet deep will be accomplished by filling the well casing with neat cement grout, sand cement grout, unhydrated bentonite, or bentonite grout, or other appropriate materials. The well casing will then be cut off below the ground surface and native materials placed over the abandoned well site.

If a water well is exposed by coal mining and reclamation operations, it will be permanently closed unless otherwise managed in a manner approved by the Division.

Permanent closure and abandonment of water wells greater than 30 feet in depth will be in accordance with the requirements of “Administrative Rules for Water Well Drillers”, State of Utah, Division of Water Rights or other applicable state regulations. Abandonment of wells will be performed by a licensed water well driller. The wells to be abandoned will be completely filled using neat cement grout, sand cement grout, unhydrated bentonite, or

bentonite grout, or other materials approved by the Utah State Engineer's office. Alternatively, the well may be abandoned using a different procedure upon approval from the Utah State Engineer's office.

Abandonment materials will be introduced at the bottom of the well or required sealing interval and placed progressively upward to the top of the well. The casing will be severed a minimum of 2 feet below the ground surface. A minimum of 2 feet of compacted native material will be placed above the abandoned well upon completion.

Within 30 days of the completion of well abandonment procedures, a report will be submitted to the State Engineer by the responsible licensed driller giving data related to the abandonment of the well. This shall include the name of the licensed driller or other person(s) performing abandonment procedures, name of well owner at the time of abandonment, the address or location of the well by section, township, and range, abandonment materials and equipment used, water right or file number covering the well, the final disposition of the well, and the date of completion.

Exploration holes and boreholes will be backfilled, plugged, cased, capped, sealed, or otherwise managed to prevent acid or toxic contamination of water resources and to minimize disturbance to the prevailing hydrologic balance. Exploration holes and boreholes will be managed to ensure the safety of people, livestock, fish and wildlife, and machinery.

If a water well is exposed by coal mining and reclamation operations, it will be permanently closed unless otherwise managed in a manner approved by the Division.

If any exploration boreholes are to be used as monitoring wells or water wells, these will meet the provisions of R645-301-731

Boreholes will be backfilled to within 1 foot of the land surface with concrete or other materials approved by the Division as necessary to prevent contamination of groundwater or surface-water resources or to protect the prevailing hydrologic balance. The upper approximately 1 foot will be backfilled with native materials to facilitate reclamation (see Drawing 6-11). Exploration holes and boreholes that may be uncovered during mining and reclamation activities will be permanently closed unless approved for water monitoring or otherwise managed in a manner approved by the Division.

760. RECLAMATION

761. GENERAL REQUIREMENTS

Before abandoning a permit area or seeking bond release, the mine will ensure that all temporary structures are removed and reclaimed, and that all permanent sedimentation ponds, diversions, impoundments and treatment facilities meet the requirements of R645-301 and R645-302 for permanent structures, have been maintained properly and meet the

requirements of the approved reclamation plan for permanent structures and impoundments. The mine will renovate such structures if necessary to meet the requirements of R645-301 and R645-302 and to conform to the approved reclamation plan.

762. ROADS

A road not to be retained for use under an approved postmining land use will be reclaimed immediately after it is no longer needed for coal mining and reclamation operations, including restoring the natural drainage patterns, and reshaping all cut and fill slopes to be compatible with the postmining land use and to complement the drainage pattern of the surrounding terrain.

The post mining land configuration is shown on 5-37 for the Coal Hollow Mine and 5-74 along with postmining road locations. Cuts and fills for the reclaimed roads will be minimal which allows for minor construction to grade roads to the approximate landform that existed prior to disturbance.

763. SILTATION STRUCTURES

763.100.

Siltation structures will be maintained until removal is authorized by the Division and the disturbed area has been stabilized and revegetated. In no case will the structure be removed sooner than two years after the last augmented seeding.

All impoundments will be reclaimed at the end of operations. The estimated timeline for removal of these structures are shown on Drawing 5-38 for the Coal Hollow Mine and 5-76 for the North Private Lease. Expected removal is year seven for the Coal Hollow and year six at the North Private Lease, of the mining and reclamation process. In areas where soils are not stabilized following the removal of these sediment impoundments, silt fence will be appropriately installed and maintained to provide sediment control until stable conditions are met.

763.200.

When the siltation structure is removed, the land on which the siltation structure was located will be regraded and revegetated in accordance with the reclamation plan and R645-301-358, R645-301-356, and R645-301-357.

No permanent sedimentation impoundments are planned.

764. STRUCTURE REMOVAL

The application will include the timetable and plans to remove each structure, if appropriate.

All impoundments will be reclaimed at the end of operations. The estimated timeline for removal of these structures are shown on Drawing 5-38 for the Coal Hollow and Drawing 5-76 for the North Private Lease. In areas where soils are not stabilized following the removal of these sediment impoundments, silt fence will be appropriately installed and maintained to provide sediment control until stable conditions are met.

The facilities will be fully reclaimed at the end of mining operations with the exception of the water well shown on Drawing 5- 8B. The final contour for this area can be viewed on Drawing 5-37 for the Coal Hollow and Drawing 5-74 for the North Private Lease.

765. PERMANENT CASING AND SEALING OF WELLS

Wells constructed for monitoring groundwater conditions in the Coal Hollow Mine permit and adjacent area, including exploration holes and boreholes used for water wells or monitoring wells, will be designed to prevent contamination of groundwater and surface-water resources and to protect the hydrologic balance. A diagram depicting typical monitoring well construction methods is shown in Drawing 7-11. Monitoring wells will include a protective hydraulic seal immediately above the screened interval, an annular seal plugging the borehole above the hydraulic seal to near the ground surface, and a concrete surface seal extending from the top of the hydraulic seal to the ground surface which is sloped away from the well casing to prevent the entrance of surface flows into the borehole area. Well casings will protrude above the ground surface a sufficient height so as to minimize the potential for the entrance of surface water or other material into the well. A steel surface protector with a locking cover will be installed at monitoring wells to prevent access by unauthorized personnel. Where there is potential for damage to monitoring wells, the wells will be protected through the use of barricades, fences, or other protective devices. These protective devices will be periodically inspected and maintained in good operating conditions. Monitoring wells will be locked in a closed position between uses.

When no longer needed for monitoring or other use approved by the Division upon a finding of no adverse environmental or health and safety effects, or unless approved for transfer as a water well under R645-301-731.100 through R645-301-731.522 and R645-301-731.800, each well will be capped, sealed, backfilled, or otherwise properly managed, as required by the Division in accordance with R645-301-529.400, R645-301-631.100, and R645-301-748. Permanent closure measures will be designed to prevent access to the mine workings by people, livestock, fish and wildlife, machinery and to keep acid or other toxic drainage from entering ground or surface waters.

Water wells less than thirty feet deep are not regulated by the Utah Division of Water Rights. The permanent closure and abandonment of water wells less than 30 feet deep will be accomplished by filling the well casing with neat cement grout, sand cement grout, unhydrated bentonite, or bentonite grout, or other appropriate materials. The well casing will then be cut off below the ground surface and native materials placed over the abandoned well site.

If a water well is exposed by coal mining and reclamation operations, it will be permanently closed unless otherwise managed in a manner approved by the Division.

Permanent closure and abandonment of water wells greater than 30 feet in depth will be in accordance with the requirements of "Administrative Rules for Water Well Drillers", State of Utah, Division of Water Rights or other applicable state regulations. Abandonment of wells will be performed by a licensed water well driller. The wells to be abandoned will be completely filled using neat cement grout, sand cement grout, unhydrated bentonite, or bentonite grout, or other materials approved by the Utah State Engineer's office. Alternatively, the well may be abandoned using a different procedure upon approval from the Utah State Engineer's office.

Abandonment materials will be introduced at the bottom of the well or required sealing interval and placed progressively upward to the top of the well. The casing will be severed a minimum of 2 feet below the ground surface. A minimum of 2 feet of compacted native material will be placed above the abandoned well upon completion.

Within 30 days of the completion of well abandonment procedures, a report will be submitted to the State Engineer by the responsible licensed driller giving data related to the abandonment of the well. This shall include the name of the licensed driller or other person(s) performing abandonment procedures, name of well owner at the time of abandonment, the address or location of the well by section, township, and range, abandonment materials and equipment used, water right or file number covering the well, the final disposition of the well, and the date of completion.

Exploration holes and boreholes will be backfilled, plugged, cased, capped, sealed, or otherwise managed to prevent acid or toxic contamination of water resources and to minimize disturbance to the prevailing hydrologic balance. Exploration holes and boreholes will be managed to ensure the safety of people, livestock, fish and wildlife, and machinery.

If a water well is exposed by coal mining and reclamation operations, it will be permanently closed unless otherwise managed in a manner approved by the Division.

If any exploration boreholes are to be used as monitoring wells or water wells, these will meet the provisions of R645-301-731

Boreholes will be backfilled to within 1 foot of the land surface with concrete or other materials approved by the Division as necessary to prevent contamination of groundwater or surface-water resources or to protect the prevailing hydrologic balance. The upper approximately 1 foot will be backfilled with native materials to facilitate reclamation (see Drawing 6-11). Exploration holes and boreholes that may be uncovered during mining and reclamation activities will be permanently closed unless approved for water monitoring or otherwise managed in a manner approved by the Division.

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CHAPTER 8

R645-301-800. BONDING AND INSURANCE

820. REQUIREMENT TO FILE A BOND

820.100 The Operator Agrees to File a Bond.

After the permit application is approved, but before the permit is issued, the applicant will file with the Division, on a form prescribed and furnished by the Division, a bond or bonds conditioned upon performance of all requirements of the State Program, the permit and the reclamation bond.

820.110-114 Area to be Covered by the Performance Bond and Incremental Bond

The disturbed areas at the Coal Hollow Project will be bonded. Bonding is representative of the full extent of current and expected disturbance for the Coal Hollow Mine permit area, and representative of discrete bond increments for the North Private Lease permit area. The areas to be bonded are located, scheduled and identified on Drawings 5-19 and 5-74, respectively.

The permittee will file with the Division an additional bond or bonds to cover each increment of the North Private Lease permit in accordance with R645-301-830. Estimates for each permit area and each increment are provided in Appendices 8-1 and 8-2. North Private Lease increments are shown in Drawing 5-77.

The North Private Lease permit area bond increment areas average over 20 acres in size and are of sufficient configuration to provide for efficient reclamation operations should reclamation by the Division become necessary according to R645-301-880.900.

820.120 Acceptance of Bond

The applicant agrees not to commence operations until the Division approves a performance bond for the Coal Hollow Project.

820.130 Coverage of Bond

The applicant will provide a performance bond for the disturbed area within the permit.

820.200 Form of the Performance Bond

820.223 Surety Bond

Alton Coal Development, LLC is proposing to submit a surety bond consistent with the requirements of R645-301-860.100 and any additional requirements in the State Program.

830. DETERMINATION OF BOND AMOUNT

830.100 Determined by the Division

The amount of the bond required will be determined by the Division.

830.140 Detailed Estimated Costs

There are five major steps in the bond calculation process:

- Determine the point of maximum reclamation cost liability.
- Estimate direct reclamation costs such as earthmoving, revegetation, and the removal and demolition of structures not to be retained as part of the postmining land use.
- Adjust direct costs for inflation.
- Estimate indirect reclamation costs.
- Calculate the total bond amount.

Determining the point of maximum reclamation liability is the most important step in the cost-estimating procedure, and will differ for each operation depending on the nature and complexity of the operation. For the Coal Hollow Mine and the North Private Lease, the bonding amount for final reclamation will depend upon the approved permit and reclamation plan (R645-301-830.120).

Generally, the greatest reclamation cost liability occurs at the point in the permit term at which one or more of the following conditions exist:

- The greatest area of disturbance or the greatest area requiring final grading, topsoil placement, and revegetation.
- The largest volume of material to be backfilled and graded to establish suitable postmining contours. For multiple-seam mining operations, this is the point at which coal extraction from the lowest coal seam is complete, most of the overburden removed to that point has been placed in excess spoil fills, and little or no backfilling has occurred.
- The longest haul distance between spoil or topsoil storage areas and the final placement location.
- The greatest number of on-site structures.
- The point at which refuse piles require the largest amount of cover material.
- Maximum disturbance of areas with special reclamation needs or special materials handling plans, such as sites with prime farmland soils, acidic or toxic materials, difficult topographic situations, or underground mine workings that must be sealed.

The points of maximum reclamation liability (also referred to as the "Worst Case Scenario") based on the concepts above are detailed for the Coal Hollow Mine and North Private Lease in Appendices 8-1 and 8-2, respectively. These points, based on the mine plan detailed in Chapter 5 of this MRP (and shown graphically in Drawings 5-17 to 5-19 and 5-76A to 5-77 respectively), represent the largest liability that would ever be incurred by the Division in the event of default or forfeiture of bond. Therefore, if default occurred at any point prior to or after the point of maximum liability, bonding would be more than adequate to cover all reclamation costs.

For the Coal Hollow Mine, maximum liability is represented by the point in time where all structures and facilities are constructed, all proposed surface disturbance has occurred, and the open pit associated with ~~the underground portals~~Pits F-7 and F-8 remains open and requires backfill from the borrow area. The bond liability associated with this scenario is $7,1~~34,395~~99,299.

For the North Private Lease, maximum liability is represented by the point in time where all structures and facilities are constructed, all proposed surface disturbance has occurred, and the open pit left behind after final coal removal in Pit 21 remains open and requires backfill from the excess material located in the adjacent pits. The bond liability associated with this scenario is $4,736,582.

In addition to the maximum liability cost, ACD has elected to post 10% incremental phase 1 bond for each individual open pit prior to mining. Following mining, backfill and regrading and the placement of subsoil, this incremental cost will be recovered through the bond release process (R645-301-880). The sequences for bond posting and release are also detailed in Appendices 8-1 and 8-2 for each permit area.

As part of determining the points of maximum liability the direct, indirect and inflation (escalation) costs were estimated and tabulated for each polygon contained in the permit areas. As shown in the Polygon Cost Estimate sheets in Appendices 8-1 and 8-2, these costs were also grouped by reclamation phase. The area totals shown at the bottom of these sheets are for illustrative purposes only and do not reflect actual liability. Instead, total liability is a function of the bond posting and release plans discussed above.

The bonding and release schedules shown in Appendices 8-1 and 8-2 anticipate the potential for additional mining area to ~~become available under the BLM's~~be permitted on the adjacent LBA tract. ~~Should this occur~~As this mining proceeds, the underground portals, coal facilities, and thereby ~~Pit 10~~Pits F-7 and F-8 would remain open requiring the continued surety shown prior to the end of underground mining. Subsequent permit amendments would then address updated reclamation sequences to illustrate alternate scenarios for backfill of these pits and relocation and/or removal of these facilities. Should these ~~additional leases not become available~~amendments not occur, reclamation of the remaining area would be performed and the bond would be released as shown. As part of the application process for these additional areas, updated estimates and calculations will be provided.

Inspection of the bond posting plans in Appendices 8-1 and 8-2 shows that the currently posted bond amount of $~~12,750,000~~13,000,000 is more than adequate for the full life of both permit areas. ~~In fact, the overall combined liability for both areas is never expected to exceed $12,250,000.~~

840. GENERAL TERMS AND CONDITIONS OF THE BOND

General terms and conditions of the bond as stated at R645-301-840 through R645-301-840.520 will be met by Alton Coal Development, LLC

850. BOND REQUIREMENTS FOR UNDERGROUND COAL MINING

Not Applicable

860. FORM OF BOND

860.100 Surety Bond

The applicant will submit a surety bond as defined under R645-100-200 and meet all the requirements under R645-301-860.110 to .120.

870. REPLACEMENT OF BONDS

Equivalent bond coverage will be provided if Alton Coal Development, LLC replaces the surety bond.

880. REQUIREMENT TO RELEASE PERFORMANCE BONDS

Upon completion of reclamation operations, the applicant will apply for bond release and meet the requirements of R645-301-880.

890. TERMS AND CONDITIONS FOR LIABILITY INSURANCE

890.100 Certificate of Liability Insurance

A copy of the Certificate of Liability Insurance is provided in Appendix 1-3. Alton Coal Development, LLC will meet the requirements of R645-301-890 prior to commencing any mining operations.

SOUTH AREA BONDING

Introduction

The purpose of this appendix is to provide a reclamation bond estimate as required by R645-301-830.140.

This estimate includes liability calculations for:

- All areas of surface disturbance requiring Phase 2 and Phase 3 reclamation
- All facilities and special areas requiring demolition, demobilization, etc.
- All excavated pits requiring Phase 1 through Phase 3 reclamation

This appendix includes the following details/sheets:

- Bond Posting Plan
- Bond Release Plan
- Point of Maximum Reclamation Liability Determination Sheet
- Mine Facilities Line Item Reclamation Estimate
- Bond Polygon Cost Estimates
- Production Model Cost Data and Assumptions
- Pit Backfill - Truck/Shovel, Fleet Production and Cost Analysis (FPC)
- Subsoil - Truck/Shovel, Fleet Production and Cost Analysis (FPC)
- Topsoil - Truck/Shovel, Fleet Production and Cost Analysis (FPC)

All material volume and surface area calculations were performed utilizing Carlson Civil and Mining software.

Cost data sources include:

- RSMeans Heavy Cost Construction 2018
- RSMeans Construction Cost Data 2018
- CostMine Coal Cost Guide 2017 (latest version available)
- CostMine Mine and Mill Equipment Cost Data, 2017 (latest version available)

These sources are applied where appropriate in each of the cost estimates. Each line item in the estimate lists specifies which source is utilized for cost data.

Summary

The following is a brief summary of the information and methods used to calculate the costs for each category. The overall cost estimates below include total escalated costs applicable for all three phases of reclamation (where appropriate):

Bond Posting and Release Plans
This estimate considers the permit area on a maximum reclamation liability and incremental basis and applies successive bond additions and bond release applications as stepwise additions and subtractions from the ultimate disturbance liability. Each bond addition and release application potentially contain a combination of multiple pit & surface areas under different phases of disturbance or reclamation. These area polygons can be viewed on Drawing 5-19.

Point of Maximum Reclamation Liability Determination
This section details the polygons, phases and facilities included in the determination of the point in time where the permit area faces a maximum reclamation liability. This estimate is directly based on the sequence and mining and reclamation plans described in Chapter 5 of this MRP. The maximum liability amount is $7,134,39599,299.

Mine Facilities
This section includes line items for the demolition, disposal, earthwork and specialized land reclamation costs for the entire facilities area, including ponds and ditches. The calculations for this section are based on the facilities and pond drawings in the current version of the Mining and Reclamation Plan. These drawings are all provided in Chapter 5 as Drawings 5-3 through 5-8C. The RSMeans Cost data is applied to this estimate. The overall cost estimate for the facilities reclamation is approximately $1,441,36505,986.

Bond Polygon Cost Estimates
This section tabulates the direct, indirect, and escalated reclamation costs for each polygon shown on Drawing 5-19. These costs are also grouped by phase. The area totals shown at the bottom of these sheets are for illustrative purposes only and do not reflect actual liability. Instead, total liability is a function of the bond posting and release plans discussed above.

Production Model and Cost Assumptions
Caterpillar's Fleet Production and Cost analysis software was utilized to establish a baseline cost model with inputs from the appropriate cost guides. This model provided unit costs on a $/BCY and $/LCY basis.

The following documentation provides the details for each section of this bond estimate.

