C/015/0025
Received 7/6/15
Task ID #4947

RHINO
CASTLE VALLEY MINING LLC

3 June 2015

Mr. Daron Haddock
Utah Division of Oil, Gas & Mining
1594 West North Temple, Suite 1210
P. O. Box 145801
Salt Lake City, Utah 84114-5801

Re: Phase III Bond Release, Castle Valley Mining, LLC, C/015/025

Dear Mr. Haddock

We are requesting a Phase III bond release on the work already completed at Castle Valley Mining, LLC.

The total direct cost for this work is $38,177. The total indirect cost for this work is $10,231. Both costs are in 2018 dollars. The difference in escalation costs is $3,741.

The total Bond Release that we are requesting in 2018 dollars rounded to the nearest $1,000 is $52,000.

A copy of the redline/strikeout documentation for the bond release is attached.

If you have any questions, please call me at (435) 687-5454

Sincerely,

AREN JORGENSEN

Tony Welch
Resident Agent

FOR TONY WELCH

P.O. Box 475 • Huntington, UT 84528
Phone (435) 687-5454 • Fax (435) 687-5037

APPLICATION FOR COAL PERMIT PROCESSING

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

Permittee: Castle Valley Mining, LLC
Mine: _____ **Permit Number:** ACT 015/0025
Title: Phases III Bond Release

Description, Include reason for application and timing required to implement:
Bond Release on reclaimed areas TS- 8, 10 11 and portions of 7

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.

Print Name	Position	Date	Signature (Right-click above choose certify then have notary sign below)
JAREN JORGENSEN	ENGINEER	6-30-15	

Subscribed and sworn to before me this 30 day of June, 2015

Notary Public: Chris M Christensen, state of Utah.

My commission Expires: April 24 2019
Commission Number: 682810
Address: 51 N Main
City: Huntington State: Ut Zip: 84528

NOTARY PUBLIC
CHRIS M CHRISTENSEN
Commission No. 682810
Commission Expires
APRIL 24, 2019
STATE OF UTAH

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: Castle Valley Mining, LLC
Mine:
Title: Phases III Bond Release

Permit Number: ACT 015/0025

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	Public Notice
☒ Add	☐ Replace	☐ Remove	Notification Letters - Surface and Sub-surface Owners
☐ Add	☒ Replace	☐ Remove	Redline/Strikeout Chapter 3, page 3-iv
☒ Add	☐ Replace	☐ Remove	Chapter 3, Appendix Q
☐ Add	☒ Replace	☐ Remove	Redline/Strikeout Chapter 7, Pages 7-vi and 7-133
☒ Add	☐ Replace	☐ Remove	Chapter 7, Appendix R
☐ Add	☒ Replace	☐ Remove	Redline/Strikeout Chapter 8, Appendix A, Pages 8-1, 8-51, and 8-52
☐ Add	☐ Replace	☐ Remove	
☐ Add	☐ Replace	☐ Remove	
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Any other specific or special instruction required for insertion of this proposal into the Mining and Reclamation Plan.	Received by Oil, Gas & Mining

PHASE III

BOND RELEASE

PUBLIC NOTIFICATION NEWSPAPER

AFFIDAVIT OF PUBLICATION

STATE OF UTAH)

ss.

County of Emery,)

I, Richard Shaw, on oath, say that I am the Publisher of the Emery County Progress, a weekly newspaper of general circulation, published at Castle Dale, State of Utah and County aforesaid, and that a certain notice, a true copy of which is hereto attached, was published in the full issue of such newspaper for 4 (Four) consecutive issues, and on the Utah legals.com webwsite; the first publication was on the 5th day of May, 2015, and that the last publication of such notice was in the issue of such newspaper dated the 26th day of May, 2015.

Richard Shaw – Publisher

Subscribed and sworn to before me this 26th day of May 2015.

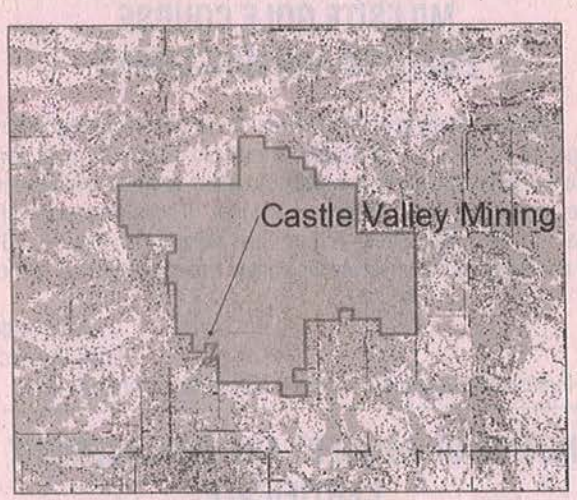
Notary Public My commission expires January 10, 2019 Residing at Price, Utah

Publication fee, $ 432.00

LINDA THAYN
NOTARY PUBLIC-STATE OF UTAH
COMMISSION# 680835
COMM. EXP. 01-10-2019

PUBLIC NOTICE
APPLICATION FOR PHASE III BOND RELEASE
BEAR CANYON MINE
CASTLE VALLEY MINING, LLC
PERMIT C/015/0025, RENEWED 12/16/2010
EMERY COUNTY, UTAH

Notice is hereby given that Castle Valley Mining, LLC, 5550 W. Bear Canyon Rd., Huntington, Utah 84528, with Tony Welch as Resident Agent, has filed an application with the Utah Department of Natural Resources, Division of Oil, Gas and Mining for a Phase III bond release on disturbed lands currently in Permit C/015/0025 pursuant to R645-301-880 and R645-301-400 of the Utah Coal Program Regulations. The permit area as shown below is from the Hiawatha U.S. Geological Survey 7.5-minute Quadrangle map. The permit area affected is located in Emery County, Utah, in Township 16 South, Range 7 East, Section 26, Salt Lake Base & Meridian.



The Phase III bond release application is for a bond reduction of $52,000.00 on the current bond of $2,167,000.00 for the Tank Seam Access Road and covers a total of 5.62 acres. All areas within the Tank Seam Access Road meet the requirements of the regulations for post mine land use of Wildlife Habitat, Recreational, Grazing and Timber, including stabilization of lands, restoration of drainage, and vegetation establishment. Reclamation of 5.62 acres was completed in the summer of 2009.

Written comments, objections and requests for an informal conference on this proposal may be addressed to:

Utah Coal Program
Utah Division of Oil, Gas and Mining
1594 West North Temple, Suite 1210
Salt Lake City, Utah 84111-5201

Closing date for submission of such comments, objections and request for an informal conference on this proposal must be submitted within 30 days of the last publication.

Published in the Emery County Progress May 5, 12, 19, and 26, 2015.

NOTIFICATION LETTERS
SURFACE AND SUB-SURFACE
OWNERS

RHINO
CASTLE VALLEY MINING LLC

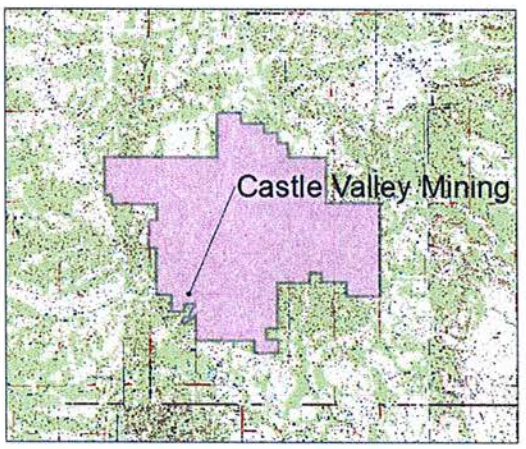
29 April 2015

A U. Mines Inc.
Cimmeron Coal
1325 Airmotive Way 175V
Reno, Nevada 89502-3201

Dear Sir,

This is a letter of notification that Castle Valley Mining, LLC, owner of Bear Canyon Coal Company at 5550 W. Bear Canyon Rd., Huntington, Utah 84528 is submitting to the Utah Division of Oil, Gas and Mining an application for Phase III bond release for the Tank Seam Access Road and Portal Pad, Upper Storage Pad and Portal Pad. The bond release is under Permit C/015/0025 in Emery County, Utah.

The bond release action is in Township 16 South, Range 7 East, Section 26, Salt Lake Base & Meridian and is shown in the map below:



This map was taken from the Hiawatha U. S. Geological Survey 7.5 minute quadrangle.

The Phase bond release application is for Continental Casualty Company #929518448 for $52,000.00 of $2,167,000.00 bond for the Tank Seam Access Road and other areas covering a total of 5.62 acres. All areas within the Tank Seam Access Road and other areas meet the requirements of the regulations for post mine land use of Wildlife Habitat, Recreational, Grazing and Timber, including stabilization of lands, restoration of drainage, and vegetation establishment.

P.O. Box 475 • Huntington, UT 84528
Phone (435) 687-5454 • Fax (435) 687-5037

Written comments, objections and requests for an informal conference on this proposal may be addressed to:

Utah Coal Program
Utah Division of Oil, Gas and Mining
1594 West North Temple, Suite 1210
Salt Lake City, Utah 84111-5801

Closing date for submission of such comments, objections and request for an informal conference on this proposal must be submitted within 30 days of the last publication.

A Public Notice will be published in the Emery County Progress.

Sincerely,

Tony Welch
Resident Agent

P.O. Box 475 • Huntington, UT 84528
Phone (435) 687-5454 • Fax (435) 687-5037

RHINO
CASTLE VALLEY MINING LLC

29 April 2015

Emery County
P. O. Box 629
Castle Dale, Utah 84513

Dear Sir,

This is a letter of notification that Castle Valley Mining, LLC, owner of Bear Canyon Coal Company at 5550 W. Bear Canyon Rd., Huntington, Utah 84528 is submitting to the Utah Division of Oil, Gas and Mining an application for Phase III bond release for the Tank Seam Access Road and Portal Pad, Upper Storage Pad and Portal Pad. The bond release is under Permit C/015/0025 in Emery County, Utah.

