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C/015/018 Incoming

#3726
OK

P.O. Box 310
15 North Main Street
Huntington, Utah 84528

January 3, 2011

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

Subj: Application for Phase II and Phase III Bond Release of the Deer Creek Mine, 9th East Portal Area, PacifiCorp, Deer Creek Mine, C/015/0018, Emery County, Utah

PacifiCorp, by and through its wholly-owned subsidiary, Energy West Mining Company ("Energy West"), as mine operator, hereby submits an application for Phase II and Phase III bond release of the Deer Creek Mine, 9th East Portal area. The said area covered by the bond is approximately 0.6 acres and is located in SW1/4 SE1/4 Section 22, Township 17 South, Range 7 East, SLB&M. This area has met the regulations of the R645 Utah Coal Rules in regards to both Phase II and III bond release (R645-301-880.310).

The information included with this application provides documentation as required by Directive Number: Tech-006 and the R645-301-800 Utah Coal Regulations. This information is included as Attachments 1 through 11 and as follows:

General Information for Bond Release

- Attachment 1: Notarized Signature
- Attachment 2: Draft Letters to Interested Parties
- Attachment 3: Draft Newspaper Advertisement
- Attachment 4: Legal Description and Site Map
- Attachment 5: Reclamation Treatments Utilized
- Attachment 6: Deer Creek Mine, 9th East Portal Site General History of Mining and Reclamation Activities
- Attachment 7: Current Total Bond Amount and Incremental Amount Requested for Release

Information for Phase II Bond Release

- Attachment 8: Vegetation Analysis for Last Two Years of Responsibility
- Attachment 9: Demonstration that Area is Not Contributing Suspended Solids Outside Permit Area

Information for Phase III Bond Release

- Attachment 10: Demonstration that Responsibility Period has been Met
- Attachment 11: Demonstration that Post Mining Land Use has been Achieved

File in:

- Confidential
- Shelf
- Expandable

In C/ *0150018 Incoming*
Date: *01/12/11*, For additional information

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JAN 11 2011

DIV OF OIL, GAS & MINING

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When Phase III Bond Release procedures are complete and application approved, the Deer Creek Mine MRP and Legal/Financial Volumes will be revised to reflect the changes to the mining and reclamation permit. The required C1 form is included with this application. Additional information for this site can be reviewed in the application for Phase I Bond Release of the Deer Creek Mine, 9th East Portal Area approved July 31, 2007 (C/015/018-Task ID #2755) contained in your files. If you have any questions or concerns regarding the enclosed information, please contact Dennis Oakley at 435-687-4825.

Sincerely,



Ken Fleck

Geology and Environmental Affairs Manager

Enclosures: C1 Form
Attachments 1 through 11

Cc: Scott Child w/o attachments (Interwest Mining Company)
DOGM, PFO w/attachments
file

APPLICATION FOR COAL PERMIT PROCESSING

COPY

Permit Change New Permit Renewal Exploration Bond Release Transfer

Permittee: PacifiCorp

Mine: Deer Creek Mine

Permit Number: C/015/0018

Title: Application for Phase II and III Bond Release for the Reclaimed Areas of the Deer Creek Mine Site, PacifiCorp, C/015/0018

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

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

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

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

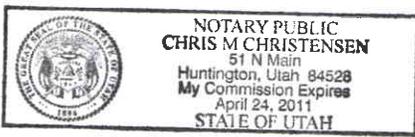
I hereby certify that I am a responsible official of the applicant and that the information contained in this application is true and correct to the best of my information and belief in all respects with the laws of Utah in reference to commitments, undertakings, and obligations, herein.