South Area Bond Posting Plan

Stage of Reclamation	Included Pits / Areas	Phase 1 Bond Amount	Phase 1 Surface Area (acres)	Phase 2 Bond Amount	Phase 2 Surface Area (acres)	Phase 3 Bond Amount	Phase 3 Surface Area (acres)	Facilities Bond Amount	Total Bond Amount
***All amounts escalated to 2019**									
Point of Maximum Reclamation Liability - Initial Bond to Post									
Phase 1	Pit F-7	$ 1,876,763	11.6						$ 1,876,763
Phase 1	Pit F-8	$ 608,034	15.7						$ 608,034
Phase 1	BORROW	$ 1,092,122	62.0						$ 1,092,122
Phase 2 & 3	BORROW	-		$ 364,192	62.0	$ 79,453	62.0		$ 443,644
Phase 2 & 3	SURF1	-		$ 39,522	9.8	$ 12,552	9.8		$ 52,074
Phase 2 & 3	SURF4	-		$ 8,071	2.0	$ 2,563	2.0		$ 10,634
Phase 2 & 3	SURF5	-		$ 78,692	19.5	$ 24,993	19.5		$ 103,685
Phase 2 & 3	SURF6	-		$ 30,057	7.4	$ 9,546	7.4		$ 39,603
Phase 2 & 3	SURF7	-		$ 4,846	1.2	$ 1,539	1.2		$ 6,385
Phase 2 & 3	SURF8 HAUL & MAINT	-		$ 115,415	28.6	$ 36,656	28.6		$ 152,071
Phase 2 & 3	DITCH 3	-		$ 2,129	0.5	$ 676	0.5		$ 2,805
Phase 2 & 3	POND 3	-		$ 16,697	4.1	$ 5,303	4.1		$ 22,000
Phase 2 & 3	POND 4 (includes ditch 1)	-		$ 29,335	7.3	$ 9,317	7.3		$ 38,652
Phase 2 & 3	ROBINSON	-		$ 21,746	5.4	$ 6,907	5.4		$ 28,652
Phase 2 & 3	LOADOUT (includes Ponds 1 & 1B)	-		$ 123,819	30.7	$ 39,325	30.7		$ 163,144
Phase 2 & 3	HWT 1-A	-		$ 12,914	3.2	$ 4,101	3.2		$ 17,015
Phase 2 & 3	HWT 1-B	-		$ 35,916	8.9	$ 11,407	8.9		$ 47,323
Phase 2 & 3	HWT 2-A	-		$ 20,984	5.2	$ 6,665	5.2		$ 27,649
Phase 2 & 3	HWT 2-B	-		$ 9,685	2.4	$ 3,076	2.4		$ 12,761
Phase 2 & 3	HWT 3-A	-		$ 9,282	2.3	$ 2,948	2.3		$ 12,229
Phase 2 & 3	HWT 3-B	-		$ 26,634	6.6	$ 8,459	6.6		$ 35,093
Phase 2 & 3	Pit 1-A	-		$ 14,528	3.6	$ 4,614	3.6		$ 19,142
Phase 2 & 3	Pit 1-B	-		$ 11,703	2.9	$ 3,717	2.9		$ 15,420
Phase 2 & 3	Pit 2	-		$ 33,439	8.3	$ 10,620	8.3		$ 44,060
Phase 2 & 3	Pit 3	-		$ 28,343	7.0	$ 9,002	7.0		$ 37,345
Phase 2 & 3	Pit 4	-		$ 25,376	6.3	$ 8,060	6.3		$ 33,436
Phase 2 & 3	Pit 5	-		$ 27,061	6.7	$ 8,595	6.7		$ 35,656
Phase 2 & 3	Pit 6	-		$ 33,494	8.3	$ 10,638	8.3		$ 44,132
Phase 2 & 3	Pit 7	-		$ 25,386	6.3	$ 8,063	6.3		$ 33,449
Phase 2 & 3	Pit 8	-		$ 16,142	4.0	$ 5,127	4.0		$ 21,269
Phase 2 & 3	Pit 9-A	-		$ -	-	$ -	-		$ -
Phase 2 & 3	Pit 9-B	-		$ 32,284	8.0	$ 10,253	8.0		$ 42,537
Phase 2 & 3	Pit 9-C	-		$ 13,317	3.3	$ 4,230	3.3		$ 17,547
Phase 2 & 3	Pit 10-A	-		$ 35,916	8.9	$ 11,407	8.9		$ 47,323
Phase 2 & 3	Pit 10-B	-		$ 26,634	6.6	$ 8,459	6.6		$ 35,093
Phase 2 & 3	Pit 20-A	-		$ 4,843	1.2	$ 1,538	1.2		$ 6,381
Phase 2 & 3	Pit 20-B	-		$ 23,406	5.8	$ 7,434	5.8		$ 30,839
Phase 2 & 3	Pit 21-A	-		$ 6,860	1.7	$ 2,179	1.7		$ 9,039
Phase 2 & 3	Pit 21-B	-		$ 11,299	2.8	$ 3,589	2.8		$ 14,888
Phase 2 & 3	Pit 22	-		$ 21,473	5.3	$ 6,820	5.3		$ 28,293
Phase 2 & 3	Pit 23	-		$ 18,337	4.5	$ 5,824	4.5		$ 24,161
Phase 2 & 3	Pit 24	-		$ 18,474	4.6	$ 5,867	4.6		$ 24,341
Phase 2 & 3	Pit 25	-		$ 27,319	6.8	$ 8,676	6.8		$ 35,995
Phase 2 & 3	Pit 26	-		$ 21,112	5.2	$ 6,705	5.2		$ 27,818
Phase 2 & 3	Pit 27	-		$ 22,151	5.5	$ 7,035	5.5		$ 29,186
Phase 2 & 3	Pit 28	-		$ 26,346	6.5	$ 8,368	6.5		$ 34,713
Phase 2 & 3	Pit F-1	-		$ 34,705	8.6	$ 11,022	8.6		$ 45,728
Phase 2 & 3	Pit F-2	-		$ 35,109	8.7	$ 11,151	8.7		$ 46,259
Phase 2 & 3	Pit F-3	-		$ 33,898	8.4	$ 10,766	8.4		$ 44,664
Phase 2 & 3	Pit F-4	-		$ 33,898	8.4	$ 10,766	8.4		$ 44,664
Phase 2 & 3	Pit F-5	-		$ 32,284	8.0	$ 10,253	8.0		$ 42,537
Phase 2 & 3	Pit F-6	-		$ 31,477	7.8	$ 9,997	7.8		$ 41,474
Phase 2 & 3	Pit F-7	-		$ 46,811	11.6	$ 14,868	11.6		$ 61,679
Phase 2 & 3	Pit F-8	-		$ 63,357	15.7	$ 20,122	15.7		$ 83,479
	Line Items Facilities Concrete Demolition							$ 203,783	$ 203,783
	Line Items Facilities Structure Demolition							$ 916,828	$ 916,828
	Line Items Facilities Earthwork							$ 335,874	$ 335,874
Subtotal (+)		**$ 3,576,919**	**89.3**	**$ 1,786,715**	**414.5**	**$ 531,251**	**414.5**	**$ 1,456,485**	**$ 7,351,370**
No Applicable Release Submission (-)									
Cumulative Liability (=)		**$ 3,576,919**	**89.3**	**$ 1,786,715**	**414.5**	**$ 531,251**	**414.5**	**$ 1,456,485**	**$ 7,351,370**
2010 - 2014 Mining Bond to Post									
	Incremental Phase 1 Pit 1-A	$ 58,496	3.6						$ 58,496
	Incremental Phase 1 Pit 1-B	$ 47,122	2.9						$ 47,122
	Incremental Phase 1 Pit 2	$ 102,570	8.3						$ 102,570
	Incremental Phase 1 Pit 3	$ 243,315	7.0						$ 243,315
	Incremental Phase 1 Pit 4	$ 69,061	6.3						$ 69,061
	Incremental Phase 1 Pit 5	$ 142,267	6.7						$ 142,267
	Incremental Phase 1 Pit 6	$ 229,515	8.3						$ 229,515
	Incremental Phase 1 Pit 7	$ 358,479	6.3						$ 358,479
	Incremental Phase 1 Pit 8	$ 122,967	4.0						$ 122,967
	Incremental Phase 1 Pit 9-A	$ 49,563	-						$ 49,563
	Incremental Phase 1 Pit 9-B	$ 139,965	8.0						$ 139,965
	Incremental Phase 1 Pit 9-C	$ 40,079	3.3						$ 40,079
	Incremental Phase 1 Pit 10-A	$ 88,293	8.9						$ 88,293
	Incremental Phase 1 Pit 20-A	$ 17,276	1.2						$ 17,276
	Incremental Phase 1 Pit 20-B	$ 83,502	5.8						$ 83,502
	Incremental Phase 1 Pit 21-A	$ 32,153	1.7						$ 32,153
	Incremental Phase 1 Pit 21-B	$ 52,958	2.8						$ 52,958
	Incremental Phase 1 Pit 22	$ 112,704	5.3						$ 112,704
	Incremental Phase 1 Pit 23	$ 89,797	4.5						$ 89,797
	Incremental Phase 1 Pit 24	$ 78,221	4.6						$ 78,221
	Incremental Phase 1 Pit 25	$ 138,696	6.8						$ 138,696
	Incremental Phase 1 Pit 26	$ 97,568	5.2						$ 97,568
	Incremental Phase 1 Pit 27	$ 102,303	5.5						$ 102,303
	Incremental Phase 1 Pit 28	$ 125,563	6.5						$ 125,563
Subtotal (+)		**$ 2,622,433**	**123.6**	**$ -**	**-**	**$ -**	**-**	**$ -**	**$ 2,622,433**
No Applicable Release Submission (-)									
Cumulative Liability (=)		**$ 6,199,352**	**212.8**	**$ 1,786,715**	**414.5**	**$ 531,251**	**414.5**	**$ 1,456,485**	**$ 9,973,803**
2015 Mining Bond to Post									
	Incremental Phase 1 HWT 1-A	$ 55,481	3.2						$ 55,481
	Incremental Phase 1 HWT 1-B	$ 154,307	8.9						$ 154,307
	Incremental Phase 1 HWT 2-A	$ 86,522	5.2						$ 86,522
	Incremental Phase 1 HWT 2-B	$ 39,933	2.4						$ 39,933
	Incremental Phase 1 HWT 3-A	$ 29,954	2.3						$ 29,954
	Incremental Phase 1 HWT 3-B	$ 85,954	6.6						$ 85,954
	Incremental Phase 1 Pit B-1 (Volume backfilled under 3:1 slope)	$ 13,359	-						$ 13,359
Subtotal (+)		**$ 465,509**	**28.6**	**$ -**	**-**	**$ -**	**-**	**$ -**	**$ 465,509**
2015_1 & 2015_2 Release Submissions (-)		**$ 2,362,456**	**103.7**	**$ -**	**-**	**$ -**	**-**	**$ -**	**$ 2,362,456**
Cumulative Liability (=)		**$ 4,302,405**	**137.8**	**$ 1,786,715**	**414.5**	**$ 531,251**	**414.5**	**$ 1,456,485**	**$ 8,076,856**
Cumulative Liability Calculations Transferred to North Area Bond Posting Plan from this point forward									
2016 Mining Bond to Post									
	None	$ -	-						$ -
Subtotal (+)		**$ -**	**-**	**$ -**	**-**	**$ -**	**-**	**$ -**	**$ -**
2016_1 & 2016_2 Release Submissions (-)		**$ 583,756**	**36.3**	**$ -**	**-**	**$ -**	**-**	**$ -**	**$ 583,756**
Cumulative Liability (=)		**$ 3,718,649**	**101.5**	**$ 1,786,715**	**414.5**	**$ 531,251**	**414.5**	**$ 1,456,485**	**$ 7,493,100**
2017 Mining Bond to Post									
	None	$ -	-						$ -
Subtotal (+)		**$ -**	**-**	**$ -**	**-**	**$ -**	**-**	**$ -**	**$ -**
2017_1 & 2017_2 Release Submissions (-)		**$ 13,359**	**-**	**$ 297,173**	**73.6**	**$ -**	**-**	**$ -**	**$ 310,533**
Cumulative Liability (=)		**$ 3,705,290**	**101.5**	**$ 1,489,541**	**340.9**	**$ 531,251**	**414.5**	**$ 1,456,485**	**$ 7,182,568**
Cumulative Liability Calculations Transferred back from North Area Bond Posting Plan from this point forward									
2019 End of NPL Cumulative Bond Transfer									
Phase1, 2 & 3	Overall Cumulative Liability	$ 7,096,754	211.4	$ 2,453,520	579.9	$ 837,629	653.5	$ 2,573,980	$ 12,961,883
Subtotal (+)		**$ 7,096,754**	**211.4**	**$ 2,453,520**	**579.9**	**$ 837,629**	**653.5**	**$ 2,573,980**	**$ 12,961,883**
No Applicable Release Submission (-)		**$ -**	**-**	**$ -**	**-**	**$ -**	**-**	**$ -**	**$ -**
Cumulative Liability (=)		**$ 7,096,754**	**211.4**	**$ 2,453,520**	**579.9**	**$ 837,629**	**653.5**	**$ 2,573,980**	**$ 12,961,883**
2019 Mining Bond to Post									
	Incremental Phase 1 Pit 10-B	$ 236,341	6.6						$ 236,341
	Incremental Phase 1 Pit F-1	$ 169,264	8.6						$ 169,264
	Incremental Phase 1 Pit F-2	$ 179,247	8.7						$ 179,247
	Incremental Phase 1 Pit F-3	$ 191,533	8.4						$ 191,533
	Incremental Phase 1 Pit F-4	$ 157,479	8.4						$ 157,479
Subtotal (+)		**$ 933,864**	**40.7**	**$ -**	**-**	**$ -**	**-**	**$ -**	**$ 933,864**
2019_1 & 2019_2 Release Submissions (-)		**$ 533,976**	**27.4**	**$ 450,551**	**111.6**	**$ -**	**-**	**$ -**	**$ 984,527**
Cumulative Liability (=)		**$ 7,496,642**	**224.7**	**$ 2,002,969**	**468.3**	**$ 837,629**	**653.5**	**$ 2,573,980**	**$ 12,911,220**
2020 Mining Bond to Post									
	Incremental Phase 1 Pit F-5	$ 197,741	8.0						$ 197,741
	Incremental Phase 1 Pit F-6	$ 185,135	7.8						$ 185,135
Subtotal (+)		**$ 382,876**	**15.8**	**$ -**	**-**	**$ -**	**-**	**$ -**	**$ 382,876**
2020_1 NPL & 2020_1 Release Submissions (-)		**$ 1,768,733**	**117.3**	**$ -**	**-**	**$ -**	**-**	**$ -**	**$ 1,768,733**
Cumulative Liability (=)		**$ 6,110,784**	**123.2**	**$ 2,002,969**	**468.3**	**$ 837,629**	**653.5**	**$ 2,573,980**	**$ 11,525,363**
2021 Mining Bond to Post									
	None	$ -	-						$ -
Subtotal (+)		**$ -**	**-**	**$ -**	**-**	**$ -**	**-**	**$ -**	**$ -**
2021_1 Release Submission (-)		**$ 185,135**	**7.8**	**$ -**	**-**	**$ -**	**-**	**$ -**	**$ 185,135**
Cumulative Liability (=)		**$ 5,925,649**	**115.4**	**$ 2,002,969**	**468.3**	**$ 837,629**	**653.5**	**$ 2,573,980**	**$ 11,340,228**
2022 Mining Bond to Post									
	None	$ -	-						$ -
Subtotal (+)		**$ -**	**-**	**$ -**	**-**	**$ -**	**-**	**$ -**	**$ -**
2022_1 NPL & 2022_2 NPL Release Submissions (-)		**$ 2,348,731**	**26.1**	**$ 700,171**	**173.6**	**$ -**	**-**	**$ -**	**$ 3,048,902**
Cumulative Liability (=)		**$ 3,576,919**	**89.3**	**$ 1,302,798**	**294.6**	**$ 837,629**	**653.5**	**$ 2,573,980**	**$ 8,291,326**
2023 Mining Bond to Post									
	None	$ -	-						$ -
Subtotal (+)		**$ -**	**-**	**$ -**	**-**	**$ -**	**-**	**$ -**	**$ -**
2023_1 NPL & 2023_1 Release Submissions (-)		**$ -**	**-**	**$ 541,045**	**134.1**	**$ -**	**-**	**$ -**	**$ 541,045**
Cumulative Liability (=)		**$ 3,576,919**	**89.3**	**$ 761,754**	**160.5**	**$ 837,629**	**653.5**	**$ 2,573,980**	**$ 7,750,281**
2024 - 2034 Mining Bond to Post									
	None	$ -	-						$ -
Subtotal (+)		**$ -**	**-**	**$ -**	**-**	**$ -**	**-**	**$ -**	**$ -**
2024 - 2034 NPL Release Submissions (-)		**$ -**	**-**	**$ -**	**-**	**$ 306,378**	**239.0**	**$ 1,117,495**	**$ 1,423,873**
Cumulative Liability (=)		**$ 3,576,919**	**89.3**	**$ 761,754**	**160.5**	**$ 531,251**	**414.5**	**$ 1,456,485**	**$ 6,326,408**
End of UG Mining Bond to Post									
	None	$ -	-						$ -
Subtotal (+)		**$ -**	**-**	**$ -**	**-**	**$ -**	**-**	**$ -**	**$ -**
End of UG Release Submission (-)		**$ 3,576,919**	**89.3**	**$ 761,754**	**160.5**	**$ 531,251**	**414.5**	**$ 1,456,485**	**$ 6,326,408**
Cumulative Liability (=)		**$ -**	**-**	**$ -**	**-**	**$ -**	**-**	**$ -**	**$ -**

South Area Bond Release Plan

Stage of Reclamation / Release Application	Areas Included in Release Application	Phase 1 Bond Amount	Phase 1 Surface Area (acres)	Phase 2 Bond Amount	Phase 2 Surface Area (acres)	Phase 3 Bond Amount	Phase 3 Surface Area (acres)	Facilities Bond Amount	Total Bond Amount
Point of Maximum Reclamation Liability Bond Amount		**$ 3,576,919**	**89.3**	**$ 1,671,300**	**405.2**	**$ 494,595**	**405.2**	**$ 1,456,485**	**$ 7,199,299**
***All amounts escalated to 2020**									
2015_1 Incremental Phase 1 Release Submission									
	Incremental Phase 1 Pit 1-A	$ 58,496	3.6						$ 58,496
	Incremental Phase 1 Pit 2	$ 102,570	8.3						$ 102,570
	Incremental Phase 1 Pit 3	$ 243,315	7.0						$ 243,315
	Incremental Phase 1 Pit 4	$ 69,061	6.3						$ 69,061
	Incremental Phase 1 Pit 5	$ 142,267	6.7						$ 142,267
	Incremental Phase 1 Pit 6	$ 229,515	8.3						$ 229,515
	Incremental Phase 1 Pit 7	$ 358,479	6.3						$ 358,479
	Incremental Phase 1 Pit 8	$ 122,967	4.0						$ 122,967
	Incremental Phase 1 Pit 9-A	$ 49,563	-						$ 49,563
	Incremental Phase 1 Pit 21-A	$ 32,153	1.7						$ 32,153
	Incremental Phase 1 Pit 22	$ 112,704	5.3						$ 112,704
	Incremental Phase 1 Pit 23	$ 89,797	4.5						$ 89,797
	Incremental Phase 1 Pit 24	$ 78,221	4.6						$ 78,221
	Incremental Phase 1 Pit 25	$ 138,696	6.8						$ 138,696
	Incremental Phase 1 Pit 26	$ 97,568	5.2						$ 97,568
	Incremental Phase 1 Pit 27	$ 102,303	5.5						$ 102,303
	Incremental Phase 1 Pit 28	$ 125,563	6.5						$ 125,563
	Subtotal	**$ 2,153,240**	**90.7**	**$ -**	**-**	**$ -**	**-**	**$ -**	**$ 2,153,240**
2015_2 Incremental Phase 1 Release Submission									
	Incremental Phase 1 Pit 20-A	$ 17,276	1.2						$ 17,276
	Incremental Phase 1 Pit 20-B	$ 83,502	5.8						$ 83,502
	Incremental Phase 1 Pit 21-B	$ 52,958	2.8						$ 52,958
	Incremental Phase 1 HWT 1-A	$ 55,481	3.2						$ 55,481
	Subtotal	**$ 209,217**	**13.0**	**$ -**	**-**	**$ -**	**-**	**$ -**	**$ 209,217**
2016_1 Incremental Phase 1 Release Submission									
	Incremental Phase 1 Pit 1-B	$ 47,122	2.9						$ 47,122
	Incremental Phase 1 Pit 9-B	$ 139,965	8.0						$ 139,965
	Incremental Phase 1 HWT 1-B	$ 154,307	8.9						$ 154,307
	Incremental Phase 1 HWT 2-A	$ 86,522	5.2						$ 86,522
	Incremental Phase 1 HWT 3-A	$ 29,954	2.3						$ 29,954
	Subtotal	**$ 457,869**	**27.3**	**$ -**	**-**	**$ -**	**-**	**$ -**	**$ 457,869**
2016_2 Incremental Phase 1 Release Submission									
	Incremental Phase 1 HWT 2-B	$ 39,933	2.4						$ 39,933
	Incremental Phase 1 HWT 3-B	$ 85,954	6.6						$ 85,954
	Subtotal	**$ 125,887**	**9.0**	**$ -**	**-**	**$ -**	**-**	**$ -**	**$ 125,887**
2017_1 Incremental Phase 1 Release Submission									
	Incremental Phase 1 Pit B-1 (Volume backfilled under 3:1 slope)	$ 13,359	-						$ 13,359
	Subtotal	**$ 13,359**	**-**	**$ -**	**-**	**$ -**	**-**	**$ -**	**$ 13,359**
2017_2 Phase 2 Release Submission									
	Phase 2 Pit 3		-	$ 28,343	7.0		-		$ 28,343
	Phase 2 Pit 5		-	$ 27,061	6.7		-		$ 27,061
	Phase 2 Pit 6		-	$ 33,494	8.3		-		$ 33,494
	Phase 2 Pit 21-A		-	$ 6,860	1.7		-		$ 6,860
	Phase 2 Pit 21-B		-	$ 11,299	2.8		-		$ 11,299
	Phase 2 Pit 22		-	$ 21,473	5.3		-		$ 21,473
	Phase 2 Pit 23		-	$ 18,337	4.5		-		$ 18,337
	Phase 2 Pit 24		-	$ 18,474	4.6		-		$ 18,474
	Phase 2 Pit 25		-	$ 27,319	6.8		-		$ 27,319
	Phase 2 Pit 26		-	$ 21,112	5.2		-		$ 21,112
	Phase 2 Pit 27		-	$ 22,151	5.5		-		$ 22,151
	Phase 2 Pit 28		-	$ 26,346	6.5		-		$ 26,346
	Phase 2 SURF6		-	$ 30,057	7.4		-		$ 30,057
	Phase 2 SURF7		-	$ 4,846	1.2		-		$ 4,846
	Subtotal	**$ -**	**-**	**$ 297,173**	**73.6**	**$ -**	**-**	**$ -**	**$ 297,173**
2019_1 Incremental Phase 1 Release Submission									
	Incremental Phase 1 Pit 9-C	$ 40,079	3.3						$ 40,079
	Incremental Phase 1 Pit 10-A	$ 88,293	8.9						$ 88,293
	Incremental Phase 1 Pit 10-B	$ 236,341	6.6						$ 236,341
	Incremental Phase 1 Pit F-1	$ 169,264	8.6						$ 169,264
	Subtotal	**$ 533,976**	**27.4**	**$ -**	**-**	**$ -**	**-**	**$ -**	**$ 533,976**
2019_2 Phase 2 Release Submission									
	Phase 2 SURF1		-	$ 39,522	9.8		-		$ 39,522
	Phase 2 SURF4		-	$ 8,071	2.0		-		$ 8,071
	Phase 2 SURF5		-	$ 78,692	19.5		-		$ 78,692
	Phase 2 ROBINSON		-	$ 21,746	5.4		-		$ 21,746
	Phase 2 HWT 1-A		-	$ 12,914	3.2		-		$ 12,914
	Phase 2 HWT 1-B		-	$ 35,916	8.9		-		$ 35,916
	Phase 2 HWT 2-A		-	$ 20,984	5.2		-		$ 20,984
	Phase 2 HWT 2-B		-	$ 9,685	2.4		-		$ 9,685
	Phase 2 HWT 3-A		-	$ 9,282	2.3		-		$ 9,282
	Phase 2 HWT 3-B		-	$ 26,634	6.6		-		$ 26,634
	Phase 2 Pit 1-A		-	$ 14,528	3.6		-		$ 14,528
	Phase 2 Pit 1-B		-	$ 11,703	2.9		-		$ 11,703
	Phase 2 Pit 2		-	$ 33,439	8.3		-		$ 33,439
	Phase 2 Pit 4		-	$ 25,376	6.3		-		$ 25,376
	Phase 2 Pit 7		-	$ 25,386	6.3		-		$ 25,386
	Phase 2 Pit 8		-	$ 16,142	4.0		-		$ 16,142
	Phase 2 Pit 9-B		-	$ 32,284	8.0		-		$ 32,284
	Phase 2 Pit 20-A		-	$ 4,843	1.2		-		$ 4,843
	Phase 2 Pit 20-B		-	$ 23,406	5.8		-		$ 23,406
	Subtotal	**$ -**	**-**	**$ 450,551**	**111.6**	**$ -**	**-**	**$ -**	**$ 450,551**
2020_1 NPL Phase 1 Release Submission									
	Incremental Phase 1 Various - See Appendix 8-2	$ 1,042,733	83.8	$ -	-	$ -	-	$ -	$ 1,042,733
	Subtotal	**$ 1,042,733**	**83.8**	**$ -**	**-**	**$ -**	**-**	**$ -**	**$ 1,042,733**
2020_1 Incremental Phase 1 Release Submission									
	Incremental Phase 1 Pit F-2	$ 179,247	8.7						$ 179,247
	Incremental Phase 1 Pit F-3	$ 191,533	8.4						$ 191,533
	Incremental Phase 1 Pit F-4	$ 157,479	8.4						$ 157,479
	Incremental Phase 1 Pit F-5	$ 197,741	8.0						$ 197,741
	Subtotal	**$ 726,000**	**33.5**	**$ -**	**-**	**$ -**	**-**	**$ -**	**$ 726,000**
2021_1 Incremental Phase 1 Release Submission									
	Incremental Phase 1 Pit F-6	$ 185,135	7.8						$ 185,135
	Subtotal	**$ 185,135**	**7.8**	**$ -**	**-**	**$ -**	**-**	**$ -**	**$ 185,135**
2022_1 NPL Phase 1 Release Submission									
	Incremental Phase 1 Various - See Appendix 8-2	$ 2,348,731	26.1	$ 105,103	26.1				$ 2,453,834
	Subtotal	**$ 2,348,731**	**26.1**	**$ 105,103**	**26.1**	**$ -**	**-**	**$ -**	**$ 2,453,834**
2022_2 NPL Phase 2 Release Submission									
	Phase 2 Various - See Appendix 8-2	$ -		$ 595,068	147.6	$ -		$ -	$ 595,068
	Subtotal	**$ -**	**-**	**$ 595,068**	**147.6**	**$ -**	**-**	**$ -**	**$ 595,068**
2023_1 NPL Phase 2 Release Submission									
	Phase 2 Various - See Appendix 8-2	$ -	-	$ 263,808	65.4	$ -	-	$ -	$ 263,808
	Subtotal	**$ -**	**-**	**$ 263,808**	**65.4**	**$ -**	**-**	**$ -**	**$ 263,808**
2023_1 Phase 2 Release Submission									
	Phase 2 Pit 9-C		-	$ 13,317	3.3		-		$ 13,317
	Phase 2 Pit 10-A		-	$ 35,916	8.9		-		$ 35,916
	Phase 2 Pit 10-B		-	$ 26,634	6.6		-		$ 26,634
	Phase 2 Pit F-1		-	$ 34,705	8.6		-		$ 34,705
	Phase 2 Pit F-2		-	$ 35,109	8.7		-		$ 35,109
	Phase 2 Pit F-3		-	$ 33,898	8.4		-		$ 33,898
	Phase 2 Pit F-4		-	$ 33,898	8.4		-		$ 33,898
	Phase 2 Pit F-5		-	$ 32,284	8.0		-		$ 32,284
	Phase 2 Pit F-6		-	$ 31,477	7.8		-		$ 31,477
	Subtotal	**$ -**	**-**	**$ 277,237**	**68.7**	**$ -**	**-**	**$ -**	**$ 277,237**
2024 - 2034 NPL Phase 3 Release Submission									
	Phase 3 Various - See Appendix 8-2	$ -	-	$ -	-	$ 306,378	239.0	$ 1,117,495	$ 1,423,873
	Subtotal	**$ -**	**-**	**$ -**	**-**	**$ 306,378**	**239.0**	**$ 1,117,495**	**$ 1,423,873**
End of Underground Mining Release Submission									
	Phase 1,2 & 3 Pit F-7	$ 1,876,763	11.6	$ 46,811	11.6	$ 14,868	11.6	$ -	$ 1,938,442
	Phase 1,2 & 3 Pit F-8	$ 608,034	15.7	$ 63,357	15.7	$ 20,122	15.7	$ -	$ 691,513
	Phase 2 & 3 SURF8 HAUL & MAINT	$ -	-	$ 115,415	28.6	$ 36,656	28.6	$ -	$ 152,071
	Phase 1,2 & 3 BORROW	$ 1,092,122	62.0	$ 364,192	62.0	$ 79,453	62.0	$ -	$ 1,535,766
	Phase 2 & 3 DITCH 3	$ -	-	$ 2,129	0.5	$ 676	0.5	$ -	$ 2,805
	Phase 2 & 3 POND 3	$ -	-	$ 16,697	4.1	$ 5,303	4.1	$ -	$ 22,000
	Phase 2 & 3 POND 4 (includes ditch 1)	$ -	-	$ 29,335	7.3	$ 9,317	7.3	$ -	$ 38,652
	Phase 3 ROBINSON	$ -	-		-	$ 6,907	5.4	$ -	$ 6,907
	Phase 2 & 3 LOADOUT (includes Ponds 1 & 1B)	$ -	-	$ 123,819	30.7	$ 39,325	30.7	$ -	$ 163,144
	Phase 3 SURF1		-		-	$ 12,552	9.8		$ 12,552
	Phase 3 SURF4		-		-	$ 2,563	2.0		$ 2,563
	Phase 3 SURF5		-		-	$ 24,993	19.5		$ 24,993
	Phase 3 SURF6		-		-	$ 9,546	7.4		$ 9,546
	Phase 3 SURF7		-		-	$ 1,539	1.2		$ 1,539
	Phase 3 HWT 1-A		-		-	$ 4,101	3.2		$ 4,101
	Phase 3 HWT 1-B		-		-	$ 11,407	8.9		$ 11,407
	Phase 3 HWT 2-A		-		-	$ 6,665	5.2		$ 6,665
	Phase 3 HWT 2-B		-		-	$ 3,076	2.4		$ 3,076
	Phase 3 HWT 3-A		-		-	$ 2,948	2.3		$ 2,948
	Phase 3 HWT 3-B		-		-	$ 8,459	6.6		$ 8,459
	Phase 3 Pit 1-A		-		-	$ 4,614	3.6		$ 4,614
	Phase 3 Pit 1-B		-		-	$ 3,717	2.9		$ 3,717
	Phase 3 Pit 2		-		-	$ 10,620	8.3		$ 10,620
	Phase 3 Pit 3		-		-	$ 9,002	7.0		$ 9,002
	Phase 3 Pit 4		-		-	$ 8,060	6.3		$ 8,060
	Phase 3 Pit 5		-		-	$ 8,595	6.7		$ 8,595
	Phase 3 Pit 6		-		-	$ 10,638	8.3		$ 10,638
	Phase 3 Pit 7		-		-	$ 8,063	6.3		$ 8,063
	Phase 3 Pit 8		-		-	$ 5,127	4.0		$ 5,127
	Phase 3 Pit 9-A		-		-	$ -	-		$ -
	Phase 3 Pit 9-B		-		-	$ 10,253	8.0		$ 10,253
	Phase 3 Pit 9-C		-		-	$ 4,230	3.3		$ 4,230
	Phase 3 Pit 10-A		-		-	$ 11,407	8.9		$ 11,407
	Phase 3 Pit 10-B		-		-	$ 8,459	6.6		$ 8,459
	Phase 3 Pit 20-A		-		-	$ 1,538	1.2		$ 1,538
	Phase 3 Pit 20-B		-		-	$ 7,434	5.8		$ 7,434
	Phase 3 Pit 21-A		-		-	$ 2,179	1.7		$ 2,179
	Phase 3 Pit 21-B		-		-	$ 3,589	2.8		$ 3,589
	Phase 3 Pit 22		-		-	$ 6,820	5.3		$ 6,820
	Phase 3 Pit 23		-		-	$ 5,824	4.5		$ 5,824
	Phase 3 Pit 24		-		-	$ 5,867	4.6		$ 5,867
	Phase 3 Pit 25		-		-	$ 8,676	6.8		$ 8,676
	Phase 3 Pit 26		-		-	$ 6,705	5.2		$ 6,705
	Phase 3 Pit 27		-		-	$ 7,035	5.5		$ 7,035
	Phase 3 Pit 28		-		-	$ 8,368	6.5		$ 8,368
	Phase 3 Pit F-1		-		-	$ 11,022	8.6		$ 11,022
	Phase 3 Pit F-2		-		-	$ 11,151	8.7		$ 11,151
	Phase 3 Pit F-3		-		-	$ 10,766	8.4		$ 10,766
	Phase 3 Pit F-4		-		-	$ 10,766	8.4		$ 10,766
	Phase 3 Pit F-5		-		-	$ 10,253	8.0		$ 10,253
	Phase 3 Pit F-6		-		-	$ 9,997	7.8		$ 9,997
Line Items	Facilities Concrete Demolition	$ -	-	$ -	-	$ -	-	$ 203,783	$ 203,783
Line Items	Facilities Structure Demolition	$ -	-	$ -	-	$ -	-	$ 916,828	$ 916,828
Line Items	Facilities Earthwork	$ -	-	$ -	-	$ -	-	$ 335,874	$ 335,874
Subtotal		**$ 3,576,919**	**89.3**	**$ 761,754**	**160.5**	**$ 531,251**	**414.5**	**$ 1,456,485**	**$ 6,326,408**