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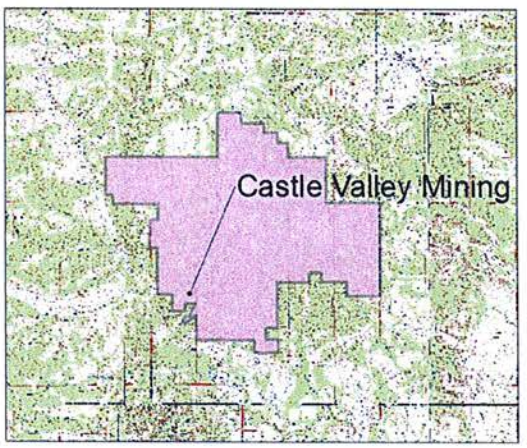

This map was taken from the Hiawatha U. S. Geological Survey 7.5 minute quadrangle.

The Phase III bond release application is for Continental Casualty Company #929518448 for $52,000.00 of $2,167,000.00 bond for the Tank Seam Access Road and other areas covering a total of 5.62 acres. All areas within the Tank Seam Access Road and other areas meet the requirements of the regulations for post mine land use of Wildlife Habitat, Recreational, Grazing and Timber, including stabilization of lands, restoration of drainage, and vegetation establishment.

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Sincerely,

Tony Welch
Resident Agent

P.O. Box 475 • Huntington, UT 84528
Phone (435) 687-5454 • Fax (435) 687-5037

RHINO
CASTLE VALLEY MINING LLC

29 April 2015

ANR Company, Inc.
3212 South State Street
Salt Lake City, Utah 84115

Dear Sir,

This is a letter of notification that Castle Valley Mining, LLC, owner of Bear Canyon Coal Company at 5550 W. Bear Canyon Rd., Huntington, Utah 84528 is submitting to the Utah Division of Oil, Gas and Mining an application for Phase III bond release for the Tank Seam Access Road and Portal Pad, Upper Storage Pad and Portal Pad. The bond release is under Permit C/015/0025 in Emery County, Utah.

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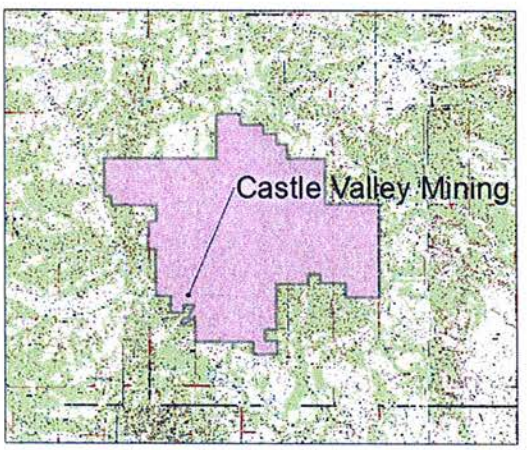

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Utah Division of Oil, Gas and Mining
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Sincerely,

Tony Welch
Resident Agent

P.O. Box 475 • Huntington, UT 84528
Phone (435) 687-5454 • Fax (435) 687-5037

RHINO
CASTLE VALLEY MINING LLC

29 April 2015

Intermountain Power Agency
10653 South River Front Parkway, Suite 120
South Jordon, Utah 84095

Dear Sir,

This is a letter of notification that Castle Valley Mining, LLC, owner of Bear Canyon Coal Company at 5550 W. Bear Canyon Rd., Huntington, Utah 84528 is submitting to the Utah Division of Oil, Gas and Mining an application for Phase III bond release for the Tank Seam Access Road and Portal Pad, Upper Storage Pad and Portal Pad. The bond release is under Permit C/015/0025 in Emery County, Utah.

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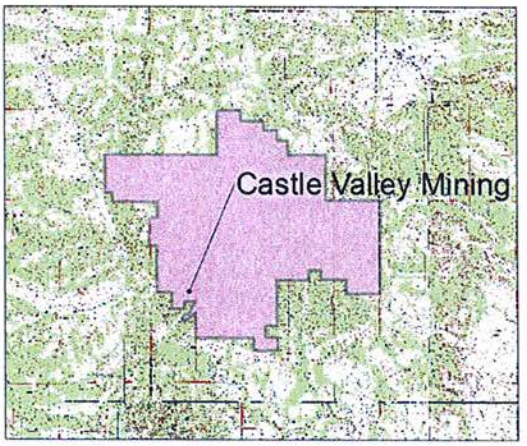

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Sincerely,

Tony Welch
Resident Agent

P.O. Box 475 • Huntington, UT 84528
Phone (435) 687-5454 • Fax (435) 687-5037

RHINO
CASTLE VALLEY MINING LLC

29 April 2015

C. O. P. Development
53 West Angel Ave.
Salt Lake City, Utah 84115

Dear Sir,

This is a letter of notification that Castle Valley Mining, LLC, owner of Bear Canyon Coal Company at 5550 W. Bear Canyon Rd., Huntington, Utah 84528 is submitting to the Utah Division of Oil, Gas and Mining an application for Phase III bond release for the Tank Seam Access Road and Portal Pad, Upper Storage Pad and Portal Pad. The bond release is under Permit C/015/0025 in Emery County, Utah.

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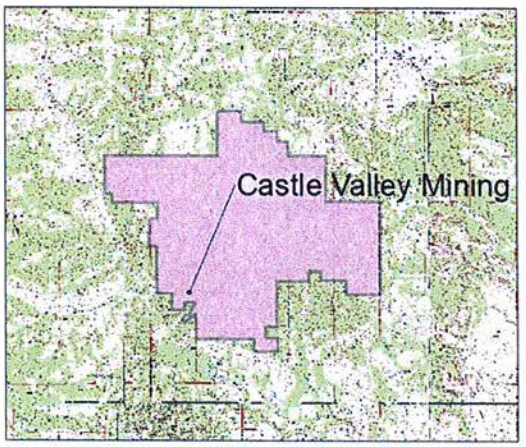

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Phone (435) 687-5454 • Fax (435) 687-5037

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Utah Division of Oil, Gas and Mining
1594 West North Temple, Suite 1210
Salt Lake City, Utah 84111-5801

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Sincerely,

Tony Welch
Resident Agent

P.O. Box 475 • Huntington, UT 84528
Phone (435) 687-5454 • Fax (435) 687-5037

RHINO
CASTLE VALLEY MINING LLC

29 April 2015

U. S. Forest Service
Manti-LaSal National Forest
Attn. Forest Supervisor
599 Price River Dr.
Price, Utah 84501

Dear Sir,

This is a letter of notification that Castle Valley Mining, LLC, owner of Bear Canyon Coal Company at 5550 W. Bear Canyon Rd., Huntington, Utah 84528 is submitting to the Utah Division of Oil, Gas and Mining an application for Phase III bond release for the Tank Seam Access Road and Portal Pad, Upper Storage Pad and Portal Pad. The bond release is under Permit C/015/0025 in Emery County, Utah.

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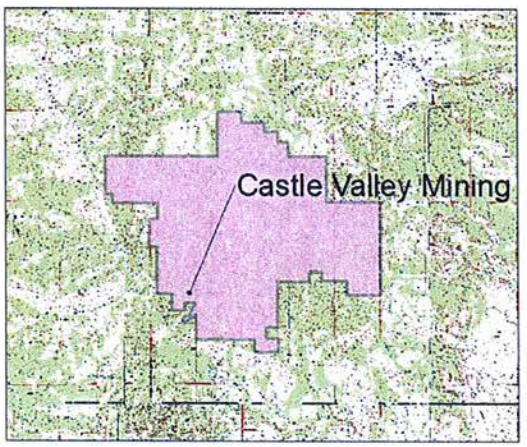

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Utah Division of Oil, Gas and Mining
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Sincerely,

Tony Welch
Resident Agent

P.O. Box 475 • Huntington, UT 84528
Phone (435) 687-5454 • Fax (435) 687-5037

RHINO
CASTLE VALLEY MINING LLC

29 April 2015

Genwall Coal Company
Utah American Energy
Attn. Mr. Jay Marshall
P. O. Box 190
East Carbon, Utah 84520

Dear Mr. Marshall,

This is a letter of notification that Castle Valley Mining, LLC, owner of Bear Canyon Coal Company at 5550 W. Bear Canyon Rd., Huntington, Utah 84528 is submitting to the Utah Division of Oil, Gas and Mining an application for Phase III bond release for the Tank Seam Access Road and Portal Pad, Upper Storage Pad and Portal Pad. The bond release is under Permit C/015/0025 in Emery County, Utah.

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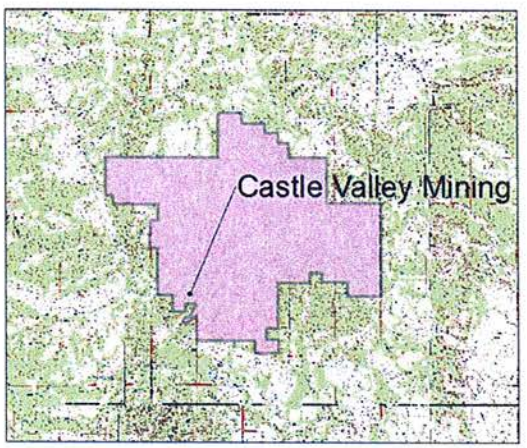

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Sincerely,

Tony Welch
Resident Agent

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Phone (435) 687-5454 • Fax (435) 687-5037

RHINO
CASTLE VALLEY MINING LLC

29 April 2015

Nevada Energy
6226 West Sahara Avenue
Las Vegas, Nevada 89146

Dear Sir,

This is a letter of notification that Castle Valley Mining, LLC, owner of Bear Canyon Coal Company at 5550 W. Bear Canyon Rd., Huntington, Utah 84528 is submitting to the Utah Division of Oil, Gas and Mining an application for Phase III bond release for the Tank Seam Access Road and Portal Pad, Upper Storage Pad and Portal Pad. The bond release is under Permit C/015/0025 in Emery County, Utah.