Kenneth Fleck
Print Name Kenneth S. Fleck Manager of Environmental Affairs JAN 3, 2011
Sign Name, Position, Date

Subscribed and sworn to before me this 3rd day of January, 2011

Chris M. Christensen
Notary Public
My commission Expires: April 24, 2011

Attest: State of UTAH } } ss:
County of Emery



<p>For Office Use Only:</p>	<p>Assigned Tracking Number:</p>	<p>Received by Oil, Gas & Mining</p> <div style="text-align: center; border: 1px solid black; padding: 10px;"> <p style="font-size: 1.5em; font-weight: bold;">RECEIVED</p> <p style="font-size: 1.2em;">JAN 11 2011</p> <p>DIV. OF OIL, GAS & MINING</p> </div>
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Application for Phase II and III Bond Release

**Deer Creek Mine, 9th East
Breakout Portal Site**

Attachment 1

Notarized Signature

**PacifiCorp
Energy West Mining Company
Deer Creek Mine
C/015/0018**

Phase II and III Bond Release on Approximately 0.6 Acres of Land Related to the Deer Creek Mine, 9th East Portal Breakout Site.

I hereby certify, to the best of my knowledge and belief, that all the information contained in this request is true and correct and that all applicable reclamation activities have been accomplished in accordance with the requirements of the Act, the regulatory program, and the approved reclamation plan.

Kenneth Fleck, Manager of Geology and Environmental Affairs

Print Name

KENNETH S. FLECK

Signature, Position, Date

Kenneth S. Fleck, MANAGER OF GEOLOGY & ENVIRONMENTAL AFFAIRS

Subscribed and sworn to before me this 3rd day of Jan, 2010.

Chris M. Christensen

Notary Public

My Commission Expires: April 24, 2011

Attest: State of Utah

County of Emery



Application for Phase II and III Bond Release

Deer Creek Mine, 9th East Breakout Portal Site

Attachment 2

Draft Letters to Interested Parties

August 20, 2010

Jerry Kenczka, Field Office Manager
Bureau of Land Management
Price Field Office
125 South 600 West
Price, Utah 84501

Subject: Application for Phase II and III Bond Release, Deer Creek Mine, 9th East Portal Breakout Area

PacifiCorp, by and through its wholly-owned subsidiary, Energy West Mining Company ("Energy West") as mine operator, has filed with the Division of Oil, Gas and Mining an application for Phase II and III Bond Release for 0.6 acres of the Deer Creek Mine, 9th East Portal Breakout Area.

As required by the State of Utah, R645-Coal Mining Rules (R645-301-880), all adjoining property owners, local governmental bodies, etc, are notified, informing them of the operator's intention to seek release from bond. You are receiving this notice because of your association with one of the groups mentioned above. A public notice was published in the Emery County Progress commencing on **xxxx xx, xxxx** and will run for four (4) consecutive weeks.

The Deer Creek Mine, 9th East Portal Breakout Area is located in the Right Fork of Grimes Wash. The said area, located in SE1/4 of the SW1/4 of the SE1/4 of Section 22, Township 17 South, Range 7 East, SLB&M. The (2) portals in this area were developed in the 1920's. Both portals were wagon operations. In June 1977, three (3) more portals, called the 9th East Breakout Portals, were developed for ventilation purposes. All portals and access were considered a pre-SMRCA sites. The 1977 intake portals were equipped with concrete collars. The breakouts at 9th East were utilized for intake ventilation purposes from 1977 until 1990, when they were permanently sealed according the Mine Safety Health Administration (MSHA) regulations.

Final reclamation of the 9th East breakouts began in the fall of 1999 and was completed in December of the same year. The concrete collars were removed and all the portals, including the (2) historic portals that were developed in 1920, have been backfilled. The site was fertilized, mulched and seeded contemporaneously with backfilling and grading. Phase I Bond Release for this area was approved on July 31, 2007.

The period of extended responsibility requirement (10 years) has been met and the vegetation parameters identified in R645-301-356.200 has exceed the approved success standard during the growing seasons of the last two years of this responsibility period. Vegetation sampling for bond release was conducted during the fall of 2008 and 2009.

Application for Phase II and III Bond Release
Deer Creek Mine
9th East Portal Area
xxxx xx, xxxx

PacifiCorp currently maintains a \$4,113,000.00 surety bond payable to the Division of Oil, Gas, and Mining. No reduction of this bond is being requested for the release of the site. If you have any questions, or require further information pertaining this bond release application, please feel free to call me at (435) 687-4825 or Ken Fleck at 435-687-4712.