South Area Point of Maximum Reclamation Liability Determination

Stage of Reclamation	Included Pits / Areas	Phase 1 Bond Amount	Phase 1 Surface Area (acres)	Phase 2 Bond Amount	Phase 2 Surface Area (acres)	Phase 3 Bond Amount	Phase 3 Surface Area (acres)	Facilities Bond Amount	Total Bond Amount
*All amounts escalated to 2019									
Point of Maximum Reclamation Liability									
Phase 1	Pit F-7	$ 1,876,763	11.6						$ 1,876,763
Phase 1	Pit F-8	$ 608,034	15.7						$ 608,034
Phase 1	BORROW	$ 1,092,122	62.0						$ 1,092,122
Phase 2 & 3	BORROW		-	$ 364,192	62.0	$ 79,453	62.0		$ 443,644
Phase 2 & 3	SURF1		-	$ 39,522	9.8	$ 12,552	9.8		$ 52,074
Phase 2 & 3	SURF4		-	$ 8,071	2.0	$ 2,563	2.0		$ 10,634
Phase 2 & 3	SURF5		-	$ 78,692	17.8	$ 24,993	17.8		$ 103,685
Phase 2 & 3	SURF6		-	$ 30,057	7.4	$ 9,546	7.4		$ 39,603
Phase 2 & 3	SURF7		-	$ 4,846	1.2	$ 1,539	1.2		$ 6,385
Phase 2 & 3	SURF8 HAUL & MAINT (includes Pond 2)		-	$ -	-	$ -	-		$ -
Phase 2 & 3	DITCH 3		-	$ 2,129	0.5	$ 676	0.5		$ 2,805
Phase 2 & 3	POND 3		-	$ 16,697	4.1	$ 5,303	4.1		$ 22,000
Phase 2 & 3	POND 4 (includes ditch 1)		-	$ 29,335	7.3	$ 9,317	7.3		$ 38,652
Phase 2 & 3	ROBINSON		-	$ 21,746	5.4	$ 6,907	5.4		$ 28,652
Phase 2 & 3	LOADOUT (includes Ponds 1 & 1B)		-	$ 123,819	30.7	$ 39,325	30.7		$ 163,144
Phase 2 & 3	HWT 1-A		-	$ 12,914	3.2	$ 4,101	3.2		$ 17,015
Phase 2 & 3	HWT 1-B		-	$ 35,916	8.9	$ 11,407	8.9		$ 47,323
Phase 2 & 3	HWT 2-A		-	$ 20,984	5.2	$ 6,665	5.2		$ 27,649
Phase 2 & 3	HWT 2-B		-	$ 9,685	2.4	$ 3,076	2.4		$ 12,761
Phase 2 & 3	HWT 3-A		-	$ 9,282	2.3	$ 2,948	2.3		$ 12,229
Phase 2 & 3	HWT 3-B		-	$ 26,634	6.6	$ 8,459	6.6		$ 35,093
Phase 2 & 3	Pit 1-A		-	$ 14,528	3.6	$ 4,614	3.6		$ 19,142
Phase 2 & 3	Pit 1-B		-	$ 11,703	2.9	$ 3,717	2.9		$ 15,420
Phase 2 & 3	Pit 2		-	$ 33,439	8.3	$ 10,620	8.3		$ 44,060
Phase 2 & 3	Pit 3		-	$ 28,343	7.0	$ 9,002	7.0		$ 37,345
Phase 2 & 3	Pit 4		-	$ 25,376	6.3	$ 8,060	6.3		$ 33,436
Phase 2 & 3	Pit 5		-	$ 27,061	6.7	$ 8,595	6.7		$ 35,656
Phase 2 & 3	Pit 6		-	$ 33,494	12.1	$ 10,638	12.1		$ 44,132
Phase 2 & 3	Pit 7		-	$ 25,386	6.3	$ 8,063	6.3		$ 33,449
Phase 2 & 3	Pit 8		-	$ 16,142	5.6	$ 5,127	5.6		$ 21,269
Phase 2 & 3	Pit 9-A		-	$ -	-	$ -	-		$ -
Phase 2 & 3	Pit 9-B		-	$ 32,284	11.8	$ 10,253	11.8		$ 42,537
Phase 2 & 3	Pit 9-C		-	$ 13,317	3.3	$ 4,230	3.3		$ 17,547
Phase 2 & 3	Pit 10-A		-	$ 35,916	20.7	$ 11,407	20.7		$ 47,323
Phase 2 & 3	Pit 10-B		-	$ 26,634	6.6	$ 8,459	6.6		$ 35,093
Phase 2 & 3	Pit 20-A		-	$ 4,843	1.2	$ 1,538	1.2		$ 6,381
Phase 2 & 3	Pit 20-B		-	$ 23,406	5.8	$ 7,434	5.8		$ 30,839
Phase 2 & 3	Pit 21-A		-	$ 6,860	1.7	$ 2,179	1.7		$ 9,039
Phase 2 & 3	Pit 21-B		-	$ 11,299	2.8	$ 3,589	2.8		$ 14,888
Phase 2 & 3	Pit 22		-	$ 21,473	5.3	$ 6,820	5.3		$ 28,293
Phase 2 & 3	Pit 23		-	$ 18,337	4.5	$ 5,824	4.5		$ 24,161
Phase 2 & 3	Pit 24		-	$ 18,474	4.6	$ 5,867	4.6		$ 24,341
Phase 2 & 3	Pit 25		-	$ 27,319	6.8	$ 8,676	6.8		$ 35,995
Phase 2 & 3	Pit 26		-	$ 21,112	5.2	$ 6,705	5.2		$ 27,818
Phase 2 & 3	Pit 27		-	$ 22,151	5.5	$ 7,035	5.5		$ 29,186
Phase 2 & 3	Pit 28		-	$ 26,346	6.5	$ 8,368	6.5		$ 34,713
Phase 2 & 3	Pit F-1		-	$ 34,705	8.6	$ 11,022	8.6		$ 45,728
Phase 2 & 3	Pit F-2		-	$ 35,109	8.7	$ 11,151	8.7		$ 46,259
Phase 2 & 3	Pit F-3		-	$ 33,898	8.4	$ 10,766	8.4		$ 44,664
Phase 2 & 3	Pit F-4		-	$ 33,898	8.4	$ 10,766	8.4		$ 44,664
Phase 2 & 3	Pit F-5		-	$ 32,284	8.0	$ 10,253	8.0		$ 42,537
Phase 2 & 3	Pit F-6		-	$ 31,477	7.8	$ 9,997	7.8		$ 41,474
Phase 2 & 3	Pit F-7		-	$ 46,811	11.6	$ 14,868	11.6		$ 61,679
Phase 2 & 3	Pit F-8		-	$ 63,357	15.7	$ 20,122	15.7		$ 83,479
Line Items	Facilities Concrete Demolition							$ 203,783	$ 203,783
Line Items	Facilities Structure Demolition							$ 916,828	$ 916,828
Line Items	Facilities Earthwork							$ 335,874	$ 335,874
Total		**$ 3,576,919**	**89.3**	**$ 1,671,300**	**405.2**	**$ 494,595**	**405.2**	**$ 1,456,485**	**$ 7,199,299**

South Area Facilities Reclamation Cost Estimate

Concrete Reclamation Cost Estimate

Concrete Demolition

Item	Unit	Quantity	Unit Cost ($)	Cost	**Cost Data Reference
Office (footer)	lft	500	$20.00	$10,000	RSMeans Building Constr., 02 41 16.17 1140
Shop (footer)	lft	616	$24.00	$14,784	RSMeans Building Constr., 02 41 16.17 1140 & 1220
Shop (foundation)	ft^2	3,080	$1.29	$3,964	RSMeans Building Constr., 02 41 16.17 2100 & 2200
Shop (floor)	ft^2	20,000	$0.98	$19,600	RSMeans Building Constr., 02 41 16.17 0440
Wash Bay (footer)	lft	244	$24.00	$5,856	RSMeans Building Constr., 02 41 16.17 1140 & 1220
Wash Bay (foundation)	ft^2	660	$1.29	$849	RSMeans Building Constr., 02 41 16.17 2100 & 2200
Wash Bay (floor & sump)	ft^2	3,100	$0.98	$3,038	RSMeans Building Constr., 02 41 16.17 0440
Fuel Storage (slab)	yd^3	111	$169.00	$18,778	RSMeans Heavy Constr., 03 05 05.10 0060
Fuel Storage (containment wall)	yd^3	9	$169.00	$1,502	RSMeans Heavy Constr., 03 05 05.10 0060
Oil Storage (slab)	yd^3	89	$169.00	$15,022	RSMeans Heavy Constr., 03 05 05.10 0060
Oil Storage (containment wall)	yd^3	12	$169.00	$2,066	RSMeans Heavy Constr., 03 05 05.10 0060
Coal Hopper/Feeder Breaker (Tunnel Access)	yd^3	95	$169.00	$16,024	RSMeans Heavy Constr., 03 05 05.10 0060
Coal Hopper/Feeder Breaker (Hopper Supports)	yd^3	190	$169.00	$32,047	RSMeans Heavy Constr., 03 05 05.10 0060
Coal Hopper/Feeder Breaker (Belt Tunnel)	yd^3	133	$169.00	$22,433	RSMeans Heavy Constr., 03 05 05.10 0060
Crusher Building (Footer)	lft	80	$24.00	$1,920	RSMeans Building Constr., 02 41 16.17 1140 & 1220
Feed Conveyor (Support Footers)	lft	30	$24.00	$720	RSMeans Building Constr., 02 41 16.17 1140 & 1220
Reclaim Belt (Support Footers)	lft	25	$24.00	$600	RSMeans Building Constr., 02 41 16.17 1140 & 1220
Loadout (Footers)	lft	72	$24.00	$1,728	RSMeans Building Constr., 02 41 16.17 1140 & 1220
Loadout (Scale Footer)	lft	60	$24.00	$1,440	RSMeans Building Constr., 02 41 16.17 1140 & 1220
Concrete Disposal					
*Concrete Disposal (All Facilities)	yd^3	1,551	$15.70	$24,346	RSMeans Building Constr., 02 41 16.17 4250
Subtotal Concrete Demolition & Disposal				**$196,718**	

*Concrete is disposed of on site (in pits) within five miles of facilities

**All cost data is from the 2018 editions of either the RS Means Heavy Construction or Building Construction Cost Data Manuals

(Total Cost Including O&P)

Structures Reclamation Cost Estimate

Structure Demolition & Disposal

Item	*Unit	Quantity	Unit Cost ($)	Cost	**Cost Data Reference
Office	ft^3	150,000	$0.38	$57,000	RSMeans Heavy Constr., 02 41 16.13 0100
Office (Sewage Tank)	Ea.	1	$4,005.00	$4,005	RSMeans Heavy Constr., 02 65 10.30 1233 & 1253
Shop	ft^3	1,000,000	$0.36	$360,000	RSMeans Heavy Constr., 02 41 16.13 0020
Wash Bay	ft^3	150,000	$0.36	$54,000	RSMeans Heavy Constr., 02 41 16.13 0020
Fuel Storage (3 tanks)	Ea.	3	$2,950.00	$8,850	RSMeans Heavy Constr., 02 65 10.30 0130 & 1029
Coal Hopper/Feeder Breaker (Demolition)	Ton	64	$293.00	$18,752	RSMeans Heavy Constr., 05 05 05.10 0260
Coal Hopper/Feeder Breaker (Disposal)	yd^3	570	$13.40	$7,638	RSMeans Heavy Constr., 02 41 19.18 0200
Crusher (structure)	ft^3	9,200	$0.36	$3,312	RSMeans Heavy Constr., 02 41 16.13 0020
Crusher (equipment demolition)	Ton	60	$293.00	$17,580	RSMeans Heavy Constr., 05 05 05.10 0260
Crusher (equipment disposal)	yd^3	150	$13.40	$2,010	RSMeans Heavy Constr., 02 41 19.18 0200
Coal Reclaim System (demolition)	Ton	50	$293.00	$14,650	RSMeans Heavy Constr., 05 05 05.10 0260
Coal Reclaim System (disposal)	yd^3	233	$13.40	$3,122	RSMeans Heavy Constr., 02 41 19.18 0200
Loadout (structure)	ft^3	19,000	$0.36	$6,840	RSMeans Heavy Constr., 02 41 16.13 0020
Loadout (equipment demolition)	Ton	68	$293.00	$19,924	RSMeans Heavy Constr., 05 05 05.10 0260
Loadout (equipment disposal)	yd^3	185	$13.40	$2,479	RSMeans Heavy Constr., 02 41 19.18 0200
100 lb/cu. Ft material - 48" Process Plant Conveyors (demolition)	ft	545	$300.75	$163,909	CostMine - Mine and Mill Equipment Costs 2018 (Estimated as 25% of Construction Cost)
12" Drainage Culvert (demolition)	ft	50	$2.60	$130	RSMeans Heavy Constr., 02 41 13.40 0150
18" Drainage Culvert (demolition)	ft	413	$3.90	$1,611	RSMeans Heavy Constr., 02 41 13.40 0160
24" Drainage Culvert (demolition)	ft	455	$14.55	$6,620	RSMeans Heavy Constr., 02 41 13.40 0170
36" Drainage Culvert (demolition)	ft	184	$17.45	$3,211	RSMeans Heavy Constr., 02 41 13.40 0180
96" Drainage Culvert (demolition)	ft	184	$48.00	$8,832	RSMeans Heavy Constr., 02 41 13.40 0200
Culvert Excavation 6' - 10' Deep	yd^3	1,485	$4.95	$7,351	RSMeans Heavy Constr., 31 23 16.13 0510
Culvert Excavation 14' - 20' Deep	yd^3	2,208	$6.20	$13,690	RSMeans Heavy Constr., 31 23 16.13 1300
Perimeter Fencing (demolition)	ft	22,000	$3.47	$76,340	RSMeans Heavy Constr., 02 41 13.60 1650
Water Monitoring Wells - PVC (demolition)	VLF	1,919	$9.00	$17,267	RSMeans Heavy Constr., 02 41 13.76 0900
Water Monitoring Wells - Steel (demolition)	VLF	201	$18.00	$3,618	RSMeans Heavy Constr., 02 41 13.76 1000
Water System (tanks)	Ea.	2	$1,150.00	$2,300	RSMeans Heavy Constr., 02 65 10.30 1029
Subtotal Structure Demolition & Disposal				**$885,040**	

*Exact makes and models of equipment are not currently known, therefore estimates are included for weights and yardages of equipment

** RS Means does not have direct cost data references for some specific items. Where needed, reasonable substitutues are utilized.