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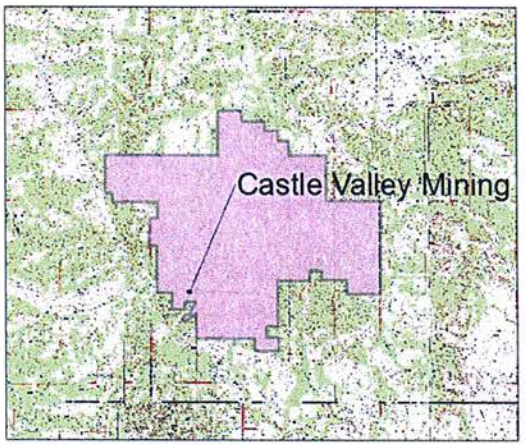

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Sincerely,

Tony Welch
Resident Agent

P.O. Box 475 • Huntington, UT 84528
Phone (435) 687-5454 • Fax (435) 687-5037

RHINO
CASTLE VALLEY MINING LLC

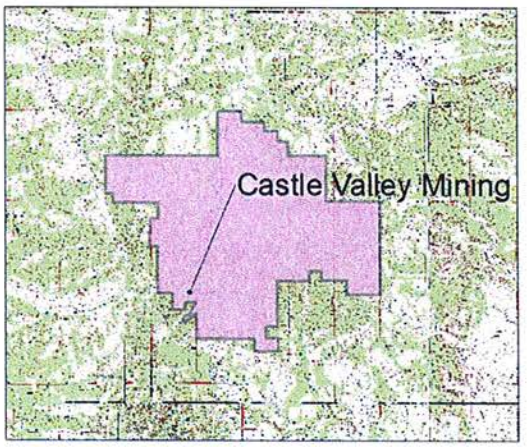
29 April 2015

Bureau of Land Management
Utah State Office
P. O. Box 45155
Salt Lake City, Utah 84145-0155

Dear Sir,

This is a letter of notification that Castle Valley Mining, LLC, owner of Bear Canyon Coal Company at 5550 W. Bear Canyon Rd., Huntington, Utah 84528 is submitting to the Utah Division of Oil, Gas and Mining an application for Phase III bond release for the Tank Seam Access Road and Portal Pad, Upper Storage Pad and Portal Pad. The bond release is under Permit C/015/0025 in Emery County, Utah.

The bond release action is in Township 16 South, Range 7 East, Section 26, Salt Lake Base & Meridian and is shown in the map below:



This map was taken from the Hiawatha U. S. Geological Survey 7.5 minute quadrangle.

The Phase bond release application is for Continental Casualty Company #929518448 for $52,000.00 of $2,167,000.00 bond for the Tank Seam Access Road and other areas covering a total of 5.62 acres. All areas within the Tank Seam Access Road and other areas meet the requirements of the regulations for post mine land use of Wildlife Habitat, Recreational, Grazing and Timber, including stabilization of lands, restoration of drainage, and vegetation establishment.

P.O. Box 475 • Huntington, UT 84528
Phone (435) 687-5454 • Fax (435) 687-5037

Written comments, objections and requests for an informal conference on this proposal may be addressed to:

Utah Coal Program
Utah Division of Oil, Gas and Mining
1594 West North Temple, Suite 1210
Salt Lake City, Utah 84111-5801

Closing date for submission of such comments, objections and request for an informal conference on this proposal must be submitted within 30 days of the last publication.

A Public Notice will be published in the Emery County Progress.

Sincerely,

Tony Welch
Resident Agent

P.O. Box 475 • Huntington, UT 84528
Phone (435) 687-5454 • Fax (435) 687-5037

RHINO
CASTLE VALLEY MINING LLC

29 April 2015

Intermountain Power Agency
10653 South River Front Parkway, Suite 120
South Jordon, Utah 84095

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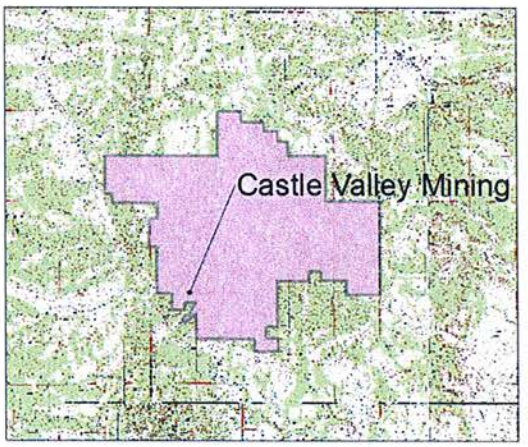

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RHINO
CASTLE VALLEY MINING LLC

29 April 2015

State of Utah School & Institutional Trust Land Administration
675 East 500 South, Suite 500
Salt Lake City, Utah 84102

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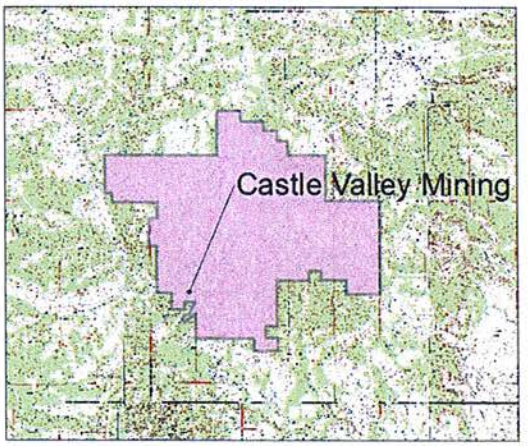

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CHAPTER 3
R645-301-300 BIOLOGY

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CHAPTER 3 BIOLOGY

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APPENDIX Q

CASTLE VALLEY (RHINO ENERGY) VEGETATION

SAMPLING REPORT

TANK SEAM ACCESS ROAD RECLAMATION

CASTLE VALLEY MINING

PHASE III BOND RELEASE
RECLAMATION VEGETATION STUDY
TANK SEAM ROAD

JULY 2014

CONDUCTED BY
EIS Environmental and Engineering Consulting
31 North Main Street * Helper, Utah 84526
Office - (435) 472-3814 * Toll free - (800) 641-2927 * Fax - (435) 472-8780
EISenviro.com * eisec@preciscom.net

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Appendix 3 Production Estimate
Maps
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1.0 INTRODUCTION

EIS Environmental and Engineering Consulting were contracted out by Castle Valley Mining to determine if the reclamation efforts on the Tank Seam Road were adequate for the Phase III bond release. The required field work to determine if the overall vegetation conditions would meet the requirements the release was conducted on July 23rd & 24th, 2014. The vegetation study included the reclaimed Tank Seam Road and adjacent reference area. The reference area was established and described in the mine's Mining and Reclamation Plan (MRP).

Data collection included total vegetation cover, percent cover by species, and woody plant density. Production values were found by qualified individuals of the NRCS on August 8, 2014. Indices for the reference area and reclamation areas were calculated to determine if the reclamation efforts met the bond release requirements.

2.0 MATERIALS AND METHODS

The reclamation area was selected based on timing of reclamation efforts, expected future disturbance, and vegetation establishment. The site corresponded with reclamation areas in the MRP. The reference area for comparing the reclaimed area was determined in a pre-disturbance survey in 1992 and is located at the end of the reclaimed Tank Seam Road. The vegetation surveys were conducted according to DOGM Vegetation Information Guidelines (1992) and the MRP Criteria and Tests for Demonstrating Successful Revegetation. Data collected in the reference area were compared to the reclamation area to determine similarity.

2.1 Percent Cover

Percent cover was measured using quadrat sampling. Random points were generated and uploaded to handheld GPS devices. Once at the point, surveyors would then randomly place the 1m x 1m square frame centered on the point. In each sample frame, percent cover by species, density by species, and percent non-living cover were recorded. Non-living cover included rock, soil, and litter. Total vegetation cover added to non-living cover summed to 100 percent. The number of sampling quadrats was determined by the equation in the DOGM Vegetation Information Guidelines (1992). Sample size was determined at a 90 percent confidence level at +/- 10 percent precision as required by DOGM.

$$N = (t^2s^2)/(p^2x^2)$$

N = The number of samples required for statistical adequacy.
t = Student's T-value for the t_{90} confidence level and for degrees of freedom.
s = Standard deviation.
p = Precision of test (0.1)
x = The mean of the samples.

The following table shows the number of sample plots in each reclamation area and reference area and the required number of sample quadrats.

Table 1: Sample Quadrats		
Survey Area	**Number of Quadrats Sampled**	**Number of Quadrats Required**
Reference Area	20	19.4
Tank Seam Road	41	36.13

2.2 Woody Plant Density

Woody plant density was sampled by the point-quarter method. At each random point, 2 perpendicular lines divided the area into four quadrants with the point being the center. In each quadrant, the distance to the base of the nearest shrub was measured. Only shrubs that have been established for more than two growing seasons were measured. The 4 recorded distances were averaged to use as the individual sample. Woody plant density was measured at each point where percent cover was recorded.