Sincerely,

Dennis Oakley
Sr. Environmental Engineer

Cc Gary Kofford, Chairman, Emery County Board of Commissioners
Pamela Brown, Forest Supervisor, USFS, Region 4, Manti-LaSal National Forest
Jerry Kenczka, Field Office Manager, Bureau of Land Management
Dr. Phil Notorianni, Jr., Director, State Historic Preservation Office
Eric Larson, Regional Supervisor, State of Utah, Division of Wildlife Resources
Mark Stilson, Regional Engineer, Division of Water Rights
File

Notification List:

Gary Kofford, Chairman
Emery County Board of Commissioners
P.O. Box 629
Castle Dale, Utah 84513

Jerry Kenczka, Field Office Manager
Bureau of Land Management
Price Field Office
125 South 600 West
Price, Utah 84501

Pamela Brown, Forest Supervisor
United States Forest Service
Region 4, Manti-LaSal National Forest
599 West Price River Road
Price, Utah 84501

Dr. Phil Notorianni, Jr., Director
State Historic Preservation Office
300 Rio Grande
Salt Lake City, Utah 84101

Eric Larson, Regional Supervisor
State of Utah
Division of Wildlife Resources
SOUTHEASTERN REGION
319 North Carbonville Rd., Suite A
Price, Utah 84501

Mark Stilson, Regional Engineer
State of Utah
Division of Water Rights
Southeastern Area
319 Carbonville Rd, Suite B
Price, Utah 84501

Application for Phase II and III Bond Release

Deer Creek Mine, 9th East Breakout Portal Site

Attachment 3

Draft Newspaper Advertisement

**Application for Phase II and III Bond Release
Deer Creek Mine
9th East Portal Breakout Area
C/015/0018
Energy West Mining Company
P.O. Box 310
Huntington, Utah 84528**

PacifiCorp, by and through its wholly-owned subsidiary, Energy West Mining Company ("Energy West") as mine operator, hereby submits an application for Phase II and III bond release for the Deer Creek Mine, 9th East Breakout site. The said area, located in SE1/4 of the SW1/4 of the SE1/4 of Section 22, Township 17 South, Range 7 East, SLB&M, has met the regulations of the R645 Utah Coal Rules in regards to Phase II and III Bond Release (R645-301-880.300). The total acreage proposed for release is approximately 0.6 acres and is located near the Cottonwood Wilberg Portals.

The 9th East Breakout site includes (3) portals developed in 1977 for mine ventilation. These (3) concrete collared portals were used until 1990. In addition, the area had (2) portals developed in the 1920's for a small mine operation. The 1977 portals were sealed in 1990. All of the portals and access road were reclaimed in the fall of 1999.

Currently, a surety bond is filed with the Division of Oil, Gas and Mining in the amount of \$4,113,000.00 and is payable to the State of Utah, Division of Oil, Gas and Mining (DOG M), and the Office of Surface Mining Reclamation and Enforcement (OSM). PacifiCorp does not request that a reduction of the bond be made for this site.

A copy of the Phase II and III application may be examined at the office of the Division of Oil, Gas and Mining, 1594 West North Temple, Suite 1210, Salt Lake City, Utah 84114-5801 and also at the Records Office located in the Emery County Courthouse in Castle Dale, Utah. Written comments, objections, or requests for an informal conference may be submitted to the Salt Lake City address. Said comments must be submitted thirty (30) days from the date of the last publication of this notice. This notice is being published to comply with the Surface Mining Control and Reclamation Act of 1977, and State and Federal regulations promulgated pursuant to said Act.

Published in the Emery County Progress for four consecutive weeks beginning [REDACTED].

Application for Phase II and III Bond Release

Deer Creek Mine, 9th East Breakout Portal Site

Attachment 4

Legal Description and Map

Legal Description for Phase II and III Bond Release

The area under application for release of the Deer Creek Mine, 9th East Breakout Portal area consists of a small reclaimed area within the SE1/4 SW1/4 SE1/4 of Section 22, Township 17 South, Range 7 East, SLB&M. This area contains approximately 0.6 acres of land that was reclaimed in 1999.