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Earthwork Reclamation Cost Estimate

Facilities Earthwork

Item	Unit	Quantity	Unit Cost ($)	Cost	**Cost Data Reference
Pond 1 backfill from embankment	yd^3	1,156	$2.29	$2,647	RSMeans Heavy Constr., 31 23 23.17 0020
Pond 1 backfill from subsoil pile	yd^3	3,200	$5.57	$17,824	RSMeans Heavy Constr., 31 23 16.43 5330 & 31 23 23.20 6160 & 31 23 23.17 0020
Pond 1B backfill from embankment	yd^3	146	$2.29	$334	RSMeans Heavy Constr., 31 23 23.17 0020
Pond 1B backfill from subsoil pile	yd^3	794	$5.57	$4,423	RSMeans Heavy Constr., 31 23 16.43 5330 & 31 23 23.20 6160 & 31 23 23.17 0020
Pond 3 backfill from embankment	yd^3	4,767	$2.29	$10,916	RSMeans Heavy Constr., 31 23 23.17 0020
Pond 3 backfill from subsoil pile	yd^3	6,107	$5.57	$34,016	RSMeans Heavy Constr., 31 23 16.43 5330 & 31 23 23.20 6160 & 31 23 23.17 0020
Pond 4 backfill from embankment	yd^3	1,410	$2.29	$3,229	RSMeans Heavy Constr., 31 23 23.17 0020
Pond 4 backfill from subsoil pile	yd^3	13,282	$5.57	$73,981	RSMeans Heavy Constr., 31 23 16.43 5330 & 31 23 23.20 6160 & 31 23 23.17 0020
Robinson Creek Rip-Rap	yd^3	562	$67.50	$37,923	RS Means Heavy Constr., 31 37 13.10 0100
Robinson Creek Grass Matting	yd^2	2,189	$4.17	$9,128	RS Means Heavy Constr., 31 25 14.16 0120
Ditch 1 recontouring	yd^3	4,580	$2.29	$10,488	RSMeans Heavy Constr., 31 23 23.17 0020
Ditch 3 recontouring	yd^3	11,556	$2.29	$26,463	RSMeans Heavy Constr., 31 23 23.17 0020
Ditch 4 recontouring	yd^3	4,897	$2.29	$11,215	RSMeans Heavy Constr., 31 23 23.17 0020
Ripping of haul roads and compacted surfaces (Facilities Access Haul Road & Dump Access Haul Road - 2 ft. Depth)	yd^3	31,161	$2.62	$81,642	RSMeans Heavy Constr., 31 23 16.32 2310
Subtotal Facilities Earthwork				**$324,229**	

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Total Facilities Reclamation Cost Estimate	**$1,405,986**

South Area Bond Polygon Cost Estimates

									Phase 1 Cost							Phase 2 Cost									Phase 3 Cost						Facilities Cost		Total
	Pit	BCF [BCY * 27]	BCY	LCY	Pre-Fed Block Area (sf) [acres * 43560]	Post-Fed Block Area (sf) [acres * 43560]	Pre-Fed Block Area (acres)	Post Fed-Block Area (acres)	Backfill Cost	Subsoil Quantity (LCY)	Subsoil Cost	Total Direct Cost	Indirect Cost	Total Phase 1 Cost	**Total Phase 1 Cost - Escalated**	**Incremental Phase 1 Cost (10%)**	Topsoil Quantity (LCY)	Topsoil Cost	Mulching Quantity (M.S.F)	Mulching Cost	Seeding Quantity (M.S.F)	Seeding Cost	Total Direct Cost	Indirect Cost	Total Phase 2 Cost	**Total Phase 2 Cost - Escalated**	Re-Seed Quantity (M.S.F)	Re-Seed Cost	Total Direct Cost	Indirect Cost	Total Phase 3 Cost	**Total Phase 3 Cost - Escalated**	Total Facilities Cost	**Total Facilities Cost - Escalated**	**Total Bonded Amount - Escalated**
Excavated Areas	HWT 1-A	9,752,043	361,187	399,924	139,392	139,392	3.2	3.2	$ 400,917	18,448	$ 21,459	$ 422,377	$ 113,197	$ 535,574	**$ 554,810**	**$ 55,481**	3,690	$ 4,481	139	$ 2,227	139	$ 3,122	$ 9,831	$ 2,635	$ 12,466	**$ 12,914**	139	$ 3,122	$ 3,122	$ 837	$ 3,959	**$ 4,101**			**$ 571,825**
	HWT 1-B	27,122,871	1,004,551	1,112,289	387,684	387,684	8.9	8.9	$ 1,115,051	51,308	$ 59,684	$ 1,174,736	$ 314,829	$ 1,489,565	**$ 1,543,065**	**$ 154,307**	10,262	$ 12,463	388	$ 6,195	388	$ 8,684	$ 27,343	$ 7,328	$ 34,670	**$ 35,916**	388	$ 8,684	$ 8,684	$ 2,327	$ 11,011	**$ 11,407**			**$ 1,590,388**
	HWT 2-A	15,173,962	561,999	622,273	226,512	226,512	5.2	5.2	$ 623,818	29,978	$ 34,872	$ 658,690	$ 176,529	$ 835,219	**$ 865,217**	**$ 86,522**	5,996	$ 7,282	227	$ 3,620	227	$ 5,074	$ 15,975	$ 4,281	$ 20,257	**$ 20,984**	227	$ 5,074	$ 5,074	$ 1,360	$ 6,434	**$ 6,665**			**$ 892,867**
	HWT 2-B	7,003,367	259,384	287,203	104,544	104,544	2.4	2.4	$ 287,916	13,836	$ 16,095	$ 304,011	$ 81,475	$ 385,486	**$ 399,331**	**$ 39,933**	2,767	$ 3,361	105	$ 1,671	105	$ 2,342	$ 7,373	$ 1,976	$ 9,349	**$ 9,685**	105	$ 2,342	$ 2,342	$ 628	$ 2,969	**$ 3,076**			**$ 412,092**
	HWT 3-A	5,171,686	191,544	212,087	100,188	100,188	2.3	2.3	$ 212,614	13,259	$ 15,424	$ 228,038	$ 61,114	$ 289,152	**$ 299,537**	**$ 29,954**	2,652	$ 3,221	100	$ 1,601	100	$ 2,244	$ 7,066	$ 1,894	$ 8,960	**$ 9,282**	100	$ 2,244	$ 2,244	$ 601	$ 2,846	**$ 2,948**			**$ 311,767**
	HWT 3-B	14,840,491	549,648	608,598	287,496	287,496	6.6	6.6	$ 610,109	38,049	$ 44,260	$ 654,369	$ 175,371	$ 829,740	**$ 859,542**	**$ 85,954**	7,610	$ 9,242	287	$ 4,594	287	$ 6,440	$ 20,277	$ 5,434	$ 25,711	**$ 26,634**	287	$ 6,440	$ 6,440	$ 1,726	$ 8,166	**$ 8,459**			**$ 894,635**
	Pit 1-A	10,245,166	379,451	420,147	156,816	156,816	3.6	3.6	$ 421,190	20,754	$ 24,142	$ 445,332	$ 119,349	$ 564,681	**$ 584,963**	**$ 58,496**	4,151	$ 5,041	157	$ 2,506	157	$ 3,513	$ 11,060	$ 2,964	$ 14,024	**$ 14,528**	157	$ 3,513	$ 3,513	$ 941	$ 4,454	**$ 4,614**			**$ 604,104**
	Pit 1-B	8,253,050	305,669	338,451	126,324	126,324	2.9	2.9	$ 339,292	16,718	$ 19,448	$ 358,740	$ 96,142	$ 454,882	**$ 471,220**	**$ 47,122**	3,344	$ 4,061	126	$ 2,019	126	$ 2,830	$ 8,909	$ 2,388	$ 11,297	**$ 11,703**	126	$ 2,830	$ 2,830	$ 758	$ 3,588	**$ 3,717**			**$ 486,640**
	Pit 2	17,642,275	653,418	723,497	360,952	360,952	8.3	8.3	$ 725,294	47,770	$ 55,569	$ 780,862	$ 209,271	$ 990,133	**$ 1,025,696**	**$ 102,570**	9,554	$ 11,604	361	$ 5,768	361	$ 8,085	$ 25,457	$ 6,823	$ 32,280	**$ 33,439**	361	$ 8,085	$ 8,085	$ 2,167	$ 10,252	**$ 10,620**			**$ 1,069,755**
	Pit 3	43,911,690	1,626,359	1,800,786	305,947	305,947	7.0	7.0	$ 1,805,258	40,491	$ 47,101	$ 1,852,359	$ 496,432	$ 2,348,791	**$ 2,433,153**	**$ 243,315**	8,098	$ 9,836	306	$ 4,889	306	$ 6,853	$ 21,578	$ 5,783	$ 27,361	**$ 28,343**	306	$ 6,853	$ 6,853	$ 1,837	$ 8,690	**$ 9,002**			**$ 2,470,498**
	Pit 4	11,763,124	435,671	482,397	273,917	273,917	6.3	6.3	$ 483,595	36,252	$ 42,170	$ 525,765	$ 140,905	$ 666,670	**$ 690,614**	**$ 69,061**	7,250	$ 8,806	274	$ 4,377	274	$ 6,136	$ 19,319	$ 5,177	$ 24,496	**$ 25,376**	274	$ 6,136	$ 6,136	$ 1,644	$ 7,780	**$ 8,060**			**$ 724,050**
	Pit 5	25,251,319	935,234	1,035,538	292,103	292,103	6.7	6.7	$ 1,038,110	38,659	$ 44,969	$ 1,083,079	$ 290,265	$ 1,373,344	**$ 1,422,671**	**$ 142,267**	7,732	$ 9,391	292	$ 4,668	292	$ 6,543	$ 20,601	$ 5,521	$ 26,123	**$ 27,061**	292	$ 6,543	$ 6,543	$ 1,754	$ 8,297	**$ 8,595**			**$ 1,458,326**
	Pit 6	41,147,880	1,523,996	1,687,444	527,076	361,548	12.1	8.3	$ 1,691,635	47,849	$ 55,661	$ 1,747,296	$ 468,275	$ 2,215,571	**$ 2,295,147**	**$ 229,515**	9,570	$ 11,623	362	$ 5,778	362	$ 8,099	$ 25,499	$ 6,834	$ 32,333	**$ 33,494**	362	$ 8,099	$ 8,099	$ 2,170	$ 10,269	**$ 10,638**			**$ 2,339,280**
	Pit 7	65,357,399	2,420,644	2,680,259	274,027	274,027	6.3	6.3	$ 2,686,915	36,266	$ 42,187	$ 2,729,102	$ 731,399	$ 3,460,501	**$ 3,584,791**	**$ 358,479**	7,253	$ 8,809	274	$ 4,379	274	$ 6,138	$ 19,327	$ 5,180	$ 24,506	**$ 25,386**	274	$ 6,138	$ 6,138	$ 1,645	$ 7,783	**$ 8,063**			**$ 3,618,241**
	Pit 8	22,118,746	819,213	907,073	243,936	174,240	5.6	4.0	$ 909,326	23,060	$ 26,824	$ 936,151	$ 250,888	$ 1,187,039	**$ 1,229,674**	**$ 122,967**	4,612	$ 5,601	174	$ 2,784	174	$ 3,903	$ 12,289	$ 3,293	$ 15,582	**$ 16,142**	174	$ 3,903	$ 3,903	$ 1,046	$ 4,949	**$ 5,127**			**$ 1,250,942**
	Pit 9-A	9,178,039	339,927	376,385	191,664	-	4.4	-	$ 377,319	-	$ -	$ 377,319	$ 101,122	$ 478,441	**$ 495,625**	**$ 49,563**	-	$ -	-	$ -	-	$ -	$ -	$ -	$ -	**$ -**	-	$ -	$ -	$ -	$ -	**$ -**			**$ 495,625**
	Pit 9-B	24,613,833	911,623	1,009,395	514,008	348,480	11.8	8.0	$ 1,011,902	46,120	$ 53,649	$ 1,065,551	$ 285,568	$ 1,351,118	**$ 1,399,646**	**$ 139,965**	9,224	$ 11,203	348	$ 5,569	348	$ 7,806	$ 24,578	$ 6,587	$ 31,164	**$ 32,284**	348	$ 7,806	$ 7,806	$ 2,092	$ 9,898	**$ 10,253**			**$ 1,442,183**
	Pit 9-C	6,883,530	254,946	282,288	143,748	143,748	3.3	3.3	$ 282,990	19,024	$ 22,130	$ 305,120	$ 81,772	$ 386,892	**$ 400,788**	**$ 40,079**	3,805	$ 4,621	144	$ 2,297	144	$ 3,220	$ 10,138	$ 2,717	$ 12,855	**$ 13,317**	144	$ 3,220	$ 3,220	$ 863	$ 4,083	**$ 4,230**			**$ 418,334**
	Pit 10-A	14,898,348	551,791	610,970	901,692	387,684	20.7	8.9	$ 612,488	51,308	$ 59,684	$ 672,172	$ 180,142	$ 852,314	**$ 882,926**	**$ 88,293**	10,262	$ 12,463	388	$ 6,195	388	$ 8,684	$ 27,343	$ 7,328	$ 34,670	**$ 35,916**	388	$ 8,684	$ 8,684	$ 2,327	$ 11,011	**$ 11,407**			**$ 930,249**
	Pit 10-B	42,689,233	1,581,083	1,750,654	287,496	287,496	6.6	6.6	$ 1,755,002	38,049	$ 44,260	$ 1,799,262	$ 482,202	$ 2,281,464	**$ 2,363,407**	**$ 236,341**	7,610	$ 9,242	287	$ 4,594	287	$ 6,440	$ 20,277	$ 5,434	$ 25,711	**$ 26,634**	287	$ 6,440	$ 6,440	$ 1,726	$ 8,166	**$ 8,459**			**$ 2,398,500**
	Pit 20-A	3,003,497	111,241	123,171	52,272	52,272	1.2	1.2	$ 123,477	6,918	$ 8,047	$ 131,524	$ 35,249	$ 166,773	**$ 172,763**	**$ 17,276**	1,384	$ 1,680	52	$ 835	52	$ 1,171	$ 3,687	$ 988	$ 4,675	**$ 4,843**	52	$ 1,171	$ 1,171	$ 314	$ 1,485	**$ 1,538**			**$ 179,143**
	Pit 20-B	14,516,903	537,663	595,327	252,648	252,648	5.8	5.8	$ 596,806	33,437	$ 38,895	$ 635,701	$ 170,368	$ 806,069	**$ 835,021**	**$ 83,502**	6,687	$ 8,122	253	$ 4,037	253	$ 5,659	$ 17,819	$ 4,775	$ 22,594	**$ 23,406**	253	$ 5,659	$ 5,659	$ 1,517	$ 7,176	**$ 7,434**			**$ 865,860**
	Pit 21-A	5,676,782	210,251	232,801	74,052	74,052	1.7	1.7	$ 233,379	9,800	$ 11,400	$ 244,779	$ 65,601	$ 310,380	**$ 321,528**	**$ 32,153**	1,960	$ 2,381	74	$ 1,183	74	$ 1,659	$ 5,223	$ 1,400	$ 6,622	**$ 6,860**	74	$ 1,659	$ 1,659	$ 445	$ 2,103	**$ 2,179**			**$ 330,567**
	Pit 21-B	9,349,995	346,296	383,436	121,968	121,968	2.8	2.8	$ 384,389	16,142	$ 18,777	$ 403,166	$ 108,048	$ 511,214	**$ 529,575**	**$ 52,958**	3,228	$ 3,921	122	$ 1,949	122	$ 2,732	$ 8,602	$ 2,305	$ 10,908	**$ 11,299**	122	$ 2,732	$ 2,732	$ 732	$ 3,464	**$ 3,589**			**$ 544,463**
	Pit 22	20,002,682	740,840	820,295	231,787	231,787	5.3	5.3	$ 822,332	30,676	$ 35,684	$ 858,016	$ 229,948	$ 1,087,965	**$ 1,127,041**	**$ 112,704**	6,135	$ 7,452	232	$ 3,704	232	$ 5,192	$ 16,347	$ 4,381	$ 20,729	**$ 21,473**	232	$ 5,192	$ 5,192	$ 1,391	$ 6,583	**$ 6,820**			**$ 1,155,334**
	Pit 23	15,887,560	588,428	651,537	197,937	197,937	4.5	4.5	$ 653,155	26,196	$ 30,473	$ 683,628	$ 183,212	$ 866,840	**$ 897,974**	**$ 89,797**	5,239	$ 6,363	198	$ 3,163	198	$ 4,434	$ 13,960	$ 3,741	$ 17,701	**$ 18,337**	198	$ 4,434	$ 4,434	$ 1,188	$ 5,622	**$ 5,824**			**$ 922,135**
	Pit 24	13,738,342	508,827	563,399	199,413	199,413	4.6	4.6	$ 564,799	26,391	$ 30,700	$ 595,498	$ 159,594	$ 755,092	**$ 782,212**	**$ 78,221**	5,278	$ 6,411	199	$ 3,187	199	$ 4,467	$ 14,064	$ 3,769	$ 17,833	**$ 18,474**	199	$ 4,467	$ 4,467	$ 1,197	$ 5,664	**$ 5,867**			**$ 806,554**
	Pit 25	24,579,611	910,356	1,007,992	294,885	294,885	6.8	6.8	$ 1,010,495	39,027	$ 45,398	$ 1,055,893	$ 282,979	$ 1,338,872	**$ 1,386,960**	**$ 138,696**	7,805	$ 9,480	295	$ 4,712	295	$ 6,605	$ 20,798	$ 5,574	$ 26,371	**$ 27,319**	295	$ 6,605	$ 6,605	$ 1,770	$ 8,376	**$ 8,676**			**$ 1,422,955**
	Pit 26	17,214,402	637,570	705,950	227,894	227,894	5.2	5.2	$ 707,703	30,161	$ 35,084	$ 742,788	$ 199,067	$ 941,855	**$ 975,683**	**$ 97,568**	6,032	$ 7,326	228	$ 3,642	228	$ 5,105	$ 16,073	$ 4,308	$ 20,380	**$ 21,112**	228	$ 5,105	$ 5,105	$ 1,368	$ 6,473	**$ 6,705**			**$ 1,003,501**
	Pit 27	18,049,211	668,489	740,185	239,102	239,102	5.5	5.5	$ 742,023	31,644	$ 36,810	$ 778,833	$ 208,727	$ 987,560	**$ 1,023,030**	**$ 102,303**	6,329	$ 7,687	239	$ 3,821	239	$ 5,356	$ 16,863	$ 4,519	$ 21,383	**$ 22,151**	239	$ 5,356	$ 5,356	$ 1,435	$ 6,791	**$ 7,035**			**$ 1,052,216**
	Pit 28	22,187,018	821,741	909,873	284,384	284,384	6.5	6.5	$ 912,133	37,637	$ 43,781	$ 955,914	$ 256,185	$ 1,212,099	**$ 1,255,634**	**$ 125,563**	7,527	$ 9,142	284	$ 4,544	284	$ 6,370	$ 20,057	$ 5,375	$ 25,432	**$ 26,346**	284	$ 6,370	$ 6,370	$ 1,707	$ 8,077	**$ 8,368**			**$ 1,290,347**
	Pit F-1	29,941,713	1,108,952	1,227,887	374,616	374,616	8.6	8.6	$ 1,230,937	49,579	$ 57,672	$ 1,288,609	$ 345,347	$ 1,633,957	**$ 1,692,643**	**$ 169,264**	9,916	$ 12,043	375	$ 5,986	375	$ 8,391	$ 26,421	$ 7,081	$ 33,502	**$ 34,705**	375	$ 8,391	$ 8,391	$ 2,249	$ 10,640	**$ 11,022**			**$ 1,738,371**
	Pit F-2	31,773,916	1,176,812	1,303,025	378,972	378,972	8.7	8.7	$ 1,306,261	50,155	$ 58,343	$ 1,364,604	$ 365,714	$ 1,730,318	**$ 1,792,465**	**$ 179,247**	10,031	$ 12,183	379	$ 6,056	379	$ 8,489	$ 26,728	$ 7,163	$ 33,891	**$ 35,109**	379	$ 8,489	$ 8,489	$ 2,275	$ 10,764	**$ 11,151**			**$ 1,838,725**
	Pit F-3	34,098,147	1,262,894	1,398,340	365,904	365,904	8.4	8.4	$ 1,401,813	48,426	$ 56,331	$ 1,458,144	$ 390,783	$ 1,848,926	**$ 1,915,334**	**$ 191,533**	9,685	$ 11,763	366	$ 5,847	366	$ 8,196	$ 25,807	$ 6,916	$ 32,723	**$ 33,898**	366	$ 8,196	$ 8,196	$ 2,197	$ 10,393	**$ 10,766**			**$ 1,959,998**
	Pit F-4	27,791,903	1,029,330	1,139,725	365,904	365,904	8.4	8.4	$ 1,142,556	48,426	$ 56,331	$ 1,198,887	$ 321,302	$ 1,520,189	**$ 1,574,789**	**$ 157,479**	9,685	$ 11,763	366	$ 5,847	366	$ 8,196	$ 25,807	$ 6,916	$ 32,723	**$ 33,898**	366	$ 8,196	$ 8,196	$ 2,197	$ 10,393	**$ 10,766**			**$ 1,619,453**
	Pit F-5	35,312,981	1,307,888	1,448,159	348,480	348,480	8.0	8.0	$ 1,451,756	46,120	$ 53,649	$ 1,505,405	$ 403,448	$ 1,908,853	**$ 1,977,413**	**$ 197,741**	9,224	$ 11,203	348	$ 5,569	348	$ 7,806	$ 24,578	$ 6,587	$ 31,164	**$ 32,284**	348	$ 7,806	$ 7,806	$ 2,092	$ 9,898	**$ 10,253**			**$ 2,019,950**
	Pit F-6	33,011,100	1,222,633	1,353,761	339,768	339,768	7.8	7.8	$ 1,357,123	44,967	$ 52,307	$ 1,409,431	$ 377,727	$ 1,787,158	**$ 1,851,347**	**$ 185,135**	8,993	$ 10,923	340	$ 5,429	340	$ 7,611	$ 23,963	$ 6,422	$ 30,385	**$ 31,477**	340	$ 7,611	$ 7,611	$ 2,040	$ 9,650	**$ 9,997**			**$ 1,892,821**
	Pit F-7	32,861,900	1,217,107	1,347,642	505,296	505,296	11.6	11.6	$ 1,350,989	66,874	$ 77,791	$ 1,428,780	$ 382,913	$ 1,811,693	**$ 1,876,763**	**$ 187,676**	13,375	$ 16,244	505	$ 8,075	505	$ 11,319	$ 35,638	$ 9,551	$ 45,188	**$ 46,811**	505	$ 11,319	$ 11,319	$ 3,033	$ 14,352	**$ 14,868**			**$ 1,938,442**
	Pit F-8	8,698,630	322,171	356,724	683,892	683,892	15.7	15.7	$ 357,610	90,510	$ 105,286	$ 462,896	$ 124,056	$ 586,952	**$ 608,034**	**$ 60,803**	18,102	$ 21,986	684	$ 10,929	684	$ 15,319	$ 48,234	$ 12,927	$ 61,160	**$ 63,357**	684	$ 15,319	$ 15,319	$ 4,106	$ 19,425	**$ 20,122**			**$ 691,513**
Phase 1 Only	Pit B-1 (Volume backfilled under 3:1 slope)	2,473,851	91,624	101,451	-	-	-	-	$ 101,703	-	$ -	$ 101,703	$ 27,256	$ 128,959	**$ 133,591**	**$ 13,359**	-	$ -	-	$ -	-	$ -	$ -	$ -	$ -	**$ -**	-	$ -	$ -	$ -	$ -	**$ -**			**$ 133,591**
	Excavated Areas Totals	**823,188,197**	**30,488,452**	**33,758,338**	**11,384,694**	**10,278,270**	**261.4**	**236.0**	**$ 33,842,181**	**1,360,285**	**$ 1,582,346**	**$ 35,424,527**	**$ 9,493,773**	**$ 44,918,301**	**$ 46,531,624**	**$ 4,653,162**	**272,057**	**$ 330,427**	**10,278**	**$ 164,247**	**10,278**	**$ 230,233**	**$ 724,907**	**$ 194,275**	**$ 919,183**	**$ 952,197**	**10,278**	**$ 230,233**	**$ 230,233**	**$ 61,703**	**$ 291,936**	**$ 302,421**			**$ 47,786,242**
Borrow Area (Area Requires Topsoil & Subsoil to be hauled twice)	BORROW				2,700,322	2,700,322	62.0	62.0	$ -	714,752	$ 831,432	$ 831,432	$ 222,824	$ 1,054,256	**$ 1,092,122**	**$ 109,212**	142,950	$ 173,621	2,700.32	$ 43,151	2,700	$ 60,487	$ 277,259	$ 74,305	$ 351,564	**$ 364,192**	2,700	$ 60,487	$ 60,487	$ 16,211	$ 76,698	**$ 79,453**			**$ 1,535,766**
	Borrow Area Totals				**2,700,322**	**2,700,322**	**62.0**	**62.0**	**$ -**	**714,752**	**$ 831,432**	**$ 831,432**	**$ 222,824**	**$ 1,054,256**	**$ 1,092,122**	**$ 109,212**	**142,950**	**$ 173,621**	**2,700**	**$ 43,151**	**2,700**	**$ 60,487**	**$ 277,259**	**$ 74,305**	**$ 351,564**	**$ 364,192**	**2,700**	**$ 60,487**	**$ 60,487**	**$ 16,211**	**$ 76,698**	**$ 79,453**			**$ 1,535,766**
Surface Disturbance Only Areas	SURF1				426,607	426,607	9.8	9.8									11,292	$ 13,715	426.61	$ 6,817	427	$ 9,556	$ 30,088	$ 8,064	$ 38,151	**$ 39,522**	427	$ 9,556	$ 9,556	$ 2,561	$ 12,117	**$ 12,552**			**$ 52,074**
	SURF4				87,120	87,120	2.0	2.0									2,306	$ 2,801	87	$ 1,392	87	$ 1,951	$ 6,144	$ 1,647	$ 7,791	**$ 8,071**	87	$ 1,951	$ 1,951	$ 523	$ 2,474	**$ 2,563**			**$ 10,634**
	SURF5				775,368	849,420	17.8	19.5									22,483	$ 27,307	849	$ 13,574	849	$ 19,027	$ 59,908	$ 16,055	$ 75,963	**$ 78,692**	849	$ 19,027	$ 19,027	$ 5,099	$ 24,126	**$ 24,993**			**$ 103,685**
	SURF6				324,443	324,443	7.4	7.4									8,588	$ 10,430	324	$ 5,185	324	$ 7,268	$ 22,882	$ 6,132	$ 29,015	**$ 30,057**	324	$ 7,268	$ 7,268	$ 1,948	$ 9,215	**$ 9,546**			**$ 39,603**
	SURF7				52,309	52,309	1.2	1.2									1,385	$ 1,682	52	$ 836	52	$ 1,172	$ 3,689	$ 989	$ 4,678	**$ 4,846**	52	$ 1,172	$ 1,172	$ 314	$ 1,486	**$ 1,539**			**$ 6,385**
	SURF8 HAUL & MAINT				1,951,488	1,245,816	44.8	28.6									32,976	$ 40,051	1,246	$ 19,908	1,246	$ 27,906	$ 87,865	$ 23,548	$ 111,413	**$ 115,415**	1,246	$ 27,906	$ 27,906	$ 7,479	$ 35,385	**$ 36,656**			**$ 152,071**
	Surface Disturbance Only Areas Totals				**3,617,335**	**2,985,715**	**83.0**	**68.5**									**79,029**	**$ 95,985**	**2,986**	**$ 47,712**	**2,986**	**$ 66,880**	**$ 210,577**	**$ 56,435**	**$ 267,012**	**$ 276,602**	**2,986**	**$ 66,880**	**$ 66,880**	**$ 17,924**	**$ 84,804**	**$ 87,850**			**$ 364,452**
Facilities & Special Areas	DITCH 3				22,976	22,976	0.5	0.5									608	$ 739	23	$ 367	23	$ 515	$ 1,620	$ 434	$ 2,055	**$ 2,129**	23	$ 515	$ 515	$ 138	$ 653	**$ 676**			**$ 2,805**
	POND 3				180,228	180,228	4.1	4.1									4,770	$ 5,794	180	$ 2,880	180	$ 4,037	$ 12,711	$ 3,407	$ 16,118	**$ 16,697**	180	$ 4,037	$ 4,037	$ 1,082	$ 5,119	**$ 5,303**			**$ 22,000**
	POND 4 (includes ditch 1)				316,647	316,647	7.3	7.3									8,381	$ 10,180	317	$ 5,060	317	$ 7,093	$ 22,333	$ 5,985	$ 28,318	**$ 29,335**	317	$ 7,093	$ 7,093	$ 1,901	$ 8,994	**$ 9,317**			**$ 38,652**
	ROBINSON				234,731	234,731	5.4	5.4									6,213	$ 7,546	235	$ 3,751	235	$ 5,258	$ 16,555	$ 4,437	$ 20,992	**$ 21,746**	235	$ 5,258	$ 5,258	$ 1,409	$ 6,667	**$ 6,907**			**$ 28,652**
	LOADOUT (includes Ponds 1 & 1B)				1,336,537	1,336,537	30.7	30.7									35,377	$ 42,967	1,337	$ 21,358	1,337	$ 29,938	$ 94,263	$ 25,263	$ 119,526	**$ 123,819**	1,337	$ 29,938	$ 29,938	$ 8,023	$ 37,962	**$ 39,325**			**$ 163,144**
																																			$
	Facilities Concrete Demolition																															**$ 196,718**	**$ 203,783**	**$ 203,783**
	Facilities Structure Demolition																															**$ 885,040**	**$ 916,828**	**$ 916,828**
	Facilities Earthwork																															**$ 324,229**	**$ 335,874**	**$ 335,874**
	Facilities & Special Areas Totals				**2,091,119**	**2,091,119**	**48.0**	**48.0**									**$ 55,350**	**$ 67,226**	**$ 2,091**	**$ 33,416**	**$ 2,091**	**$ 46,841**	**$ 147,483**	**$ 39,525**	**$ 187,008**	**$ 193,725**	**$ 2,091**	**$ 46,841**	**$ 46,841**	**$ 12,553**	**$ 59,394**	**$ 61,528**	**$ 1,405,986**	**$ 1,456,485**	**$ 1,711,738**
	South Area Totals	**823,188,197**	**30,488,452**	**33,758,338**	**19,793,470**	**18,055,426**	**454.4**	**414.5**	**$ 33,842,181**	**2,075,037**	**$ 2,413,779**	**$ 36,255,960**	**$ 9,716,597**	**$ 45,972,557**	**$ 47,623,746**	**$ 4,762,375**	**549,387**	**$ 667,259**	**18,055**	**$ 288,526**	**18,055**	**$ 404,442**	**$ 1,360,226**	**$ 364,541**	**$ 1,724,767**	**$ 1,786,715**	**18,055**	**$ 404,442**	**$ 404,442**	**$ 108,390**	**$ 512,832**	**$ 531,251**	**$ 1,405,986**	**$ 1,456,485**	**$ 51,398,197**