2.3 Reclamation Comparison

An unpaired t-test was used to compare the reclaimed areas to the reference area. Sample means per quadrat for cover were used for the comparison. The null hypothesis for each t-test was that there is no difference between the means for the measured parameter in the reclamation area and reference area. If the test failed to reject the null hypothesis, the standard for success was met. The null hypothesis was rejected when the calculated t-value exceeds the table t-value for 90 percent confidence and degrees of freedom. When the null hypothesis was rejected and the mean of the reclamation area was greater than or equal to the mean of the reference area, the standard for success was met.

3.0 RESULTS

3.1 Percent Cover

Absolute cover means for each of the reclamation areas and reference areas is shown in Table 2 and cover data for each sample quadrat is included in Appendix 1. The sum of the percentages of shrub and trees, forbs, and grasses may exceed the total vegetation cover due to overlapping vegetation.

Table 2: Average Absolute Percent Cover		
Mean Cover	Area	
	Reference Area	Tank Seam Road
Shrub	0.07	4.10
Forb	0.05	2.07
Grass	7.25	7.10
Total	7.37	13.27

Reference Area – The total vegetative cover was 7.37 and the components were 0.07 percent shrubs and trees, 0.05 percent forbs, and 7.25 percent grasses.

Tank Seam Road– The total vegetative cover was 13.27 and the components were 4.10 percent shrubs and trees, 2.07 percent forbs, and 7.10 percent grasses. The critical t-value was 1.303 and the calculated t-value was 4.04, so the null hypothesis was rejected. The mean cover in the reclamation area was greater than the mean cover in the reference area. The Tank Seam Road reclaimed area met the success standard.

3.2 Woody Plant Density

Average woody plant density for each area is shown in Table 3 and the individual sample points are included as Appendix 2. As dictated in the MRP, only shrubs and trees were included in sampling if they were in place for more than two growing seasons. The Tank Seam Road had a greater density of woody plants per acre than the reference area. The reclaimed road had 1661.42 plants per acre where the reference area had 369.30. This meets the requirements set in the MRP of having at least 1,000 plants per acre.

The reference area was dominated by curl-leaf mahogany (*Cercocarpus ledifolius)* at 45.00%, pinyon pine (*Pinus edulis*) at 22.50%, and slender buckwheat (*Eriogonum microthecum)* at 18.75%. The Tank Seam Road was dominated by rabbitbrushes, with yellow rabbitbrush (*Chrysothamnus viscidiflorus)* at 41.46% and rubber rabbitbrush (*Ericameria nauseosa)* at 39.02%. The area exceeds the obligation for plants per acre.

Table 3: Woody Plant Density	
Area	Plants/Acre
Reference Area	369.30
Tank Seam Road	1661.42

3.3 Species Diversity

The MRP states that the species diversity would be deemed adequate when the absolute cover in the reclaimed area is approximately that of the reference area. The percent cover of the perennial grasses on Tank Seam Road was 7.1 percent and the reference area had 7.25 percent. The reclamation had 4.10 percent cover of shrubs/woody species and the reference area had 0.70 percent. The Tank Seam Road had 2.07 percent cover of forbs and the reference area had 0.05 (Table 4).

The relative cover of perennial grasses on Tank Seam Road was 53.49 percent compared to 90.63 percent on the reference area. Shrubs/woody species relative cover was 30.88 percent on the reclamation as opposed to 8.75 percent on the reference area. Lastly, the reclaimed road had 15.63 percent forbs as compared to 0.63 on the reference area. In the reclamation area, the absolute cover was much higher and more even in all the major classes except for perennial grasses. However 88.75 of the 90.63 percent of the perennial grasses in the reference area is all one species, *Leymus salinus*, whereas the reclamation has a much more diverse composition of grass species (Table 5).

Table 4: Species Percent Cover		
Grasses Species:	**Tank Seam Road**	**Reference Area**
Achnatherum hymenoides	1.00	0
Elymus lanceolatus	0.07	0
Leymus cinereus	1.37	0
Leymus salinus	1.56	7.1
Pascopyrum smithii	0.05	0
Pseudoroegneria spicata	2.49	0.05
Thinopyrum intermedium	0.56	0.1
Total Percent	7.10	7.25
Shrubs/Woody Species:	**Tank Seam Road**	**Reference Area**
Amelanchier utahensis	0.05	0
Artemisia frigida	0.02	0
Artemisia tridentata	0.46	0
Chrysothamnus viscidiflorus	1.93	0.05
Ericameria nauseosa	1.49	0
Eriogonum microthecum	0.15	0.6
Pinus edulis	0	0.05
Total Percent	4.10	0.7
Forb Species:	**Tank Seam Road**	**Reference Area**
Achillea millefolium	0.24	0
Aster glaucodes	0.66	0
Grindelia squarrosa	0.20	0
Hedysarum boreale	0.07	0
Penstemon palmeri	0.68	0
Stanleya pinnata	0.02	0.05
Viola sp	0.05	0
Phlox sp	0.15	0
Total Percent	2.07	0.05

Table 5: Species Relative Cover		
Grasses Species:	**Tank Seam Road**	**Reference Area**
Achnatherum hymenoides	7.54	0.00
Elymus lanceolatus	0.55	0.00
Leymus cinereus	10.29	0.00
Leymus salinus	11.76	88.75
Pascopyrum smithii	0.37	0.00
Pseudoroegneria spicata	18.75	0.63
Thinopyrum intermedium	4.23	1.25
Total Percent	53.49	90.63
Shrubs/Woody Species:	**Tank Seam Road**	**Reference Area**
Amelanchier utahensis	0.37	0.00
Artemisia frigida	0.18	0.00
Artemisia tridentata	3.49	0.00
Chrysothamnus viscidiflorus	14.52	0.63
Ericameria nauseosa	11.21	0.00
Eriogonum microthecum	1.10	7.50
Pinus edulis	0.00	0.63
Total Percent	30.88	8.75
Forb Species:	**Tank Seam Road**	**Reference Area**
Achillea millefolium	1.84	0.00
Aster glaucodes	4.96	0.00
Grindelia squarrosa	1.47	0.00
Hedysarum boreale	0.55	0.00
Penstemon palmeri	5.15	0.00
Stanleya pinnata	0.18	0.63
Viola sp	0.37	0.00
Phlox sp	1.10	0.00
Total Percent	15.63	0.63

3.4 Production

Production rates were estimated on both the reclaimed and reference areas by M. Dean Stacy, Area Range Management Specialist at the Natural Resources Conservation Service, on August 8, 2014. The productivity was estimated to have 2,100 pounds per acre on the Tank Seam Road reclamation compared to 750 pounds per acre pre-disturbance (Appendix 3).

Table 6: Production Rates	
Area	**Plants/Acre**
Pre-disturbance	750.00
Tank Seam Road	2100.00

4.0 DISCUSSION

The percent cover, production rates, and woody plant density all meet or exceed the value found in the adjacent reference area. Overall, the species diversity in the reclaimed Tank Seam Road surpasses the diversity found in the adjacent reference area. These findings suggest that the disturbed area has been returned to a stable plant community. Another consecutive year vegetation study of similar results is required to show that the vegetation has established into a long-term, self-perpetuating community.

REFERENCES

DOGM. 1992. Vegetation Information Guidelines. Utah Division of Oil, Gas, and Mining. Salt Lake City, UT.

Hayter, A. J. 2002. Probability and Statistics for Engineers and Scientists – Second Edition. Wadsworth Group. Pacific Grove, CA.