Refer to the attached drawing for the location of the Deer Creek Mine, 9th East Breakout Portal Area.

Application for Phase II and III Bond Release

Deer Creek Mine, 9th East Breakout Portal Site

Attachment 5

Reclamation Treatments

**Reclamation Treatments Utilized at the
Deer Creek Mine, 9th East Portal Breakout Area**
(Refer to Volume 3B, Appendix XIII for the complete reclamation plan)

The 9th East breakouts are located on an east facing steep slope in the Right Fork of Grimes Wash. The area is dominated by rock outcrop, rubble land, and shallow soils. As stated in the Cottonwood MRP (Volume 2 Part 2) "Nowhere in the vicinity is there a source of material which would usually be referred to as "topsoil". Soil test on the disturbed and undisturbed areas and coal waste areas show that the materials at the portal site should support selected vegetative materials.

The site was originally disturbed prior to 1922 as documented by Speiker¹. A baseline survey was conducted to determine the quantities of available spoil material to be used as backfill. Based upon the survey, adequate fill existed to create overland flow at the portal site and along the access road. A total of approximately 0.6 acres were reclaimed which included the portal terrace area and access road.

Portal Sealing: The 9th East Portals were sealed according to Mine Safety Health Administration (MSHA) specifications but not backfilled in November 1991. The portal area was reclaimed by removing the surrounding fences and portal collars. The collars were broken up and used as backfill material. The remaining void was backfilled utilizing existing fill according to the plan.

Soil Placement: Material from the berms, located in front of the portal area and along the access road, was used as backfill. Material was backfilled to approximately a 2:1. This salvaged material was used to recontour the portal terrace and the access road from the historic portals to the Wilberg Mine Fan. Approximately 1,332 cubic yards of salvaged material was utilized for reclamation.

Spoil material from the berms were removed by excavator and distributed and placed. All material placement locations were staked to show crest and toe of slope. Materials were compacted with the bucket of the excavator or track-over methods.

Soil stabilization: Compaction efforts were applied as lifts of material were placed. Large boulders were removed to allow for proper compaction. After recontouring and slope compaction, various sized rocks and boulders were randomly positioned along the portal terrace and along the access road to enhance vegetation establishment, create micro habitats, to provide slope containment, and to help provide natural esthetic appearance.

Erosion control: Deep gouging techniques were used to control sedimentation at the 9th East Portal Breakouts. These techniques required a track-hoe or similar machine to roughen the disturbed area in a random and discontinuous fashion using the bucket. Pockmarks were created to the size of approximately three (3) feet in diameter and one and half (1 ½) feet deep. The pockmarks were designed to capture or trap precipitation, influencing infiltration. Gouging serves to control erosion through water retention, and thus enhances vegetation growth. Because of the water retaining capabilities of deep gouging techniques, contribution of sediment above background levels did not occur. All exposed surfaces were protected and stabilized by incorporating or mixing hay mulch into the top layer of soil. A wood fiber mulch and tackifier was applied to the surface as detailed below.

Fertilizers and seed mix: Seeding was contemporaneously as practical following soil placement, contouring/pocking and fertilization of the area being reclaimed. Certified weed free alfalfa hay was incorporated into the soil following contouring at a rate of 2000lbs/acre. Fertilizer was applied at the following rate:

Ammonium Nitrate 40 lbs./acre
Triple Superphosphate 35 lbs./acre

Pocking techniques mixed the hay mulch and fertilizer into the upper portion of the soil. The seed mixture was broadcast by hand.

Next, a wood fiber mulch was applied at a rate of 1000 lbs./acre. A tackifier was added to the mulch and applied at a rate of 500 lbs/acre. Mulch and tackifier was applied simultaneously.

Revegetation:

Seed Mixture: The following table lists the seed mixture that was used to revegetate the disturbed Pinyon/Juniper habitat.