South Area Production Model Cost Data & Assumptions

Equipment Description	Equipment Cost $/hr	Equip + Labor Cost $/hr
7 yd. Excavator (385C LME)	$87.34	$121.34
40 Ton (30 CY) Haul Truck (769C)	$51.23	$91.47
5,000 Gal. Water Truck (35 ton articulated chassis)	$33.35	$67.35
14 Grader	$42.31	$76.31
D10 Dozer	$98.42	$132.42
D7 Dozer	$54.21	$88.21

Sourced from Cost Mine 2017 Coal Cost Guide and 2017 Mine and Mill Equipment Costs

Labor Cost Data

Manpower Type	Base Wage ($/hr)	Labor Cost @ 36% burden ($/hr)
Heavy Equipment Operator	$25.00	$34.00
Truck Drivers	$29.59	$40.24

Labor Data from 2017 Coal Cost Guide Table LA-7 for Surface Coal Mines (Non-Union)

Unit Cost Data

Movement Type	Cost/BCY	Cost/LCY	Unit Swell Factor	
Rehandle with Truck/Shovel	$ 1.11	$ 1.00	10.7%	
Subsoil	$ 1.25	$ 1.16	7.2%	
Topsoil	$ 1.30	$ 1.21	7.2%	
		Cost/M.S.F		
Mulching		$ 15.98		Local Supplier Quote 3 yr. average
Seeding		$ 22.40		Local Supplier Quote 3 yr. average

Unit Costs calculated from Caterpillar Inc. FPC production model (v. 5.3.0.6) using 2017 cost data

Indirect Cost Factor
26.8%

Escalation Factor 2018 to 2019
1.03591684

South Area and North Area Actual Cost of Reclamation Per Acre

North Pasture	2017	Cost per M.S.F.		
Seed Cost**	$161.60	$ 3.71		
Drill Seeding Cost	$ 609.00	$ 13.98	**$ 17.69**	**Seeding Subtotal**
Nutrimulch (2,250 lbs)	$ 105.00	$ 2.41		
Straw Mulch (2,000 lbs)	$ 135.00	$ 3.10		
Spreading Mulch	$ 486.00	$ 11.16	**$ 16.67**	**Mulching Subtotal**
Total	**$1,496.60**	**$34.36**	**$34.36**	

**Doesn't include shipping

North Pasture	3 Yr Average	Cost per M.S.F.		
Seed Cost**	$148.20	$ 3.40		
Drill Seeding Cost	$609.00	$ 13.98	**$ 17.38**	**Seeding Subtotal**
Nutrimulch (2,250 lbs)	$81.67	$ 1.87		
Straw Mulch (2,000 lbs)	$128.33	$ 2.95		
Spreading Mulch	$486.00	$ 11.16	**$ 15.98**	**Mulching Subtotal**
Total	**$1,453.20**	**$33.36**	**$33.36**	

**Doesn't include shipping

Sage Grass Mix	2017	Cost per M.S.F.		
Seed Cost**	$311.75	$ 7.16		
Drill Seeding Cost	$ 609.00	$ 13.98	**$ 21.14**	**Seeding Subtotal**
Nutrimulch (2,250 lbs)	$ 105.00	$ 2.41		
Straw Mulch (2,000 lbs)	$ 135.00	$ 3.10		
Spreading Mulch	$ 486.00	$ 11.16	**$ 16.67**	**Mulching Subtotal**
Total	**$1,646.75**	**$37.80**	**$37.80**	

**Doesn't include shipping

Sage Grass Mix	3 Yr Average	Cost per M.S.F.		
Seed Cost**	$366.92	$ 8.42		
Drill Seeding Cost	$609.00	$ 13.98	**$ 22.40**	**Seeding Subtotal**
Nutrimulch (2,250 lbs)	$81.67	$ 1.87		
Straw Mulch (2,000 lbs)	$128.33	$ 2.95		
Spreading Mulch	$486.00	$ 11.16	**$ 15.98**	**Mulching Subtotal**
Total	**$1,671.92**	**$38.38**	**$38.38**	

**Doesn't include shipping

North Pasture	2016	Cost per M.S.F.		
Seed Cost**	$177.00	$ 4.06		
Drill Seeding Cost	$ 609.00	$ 13.98	**$ 18.04**	**Seeding Subtotal**
Nutrimulch (1,500 lbs)	$ 70.00	$ 1.61		
Straw Mulch (2,000 lbs)	$ 125.00	$ 2.87		
Spreading Mulch	$ 486.00	$ 11.16	**$ 15.63**	**Mulching Subtotal**
Total	**$1,467.00**	**$33.68**	**$33.68**	

**Includes Shipping

Sage Grass Mix	2016	Cost per M.S.F.		
Seed Cost**	$385.00	$ 8.84		
Drill Seeding Cost	$ 609.00	$ 13.98	**$ 22.82**	**Seeding Subtotal**
Nutrimulch (1,500 lbs)	$ 70.00	$ 1.61		
Straw Mulch (2,000 lbs)	$ 125.00	$ 2.87		
Spreading Mulch	$ 486.00	$ 11.16	**$ 15.63**	**Mulching Subtotal**
Total	**$1,675.00**	**$38.45**	**$38.45**	

**Includes Shipping

Pasture	2015	Cost per M.S.F.		
Seed Cost**	$106.00	$ 2.43		
Drill Seeding Cost	$ 609.00	$ 13.98	**$ 16.41**	**Seeding Subtotal**
Nutrimulch (1,500 lbs)	$ 70.00	$ 1.61		
Straw Mulch (2,000 lbs)	$ 125.00	$ 2.87		
Spreading Mulch	$ 486.00	$ 11.16	**$ 15.63**	**Mulching Subtotal**
Total	**$1,396.00**	**$32.05**	**$32.05**	

**Includes Shipping

Sage Grass Mix	2015	Cost per M.S.F.		
Seed Cost**	$404.00	$ 9.27		
Drill Seeding Cost	$ 609.00	$ 13.98	**$ 23.26**	**Seeding Subtotal**
Nutrimulch (1,500 lbs)	$ 70.00	$ 1.61		
Straw Mulch (2,000 lbs)	$ 125.00	$ 2.87		
Spreading Mulch	$ 486.00	$ 11.16	**$ 15.63**	**Mulching Subtotal**
Total	**$1,694.00**	**$38.89**	**$38.89**	

**Includes Shipping

FPC_2018_January_South Area_Truck-Shovel_Backfill

Cycle Times

Hauler Cycle Time

	6 769C
Load with Exchange (min)	1.25
Haul (min)	1.81
Dump and Maneuver (min)	1.2
Return (min)	1.62
Potential Cycle Time (min)	5.88
Wait on Slow Hauler (min)	0
Wait to Load (min)	1.62
Additional Bunching (min)	0.44
Wait to Dump (min)	0
TMPH Wait (min)	
Total Cycle Time (min)	7.94
Bunching	Avg
Haul Start mph	0
Haul End mph	0
Return Start mph	0
Return End mph	0

Loader Cycle Time

	6 769C
Loader Model	385C LME
Loader Quantity	1
Bucket Capacity (CY)	7.25
Loader Fill Factor (%)	100
Loose Density (Lbs/LCY)	2,498
Tons per Pass	9.06
System Passes per Hauler	3
Hauler Payload (Tons)	27.17
% of Max GVW	103.52
Hauler Volume (LCY)	21.75
% of Body Fill	70
Loader Cycle Time (min)	0.25
First Bucket Dump (min)	0.05
Hauler Exchange Time (min)	0.7

Fleet Production

Fleet Estimates

Operating Schedule		
Operator Efficiency	90	%
Schedule Period	Shift	
Scheduled Hours	10.5	
Fleet Estimates		
Fleet Availability	87.49	%
Production per Sched Hr	693.54	BCY
Total Production	1,540,000	BCY
Sched Hrs Required	2,220.49	
Total Cost ($)	1,786,945	
Cost per BCY ($)	1.16	
Production per Shift	7,282	BCY
Shifts Required	211.48	

Theoretical Production

	Quantity		Model	BCY per Hour	Cycles per Hour	
1		1	385C LME	932		
2		6	769C	1,188		10.2

Actual Production

	Quantity		Model	Cycles per Hour	Payload in Tons	Tons per Hour
	1	5	769C	7.56	27.17	1,026.87
Fleet Tons per Operating Hour						1,026.87
x 90.00% Operator Efficiency =						924.18
x 87.49% Fleet Availability =						808.55

Cost

	Qty	Model	Machine Code	Hourly Cost Each Unit	Operating Hours	Total $	$ per BCY
Loaders	1	385C LME		124.78	1,998	249,366	0.162
Haulers:	6	769C	C202	93.51	11,656	1,089,947	0.708
Totals	6				11,656	1,089,947	0.708
Support	1	5,000 Gal. Water Truck		66.58	1,457	97,008	0.063
	1	14 Grader		82.84	971	80,466	0.052
	1	D10 Dozer		132.42	1,457	192,937	0.125
Totals	3				3,885	370,411	0.241
Fleet Totals	10				17,540	1,709,723	1.11

FPC_2018_January_South Area_Truck-Shovel_Subsoil

Cycle Times

Hauler Cycle Time

	5 769C
Load with Exchange (min)	1.25
Haul (min)	1.05
Dump and Maneuver (min)	1.2
Return (min)	1.02
Potential Cycle Time (min)	4.53
Wait on Slow Hauler (min)	0
Wait to Load (min)	1.72
Additional Bunching (min)	0.22
Wait to Dump (min)	0
TMPH Wait (min)	
Total Cycle Time (min)	6.47
Bunching	Avg
Haul Start mph	0
Haul End mph	0
Return Start mph	0
Return End mph	0

Loader Cycle Time

	5 769C
Loader Model	385C LME
Loader Quantity	1
Bucket Capacity (CY)	7.25
Loader Fill Factor (%)	100
Loose Density (Lbs/LCY)	1,601
Tons per Pass	5.8
System Passes per Hauler	3
Hauler Payload (Tons)	17.41
% of Max GVW	87.58
Hauler Volume (LCY)	21.75
% of Body Fill	70
Loader Cycle Time (min)	0.25
First Bucket Dump (min)	0.05
Hauler Exchange Time (min)	0.7

Fleet Production

Fleet Estimates

Operating Schedule		
Operator Efficiency	90	%
Schedule Period	Shift	
Scheduled Hours	10.5	
Fleet Estimates		
Fleet Availability	87.87	%
Production per Sched Hr	553.28	BCY
Total Production	850,000	BCY
Sched Hrs Required	1,536.30	
Total Cost ($)	1,107,857	
Cost per BCY ($)	1.303	
Production per Shift	5,809	BCY
Shifts Required	146.31	

Theoretical Production

	Quantity	Model	BCY per Hour	Cycles per Hour
1	1	385C LME	724	
2	5	769C	1,000	13.3

Actual Production

	Quantity	Model	Cycles per Hour	Payload in Tons	Tons per Hour
1	5	769C	9.28	17.41	807.73
Fleet Tons per Operating Hour					807.73
x 90.00% Operator Efficiency =					726.95
x 87.87% Fleet Availability =					638.76

Cost

	Qty	Model	Machine Code	Hourly Cost Each Unit	Operating Hours	Total $	$ per BCY
Loaders	1	385C LME		124.78	1,383	172,529	0.203
Haulers:	5	769C	C202	93.35	6,750	630,090	0.741
Totals	5				6,750	630,090	0.741
Support	1	5,000 Gal. Water Truck		66.58	1,012	67,408	0.079
	1	14 Grader		82.84	675	55,914	0.066
	1	D10 Dozer		132.42	1,012	134,067	0.158
Totals	3				2,700	257,388	0.303
Fleet Totals	9				10,832	1,060,008	1.247

FPC_2018_January_South Area_Truck-Shovel_Topsoil

Cycle Times

Hauler Cycle Time

	5 769C
Load with Exchange (min)	1.25
Haul (min)	1.51
Dump and Maneuver (min)	1.2
Return (min)	1.57
Potential Cycle Time (min)	5.53
Wait on Slow Hauler (min)	0
Wait to Load (min)	0.72
Additional Bunching (min)	0.68
Wait to Dump (min)	0
TMPH Wait (min)	
Total Cycle Time (min)	6.93
Bunching	Avg
Haul Start mph	0
Haul End mph	0
Return Start mph	0
Return End mph	0

Loader Cycle Time

	5 769C
Loader Model	385C LME
Loader Quantity	1
Bucket Capacity (CY)	7.25
Loader Fill Factor (%)	100
Loose Density (Lbs/LCY)	1,601
Tons per Pass	5.8
System Passes per Hauler	3
Hauler Payload (Tons)	17.41
% of Max GVW	87.58
Hauler Volume (LCY)	21.75
% of Body Fill	70
Loader Cycle Time (min)	0.25
First Bucket Dump (min)	0.05
Hauler Exchange Time (min)	0.7

Fleet Production

Fleet Estimates

Operating Schedule		
Operator Efficiency	90	%
Schedule Period	Shift	
Scheduled Hours	10.5	
Fleet Estimates		
Fleet Availability	87.87	%
Production per Sched Hr	516.36	BCY
Total Production	500,000	BCY
Sched Hrs Required	968.33	
Total Cost ($)	678,986	
Cost per BCY ($)	1.358	
Production per Shift	5,422	BCY
Shifts Required	92.22	

Theoretical Production

	Quantity		Model	BCY per Hour	Cycles per Hour	
1		1	385C LME	724		
2		5	769C	818		10.8

Actual Production

	Quantity		Model	Cycles per Hour	Payload in Tons	Tons per Hour
	1	5	769C	8.66	17.41	753.82
Fleet Tons per Operating Hour						753.82
x 90.00% Operator Efficiency =						678.44
x 87.87% Fleet Availability =						596.13

Cost

	Qty	Model	Machine Code	Hourly Cost Each Unit	Operating Hours	Total $	$ per BCY
Loaders	1	385C LME		124.78	871	108,745	0.217
Haulers:	5	769C	C202	93.35	4,254	397,145	0.794
Totals	5				4,254	397,145	0.794
Support	1	5,000 Gal. Water Truck		66.58	638	42,487	0.085
	1	14 Grader		82.84	425	35,242	0.07
	1	D7 Dozer		88.21	766	67,548	0.135
Totals	3				1,829	145,278	0.291
Fleet Totals	9				6,955	651,167	1.302

NORTH AREA BONDING

Introduction

The purpose of this appendix is to provide a reclamation bond estimate for the North Private Lease permit area as required by R645-301-830.140.

This estimate includes liability calculations for:

- All areas of surface disturbance requiring Phase 2 and Phase 3 reclamation
- All facilities and special areas requiring demolition, demobilization, etc.
- All excavated pits requiring Phase 1 through Phase 3 reclamation

This appendix includes the following details/sheets:

- Bond Posting Plan
- Bond Release Plan
- Point of Maximum Reclamation Liability Determination Sheet
- Mine Facilities Line Item Reclamation Estimate
- Bond Polygon Cost Estimates
- Production Model Cost Data and Assumptions
- Pit Backfill - Truck/Shovel, Fleet Production and Cost Analysis (FPC)
- Subsoil - Truck/Shovel, Fleet Production and Cost Analysis (FPC)
- Topsoil - Truck/Shovel, Fleet Production and Cost Analysis (FPC)

All material volume and surface area calculations were performed utilizing Carlson Civil and Mining software.

Cost data sources include:

- RSMeans Heavy Cost Construction 2018
- RSMeans Construction Cost Data 2018
- CostMine Coal Cost Guide 2017 (latest version available)
- CostMine Mine and Mill Equipment Cost Data, 2017 (latest version available)

These sources are applied where appropriate in each of the cost estimates. Each line item in the estimate lists specifies which source is utilized for cost data.

Summary

The following is a brief summary of the information and methods used to calculate the costs for each category. The overall cost estimates below include total escalated costs applicable for all three phases of reclamation (where appropriate):

Bond Posting and Release Plans
This estimate considers the permit area on a maximum reclamation liability and incremental basis and applies successive bond additions and bond release applications as stepwise additions and subtractions from the ultimate disturbance liability. Each bond addition and release application potentially contain a combination of multiple pit & surface areas under different phases of disturbance or reclamation. These area polygons can be viewed on Drawing 5-77.

Point of Maximum Reclamation Liability Determination
This section details the polygons, phases and facilities included in the determination of the point in time where the permit area faces a maximum reclamation liability. This estimate is directly based on the sequence and mining and reclamation plans described in Chapter 5 of this MRP. The maximum liability amount is $4,736,582.

Mine Facilities
This section includes line items for the demolition, disposal, earthwork and specialized land reclamation costs for the entire facilities area, including ponds and ditches. The calculations for this section are based on the facilities and pond drawings in the current version of the Mining and Reclamation Plan. These drawings are all provided in Chapter 5 as Drawings 5-47 through 5-51B, and 5-58 through 5-77. The RSMeans Cost data is applied to this estimate. The overall cost estimate for the facilities reclamation is approximately $1,078,750.

Bond Polygon Cost Estimates
This section tabulates the direct, indirect, and escalated reclamation costs for each polygon shown on Drawing 5-77. These costs are also grouped by phase. The area totals shown at the bottom of these sheets are for illustrative purposes only and do not reflect actual liability. Instead, total liability is a function of the bond posting and release plans discussed above.

Production Model and Cost Assumptions
Caterpillar's Fleet Production and Cost analysis software (v. 5.3.0.6) was utilized to establish a baseline cost model with inputs from the appropriate cost guides. This model provided unit costs on a $/BCY and $/LCY basis.

The following documentation provides the details for each section of this bond estimate.