APPENDIX 1
PERCENT COVER DATA

Percent Cover Raw Data- Tank Seam Road

Quad	Veg:	Litter:	Rock:	Soil:	Achnatherum hymenoides	Achnatherum hymenoides #	Elymus lanceolatus	Elymus lanceolatus #	Leymus cinereus	Leymus cinereus #	Leymus salinus	Leymus salinus #	Pascopyrum smithii	Pascopyrum smithii #	Pseudoroegneria spicata	Pseudoroegneria spicata #	Thinopyrum intermedium	Thinopyrum intermedium #	Amelanchier utahensis	Amelanchier utahensis #	Artemisia Frigida	Artemisia Frigida #	Artemisia tridentata	Artemisia tri
N1	9	18	53	20	0	0	0	0	6	5	2	2	0	0	1	1	0	0	0	0	0	0	0	0
N2	12	20	40	28	0	0	0	0	0	0	1	3	0	0	12	2	0	0	0	0	0	0	0	0
N3	9	5	46	40	0	0	0	0	1	1	5	4	0	0	3	5	0	0	0	0	0	0	0	0
N4	13	5	72	10	0	0	0	0	3	2	7	1	0	0	5	1	0	0	0	0	0	0	0	0
N5	12	10	53	25	0	0	0	0	2	2	3	2	2	1	6	2	1	1	0	0	0	0	0	0
N6	14	30	41	15	0	0	0	0	1	2	1	2	0	0	12	9	1	2	0	0	0	0	0	0
N7	18	15	20	47	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0	0	0	18	2
N8	6	5	79	10	0	0	0	0	0	0	1	1	0	0	2	3	0	0	0	0	0	0	0	0
N9	17	8	63	12	0	0	0	0	6	7	3	5	0	0	8	3	0	0	0	0	1	1	0	0
N10	12	20	30	38	0	0	0	0	0	0	2	1	0	0	3	3	0	0	0	0	0	0	0	0
N11	11	7	64	18	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0
N12	11	3	25	61	1	0	0	0	2	4	3	2	0	0	8	5	0	0	0	0	0	0	0	0
N13	16	8	25	51	0	0	0	0	6	5	4	4	0	0	4	6	0	0	0	0	0	0	0	0
N14	25	10	55	10	0	0	0	0	1	0	0	0	0	0	4	2	0	0	0	0	0	0	1	0
N15	20	20	50	10	0	0	0	0	2	4	18	3	0	0	2	3	0	0	0	0	0	0	0	0
N16	7	10	35	48	3	8	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
N17	7	20	43	30	0	0	0	0	3	16	0	0	0	0	3	4	0	0	0	0	0	0	0	0
N18	15	10	50	25	0	0	0	0	1	3	0	0	0	0	8	23	1	8	0	0	0	0	0	0
N19	15	6	25	54	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N20	12	2	56	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N21	13	10	22	55	2	34	0	0	0	0	0	0	0	0	0	0	2	5	0	0	0	0	0	0
N22	7	20	27	46	4	8	0	0	1	3	0	0	0	0	0	0	2	32	0	0	0	0	0	0
N23	5	8	35	52	0	0	0	0	2	5	0	0	0	0	2	3	1	7	0	0	0	0	0	0
N24	10	7	45	38	1	8	0	0	3	1	0	0	0	0	0	0	7	54	0	0	0	0	0	0
N25	17	5	50	28	6	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N26	8	18	37	37	1	3	0	0	5	7	0	0	0	0	2	3	2	4	1	1	0	0	0	0
N27	9	3	58	30	1	1	0	0	1	0	0	0	0	0	2	3	0	0	0	0	0	0	0	0
N28	1	3	66	30	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
N29	4	1	35	60	0	0	0	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0
N30	10	3	62	25	1	1	0	0	2	3	8	5	0	0	0	0	0	0	0	0	0	0	0	0
N31	8	2	50	40	0	0	2	7	2	5	0	0	0	0	3	3	1	3	0	0	0	0	0	0
N32	14	2	23	61	0	0	1	1	3	4	3	2	0	0	8	7	0	0	0	0	0	0	0	0
N33	5	1	20	74	3	4	0	0	0	0	0	0	0	0	0	0	2	6	0	0	0	0	0	0
N34	17	2	20	61	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N35	15	1	15	69	0	0	0	0	0	0	0	0	0	0	3	1	0	0	0	0	0	0	0	0
N36	17	1	12	70	13	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N37	6	2	5	87	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N38	5	1	15	79	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N39	5	1	20	74	5	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N40	6	1	63	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N41	8	2	55	35	0	0	0	0	0	0	0	0	0	0	0	0	3	32	0	0	0	0	0	0
Average	**11**	**7.95122**	**40.4878**	**40.56098**	**1**	**1.878049**	**0.073171**	**0.195122**	**1.365854**	**1.95122**	**1.560976**	**0.97561**	**0.04878**	**0.02439**	**2.487805**	**2.292683**	**0.560976**	**3.756098**	**0.04878**	**0.02439**	**0.02439**	**0.02439**	**0.463415**	**0.04878**
	11 avg				Grass	7.097561												Shrub	4.097561					2
	5.074446 sd				Relative C	7.536765		0.551471		10.29412		11.76471		0.367647		18.75		4.227941		0.367647		0.183824		3.492647
	1.303 t.90					53.49265																		
	36.13106 n																							
	Sample Si:	41																						
	Degrees o	40																						

Percent Cover Raw Data- Tank Seam Road (Cont)

Quad	Chrysothamnus viscidiflorus	Chrysothamnus viscidiflorus #	Ericameria nauseosa	Ericameria nauseosa #	Eriogonum microthecum	Eriogonum microthecum #	Achillea millefolium	Achillea millefolium #	Aster glaucodes	Aster glaucodes #	Grindelia squarrosa	Grindelia squarrosa #	Hedysarum boreale	Hedysarum boreale #	Penstemon palmeri	Penstemon palmeri #	Stanleya pinnata	Stanleya pinnata #	Viola sp	Viola sp #	Phlox sp	Phlox sp #
N1	1	1	0	0	0	0	2	4	0	0	0	0	0	0	0	0	1	1	0	0	0	0
N2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N3	1	1	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N4	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N5	1	0	0	0	0	0	1	2	0	0	0	0	0	0	1	1	0	0	0	0	0	0
N6	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0
N7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0
N8	0	0	0	0	0	0	1	2	0	0	0	0	0	0	5	11	0	0	1	1	0	0
N9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	4	0	0	1	1	0	0
N10	0	0	3	4	0	0	0	0	0	0	0	0	0	0	5	8	0	0	0	0	0	0
N11	10	3	1	2	0	0	0	0	0	0	0	0	0	0	1	5	0	0	0	0	0	0
N12	1	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
N13	1	1	1	2	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0
N14	12	3	1	1	0	0	0	0	1	3	0	0	0	0	0	0	0	0	0	0	6	1
N15	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N16	0	0	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N17	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N18	1	0	7	1	0	0	0	0	1	3	1	1	0	0	0	0	0	0	0	0	0	0
N19	3	15	8	5	0	0	0	0	0	0	4	11	0	0	0	0	0	0	0	0	0	0
N20	12	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N21	2	11	3	1	0	0	0	0	4	6	0	0	0	0	0	0	0	0	0	0	0	0
N22	0	0	0	0	0	0	0	0	1	4	0	0	0	0	0	0	0	0	0	0	0	0
N23	1	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
N24	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N25	0	0	0	0	0	0	0	0	11	31	0	0	0	0	0	0	0	0	0	0	0	0
N26	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0
N27	0	0	7	3	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0
N28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N29	0	0	4	1	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0
N30	1	2	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
N31	1	1	0	0	0	0	2	15	1	2	0	0	0	0	0	0	0	0	0	0	0	0
N32	1	1	3	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N33	1	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N34	7	5	4	6	0	0	1	4	0	1	1	0	0	0	4	4	0	0	0	0	0	0
N35	4	4	5	2	0	0	2	29	1	7	0	0	0	0	1	3	0	0	0	0	0	0
N36	2	5	1	2	0	0	0	0	1	2	1	1	1	1	2	5	0	0	0	0	0	0
N37	1	2	0	0	2	5	1	2	1	2	0	0	0	0	2	3	0	0	0	0	0	0
N38	2	3	0	0	3	2	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0
N39	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N40	4	1	2	1	1	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0
N41	4	3	1	2	0	0	0	0	1	2	1	1	0	0	1	3	0	0	0	0	0	0
Average	**1.926829**	**2**	**1.487805**	**1.04878**	**0.146341**	**0.195122**	**0.243902**	**1.414634**	**0.658537**	**1.585366**	**0.195122**	**0.341463**	**0.073171**	**0.073171**	**0.682927**	**1.268293**	**0.02439**	**0.02439**	**0.04878**	**0.04878**	**0.146341**	**0.02439**
						Forb:	2.073171															
	14.52206		11.21324		1.102941		1.838235		4.963235		1.470588		0.551471		5.147059		0.183824		0.367647		1.102941	

Percent Cover Raw Data- Reference Area

Quad	Veg:	Litter:	Rock:	Soil:	Leymus salinus	Leymus salinus #	Pseudoroegneria spicata	Pseudoroegneria spicata #	Thinopyrum intermedium	Thinopyrum intermedium #	Chrysothamnus viscidiflorus	Chrysothamnus viscidiflorus #	Eriogonum microthecum	Eriogonum microthecum #	Pinus edulis	Pinus edulis #	Stanleya pinnata	Stanleya pinnata #
N1	10	68	15	7	6	11	0	0	0	0	0	0	4	3	0	0	0	0
N2	11	30	3	56	10	11	0	0	2	15	0	0	0	0	0	0	0	0
N3	6	15	46	33	6	19	0	0	0	0	0	0	0	0	0	0	0	0
N4	6	2	77	15	6	4	0	0	0	0	0	0	0	0	0	0	0	0
N5	6	5	74	15	5	8	1	1	0	0	0	0	0	0	0	0	0	0
N6	7	3	60	30	7	19	0	0	0	0	0	0	0	0	0	0	0	0
N7	12	12	40	36	12	17	0	0	0	0	1	1	0	0	0	0	0	0
N8	8	18	20	54	0	0	0	0	0	0	0	0	8	16	0	0	0	0
N9	6	74	12	8	6	23	0	0	0	0	0	0	0	0	1	0	0	0
N10	10	27	25	38	10	15	0	0	0	0	0	0	0	0	0	0	0	0
N11	12	4	69	15	12	13	0	0	0	0	0	0	0	0	0	0	0	0
N12	6	20	64	10	6	11	0	0	0	0	0	0	0	0	0	0	1	1
N13	5	30	55	10	5	24	0	0	0	0	0	0	0	0	0	0	0	0
N14	6	10	74	10	6	17	0	0	0	0	0	0	0	0	0	0	0	0
N15	5	5	60	30	5	10	0	0	0	0	0	0	0	0	0	0	0	0
N16	8	10	62	20	8	10	0	0	0	0	0	0	0	0	0	0	0	0
N17	11	40	29	20	11	22	0	0	0	0	0	0	0	0	0	0	0	0
N18	11	20	44	25	11	16	0	0	0	0	0	0	0	0	0	0	0	0
N19	5	5	60	30	5	8	0	0	0	0	0	0	0	0	0	0	0	0
N20	5	20	50	25	5	8	0	0	0	0	0	0	0	0	0	0	0	0
Average	**7.8**	**20.9**	**46.95**	**24.35**	**7.1**	**13.3**	**0.05**	**0.05**	**0.1**	**0.75**	**0.05**	**0.05**	**0.6**	**0.95**	**0.05**	**0**	**0.05**	**0.05**

7.8	avg			Grass	7.25				Shrub	0.7				Forb	0.05		
2.587419	sd		Relative Cover:	88.75		0.625		1.25		0.625		7.5		0.625	0.625		
1.328	t.90			Relative Cover Grass		90.625			Relative Cover Shrub		10			Relative Cover Forb:	0.625		
19.4062	n																