North Area Bond Posting Plan

Stage of Reclamation	Included Pits / Areas	Phase 1 Bond Amount	Phase 1 Surface Area (acres)	Phase 2 Bond Amount	Phase 2 Surface Area (acres)	Phase 3 Bond Amount	Phase 3 Surface Area (acres)	Facilities Bond Amount	Total Bond Amount
*All amounts escalated to 2019									
Carryover Bond Liability (covering Coal Hollow Mine - Portals still open - Following Releases 15_1 & 15_2)		**$ 4,302,405**	**137.8**	**$ 1,786,715**	**414.5**	**$ 531,251**	**414.5**	**$ 1,456,485**	**$ 8,076,856**
Point of Maximum Reclamation Liability - Initial Bond to Post									
	Full Phase 1 N Pit 21	$ 2,348,731	26.1						$ 2,348,731
	Phase 2 & 3 N Pit 01			$ 11,803	2.9	$ 3,751	2.9		$ 15,555
	Phase 2 & 3 N Pit 02			$ 16,140	4.0	$ 5,130	4.0		$ 21,270
	Phase 2 & 3 N Pit 03			$ 21,468	5.3	$ 6,823	5.3		$ 28,291
	Phase 2 & 3 N Pit 04			$ 22,740	5.6	$ 7,227	5.6		$ 29,968
	Phase 2 & 3 N Pit 05			$ 23,264	5.8	$ 7,394	5.8		$ 30,657
	Phase 2 & 3 N Pit 06			$ 19,533	4.8	$ 6,208	4.8		$ 25,741
	Phase 2 & 3 N Pit 07			$ 18,244	4.5	$ 5,798	4.5		$ 24,042
	Phase 2 & 3 N Pit 08			$ 19,386	4.8	$ 6,161	4.8		$ 25,548
	Phase 2 & 3 N Pit 09			$ 23,921	5.9	$ 7,603	5.9		$ 31,524
	Phase 2 & 3 N Pit 10			$ 35,666	8.8	$ 11,336	8.8		$ 47,001
	Phase 2 & 3 N Pit 11			$ 29,252	7.3	$ 9,297	7.3		$ 38,549
	Phase 2 & 3 N Pit 12			$ 24,270	6.0	$ 7,714	6.0		$ 31,984
	Phase 2 & 3 N Pit 13			$ 26,221	6.5	$ 8,334	6.5		$ 34,554
	Phase 2 & 3 N Pit 14			$ 28,389	7.0	$ 9,023	7.0		$ 37,412
	Phase 2 & 3 N Pit 15			$ 29,883	7.4	$ 9,498	7.4		$ 39,381
	Phase 2 & 3 N Pit 16			$ 30,557	7.6	$ 9,712	7.6		$ 40,269
	Phase 2 & 3 N Pit 17			$ 31,139	7.7	$ 9,897	7.7		$ 41,036
	Phase 2 & 3 N Pit 18			$ 32,077	8.0	$ 10,195	8.0		$ 42,273
	Phase 2 & 3 N Pit 19			$ 31,477	7.8	$ 10,004	7.8		$ 41,482
	Phase 2 & 3 N Pit 20			$ 29,699	7.4	$ 9,439	7.4		$ 39,138
	Phase 2 & 3 N Pit 21			$ 105,103	26.1	$ 33,404	26.1		$ 138,507
	Phase 2 & 3 N HWT1			$ 46,838	11.6	$ 14,886	11.6		$ 61,724
	Phase 2 & 3 N HWT2			$ 106,393	26.4	$ 33,815	26.4		$ 140,208
	Phase 2 & 3 SURF 1			$ 50,510	12.5	$ 16,053	12.5		$ 66,563
	Phase 2 & 3 SURF 2			$ 39,428	9.8	$ 12,531	9.8		$ 51,960
	Phase 2 & 3 SURF 3			$ 31,941	7.9	$ 10,152	7.9		$ 42,093
	Phase 2 & 3 SURF 4			$ 1,072	0.3	$ 341	0.3		$ 1,413
	Phase 2 & 3 SURF 5			$ 44,763	11.1	$ 14,227	11.1		$ 58,990
	Phase 2 & 3 SURF 6			$ 32,800	8.1	$ 10,425	8.1		$ 43,225
	Phase 2 & 3 SURF CROSSING			$ -	-	$ -	-		$ -
	Line Items Facilities Concrete Demolition							$ 29,964	$ 29,964
	Line Items Facilities Structure Demolition							$ 130,274	$ 130,274
	Line Items Facilities Earthwork							$ 957,257	$ 957,257
Subtotal (+)		**$ 2,348,731**	**26.1**	**$ 963,979**	**239.0**	**$ 306,378**	**239.0**	**$ 1,117,495**	**$ 4,736,582**
2016_1 Coal Hollow (CHM) Release Submission (-)		**$ 457,869**	**27.3**	**$ -**	**-**	**$ -**	**-**	**$ -**	**$ 457,869**
Cumulative Liability (=)		**$ 6,193,267**	**136.6**	**$ 2,750,694**	**653.5**	**$ 837,629**	**653.5**	**$ 2,573,980**	**$ 12,355,570**
2016 Mining Bond to Post									
	Incremental Phase 1 N Pit 01	$ 40,187	2.9						$ 40,187
	Incremental Phase 1 N Pit 02	$ 84,552	4.0						$ 84,552
	Incremental Phase 1 N Pit 03	$ 90,792	5.3						$ 90,792
	Incremental Phase 1 N Pit 04	$ 73,308	5.6						$ 73,308
	Incremental Phase 1 N Pit 05	$ 72,324	5.8						$ 72,324
	Incremental Phase 1 N Pit 06	$ 84,768	4.8						$ 84,768
Subtotal (+)		**$ 445,931**	**28.5**	**$ -**	**-**	**$ -**	**-**	**$ -**	**$ 445,931**
2016_2 CHM & Incremental Phase 1 Release Submission (-)		**$ 341,418**	**21.3**	**$ -**	**-**	**$ -**	**-**	**$ -**	**$ 341,418**
Cumulative Liability (=)		**$ 6,297,780**	**143.8**	**$ 2,750,694**	**653.5**	**$ 837,629**	**653.5**	**$ 2,573,980**	**$ 12,460,083**
2017 Mining Bond to Post									
	Incremental Phase 1 N Pit 07	$ 82,728	4.5						$ 82,728
	Incremental Phase 1 N Pit 08	$ 69,406	4.8						$ 69,406
	Incremental Phase 1 N Pit 09	$ 70,005	5.9						$ 70,005
	Incremental Phase 1 N Pit 10	$ 53,352	8.8						$ 53,352
	Incremental Phase 1 N Pit 11	$ 89,277	7.3						$ 89,277
	Incremental Phase 1 N Pit 12	$ 63,477	6.0						$ 63,477
	Incremental Phase 1 N Pit 13	$ 79,834	6.5						$ 79,834
Subtotal (+)		**$ 508,079**	**43.9**	**$ -**	**-**	**$ -**	**-**	**$ -**	**$ 508,079**
2017_1 CHM Incremental Phase 1 & 2017_2 CHM Phase 2 Release Submission (-)		**$ 243,759**	**16.3**	**$ 297,173**	**73.6**	**$ -**	**-**	**$ -**	**$ 540,933**
Cumulative Liability (=)		**$ 6,562,100**	**171.4**	**$ 2,453,520**	**579.9**	**$ 837,629**	**653.5**	**$ 2,573,980**	**$ 12,427,229**
2018 Mining Bond to Post									
	Incremental Phase 1 N Pit 14	$ 91,780	7.0						$ 91,780
	Incremental Phase 1 N Pit 15	$ 103,982	7.4						$ 103,982
	Incremental Phase 1 N Pit 16	$ 111,817	7.6						$ 111,817
	Incremental Phase 1 N Pit 17	$ 122,544	7.7						$ 122,544
	Incremental Phase 1 N Pit 18	$ 131,093	8.0						$ 131,093
	Incremental Phase 1 N Pit 19	$ 129,447	7.8						$ 129,447
	Incremental Phase 1 N Pit 20	$ 128,975	7.4						$ 128,975
Subtotal (+)		**$ 819,639**	**52.9**	**$ -**	**-**	**$ -**	**-**	**$ -**	**$ 819,639**
2018_0 Adjustment & 2018_1&2 Incremental Phase 1 Release Submissions (-)		**$ 599,859**	**50.9**	**$ -**	**-**	**$ -**	**-**	**$ -**	**$ 599,859**
Cumulative Liability (=)		**$ 6,781,880**	**173.4**	**$ 2,453,520**	**579.9**	**$ 837,629**	**653.5**	**$ 2,573,980**	**$ 12,647,010**
2019 Mining Bond to Post									
	Incremental Phase 1 N HWT1	$ 149,846	11.6						$ 149,846
	Incremental Phase 1 N HWT2	$ 165,027	26.4						$ 165,027
Subtotal (+)		**$ 314,874**	**38.0**	**$ -**	**-**	**$ -**	**-**	**$ -**	**$ 314,874**
No Applicable Release Submission (-)		**$ -**	**-**	**$ -**	**-**	**$ -**	**-**	**$ -**	**$ -**
Cumulative Liability (=)		**$ 7,096,754**	**211.4**	**$ 2,453,520**	**579.9**	**$ 837,629**	**653.5**	**$ 2,573,980**	**$ 12,961,883**
Cumulative Liability Calculations Transferred to Coal Hollow Mine Posting Plan from this point forward									
2020 Mining Bond to Post									
	2019 & 2020 CHM Pits	$ 1,316,740	56.5	$ -	-	$ -	-	$ -	$ 1,316,740
Subtotal (+)		**$ 1,316,740**	**56.5**	**$ -**	**-**	**$ -**	**-**	**$ -**	**$ 1,316,740**
CHM 2019_1 & CHM 2019_2 & CHM 2020_1 & 2020_1 Incremental Phase 1 Release Submission (-)		**$ 2,302,710**	**144.7**	**$ 450,551**	**111.6**	**$ -**	**-**	**$ -**	**$ 2,753,261**
Cumulative Liability (=)		**$ 6,110,784**	**123.2**	**$ 2,002,969**	**468.3**	**$ 837,629**	**653.5**	**$ 2,573,980**	**$ 11,525,363**
2021 Mining Bond to Post									
	None	$ -	-						$ -
Subtotal (+)		**$ -**	**-**	**$ -**	**-**	**$ -**	**-**	**$ -**	**$ -**
CHM 2021_1 Release Submission (-)		**$ 185,135**	**7.8**	**$ -**	**-**	**$ -**	**-**	**$ -**	**$ 185,135**
Cumulative Liability (=)		**$ 5,925,649**	**115.4**	**$ 2,002,969**	**468.3**	**$ 837,629**	**653.5**	**$ 2,573,980**	**$ 11,340,228**
2022 Mining Bond to Post									
	None	$ -	-						$ -
Subtotal (+)		**$ -**	**-**	**$ -**	**-**	**$ -**	**-**	**$ -**	**$ -**
2022_1 &2 Phase 1 and Phase 2 Release Submissions (-)		**$ 2,348,731**	**26.1**	**$ 700,171**	**173.6**	**$ -**	**-**	**$ -**	**$ 3,048,902**
Cumulative Liability (=)		**$ 3,576,919**	**89.3**	**$ 1,302,798**	**294.6**	**$ 837,629**	**653.5**	**$ 2,573,980**	**$ 8,291,326**
2023 Mining Bond to Post									
	None	$ -	-						$ -
Subtotal (+)		**$ -**	**-**	**$ -**	**-**	**$ -**	**-**	**$ -**	**$ -**
CHM 2023_1 & 2023_1 Phase 2 Release Submission (-)		**$ -**	**-**	**$ 541,045**	**134.1**	**$ -**	**-**	**$ -**	**$ 541,045**
Cumulative Liability (=)		**$ 3,576,919**	**89.3**	**$ 761,754**	**160.5**	**$ 837,629**	**653.5**	**$ 2,573,980**	**$ 7,750,281**
2024 - 2034 Mining Bond to Post									
	None	$ -	-						$ -
Subtotal (+)		**$ -**	**-**	**$ -**	**-**	**$ -**	**-**	**$ -**	**$ -**
2024 - 2034 Phase 3 Release Submissions (-)		**$ -**	**-**	**$ -**	**-**	**$ 306,378**	**239.0**	**$ 1,117,495**	**$ 1,423,873**
Cumulative Liability (=)		**$ 3,576,919**	**89.3**	**$ 761,754**	**160.5**	**$ 531,251**	**414.5**	**$ 1,456,485**	**$ 6,326,408**
End of UG Mining Bond to Post									
	None	$ -	-						$ -
Subtotal (+)		**$ -**	**-**	**$ -**	**-**	**$ -**	**-**	**$ -**	**$ -**
2024 - 2034 Phase 3 Release Submissions (-)		**$ 3,576,919**	**89.3**	**$ 761,754**	**160.5**	**$ 531,251**	**414.5**	**$ 1,456,485**	**$ 6,363,057**
Cumulative Liability (=)		**$ -**	**-**	**$ -**	**-**	**$ -**	**-**	**$ -**	**$ (36,649)**

North Area Bond Release Plan

Stage of Reclamation / Release Application	Pits Included in Release Application	Phase 1 Bond Amount	Phase 1 Surface Area (acres)	Phase 2 Bond Amount	Phase 2 Surface Area (acres)	Phase 3 Bond Amount	Phase 3 Surface Area (acres)	Facilities Bond Amount	Total Bond Amount
Point of Maximum Reclamation Liability Bond Amount		**$ 2,348,731**	**26.1**	**$ 963,979**	**239.0**	**$ 306,378**	**239.0**	**$ 1,117,495**	**$ 4,736,582**
***All amounts escalated to 2020**									
2016_1 CHM Incremental Phase 1 Release Submission									
	Incremental Phase 1 Various - See Appendix 8-1	$ 457,869	27.3	$ -	-	$ -	-	$ -	$ 457,869
	Subtotal	**$ 457,869**	**27.3**	**$ -**	**-**	**$ -**	**-**	**$ -**	**$ 457,869**
2016_2 CHM Incremental Phase 1 Release Submission									
	Incremental Phase 1 Various - See Appendix 8-1	$ 125,887	9.0	$ -	-	$ -	-	$ -	$ 125,887
	Subtotal	**$ 125,887**	**9.0**	**$ -**	**-**	**$ -**	**-**	**$ -**	**$ 125,887**
2016_2 Incremental Phase 1 Release Submission									
	Incremental Phase 1 N Pit 01	$ 40,187	2.9						$ 40,187
	Incremental Phase 1 N Pit 02	$ 84,552	4.0						$ 84,552
	Incremental Phase 1 N Pit 03	$ 90,792	5.3						$ 90,792
	Subtotal	**$ 215,531**	**12.3**	**$ -**	**-**	**$ -**	**-**	**$ -**	**$ 215,531**
2017_1 CHM Incremental Phase 1 Release Submission									
	Incremental Phase 1 Pit B-1	$ 13,359	-	$ -	-	$ -	-	$ -	$ 13,359
	Subtotal	**$ 13,359**	**-**	**$ -**	**-**	**$ -**	**-**	**$ -**	**$ 13,359**
2017_1 Incremental Phase 1 Release Submission									
	Incremental Phase 1 N Pit 04	$ 73,308	5.6						$ 73,308
	Incremental Phase 1 N Pit 05	$ 72,324	5.8						$ 72,324
	Incremental Phase 1 N Pit 06	$ 84,768	4.8						$ 84,768
	Subtotal	**$ 230,400**	**16.3**	**$ -**	**-**	**$ -**	**-**	**$ -**	**$ 230,400**
2017_2 CHM Phase 2 Release Submission									
	Incremental Phase 1 Various - See Appendix 8-1	$ -	-	$ 297,173	73.6	$ -	-	$ -	$ 297,173
	Subtotal	**$ -**	**-**	**$ 297,173**	**73.6**	**$ -**	**-**	**$ -**	**$ 297,173**
2018_0 Phase 1 Bond Adjustment - Reserve Loss									
	Incremental Phase 1 - 16% Reserve Loss N Pit 11	$ 14,284	1.2						$ 14,284
	Incremental Phase 1 - 21% Reserve Loss N Pit 12	$ 13,330	1.3						$ 13,330
	Subtotal	**$ 27,614**	**2.4**	**$ -**	**-**	**$ -**	**-**	**$ -**	**$ 27,614**
2018_1 Incremental Phase 1 Release Submission									
	Incremental Phase 1 N Pit 07	$ 82,728	4.5						$ 82,728
	Incremental Phase 1 N Pit 08	$ 69,406	4.8						$ 69,406
	Incremental Phase 1 N Pit 09	$ 70,005	5.9						$ 70,005
	Incremental Phase 1 N Pit 10	$ 53,352	8.8						$ 53,352
	Subtotal	**$ 275,492**	**24.1**	**$ -**	**-**	**$ -**	**-**	**$ -**	**$ 275,492**
2018_2 Incremental Phase 1 Release Submission									
	Incremental Phase 1 N Pit 11	$ 74,992	6.1						$ 74,992
	Incremental Phase 1 N Pit 12	$ 50,147	4.8						$ 50,147
	Incremental Phase 1 N Pit 13	$ 79,834	6.5						$ 79,834
	Incremental Phase 1 N Pit 14	$ 91,780	7.0						$ 91,780
	Subtotal	**$ 296,753**	**24.4**	**$ -**	**-**	**$ -**	**-**	**$ -**	**$ 296,753**
2019_1 CHM Phase 1 Release Submission									
	Incremental Phase 1 Various - See Appendix 8-1	$ 533,976	27.4	$ -	-	$ -	-	$ -	$ 533,976
	Subtotal	**$ 533,976**	**27.4**	**$ -**	**-**	**$ -**	**-**	**$ -**	**$ 533,976**
2019_2 CHM Phase 2 Release Submission									
	Incremental Phase 1 Various - See Appendix 8-1	$ -	-	$ 450,551	111.6	$ -	-	$ -	$ 450,551
	Subtotal	**$ -**	**-**	**$ 450,551**	**111.6**	**$ -**	**-**	**$ -**	**$ 450,551**
2020_1 CHM Phase 1 Release Submission									
	Incremental Phase 1 Various - See Appendix 8-1	$ 726,000	33.5	$ -	-	$ -	-	$ -	$ 726,000
	Subtotal	**$ 726,000**	**33.5**	**$ -**	**-**	**$ -**	**-**	**$ -**	**$ 726,000**
2020_1 Incremental Phase 1 Release Submission									
	Incremental Phase 1 N Pit 15	$ 103,982	7.4						$ 103,982
	Incremental Phase 1 N Pit 16	$ 111,817	7.6						$ 111,817
	Incremental Phase 1 N Pit 17	$ 122,544	7.7						$ 122,544
	Incremental Phase 1 N Pit 18	$ 131,093	8.0						$ 131,093
	Incremental Phase 1 N Pit 19	$ 129,447	7.8						$ 129,447
	Incremental Phase 1 N Pit 20	$ 128,975	7.4						$ 128,975
	Incremental Phase 1 N HWT1	$ 149,846	11.6						$ 149,846
	Incremental Phase 1 N HWT2	$ 165,027	26.4						$ 165,027
	Subtotal	**$ 1,042,733**	**83.8**	**$ -**	**-**	**$ -**	**-**	**$ -**	**$ 1,042,733**
2021_1 CHM Phase 1 Release Submission									
	Incremental Phase 1 Various - See Appendix 8-1	$ 185,135	7.8						$ 185,135
	Subtotal	**$ 185,135**	**7.8**	**$ -**	**-**	**$ -**	**-**	**$ -**	**$ 185,135**
2022_1 Phase 1 & 2 Release Submission									
	Phase 1 & 2 N Pit 21	$ 2,348,731	26.1	$ 105,103	26.1				$ 2,453,834
	Subtotal	**$ 2,348,731**	**26.1**	**$ 105,103**	**26.1**	**$ -**	**-**	**$ -**	**$ 2,453,834**
2022_2 Phase 2 Release Submission									
	Phase 2 N Pit 01			$ 11,803	2.9				$ 11,803
	Phase 2 N Pit 02			$ 16,140	4.0				$ 16,140
	Phase 2 N Pit 03			$ 21,468	5.3				$ 21,468
	Phase 2 N Pit 04			$ 22,740	5.6				$ 22,740
	Phase 2 N Pit 05			$ 23,264	5.8				$ 23,264
	Phase 2 N Pit 06			$ 19,533	4.8				$ 19,533
	Phase 2 N Pit 07			$ 18,244	4.5				$ 18,244
	Phase 2 N Pit 08			$ 19,386	4.8				$ 19,386
	Phase 2 N Pit 09			$ 23,921	5.9				$ 23,921
	Phase 2 N Pit 10			$ 35,666	8.8				$ 35,666
	Phase 2 N Pit 11			$ 29,252	7.3				$ 29,252
	Phase 2 N Pit 12			$ 24,270	6.0				$ 24,270
	Phase 2 N Pit 13			$ 26,221	6.5				$ 26,221
	Phase 2 N Pit 14			$ 28,389	7.0				$ 28,389
	Phase 2 N Pit 15			$ 29,883	7.4				$ 29,883
	Phase 2 N Pit 16			$ 30,557	7.6				$ 30,557
	Phase 2 N Pit 17			$ 31,139	7.7				$ 31,139
	Phase 2 N Pit 18			$ 32,077	8.0				$ 32,077
	Phase 2 N Pit 19			$ 31,477	7.8				$ 31,477
	Phase 2 N Pit 20			$ 29,699	7.4				$ 29,699
	Phase 2 SURF 1			$ 50,510	12.5				$ 50,510
	Phase 2 SURF 2			$ 39,428	9.8				$ 39,428
	Subtotal	**$ -**		**$ 595,068**	**147.6**	**$ -**		**$ -**	**$ 595,068**
2023_1 CHM Phase 2 Release Submission									
	Incremental Phase 1 Various - See Appendix 8-1	$ -	-	$ 277,237	68.7	$ -	-	$ -	$ 277,237
	Subtotal	**$ -**	**-**	**$ 277,237**	**68.7**	**$ -**	**-**	**$ -**	**$ 277,237**
2023 Phase 2 Release Submission									
	Phase 2 N HWT1			$ 46,838	11.6				$ 46,838
	Phase 2 N HWT2			$ 106,393	26.4				$ 106,393
	Phase 2 SURF 3			$ 31,941	7.9				$ 31,941
	Phase 2 SURF 4			$ 1,072	0.3				$ 1,072
	Phase 2 SURF 5			$ 44,763	11.1				$ 44,763
	Phase 2 SURF 6			$ 32,800	8.1				$ 32,800
	Subtotal	**$ -**	**-**	**$ 263,808**	**65.4**	**$ -**	**-**	**$ -**	**$ 263,808**
2024 - 2034 Release Submissions									
	Phase 3 N Pit 01					$ 3,751	2.9		$ 3,751
	Phase 3 N Pit 02					$ 5,130	4.0		$ 5,130
	Phase 3 N Pit 03					$ 6,823	5.3		$ 6,823
	Phase 3 N Pit 04					$ 7,227	5.6		$ 7,227
	Phase 3 N Pit 05					$ 7,394	5.8		$ 7,394
	Phase 3 N Pit 06					$ 6,208	4.8		$ 6,208
	Phase 3 N Pit 07					$ 5,798	4.5		$ 5,798
	Phase 3 N Pit 08					$ 6,161	4.8		$ 6,161
	Phase 3 N Pit 09					$ 7,603	5.9		$ 7,603
	Phase 3 N Pit 10					$ 11,336	8.8		$ 11,336
	Phase 3 N Pit 11					$ 9,297	7.3		$ 9,297
	Phase 3 N Pit 12					$ 7,714	6.0		$ 7,714
	Phase 3 N Pit 13					$ 8,334	6.5		$ 8,334
	Phase 3 N Pit 14					$ 9,023	7.0		$ 9,023
	Phase 3 N Pit 15					$ 9,498	7.4		$ 9,498
	Phase 3 N Pit 16					$ 9,712	7.6		$ 9,712
	Phase 3 N Pit 17					$ 9,897	7.7		$ 9,897
	Phase 3 N Pit 18					$ 10,195	8.0		$ 10,195
	Phase 3 N Pit 19					$ 10,004	7.8		$ 10,004
	Phase 3 N Pit 20					$ 9,439	7.4		$ 9,439
	Phase 3 N Pit 21					$ 33,404	26.1		$ 33,404
	Phase 3 N HWT1					$ 14,886	11.6		$ 14,886
	Phase 3 N HWT2					$ 33,815	26.4		$ 33,815
	Phase 3 SURF 1					$ 16,053	12.5		$ 16,053
	Phase 3 SURF 2					$ 12,531	9.8		$ 12,531
	Phase 3 SURF 3					$ 10,152	7.9		$ 10,152
	Phase 3 SURF 4					$ 341	0.3		$ 341
	Phase 3 SURF 5					$ 14,227	11.1		$ 14,227
	Phase 3 SURF 6					$ 10,425	8.1		$ 10,425
	Phase 3 SURF CROSSING					$ -			$ -
	Phase 3 Facilities Concrete Demolition							$ 29,964	$ 29,964
	Phase 3 Facilities Structure Demolition							$ 130,274	$ 130,274
	Phase 3 Facilities Earthwork							$ 957,257	$ 957,257
	Subtotal	**$ -**	**-**	**$ -**	**-**	**$ 306,378**	**239.0**	**$ 1,117,495**	**$ 1,423,873**
End of UG CHM Phase 1, 2 & 3 Release Submissions									
	Phase 1, 2 & 3 Various - See Appendix 8-1	$ 3,576,919	89.3	$ 761,754	160.5	$ 531,251	414.5	$ 1,456,485	$ 6,363,057
	Subtotal	**$ 3,576,919**	**89.3**	**$ 761,754**	**160.5**	**$ 531,251**	**414.5**	**$ 1,456,485**	**$ 6,363,057**