Sample Si:	20
Degrees o	19

APPENDIX 2
WOODY PLANT DENSITY DATA

Woody Plant Density Data - Tank Seam Road								
	Quad No.	Species	Point to Plant (cm)	Average Point	Average P ft		ft^2	Plants/Acr
N1	1	Artemisia tridenta	190		181.25	5.946523	35.36113	1231.861
	2	Artemisia tridenta	211		250	8.2021	67.27444	647.497
	3	Eriogonum microth	156		133	4.363517	19.04028	2287.781
	4	Ericameria nauseo	168	181.25	216	7.086614	50.2201	867.3817
N2	1	Ericameria nauseo	261		106.25	3.485893	12.15145	3584.758
	2	Chrysothamnus vis	132		119	3.9042	15.24277	2857.747
	3	Ericameria nauseo	192		119.75	3.928806	15.43552	2822.063
	4	Chrysothamnus vis	415	250	216.5	7.103019	50.45287	863.38
N3	1	Chrysothamnus vis	39		95.75	3.141404	9.868421	4414.08
	2	Chrysothamnus vis	87		137.5	4.511155	20.35052	2140.486
	3	Ericameria nauseo	107		107.5	3.526903	12.43904	3501.877
	4	Chrysothamnus vis	299	133	388	12.72966	162.0442	268.8155
N4	1	Chrysothamnus vis	232		133.25	4.371719	19.11193	2279.205
	2	Chrysothamnus vis	247		74	2.427822	5.894318	7390.168
	3	Chrysothamnus vis	228		223.5	7.332677	53.76816	810.1449
	4	Chrysothamnus vis	157	216	118	3.871391	14.98767	2906.389
N5	1	Chrysothamnus vis	70		92.5	3.034777	9.209871	4729.708
	2	Artemisia tridenta	105		52.75	1.730643	2.995126	14543.63
	3	Artemisia tridenta	127		97	3.182415	10.12776	4301.048
	4	Chrysothamnus vis	123	106.25	109	3.576116	12.7886	3406.158
N6	1	Ericameria nauseo	63		49.25	1.615814	2.610854	16684.2
	2	Chrysothamnus vis	110		256.75	8.423557	70.95631	613.8989
	3	Artemisia tridenta	180		143	4.691601	22.01112	1979
	4	Artemisia tridenta	123	119	165.5	5.42979	29.48262	1477.481
N7	1	Chrysothamnus vis	54		212.5	6.971785	48.60579	896.1896
	2	Artemisia tridenta	53		123	4.035433	16.28472	2674.9
	3	Chrysothamnus vis	176		169.25	5.552822	30.83383	1412.734
	4	Chrysothamnus vis	196	119.75	253.25	8.308727	69.03495	630.9847
N8	1	Artemisia tridenta	198		102.75	3.371063	11.36407	3833.135
	2	Artemisia frigida	371		280.75	9.210958	84.84175	513.4265
	3	Artemisia tridenta	163		211	6.922572	47.92201	908.9769
	4	Rhus trilobata	134	216.5	39	1.279528	1.637191	26606.55
N9	1	Artemisia frigida	106		79	2.591864	6.717757	6484.307
	2	Artemisia frigida	75		64.75	2.124344	4.512837	9652.465
	3	Artemisia frigida	94		53.25	1.747047	3.052174	14271.79
	4	Artemisia frigida	108	95.75	77	2.526247	6.381923	6825.529
N10	1	Ericameria nauseo	71		52.25	1.714239	2.938615	14823.31
	2	Ericameria nauseo	65		35.75	1.1729	1.375695	31663.99
	3	Ericameria nauseo	104		77	2.526247	6.381923	6825.529
	4	Ericameria nauseo	310	137.5	56.5	1.853675	3.43611	12677.13
N11	1	Chrysothamnus vis	163		73.5	2.411417	5.814934	7491.057
	2	Chrysothamnus vis	79	Average	135.2561	4.437536	26.21857	1661.418
	3	Chrysothamnus vis	61	StDev	78.83671	2.586506	31.23271	1394.692
	4	Ericameria nauseo	127	107.5				
N12	1	Artemisia frigida	284	Plants/Acr	1661.418			
	2	Chrysothamnus vis	480					
	3	Cercocarpus ledifo	339					
	4	Chrysothamnus vis	449	388				
N13	1	Artemisia tridenta	120					
	2	Chrysothamnus vis	175					
	3	Chrysothamnus vis	108					
	4	Chrysothamnus vis	130	133.25				
N14	1	Artemisia tridenta	75					
	2	Chrysothamnus vis	77					
	3	Chrysothamnus vis	92					
	4	Chrysothamnus vis	52	74				
N15	1	Ericameria nauseo	290					
	2	Chrysothamnus vis	192					
	3	Chrysothamnus vis	245					
	4	Artemisia tridenta	167	223.5				
N16	1	Ericameria nauseo	49					
	2	Amelanchier utahe	123					
	3	Ericameria nauseo	103					
	4	Chrysothamnus vis	197	118				
N17	1	Chrysothamnus vis	86					
	2	Chrysothamnus vis	68					
	3	Ericameria nauseo	141					
	4	Ericameria nauseo	75	92.5				
N18	1	Chrysothamnus vis	15					
	2	Chrysothamnus vis	70					
	3	Chrysothamnus vis	31					
	4	Ericameria nauseo	95	52.75				
N19	1	Chrysothamnus vis	78					
	2	Chrysothamnus vis	68					
	3	Ericameria nauseo	146					
	4	Ericameria nauseo	96	97				
N20	1	Chrysothamnus vis	21					
	2	Ericameria nauseo	204					
	3	Chrysothamnus vis	98					
	4	Ericameria nauseo	113	109				

N21	1	Ericameria nauseo	57	
	2	Ericameria nauseo	55	
	3	Ericameria nauseo	39	
	4	Ericameria nauseo	46	49.25
N22	1	Ericameria nauseo	139	
	2	Rhus trilobata	536	
	3	Ericameria nauseo	91	
	4	Ericameria nauseo	261	256.75
N23	1	Ericameria nauseo	183	
	2	Chrysothamnus vis	139	
	3	Ericameria nauseo	178	
	4	Chrysothamnus vis	72	143
N24	1	Ericameria nauseo	127	
	2	Rhus trilobata	187	
	3	Ericameria nauseo	243	
	4	Ericameria nauseo	105	165.5
N25	1	Ericameria nauseo	87	
	2	Ericameria nauseo	157	
	3	Ericameria nauseo	227	
	4	Ericameria nauseo	379	212.5
N26	1	Ericameria nauseo	67	
	2	Ericameria nauseo	61	
	3	Rhus trilobata	254	
	4	Amelanchier utahe	110	123
N27	1	Ericameria nauseo	73	
	2	Ericameria nauseo	108	
	3	Ericameria nauseo	298	
	4	Ericameria nauseo	198	169.25
N28	1	Cercocarpus ledifo	203	
	2	Ericameria nauseo	421	
	3	Ericameria nauseo	137	
	4	Ericameria nauseo	252	253.25
N29	1	Ericameria nauseo	64	
	2	Ericameria nauseo	120	
	3	Ericameria nauseo	97	
	4	Ericameria nauseo	130	102.75
N30	1	Ericameria nauseo	133	
	2	Ericameria nauseo	242	
	3	Ericameria nauseo	403	
	4	Ericameria nauseo	345	280.75
N31	1	Ericameria nauseo	218	
	2	Amelanchier utahe	285	
	3	Ericameria nauseo	181	
	4	Artemisia tridenta	160	211
N32	1	Chrysothamnus vis	31	
	2	Chrysothamnus vis	30	
	3	Chrysothamnus vis	40	
	4	Chrysothamnus vis	55	39
N33	1	Ericameria nauseo	63	
	2	Ericameria nauseo	77	
	3	Chrysothamnus vis	99	
	4	Ericameria nauseo	77	79
N34	1	Ericameria nauseo	70	
	2	Ericameria nauseo	56	
	3	Chrysothamnus vis	71	
	4	Chrysothamnus vis	62	64.75
N35	1	Chrysothamnus vis	20	
	2	Chrysothamnus vis	64	
	3	Chrysothamnus vis	73	
	4	Chrysothamnus vis	56	53.25
N36	1	Ericameria nauseo	61	
	2	Chrysothamnus vis	60	
	3	Chrysothamnus vis	85	
	4	Chrysothamnus vis	102	77
N37	1	Chrysothamnus vis	29	
	2	Chrysothamnus vis	89	
	3	Eriogonum microth	60	
	4	Chrysothamnus vis	31	52.25
N38	1	Chrysothamnus vis	12	
	2	Ericameria nauseo	82	
	3	Chrysothamnus vis	27	
	4	Eriogonum microth	22	35.75
N39	1	Chrysothamnus vis	10	
	2	Chrysothamnus vis	115	
	3	Eriogonum microth	77	
	4	Ericameria nauseo	106	77
N40	1	Ericameria nauseo	39	
	2	Chrysothamnus vis	31	
	3	Chrysothamnus vis	139	
	4	Chrysothamnus vis	17	56.5
N41	1	Chrysothamnus vis	35	
	2	Chrysothamnus vis	55	
	3	Chrysothamnus vis	68	
	4	Chrysothamnus vis	136	73.5