North Area Point of Maximum Reclamation Liability Determination

Stage of Reclamation	Included Pits / Areas	Phase 1 Bond Amount	Phase 1 Surface Area (acres)	Phase 2 Bond Amount	Phase 2 Surface Area (acres)	Phase 3 Bond Amount	Phase 3 Surface Area (acres)	Facilities Bond Amount	Total Bond Amount
***All amounts escalated to 2019**									
Point of Maximum Reclamation Liability									
Phase 1	N Pit 21	$ 2,348,731	26.1						$ 2,348,731
Phase 2 & 3	N Pit 01			$ 11,803	2.9	$ 3,751	2.9		$ 15,555
Phase 2 & 3	N Pit 02			$ 16,140	4.0	$ 5,130	4.0		$ 21,270
Phase 2 & 3	N Pit 03			$ 21,468	5.3	$ 6,823	5.3		$ 28,291
Phase 2 & 3	N Pit 04			$ 22,740	5.6	$ 7,227	5.6		$ 29,968
Phase 2 & 3	N Pit 05			$ 23,264	5.8	$ 7,394	5.8		$ 30,657
Phase 2 & 3	N Pit 06			$ 19,533	4.8	$ 6,208	4.8		$ 25,741
Phase 2 & 3	N Pit 07			$ 18,244	4.5	$ 5,798	4.5		$ 24,042
Phase 2 & 3	N Pit 08			$ 19,386	4.8	$ 6,161	4.8		$ 25,548
Phase 2 & 3	N Pit 09			$ 23,921	5.9	$ 7,603	5.9		$ 31,524
Phase 2 & 3	N Pit 10			$ 35,666	8.8	$ 11,336	8.8		$ 47,001
Phase 2 & 3	N Pit 11			$ 29,252	7.3	$ 9,297	7.3		$ 38,549
Phase 2 & 3	N Pit 12			$ 24,270	6.0	$ 7,714	6.0		$ 31,984
Phase 2 & 3	N Pit 13			$ 26,221	6.5	$ 8,334	6.5		$ 34,554
Phase 2 & 3	N Pit 14			$ 28,389	7.0	$ 9,023	7.0		$ 37,412
Phase 2 & 3	N Pit 15			$ 29,883	7.4	$ 9,498	7.4		$ 39,381
Phase 2 & 3	N Pit 16			$ 30,557	7.6	$ 9,712	7.6		$ 40,269
Phase 2 & 3	N Pit 17			$ 31,139	7.7	$ 9,897	7.7		$ 41,036
Phase 2 & 3	N Pit 18			$ 32,077	8.0	$ 10,195	8.0		$ 42,273
Phase 2 & 3	N Pit 19			$ 31,477	7.8	$ 10,004	7.8		$ 41,482
Phase 2 & 3	N Pit 20			$ 29,699	7.4	$ 9,439	7.4		$ 39,138
Phase 2 & 3	N Pit 21			$ 105,103	26.1	$ 33,404	26.1		$ 138,507
Phase 2 & 3	N HWT1			$ 46,838	11.6	$ 14,886	11.6		$ 61,724
Phase 2 & 3	N HWT2			$ 106,393	26.4	$ 33,815	26.4		$ 140,208
Phase 2 & 3	SURF 1			$ 50,510	12.5	$ 16,053	12.5		$ 66,563
Phase 2 & 3	SURF 2			$ 39,428	9.8	$ 12,531	9.8		$ 51,960
Phase 2 & 3	SURF 3			$ 31,941	7.9	$ 10,152	7.9		$ 42,093
Phase 2 & 3	SURF 4			$ 1,072	0.3	$ 341	0.3		$ 1,413
Phase 2 & 3	SURF 5			$ 44,763	11.1	$ 14,227	11.1		$ 58,990
Phase 2 & 3	SURF 6			$ 32,800	8.1	$ 10,425	8.1		$ 43,225
Phase 2 & 3	SURF CROSSING			$ -	-	$ -	-		$ -
Line Items	Facilities Concrete Demolition							$ 29,964	$ 29,964
Line Items	Facilities Structure Demolition							$ 130,274	$ 130,274
Line Items	Facilities Earthwork							$ 957,257	$ 957,257
Total		**$ 2,348,731**	**26.1**	**$ 963,979**	**239.0**	**$ 306,378**	**239.0**	**$ 1,117,495**	**$ 4,736,582**

North Area Facilities Reclamation Cost Estimate

Concrete Reclamation Cost Estimate

Concrete Demolition

Item	Unit	Quantity	Unit Cost ($)	Cost	**Cost Data Reference
New Kanab Creek Crossing (Box Culvert C-3)	lft	450	$24.50	$11,025	RSMeans Building Constr., 02 41 13.43 0200
Concrete Disposal					
*Concrete Disposal (All Facilities)	yd^3	1,000	$17.90	$17,900	RSMeans Building Constr., 02 41 16.17 4250
Subtotal Concrete Demolition & Disposal				**$28,925**	

*Concrete is disposed of on site (in pits) within five miles of facilities

**All cost data is from the 2018 editions of either the RS Means Heavy Construction or Building Construction Cost Data Manuals (Total Cost Including O&P)

Structures Reclamation Cost Estimate

Structure Demolition & Disposal

Item	Unit	Quantity	Unit Cost ($)	Cost	**Cost Data Reference
12" Drainage Culvert (demolition) ASCA-1 Drop Pipe	ft	10	$2.60	$26	RSMeans Heavy Constr., 02 41 13.40 0150
18" Drainage Culvert (demolition) UC-T1-01 (mined out)	ft	306	$0.00	$0	RSMeans Heavy Constr., 02 41 13.40 0170
24" Drainage Culvert (demolition) C-1	ft	140	$14.55	$2,037	RSMeans Heavy Constr., 02 41 13.40 0170
24" Drainage Culvert (demolition) C-4	ft	120	$14.55	$1,746	RSMeans Heavy Constr., 02 41 13.40 0170
36" Drainage Culvert (demolition) C-2	ft	150	$17.45	$2,618	RSMeans Heavy Constr., 02 41 13.40 0180
144" Drainage Culvert (demolition) C-3	ft	215	$48.00	$10,320	RSMeans Heavy Constr., 02 41 13.40 0200
ASCA-1 Box Drain	each	1	$242.00	$242	RSMeans Heavy Constr., 02 41 13.42 0400
Culvert Excavation 6' - 10' Deep ASCA-1 Drop Pipe	yd^3	37	$4.95	$183	RSMeans Heavy Constr., 31 23 16.13 0510
Culvert Excavation 6' - 10' Deep C-1	yd^3	187	$4.95	$924	RSMeans Heavy Constr., 31 23 16.13 0510
Culvert Excavation 6' - 10' Deep C-4	yd^3	160	$4.95	$792	RSMeans Heavy Constr., 31 23 16.13 0510
Culvert Excavation 14' - 20' Deep C-2	yd^3	1,089	$6.20	$6,751	RSMeans Heavy Constr., 31 23 16.13 1300
Culvert Excavation 14' - 20' Deep C-3	yd^3	5,000	$6.20	$31,000	RSMeans Heavy Constr., 31 23 16.13 1300
Perimeter Fencing (demolition)	ft	15,000	$3.47	$52,050	RSMeans Heavy Constr., 02 41 13.60 1650
Water Monitoring Wells - PVC (demolition)	VLF	1,888	$7.27	$13,722	RSMeans Heavy Constr., 02 41 13.76 0900
Water Monitoring Wells - Steel (demolition)	VLF	230	$14.55	$3,347	RSMeans Heavy Constr., 02 41 13.76 1000
Subtotal Structure Demolition & Disposal				**$125,758**	

** RS Means does not have direct cost data references for some specific items. Where needed, reasonable substitutues are utilized.

All cost data is from the 2018 editions of either the RS Means Heavy Construction or Building Construction Cost Data Manuals except where specifically noted (Total Cost Including O&P)

Earthwork Reclamation Cost Estimate

Facilities Earthwork

Item	Unit	Quantity	Unit Cost ($)	Cost	**Cost Data Reference
Pond 5 backfill from embankment	yd^3	124	$2.29	$285	RSMeans Heavy Constr., 31 23 23.17 0020
Pond 5 backfill from stockpile	yd^3	7,765	$5.57	$43,253	RSMeans Heavy Constr., 31 23 16.43 5330 & 31 23 23.20 6160 & 31 23 23.17 0020
Pond 6 backfill from embankment	yd^3	242	$2.29	$554	RSMeans Heavy Constr., 31 23 23.17 0020
Pond 6 backfill from stockpile	yd^3	8,665	$5.57	$48,263	RSMeans Heavy Constr., 31 23 16.43 5330 & 31 23 23.20 6160 & 31 23 23.17 0020
Pond 7 backfill from embankment	yd^3	219	$2.29	$501	RSMeans Heavy Constr., 31 23 23.17 0020
Pond 7 backfill from stockpile	yd^3	118,132	$5.57	$657,995	RSMeans Heavy Constr., 31 23 16.43 5330 & 31 23 23.20 6160 & 31 23 23.17 0020
Pond 8 backfill from embankment	yd^3	5,467	$2.29	$12,519	RSMeans Heavy Constr., 31 23 23.17 0020
Pond 8 backfill from stockpile	yd^3	0	$5.57	$0	RSMeans Heavy Constr., 31 23 16.43 5330 & 31 23 23.20 6160 & 31 23 23.17 0020
Pond 9 backfill from embankment	yd^3	371	$2.29	$850	RSMeans Heavy Constr., 31 23 23.17 0020
Pond 9 backfill from stockpile	yd^3	9,486	$5.57	$52,838	RSMeans Heavy Constr., 31 23 16.43 5330 & 31 23 23.20 6160 & 31 23 23.17 0020
Pond T1 backfill (mined out)	yd^3	3,288	$0.00	$0	RSMeans Heavy Constr., 31 23 23.17 0020
Ditch DD-05 TO DD-20 recontouring	yd^3	2,483	$2.29	$5,687	RSMeans Heavy Constr., 31 23 23.17 0020
Ditch DD-T1-01 to DD-T1-02 recontouring (mined out)	yd^3	97	$0.00	$0	RSMeans Heavy Constr., 31 23 23.17 0020
Ripping of haul roads and compacted surfaces	yd^3	38,673	$2.62	$101,322	RSMeans Heavy Constr., 31 23 16.32 2310
Subtotal Facilities Earthwork				**$924,067**	

** RS Means does not have direct cost data references for some specific items. Where needed, reasonable substitutues are utilized.
All cost data is from the 2018 editions of either the RS Means Heavy Construction or Building Construction Cost Data Manuals except where specifically noted (Total Cost Including O&P)

Total Facilities Reclamation Cost Estimate	**$1,078,750**

North Area Bond Polygon Cost Estimates

	Pit	BCF	BCY	Backfill LCY	Area (sf)	Area (acres)	Phase 1 Cost: Backfill Cost	Subsoil Quantity (LCY)	Subsoil Cost	Total Direct Cost	Indirect Cost	Total Phase 1 Cost	Total Polygon Phase 1 Cost - Escalated	Incremental Phase 1 Cost (10%)	Phase 2 Cost: Topsoil Quantity (LCY)	Topsoil Cost	Mulching Quantity (M.S.F)	Mulching Cost	Seeding Quantity (M.S.F)	Seeding Cost	Total Direct Cost	Indirect Cost	Total Phase 2 Cost	Total Phase 2 Cost - Escalated	Phase 3 Cost: Re-Seed Quantity	Re-Seed Cost	Total Direct Cost	Indirect Cost	Total Phase 3 Cost	Total Phase 3 Cost - Escalated	Facilities Cost: Total Facilities Cost	Total Facilities Cost - Escalated	Total: Total Bonded Amount - Escalated
Excavated Areas	N Pit 01			285,556	127,498.2	2.9	$ 286,266	16,874	$ 19,676	$ 305,941	$ 81,992	$ 387,934	**$ 401,867**	**$ 40,187**	3,375	$ 4,093	127	$ 2,037	127	$ 2,856	$ 8,986	$ 2,408	$ 11,394	**$ 11,803**	127	$ 2,856	$ 2,856	$ 765	$ 3,621	**$ 3,751**			**$ 417,422**
	N Pit 02			615,264	174,342.8	4.0	$ 616,793	23,074	$ 26,905	$ 643,697	$ 172,511	$ 816,208	**$ 845,524**	**$ 84,552**	4,615	$ 5,596	174	$ 2,786	174	$ 3,905	$ 12,287	$ 3,293	$ 15,581	**$ 16,140**	174	$ 3,905	$ 3,905	$ 1,047	$ 4,952	**$ 5,130**			**$ 866,794**
	N Pit 03			653,788	231,889.1	5.3	$ 655,412	30,690	$ 35,785	$ 691,197	$ 185,241	$ 876,438	**$ 907,917**	**$ 90,792**	6,138	$ 7,443	232	$ 3,706	232	$ 5,194	$ 16,343	$ 4,380	$ 20,723	**$ 21,468**	232	$ 5,194	$ 5,194	$ 1,392	$ 6,586	**$ 6,823**			**$ 936,207**
	N Pit 04			518,901	245,636.1	5.6	$ 520,189	32,509	$ 37,907	$ 558,096	$ 149,570	$ 707,666	**$ 733,083**	**$ 73,308**	6,502	$ 7,885	246	$ 3,925	246	$ 5,502	$ 17,312	$ 4,640	$ 21,952	**$ 22,740**	246	$ 5,502	$ 5,502	$ 1,475	$ 6,977	**$ 7,227**			**$ 763,051**
	N Pit 05			510,556	251,290.3	5.8	$ 511,824	33,257	$ 38,779	$ 550,604	$ 147,562	$ 698,166	**$ 723,241**	**$ 72,324**	6,651	$ 8,066	251	$ 4,016	251	$ 5,629	$ 17,711	$ 4,746	$ 22,457	**$ 23,264**	251	$ 5,629	$ 5,629	$ 1,509	$ 7,137	**$ 7,394**			**$ 753,899**
	N Pit 06			611,257	210,990.1	4.8	$ 612,775	27,924	$ 32,560	$ 645,336	$ 172,950	$ 818,285	**$ 847,676**	**$ 84,768**	5,585	$ 6,773	211	$ 3,372	211	$ 4,726	$ 14,870	$ 3,985	$ 18,856	**$ 19,533**	211	$ 4,726	$ 4,726	$ 1,267	$ 5,993	**$ 6,208**			**$ 873,416**
	N Pit 07			597,912	197,063.8	4.5	$ 599,397	26,081	$ 30,411	$ 629,809	$ 168,789	$ 798,597	**$ 827,280**	**$ 82,728**	5,216	$ 6,326	197	$ 3,149	197	$ 4,414	$ 13,889	$ 3,722	$ 17,611	**$ 18,244**	197	$ 4,414	$ 4,414	$ 1,183	$ 5,597	**$ 5,798**			**$ 851,322**
	N Pit 08			494,843	209,407.1	4.8	$ 496,072	27,714	$ 32,316	$ 528,388	$ 141,608	$ 669,996	**$ 694,060**	**$ 69,406**	5,543	$ 6,722	209	$ 3,346	209	$ 4,691	$ 14,759	$ 3,955	$ 18,714	**$ 19,386**	209	$ 4,691	$ 4,691	$ 1,257	$ 5,948	**$ 6,161**			**$ 719,608**
	N Pit 09			491,854	258,391.9	5.9	$ 493,075	34,197	$ 39,875	$ 532,951	$ 142,831	$ 675,781	**$ 700,053**	**$ 70,005**	6,839	$ 8,294	258	$ 4,129	258	$ 5,788	$ 18,211	$ 4,881	$ 23,092	**$ 23,921**	258	$ 5,788	$ 5,788	$ 1,551	$ 7,339	**$ 7,603**			**$ 731,577**
	N Pit 10			345,858	385,255.3	8.8	$ 346,717	50,987	$ 59,453	$ 406,170	$ 108,854	$ 515,023	**$ 533,521**	**$ 53,352**	10,197	$ 12,366	385	$ 6,156	385	$ 8,630	$ 27,152	$ 7,277	$ 34,429	**$ 35,666**	385	$ 8,630	$ 8,630	$ 2,313	$ 10,942	**$ 11,336**			**$ 580,523**
	N Pit 11			629,338	315,978.8	7.3	$ 630,901	41,818	$ 48,762	$ 679,663	$ 182,150	$ 861,812	**$ 892,766**	**$ 89,277**	8,364	$ 10,143	316	$ 5,049	316	$ 7,078	$ 22,270	$ 5,968	$ 28,238	**$ 29,252**	316	$ 7,078	$ 7,078	$ 1,897	$ 8,975	**$ 9,297**			**$ 931,315**
	N Pit 12			441,698	262,162.2	6.0	$ 442,795	34,696	$ 40,457	$ 483,252	$ 129,511	$ 612,763	**$ 634,772**	**$ 63,477**	6,939	$ 8,415	262	$ 4,189	262	$ 5,872	$ 18,477	$ 4,952	$ 23,429	**$ 24,270**	262	$ 5,872	$ 5,872	$ 1,574	$ 7,446	**$ 7,714**			**$ 666,755**
	N Pit 13			562,667	283,232.0	6.5	$ 564,064	37,485	$ 43,709	$ 607,773	$ 162,883	$ 770,656	**$ 798,335**	**$ 79,834**	7,497	$ 9,091	283	$ 4,526	283	$ 6,344	$ 19,962	$ 5,350	$ 25,312	**$ 26,221**	283	$ 6,344	$ 6,344	$ 1,700	$ 8,045	**$ 8,334**			**$ 832,890**
	N Pit 14			649,784	306,658.2	7.0	$ 651,397	40,585	$ 47,324	$ 698,721	$ 187,257	$ 885,978	**$ 917,800**	**$ 91,780**	8,117	$ 9,843	307	$ 4,900	307	$ 6,869	$ 21,613	$ 5,792	$ 27,405	**$ 28,389**	307	$ 6,869	$ 6,869	$ 1,841	$ 8,710	**$ 9,023**			**$ 955,212**
	N Pit 15			739,961	322,796.3	7.4	$ 741,799	42,721	$ 49,814	$ 791,613	$ 212,152	$ 1,003,765	**$ 1,039,817**	**$ 103,982**	8,544	$ 10,361	323	$ 5,158	323	$ 7,231	$ 22,750	$ 6,097	$ 28,847	**$ 29,883**	323	$ 7,231	$ 7,231	$ 1,938	$ 9,168	**$ 9,498**			**$ 1,079,198**
	N Pit 16			798,346	330,072.5	7.6	$ 800,329	43,684	$ 50,937	$ 851,266	$ 228,139	$ 1,079,405	**$ 1,118,174**	**$ 111,817**	8,737	$ 10,595	330	$ 5,275	330	$ 7,394	$ 23,263	$ 6,235	$ 29,498	**$ 30,557**	330	$ 7,394	$ 7,394	$ 1,981	$ 9,375	**$ 9,712**			**$ 1,158,443**
	N Pit 17			878,839	336,358.9	7.7	$ 881,022	44,516	$ 51,907	$ 932,929	$ 250,025	$ 1,182,954	**$ 1,225,442**	**$ 122,544**	8,903	$ 10,797	336	$ 5,375	336	$ 7,534	$ 23,706	$ 6,353	$ 30,059	**$ 31,139**	336	$ 7,534	$ 7,534	$ 2,019	$ 9,554	**$ 9,897**			**$ 1,266,478**
	N Pit 18			942,202	346,495.6	8.0	$ 944,542	45,857	$ 53,472	$ 998,013	$ 267,468	$ 1,265,481	**$ 1,310,933**	**$ 131,093**	9,171	$ 11,122	346	$ 5,537	346	$ 7,762	$ 24,421	$ 6,545	$ 30,965	**$ 32,077**	346	$ 7,762	$ 7,762	$ 2,080	$ 9,842	**$ 10,195**			**$ 1,353,206**
	N Pit 19			930,700	340,014.1	7.8	$ 933,012	44,999	$ 52,471	$ 985,483	$ 264,109	$ 1,249,592	**$ 1,294,474**	**$ 129,447**	9,000	$ 10,914	340	$ 5,433	340	$ 7,616	$ 23,964	$ 6,422	$ 30,386	**$ 31,477**	340	$ 7,616	$ 7,616	$ 2,041	$ 9,657	**$ 10,004**			**$ 1,335,955**
	N Pit 20			930,074	320,799.7	7.4	$ 932,384	42,456	$ 49,506	$ 981,890	$ 263,147	$ 1,245,037	**$ 1,289,755**	**$ 128,975**	8,491	$ 10,297	321	$ 5,126	321	$ 7,186	$ 22,610	$ 6,059	$ 28,669	**$ 29,699**	321	$ 7,186	$ 7,186	$ 1,926	$ 9,112	**$ 9,439**			**$ 1,328,892**
	N Pit 21			1,608,892	1,135,303.7	26.1	$ 1,612,888	150,253	$ 175,201	$ 1,788,089	$ 479,208	$ 2,267,297	**$ 2,348,731**	**$ 234,873**	30,051	$ 36,442	1,135	$ 18,142	1,135	$ 25,431	$ 80,015	$ 21,444	$ 101,459	**$ 105,103**	1,135	$ 25,431	$ 25,431	$ 6,815	$ 32,246	**$ 33,404**			**$ 2,487,238**
	N HWT1			1,060,071	505,935.4	11.6	$ 1,062,704	66,958	$ 78,076	$ 1,140,780	$ 305,729	$ 1,446,509	**$ 1,498,463**	**$ 149,846**	13,392	$ 16,240	506	$ 8,085	506	$ 11,333	$ 35,658	$ 9,556	$ 45,214	**$ 46,838**	506	$ 11,333	$ 11,333	$ 3,037	$ 14,370	**$ 14,886**			**$ 1,560,188**
	N HWT2			1,076,328	1,149,244.4	26.4	$ 1,079,001	152,098	$ 177,353	$ 1,256,354	$ 336,703	$ 1,593,057	**$ 1,650,274**	**$ 165,027**	30,420	$ 36,889	1,149	$ 18,365	1,149	$ 25,743	$ 80,997	$ 21,707	$ 102,705	**$ 106,393**	1,149	$ 25,743	$ 25,743	$ 6,899	$ 32,642	**$ 33,815**			**$ 1,790,482**
	Excavated Areas Totals	**0**	**0**	**16,374,689**	**8,246,817**	**189.3**	**$ 16,415,357**	**1,091,431**	**$ 1,272,657**	**$ 17,688,014**	**$ 4,740,388**	**$ 22,428,402**	**$ 23,233,960**	**$ 2,323,396**	**218,286**	**$ 264,713**	**8,247**	**$ 131,784**	**$ 8,247**	**$ 184,729**	**$ 581,225**	**$ 155,768**	**$ 736,994**	**$ 763,464**	**8,247**	**$ 184,729**	**$ 184,729**	**$ 49,507**	**$ 234,236**	**$ 242,649**			**$ 24,240,073**
Surface Disturbance Only Areas	SURF 1				545,598	12.5									14,442	$ 17,513	546	$ 8,719	546	$ 12,221	$ 38,453	$ 10,305	$ 48,759	**$ 50,510**	546	$ 12,221	$ 12,221	$ 3,275	$ 15,497	**$ 16,053**			**$ 66,563**
	SURF 2				425,897	9.8									11,273	$ 13,671	426	$ 6,806	426	$ 9,540	$ 30,017	$ 8,044	$ 38,061	**$ 39,428**	426	$ 9,540	$ 9,540	$ 2,557	$ 12,097	**$ 12,531**			**$ 51,960**
	SURF 3				345,022	7.9									9,132	$ 11,075	345	$ 5,513	345	$ 7,728	$ 24,317	$ 6,517	$ 30,834	**$ 31,941**	345	$ 7,728	$ 7,728	$ 2,071	$ 9,800	**$ 10,152**			**$ 42,093**
	SURF 4				11,583	0.3									307	$ 372	12	$ 185	12	$ 259	$ 816	$ 219	$ 1,035	**$ 1,072**	12	$ 259	$ 259	$ 70	$ 329	**$ 341**			**$ 1,413**
	SURF 5				483,523	11.1									12,798	$ 15,520	484	$ 7,727	484	$ 10,831	$ 34,078	$ 9,133	$ 43,211	**$ 44,763**	484	$ 10,831	$ 10,831	$ 2,903	$ 13,734	**$ 14,227**			**$ 58,990**
	SURF 6				354,303	8.1									9,378	$ 11,373	354	$ 5,662	354	$ 7,936	$ 24,971	$ 6,692	$ 31,663	**$ 32,800**	354	$ 7,936	$ 7,936	$ 2,127	$ 10,063	**$ 10,425**			**$ 43,225**
	SURF CROSSING				-	-									-	$ -	-	$ -	-	$ -	$ -	$ -	$ -	**$ -**	-	$ -	$ -	$ -	$ -	**$ -**			**$ -**
	Surface Disturbance Only Areas Totals				**2,165,925**	**49.7**									**57,330**	**$ 69,524**	**2,166**	**$ 34,611**	**2,166**	**$ 48,517**	**$ 152,652**	**$ 40,911**	**$ 193,562**	**$ 200,515**	**2,166**	**$ 48,517**	**$ 48,517**	**$ 13,002**	**$ 61,519**	**$ 63,729**			**$ 264,243**
Facilities & Special Areas*	Facilities Concrete Demolition																														**$ 28,925**	**$ 29,964**	**$ 29,964**
*All Topsoiling, Mulching & Seeding included in surface disturbance area calculations	Facilities Structure Demolition																														**$ 125,758**	**$ 130,274**	**$ 130,274**
	Facilities Earthwork																														**$ 924,067**	**$ 957,257**	**$ 957,257**
	Facilities & Special Areas* Totals																														**$ 1,078,750**	**$ 1,117,495**	**$ 1,117,495**
	North Area Totals	**0**	**0**	**16,374,689**	**10,412,742**	**239.0**	**$ 16,415,357**	**1,091,431**	**$ 1,272,657**	**$ 17,688,014**	**$ 4,740,388**	**$ 22,428,402**	**$ 23,233,960**	**$ 2,323,396**	**275,616**	**$ 334,236**	**10,413**	**$ 166,396**	**10,413**	**$ 233,245**	**$ 733,877**	**$ 196,679**	**$ 930,556**	**$ 963,979**	**10,413**	**$ 233,245**	**$ 233,245**	**$ 62,510**	**$ 295,755**	**$ 306,378**	**$ 1,078,750**	**$ 1,117,495**	**$ 25,621,811**

North Area Production Model Cost Data & Assumptions

Equipment Description	Equipment Cost $/hr	Equip + Labor Cost $/hr
7 yd. Excavator (385C LME)	$87.34	$121.34
40 Ton (30 CY) Haul Truck (769C)	$51.23	$91.47
5,000 Gal. Water Truck (35 ton articulat	$33.35	$67.35
14 Grader	$42.31	$76.31
D10 Dozer	$98.42	$132.42
D7 Dozer	$54.21	$88.21

Sourced from Cost Mine 2017 Coal Cost Guide and 2017 Mine and Mill Equipment Costs

Labor Cost Data

Manpower Type	Base Wage ($/hr)	Labor Cost @ 36% burden ($/hr)
Heavy Equipment Operator	$25.00	$34.00
Truck Drivers	$29.59	$40.24

Labor Data from 2017 Coal Cost Guide Table LA-7 for Surface Coal Mines (Non-Union)

Unit Cost Data

Movement Type	Cost/BCY	Cost/LCY	Unit Swell Factor	
Rehandle with Truck/Shovel	$ 1.11	$ 1.00	10.7%	
Subsoil	$ 1.25	$ 1.17	7.2%	
Topsoil	$ 1.30	$ 1.21	7.2%	
		Cost/M.S.F		
Mulching		$ 15.98		Local Supplier Quote 3 yr. average
Seeding		$ 22.40		Local Supplier Quote 3 yr. average

Unit Costs calculated from Caterpillar Inc. FPC production model (v. 5.3.0.6) using 2017 cost data

Indirect Cost Factor
26.8%

Escalation Factor 2018 to 2019
1.03591684

South Area and North Area Actual Cost of Reclamation Per Acre

North Pasture	2017	Cost per M.S.F.		
Seed Cost**	$161.60	$ 3.71		
Drill Seeding Cost	$ 609.00	$ 13.98	**$ 17.69**	**Seeding Subtotal**
Nutrimulch (2,250 lbs)	$ 105.00	$ 2.41		
Straw Mulch (2,000 lbs)	$ 135.00	$ 3.10		
Spreading Mulch	$ 486.00	$ 11.16	**$ 16.67**	**Mulching Subtotal**
Total	**$1,496.60**	**$34.36**	**$34.36**	

**Doesn't include shipping

North Pasture	3 Yr Average	Cost per M.S.F.		
Seed Cost**	$148.20	$ 3.40		
Drill Seeding Cost	$609.00	$ 13.98	**$ 17.38**	**Seeding Subtotal**
Nutrimulch (2,250 lbs)	$81.67	$ 1.87		
Straw Mulch (2,000 lbs)	$128.33	$ 2.95		
Spreading Mulch	$486.00	$ 11.16	**$ 15.98**	**Mulching Subtotal**
Total	**$1,453.20**	**$33.36**	**$33.36**	

**Doesn't include shipping

Sage Grass Mix	2017	Cost per M.S.F.		
Seed Cost**	$311.75	$ 7.16		
Drill Seeding Cost	$ 609.00	$ 13.98	**$ 21.14**	**Seeding Subtotal**
Nutrimulch (2,250 lbs)	$ 105.00	$ 2.41		
Straw Mulch (2,000 lbs)	$ 135.00	$ 3.10		
Spreading Mulch	$ 486.00	$ 11.16	**$ 16.67**	**Mulching Subtotal**
Total	**$1,646.75**	**$37.80**	**$37.80**	

**Doesn't include shipping

Sage Grass Mix	3 Yr Average	Cost per M.S.F.		
Seed Cost**	$366.92	$ 8.42		
Drill Seeding Cost	$609.00	$ 13.98	**$ 22.40**	**Seeding Subtotal**
Nutrimulch (2,250 lbs)	$81.67	$ 1.87		
Straw Mulch (2,000 lbs)	$128.33	$ 2.95		
Spreading Mulch	$486.00	$ 11.16	**$ 15.98**	**Mulching Subtotal**
Total	**$1,671.92**	**$38.38**	**$38.38**	

**Doesn't include shipping

North Pasture	2016	Cost per M.S.F.		
Seed Cost**	$177.00	$ 4.06		
Drill Seeding Cost	$ 609.00	$ 13.98	**$ 18.04**	**Seeding Subtotal**
Nutrimulch (1,500 lbs)	$ 70.00	$ 1.61		
Straw Mulch (2,000 lbs)	$ 125.00	$ 2.87		
Spreading Mulch	$ 486.00	$ 11.16	**$ 15.63**	**Mulching Subtotal**
Total	**$1,467.00**	**$33.68**	**$33.68**	

**Includes Shipping

Sage Grass Mix	2016	Cost per M.S.F.		
Seed Cost**	$385.00	$ 8.84		
Drill Seeding Cost	$ 609.00	$ 13.98	**$ 22.82**	**Seeding Subtotal**
Nutrimulch (1,500 lbs)	$ 70.00	$ 1.61		
Straw Mulch (2,000 lbs)	$ 125.00	$ 2.87		
Spreading Mulch	$ 486.00	$ 11.16	**$ 15.63**	**Mulching Subtotal**
Total	**$1,675.00**	**$38.45**	**$38.45**	

**Includes Shipping

Pasture	2015	Cost per M.S.F.		
Seed Cost**	$106.00	$ 2.43		
Drill Seeding Cost	$ 609.00	$ 13.98	**$ 16.41**	**Seeding Subtotal**
Nutrimulch (1,500 lbs)	$ 70.00	$ 1.61		
Straw Mulch (2,000 lbs)	$ 125.00	$ 2.87		
Spreading Mulch	$ 486.00	$ 11.16	**$ 15.63**	**Mulching Subtotal**
Total	**$1,396.00**	**$32.05**	**$32.05**	

**Includes Shipping

Sage Grass Mix	2015	Cost per M.S.F.		
Seed Cost**	$404.00	$ 9.27		
Drill Seeding Cost	$ 609.00	$ 13.98	**$ 23.26**	**Seeding Subtotal**
Nutrimulch (1,500 lbs)	$ 70.00	$ 1.61		
Straw Mulch (2,000 lbs)	$ 125.00	$ 2.87		
Spreading Mulch	$ 486.00	$ 11.16	**$ 15.63**	**Mulching Subtotal**
Total	**$1,694.00**	**$38.89**	**$38.89**	

**Includes Shipping

FPC_2018_April_North Area_Truck-Shovel_Backfill

Cycle Times

Hauler Cycle Time

	6 769C
Load with Exchange (min)	1.25
Haul (min)	1.81
Dump and Maneuver (min)	1.2
Return (min)	1.62
Potential Cycle Time (min)	5.88
Wait on Slow Hauler (min)	0
Wait to Load (min)	1.62
Additional Bunching (min)	0.44
Wait to Dump (min)	0
TMPH Wait (min)	
Total Cycle Time (min)	7.94
Bunching	Avg
Haul Start mph	0
Haul End mph	0
Return Start mph	0
Return End mph	0

Loader Cycle Time

	6 769C
Loader Model	385C LME
Loader Quantity	1
Bucket Capacity (CY)	7.25
Loader Fill Factor (%)	100
Loose Density (Lbs/LCY)	2,498
Tons per Pass	9.06
System Passes per Hauler	3
Hauler Payload (Tons)	27.17
% of Max GVW	103.52
Hauler Volume (LCY)	21.75
% of Body Fill	70
Loader Cycle Time (min)	0.25
First Bucket Dump (min)	0.05
Hauler Exchange Time (min)	0.7

Fleet Production

Fleet Estimates

Operating Schedule		
Operator Efficiency	90	%
Schedule Period	Shift	
Scheduled Hours	10.5	
Fleet Estimates		
Fleet Availability	87.49	%
Production per Sched Hr	693.54	BCY
Total Production	1,540,000	BCY
Sched Hrs Required	2,220.49	
Total Cost ($)	1,786,945	
Cost per BCY ($)	1.16	
Production per Shift	7,282	BCY
Shifts Required	211.48	

Theoretical Production

	Quantity		Model	BCY per Hour	Cycles per Hour	
1		1	385C LME	932		
2		6	769C	1,188		10.2

Actual Production

	Quantity		Model	Cycles per Hour	Payload in Tons	Tons per Hour
1		5	769C	7.56	27.17	1,026.87
Fleet Tons per Operating Hour						1,026.87
x 90.00% Operator Efficiency =						924.18
x 87.49% Fleet Availability =						808.55

Cost

	Qty	Model	Machine Code	Hourly Cost Each Unit	Operating Hours	Total $	$ per BCY
Loaders	1	385C LME		124.78	1,998	249,366	0.162
Haulers:	6	769C	C202	93.51	11,656	1,089,947	0.708
Totals	6				11,656	1,089,947	0.708
Support	1	5,000 Gal. Water Truck		66.58	1,457	97,008	0.063
	1	14 Grader		82.84	971	80,466	0.052
	1	D10 Dozer		132.42	1,457	192,937	0.125
Totals	3				3,885	370,411	0.241
Fleet Totals	10				17,540	1,709,723	1.11

FPC_2018_April_North Area_Truck-Shovel_Subsoil

Cycle Times

Hauler Cycle Time

	5 769C
Load with Exchange (min)	1.25
Haul (min)	1.05
Dump and Maneuver (min)	1.2
Return (min)	1.02
Potential Cycle Time (min)	4.53
Wait on Slow Hauler (min)	0
Wait to Load (min)	1.72
Additional Bunching (min)	0.22
Wait to Dump (min)	0
TMPH Wait (min)	
Total Cycle Time (min)	6.47
Bunching	Avg
Haul Start mph	0
Haul End mph	0
Return Start mph	0
Return End mph	0

Loader Cycle Time

	5 769C
Loader Model	385C LME
Loader Quantity	1
Bucket Capacity (CY)	7.25
Loader Fill Factor (%)	100
Loose Density (Lbs/LCY)	1,601
Tons per Pass	5.8
System Passes per Hauler	3
Hauler Payload (Tons)	17.41
% of Max GVW	87.58
Hauler Volume (LCY)	21.75
% of Body Fill	70
Loader Cycle Time (min)	0.25
First Bucket Dump (min)	0.05
Hauler Exchange Time (min)	0.7

Fleet Production

Fleet Estimates

Operating Schedule		
Operator Efficiency	90	%
Schedule Period	Shift	
Scheduled Hours	10.5	
Fleet Estimates		
Fleet Availability	87.87	%
Production per Sched Hr	553.28	BCY
Total Production	850,000	BCY
Sched Hrs Required	1,536.30	
Total Cost ($)	1,107,857	
Cost per BCY ($)	1.303	
Production per Shift	5,809	BCY
Shifts Required	146.31	

Theoretical Production

	Quantity	Model	BCY per Hour	Cycles per Hour
1	1	385C LME	724	
2	5	769C	1,000	13.3

Actual Production

	Quantity	Model	Cycles per Hour	Payload in Tons	Tons per Hour
1	5	769C	9.28	17.41	807.73
Fleet Tons per Operating Hour					807.73
x 90.00% Operator Efficiency =					726.95
x 87.87% Fleet Availability =					638.76

Cost

	Qty	Model	Machine Code	Hourly Cost Each Unit	Operating Hours	Total $	$ per BCY
Loaders	1	385C LME		124.78	1,383	172,529	0.203
Haulers:	5	769C	C202	93.35	6,750	630,090	0.741
Totals	5				6,750	630,090	0.741
Support	1	5,000 Gal. Water Truck		66.58	1,012	67,408	0.079
	1	14 Grader		82.84	675	55,914	0.066
	1	D10 Dozer		132.42	1,012	134,067	0.158
Totals	3				2,700	257,388	0.303
Fleet Totals	9				10,832	1,060,008	1.247

FPC_2018_April_North Area_Truck-Shovel_Topsoil

Cycle Times

Hauler Cycle Time

	5 769C	
Load with Exchange (min)	1.25	
Haul (min)	1.51	
Dump and Maneuver (min)	1.2	
Return (min)	1.57	
Potential Cycle Time (min)	5.53	
Wait on Slow Hauler (min)	0	
Wait to Load (min)	0.72	
Additional Bunching (min)	0.68	
Wait to Dump (min)	0	
TMPH Wait (min)		
Total Cycle Time (min)	6.93	
Bunching	Avg	
Haul Start mph	0	
Haul End mph	0	
Return Start mph	0	
Return End mph	0	

Loader Cycle Time

	5 769C	
Loader Model	385C LME	
Loader Quantity	1	
Bucket Capacity (CY)	7.25	
Loader Fill Factor (%)	100	
Loose Density (Lbs/LCY)	1,601	
Tons per Pass	5.8	
System Passes per Hauler	3	
Hauler Payload (Tons)	17.41	
% of Max GVW	87.58	
Hauler Volume (LCY)	21.75	
% of Body Fill	70	
Loader Cycle Time (min)	0.25	
First Bucket Dump (min)	0.05	
Hauler Exchange Time (min)	0.7	

Fleet Production

Fleet Estimates

Operating Schedule		
Operator Efficiency	90	%
Schedule Period	Shift	
Scheduled Hours	10.5	
Fleet Estimates		
Fleet Availability	87.87	%
Production per Sched Hr	516.36	BCY
Total Production	500,000	BCY
Sched Hrs Required	968.33	
Total Cost ($)	678,986	
Cost per BCY ($)	1.358	
Production per Shift	5,422	BCY
Shifts Required	92.22	

Theoretical Production

	Quantity		Model	BCY per Hour	Cycles per Hour	
1		1	385C LME	724		
2		5	769C	818	10.8	

Actual Production

	Quantity		Model	Cycles per Hour	Payload in Tons	Tons per Hour
1		5	769C	8.66	17.41	753.82
Fleet Tons per Operating Hour						753.82
x 90.00% Operator Efficiency =						678.44
x 87.87% Fleet Availability =						596.13

Cost

	Qty	Model	Machine Code	Hourly Cost Each Unit	Operating Hours	Total $	$ per BCY
Loaders	1	385C LME		124.78	871	108,745	0.217
Haulers:	5	769C	C202	93.35	4,254	397,145	0.794
Totals	5				4,254	397,145	0.794
Support	1	5,000 Gal. Water Truck		66.58	638	42,487	0.085
	1	14 Grader		82.84	425	35,242	0.07
	1	D7 Dozer		88.21	766	67,548	0.135
Totals	3				1,829	145,278	0.291
Fleet Totals	9				6,955	651,167	1.302

Exhibit 18

USDOI, BLM
Mineral Lease, dated 11/XX/2018

Alton Coal Development, LLC
Coal Hollow Mine

Permit Number	MSHA	Violation Number	Date of Issuance	Issued to	Issuing Agency	State	Brief Description of NOV	Action taken to Abate NOV	Current Status of NOV
C250005	42-02519	21162	1/20/2016	K.Nicholes	UDOGM	Utah	Failed to install drainage from the sump in pit 10 to its discharge point in Pond 3 according to the design found in Appendix 5-13.	Installed two pipes from Pit 10 Sump to Pond 3, that terminate under water	Terminated
C250005	42-02519	21163	1/20/2016	K.Nicholes	UDOGM	Utah	Failure to have rough backfilling and grading follow coal removal by not more than 60 days. Mining ceased in HWT 2 with Panel 4E in July 2015.	Submitted plans that were reviewed and approved May 27, 2016 to backfill HWT 2.	Terminated
C250005	42-02519	21164	1/20/2016	K.Nicholes	UDOGM	Utah	Failure to provide a plan for reclamation of the final Pit 10.	Submitted an ammendment for a plan to backfill Pit 10 utilizing material from a designated borrow area.	Terminated
C250005	42-02519	21165	3/9/2016	K.Nicholes	UDOGM	Utah	1. Failure to provide accurate, certified underground (UG) mine surface facilities map showing buildings; utility corridors; coal and non-coal waste disposal locations; and coal loading locations. 2. Failure to provide accurate certified map of UG mine water diversions, collection, conveyance and treatment structures.	Provided drawing 5-3B showing UG facilities. Made changes to Chapter 5 Text.	Terminated
C250005	42-02519	21166	3/9/2016	K.Nicholes	UDOGM	Utah	Failure to correct structural weakness in pond 001 and 002	Replaced gaskets for oil skimmer on the primary discharge culvert.	Terminated
C250005	42-02519	21167	3/9/2016	K.Nicholes	UDOGM	Utah	1. Failure to install adequate sediment control measures on the fill slopes surrounding the underground mine (UG). 2. Failure to install adequate sediment control within Pit 10 for the UG mine surface facility	Provided drawings and supporting text for drainage in Pit 10.	Terminated
C250005	42-02519	21174	4/6/2016	K.Nicholes	UDOGM	Utah	Failure to follow the approved plan in Area 1, MRP, Vol 3, Chapter 5, pages 5-13 and page 5-21. Page 5-13: County road to be completed prior to mining activity so that public is routed around the mine. Page 5-21: construction of haul roads, pond 5 and pond 6, subsoil pile, topsoil pile and spoil pile all ditches and culverts completed prior to mining in Pit 1 or development of pit 1.	Completed County bypass road.	Terminated
C250005	42-02519	21183	6/3/2016	K.Nicholes	UDOGM	Utah	Over excavation of excess spoil pile area.	An amendment to the MRP to include reclamation of the highwall left from overexcavation of the excess spoils pile was submitted and approved.	Terminated
C250005	42-02519	21185	9/7/2016	K.Nicholes	UDOGM	Utah	Maintenance of ASCA-1 NPL	Made repairs to ASCA-1	Terminated
C250005	42-02519	21191	12/8/2016	K.Nicholes	UDOGM	Utah	Failure to protect topsoil NPL.	Removed topsoil from top of highwall and reestablished berm.	Terminated
C250005	42-02519	21193	3/15/2017	K.Nicholes	UDOGM	Utah	Failure to store oil & grease in a controlled manner in a designated area of the permit area.	Removed unauthorized oil storage tank.	Terminated
C250005	42-02519	21194	3/15/2017	K.Nicholes	UDOGM	Utah	Failure to maintain siltation structures and diversions at the underground facilities.	Submitted amendment to MRP to enlarge sump and dike in Pit 10.	Terminated