Woody Plant Density Data- Reference Area									
	Quad No.	Species	Point to Plant (cm)	Average Point		Average P Ft		ft^2	Plants/Acı
N1	1	Eriogonum microth	75			454.5	14.91142	222.3504	195.907
	2	Ericameria nauseo	715			566	18.56955	344.8284	126.3237
	3	Eriogonum microth	447			270.25	8.86647	78.61429	554.0977
	4	Pinus edulis	581	454.5		311.25	10.21161	104.2771	417.7333
N2	1	Pinus edulis	393			475	15.58399	242.8607	179.362
	2	Pinus edulis	427			214.5	7.037402	49.52502	879.5554
	3	Pinus edulis	915			139.75	4.584974	21.02199	2072.116
	4	Pinus edulis	529	566		153	5.019685	25.19724	1728.761
N3	1	Cercocarpus ledifo	259			341.75	11.21227	125.715	346.498
	2	Cercocarpus ledifo	540			226.25	7.422901	55.09945	790.5705
	3	Cercocarpus ledifo	54			462.25	15.16568	229.9979	189.393
	4	Cercocarpus ledifo	228	270.25		164.25	5.38878	29.03895	1500.054
N4	1	Eriogonum microth	66			348.75	11.44193	130.9178	332.728
	2	Eriogonum microth	345			397.25	13.03314	169.8627	256.4425
	3	Eriogonum microth	545			331	10.85958	117.9305	369.3701
	4	Juniperus osteospe	289	311.25		245.5	8.054462	64.87436	671.4517
N5	1	Pinus edulis	68			378.75	12.42618	154.41	282.1061
	2	Eriogonum microth	624			238.5	7.824803	61.22755	711.4445
	3	Cercocarpus ledifo	628			138.75	4.552166	20.72221	2102.092
	4	Cercocarpus ledifo	580	475		320.5	10.51509	110.5672	393.9687
N6	1	Pinus edulis	117		Average	Average	10.1341	117.9519	369.303
	2	Cercocarpus ledifo	197		StDev	StDev	4.006817	87.83815	495.9121
	3	Chrysothamnus vis	188						
	4	Chrysothamnus vis	356	214.5	Plants/Acı	369.303			
N7	1	Chrysothamnus vis	77						
	2	Chrysothamnus vis	108						
	3	Chrysothamnus vis	84						
	4	Chrysothamnus vis	290	139.75					
N8	1	Eriogonum microth	119						
	2	Eriogonum microth	103						
	3	Chrysothamnus vis	224						
	4	Eriogonum microth	166	153					
N9	1	Pinus edulis	195						
	2	Cercocarpus ledifo	258						
	3	Cercocarpus ledifo	647						
	4	Cercocarpus ledifo	267	341.75					
N10	1	Cercocarpus ledifo	144						
	2	Juniperus osteospe	415						
	3	Cercocarpus ledifo	164						
	4	Pinus edulis	182	226.25					
N11	1	Cercocarpus ledifo	476						
	2	Pinus edulis	420						
	3	Pinus edulis	594						
	4	Eriogonum microth	359	462.25					
N12	1	Eriogonum microth	131						
	2	Cercocarpus ledifo	119						
	3	Eriogonum microth	106						
	4	Pinus edulis	301	164.25					
N13	1	Pinus edulis	322						
	2	Cercocarpus ledifo	604						
	3	Eriogonum microth	191						
	4	Cercocarpus ledifo	278	348.75					
N14	1	Pinus edulis	134						
	2	Cercocarpus ledifo	337						
	3	Pinus edulis	465						
	4	Pinus edulis	653	397.25					
N15	1	Cercocarpus ledifo	205						
	2	Cercocarpus ledifo	278						
	3	Pinus edulis	464						
	4	Cercocarpus ledifo	377	331					
N16	1	Eriogonum microth	189						
	2	Cercocarpus ledifo	216						
	3	Juniperus osteospe	323						
	4	Pinus edulis	254	245.5					
N17	1	Cercocarpus ledifo	183						
	2	Eriogonum microth	566						
	3	Cercocarpus ledifo	344						
	4	Cercocarpus ledifo	422	378.75					
N18	1	Cercocarpus ledifo	131						
	2	Cercocarpus ledifo	188						
	3	Cercocarpus ledifo	451						
	4	Cercocarpus ledifo	184	238.5					
N19	1	Cercocarpus ledifo	191						
	2	Cercocarpus ledifo	39						
	3	Cercocarpus ledifo	124						
	4	Cercocarpus ledifo	201	138.75					
N20	1	Cercocarpus ledifo	258						
	2	Cercocarpus ledifo	318						
	3	Cercocarpus ledifo	243						
	4	Cercocarpus ledifo	463	320.5					

APPENDIX 3
PRODUCTION ESTIMATE

USDA

United States Department of Agriculture

Natural Resources
Conservation Service

Price MLRA Office

540 W Price River Dr.
Price, UT 84501

Voice: 435-637-0041
Fax: 435-637-3146

Ms. Mindi Lundberg

31 North Main

Helper, UT 84526

August 11, 2014

Re: Production estimates for post disturbance bond release at the Castle Valley Mine, Emery County, Utah.

Ms Lundberg,

Thank you for the opportunity to visit and discuss the reclamation efforts on the tank seam road. As I observed the reclaimed road as well as the soil survey I determined that the area was most likely an Upland very steep stony loam (Pinyon/Utah juniper) site. This site (prior to disturbance) with have between 350 and 750 lbs ac^{-1} with a median value of 550 lbs ac-1. With the pinyon and juniper no longer on the site, this would naturally release the competition for moisture with the shrubs and herbaceous components, thus having larger production value after reclamation. After looking over the site and evaluating the growth stages of the species as well as the climatic conditions experienced in the region this growing season, I came to the following conclusions for production estimates;

The lower part of the road that was predominately dominated by rabbitbrush I gave a value of approximately 1,500 lbs ac^{-1}. As we walked up the road, the rabbit brush started to thin out and there was an abundance of herbaceous (both grasses and forbs) where I estimated there to be around 2,400 lbs ac^{-1}. Although the rabbitbrush dominated area was a smaller portion of the overall reclaimed site, I still believe it had an effect on the overall production, thus giving the overall production of approximately 2,100 lbs ac^{-1}.

If you have any questions or comments feel free to contact me at any time.

Sincerely,

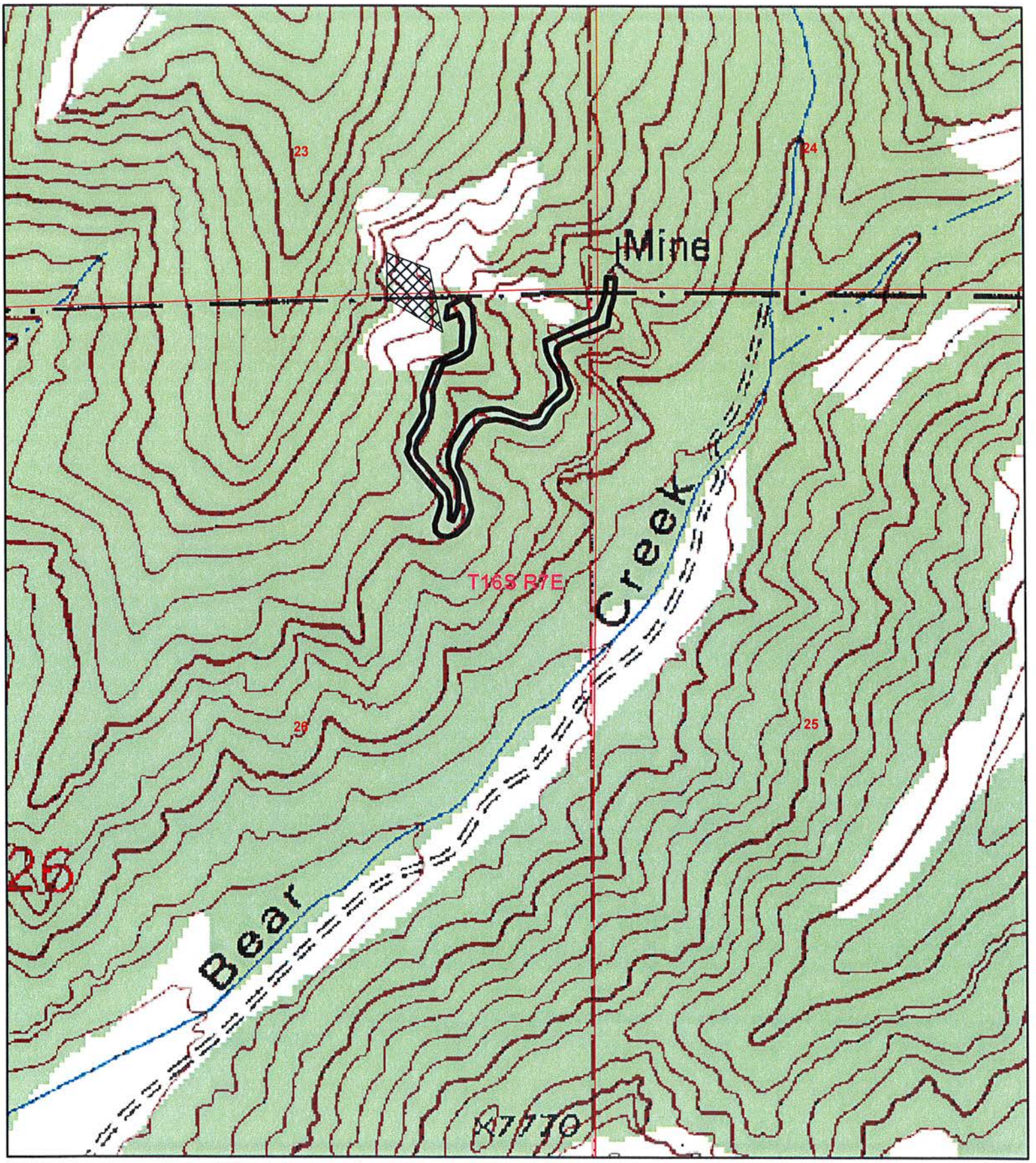
/S/

M. DEAN STACY
MLRA Ecological Site Specialist

File

An Equal Opportunity Provider and Employer

MAPS



Castle Valley Mining LLC

Environmental Industrial Services
Environmental & Engineering Consulting
31 North Main Street
Helper, Utah 84526
435-472-3814
fax 435-472-8780
eisec@preciscom.net

Legend

Reference Area

Tank Seam Road

N

Miles

0 0.05 0.1 0.2

Tank Seam Road Reclamation and Reference Area

Sec 26 T16S R7E
Emery County, UT

PHOTOGRAPHS

PHOTOGRAPHS

General Location of Tank Seam Road

Example of a Tank Seam Road Quadrat

RA1 South General Location

Example of a Reference Area Quadrat

CHPATER 7

R645-301-700 HYDROLOGY

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Chapter 7 Hydrology

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Tank Seam Portal Pad & Access Road

THIS AREA HAS BEEN RECLAIMED. The sediment that will be produced is 0.40 tons per year. The runoff from the reclaimed area will be 0.125 ac.-ft. The runoff will still report to existing sediment ponds. The calculations for the sediment yield and runoff can be found in Appendix R.

APPENDIX R

CASTLE VALLEY (RHINO ENERGY) RUNOFF REPORT

FOR

TANK SEAM ACCESS ROAD RECLAMATION

SOIL EROSION FOR TANK SEAM AREA

Use the modified Universal Soil Loss Equation:

$$A = R * K * LS * VM$$

Ref: Israelsen, C. E., Fletcher, J. E., Haws, F. W., E. K. Israelsen, 1984 Erosion and Sedimentation in Utah: A Guide for Control, Utah Water Research Laboratories, Logan, Utah

A = Amount of Soil loss per unit area
R = Rainfall Factor
K= Soil Erodibility Factor
LS = Topographic Factor
VM = Erosion Control Factor
= 1.2 for bare, compacted soil

For POND # 1

R = 15 Foot-Ton/Acre/Hour
K= 0.3 Tons/Acre/El

$$LS = \frac{(65.41s^2+4.56s+0.065)}{s^2+10{,}000+s^2*10{,}000} * \left(\frac{l}{72.6}\right)^m$$

l = slope length – 3,494 ft,
s = slope gradient – 0.09%

m = 0.2 for 0<s<1
0.3 for 1<s<3
0.4 for 3.5<s<4.5
0.5 for s>5

$$LS = \frac{(65.41(.09)^2+4.56(.09)+0.065)}{(.09)^2+10{,}000+(0.18)^2*10{,}000} * \left(\frac{3{,}493}{72.6}\right)^{0.2}$$

DRAINAGE AREA	SLOPE LENGTH	SLOPE %	R	K	LS	VM	Tons/acre/ Yr (A)	ACRES	Tons/yr (A)
Tank Seam	3,494	0.09	15	0.3	1.24	0.14	0.07	5.62	0.40

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CASTLE VALLEY MINING, LLC (RHINO ENERGY) RUNOFF REPORT PHASE III BOND RELEASE FOR TANK SEAM ACCESS ROAD RECLAMATION

Tom Paluso

EIS Environmental & Engineering Consulting
31 North Main Street
Helper, Utah 84526

Phone: (435) 472-3814
Email: tompaluso@preciscom.net

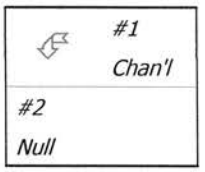
General Information

Storm Information:

Storm Type:	NRCS Type II
Design Storm:	10 yr - 24 hr
Rainfall Depth:	2.100 inches

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Channel	#1	==>	#2	0.505	0.266	Reclaimed Area
Null	#2	==>	End	0.000	0.000	



Structure Routing Details:

Stru #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	2. Minimum tillage cultivation	14.94	525.00	3,513.61	1.93	0.505
#1	**Muskingum K:**					**0.505**

Structure Summary:

	Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#1*	5.620	5.620	0.51	0.12
#2	0.000	5.620	0.50	0.12

**Denotes structures with incomplete design parameters. Results for these structures have not been evaluated, and may affect downstream structures.*

Structure Detail:

Structure #1 (Erodible Channel)

Reclaimed Area

Structure design parameters are not specified. No results to show.

Structure #2 (Null)

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	5.620	0.505	0.505	0.266	74.000	S	0.52	0.125
	$\sum$	**5.620**						**0.51**	**0.125**
#2	$\sum$	**5.620**						**0.50**	**0.125**

Subwatershed Time of Concentration Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	2. Minimum tillage cultivation	14.94	525.00	3,513.61	1.930	0.505
#1	**1**	**Time of Concentration:**					**0.505**

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	2. Minimum tillage cultivation	14.94	525.00	3,513.61	1.930	0.505
#1	**1**	**Muskingum K:**					**0.505**

CHAPTER 8

R645-301-800 BOND

Bonding Calculations
Castle Valley Mining, LLC

Bond Summary			New Bond Cost
Direct Costs			
Subtotal Demolition and Removal	$394,157.00		$ 394,157.00
Subtotal Backfilling and Grading	$715,799.00		$ 715,799.00
Subtotal Revegetation	$476,350.00		$ 438,173.00
Direct Costs	$1,586,306.00		$ 1,548,129.00
Indirect Costs			
Mob/Demob	$158,630.60	10.0%	$ 154,812.90
Contingency	$79,315.30	5.0%	$ 77,406.45
Engineering Redesign	$39,657.65	2.5%	$ 38,703.23
Main Office Expense	$107,868.81	6.8%	$ 105,272.77
Project Mainagement Fee	$39,657.65	2.5%	$ 38,703.23
Subtotal Indirect Costs	$425,130.01	26.8%	$ 414,898.57
Total Cost	$2,011,436.01		$ 1,963,027.57
Escalation factor		0.015	
Number of years		5	
Escalation	$155,452.00		$151,711.00
Reclamation Cost	$2,166,888.01		$ 2,114,738.57
Bond Amount (rounded to nearest $1,000)	$2,167,000.00		$ 2,115,000.00
2018 dollars			

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost	New Bond Cost
	Main Mine Site 01																			~~354412~~	316235
	Wild Horse Ridge 02																			121938	121938
	Total																			~~476350~~	438173

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost	New Bond Cost
	Main Mine Site 01																				
	Revegetation																				
	Drill Seeding																				
	Drill Seeding	Tractor Spreader (equip. & labor) B-66	Reveg004	24.09	/MSF					13.4						AC		584	MSF	14069	
	Seed Material	Bear Canyon Main Mine Shrubs	Bear Canyon 001	196	$/AC					13.4						AC		13	AC	2548	
	Seed Material	Bear Canyon Main Mine Forbes	Bear Canyon 002	178	$/AC					13.4						AC		13	AC	2314	
	Seed Material	Bear Canyon Main Mine Grass	Bear Canyon 003	188	$/AC					13.4						AC		13	AC	2444	
	Drill Seeding	Tractor Spreader (equip. & labor) B-66	Reveg004	24.09	/MSF					13.4						AC		584	MSF	14069	
	Mulch	Tractor Spreader (equip. & labor) B-66	Reveg004	24.09	/MSF					13.4						AC		584	MSF	14069	
	Mulch	Hay 1" material only 029105000250	Reveg001	41.19	/MSF					13.4						AC		584	MSF	24055	
	Stock Labor	Bare root seedlings, 11" to 16" med. soil	32 93 43 10 0140	0.78	Ea					13.4					500	AC		6700	EA	5226	
	Stock Material	Bear Canyon Main Transplants	Bear Canyon 004	4.66	$/AC					13.4					500	AC		6700	EA	31222	
	Ripping	300 HP Dozer w/ Ripper	31 23 16 32 2830	0.46	/CY					13.4						AC		21614	CY	9942	
	Subtotal																			119958	
	Hydroseeding																				
	Hydroseeding	Hydro Spreader (equip. & labor) B-81 80MS	Reveg002	24.83	/MSF					4.13						AC		180	MSF	4469	
	Seed Material	Bear Canyon Main Mine Shrubs	Bear Canyon 001	196	$/AC					4.13						AC		4	AC	784	
	Seed Material	Bear Canyon Main Mine Forbes	Bear Canyon 002	178	$/AC					4.13						AC		4	AC	712	
	Seed Material	Bear Canyon Main Mine Grass	Bear Canyon 003	188	$/AC					4.13						AC		4	AC	752	
	Mulch	Hydro Spreader (equip. & labor) B-81	Reveg005	24.09	/MSF					4.13						AC		180	MSF	4336	
	Mulch	Hay 1" material only 029105000250	Reveg001	41.19	/MSF					4.13						AC		180	MSF	7414	
	Stock Labor	Bare root seedlings, 11" to 16" med. soil	32 93 43 10 0140	0.78	Ea					4.13					500	AC		2065	EA	1611	
	Stock Material	Bear Canyon Main Transplants	Bear Canyon 004	4.66	$/AC					4.13					500	AC		2065	EA	9623	
	Pocking 340 CY/AC	Excavation Bulk Bank 2 CY (322BL)	31 23 16 32 0260	1.54	/CY					4.13						AC		1404	CY	2162	
	Subtotal																			31863	
	Riparian Planting Area																				
		Bear Canyon Main Mine Grass	Bear Canyon 008	105	$/AC					1						AC		1	AC	105	
	Plant Stock	Bare root seedlings, 11" to 16" med. soil	32 93 43 10 0140	0.78	Ea					1					1000	AC		1000	EA	780	
	Subtotal																			885	
	Matting																				
	Matting	Revegetation mat, webbed	31 25 13 10 0120	7	SY					2.96						AC		14326	SY	100282	
	Subtotal																			100282	
	Total																			252988	
	Reseed																			~~101424~~	63247
	Assume 25% reseeding																			~~354412~~	316235
	Subtotal																				
																				~~354412~~	316235
	Total																				