Grasses		
Bluebunch Wheatgrass	Agropyron spicatum	3.0
Big Bluegrass	Poa ampla	0.5
Great Basin Wild Rye	Leymus cinereus	2.0
Indian Ricegrass	Oryzopsis hymenoides var. Paloma	3.0
Thickspike Wheatgrass	Agropyron dasystachyum var. Critana	2.0
Western Wheatgrass	Agropyron smithii var. Rosanna	3.0
Forbes		
Blueleaf Aster	Aster glaucodes	0.5
Blue Flax	Linum lewisii	1.0
Louisiana Sage	Artemisia ludoviciana	0.2
Northern Sweetvetch	Hedysarum boreale	1.0
Palmer Penstemon	Penstemon palmeri	0.5
Shrubs		
Big Sagbrush	Artemisia tridentata var. wyomingensis	0.5
Curleaf Mahogany	Cercodarus ledifolius	2.0
Fourwing Saltbush	Atriplex canescens	3.0
Saskatoon Serviceberry	Amelanchier alnifolia	1.0
Whitestem Rubber Rabbitbrush	Chrysothamnus nauseosus	0.2

¹ Speiker, E.M., 1931, The Wasatch Plateau Coal Field, Utah: U.S. Geological Survey Bulletin 819, p.160.

Application for Phase II and III Bond Release

Deer Creek Mine, 9th East Breakout Portal Site

Attachment 6

General History of the Site

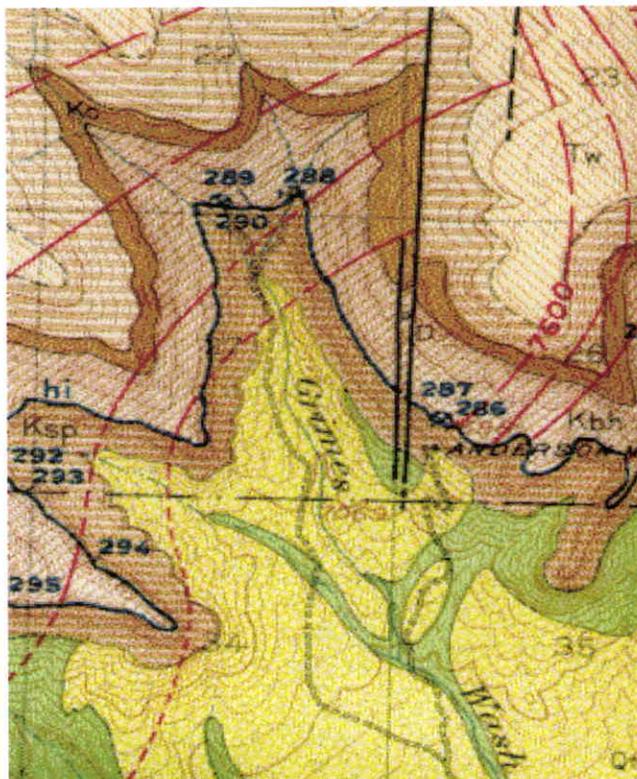
General History of Cottonwood Fan Portal Area

The 9th East breakouts were located in the Right Fork of Grimes Wash and were developed June 1977 for ventilation purposes. The portal area is considered a pre-SMRCA site. The site consisted of three (3) separate intake portals with concrete collars.



Breakouts at 9th East were utilized for intake ventilation purposes from 1977 until 1990 when they were permanently sealed according to Mine Safety Health Administration regulations. Access to the 9th East Breakouts was accomplished along an access road from the Wilberg Mine portals in the Right Fork of Grimes Wash. The access road served as drainage control for the area below the 9th East breakouts.

The portal site was originally disturbed by coal mining activities dating back prior to 1920's as documented by Speiker¹. Below is an excerpt from Speiker which documents the history of coal mining in the upper Grimes Wash area:



Mines in upper Grimes Wash, - in each of the forks of Grimes Wash is an abandoned mine (locations 288 [*9th East Breakouts*] and 289). The one at location 289 is the Reed mine, referred to by Taff². Both are very old mines.

The mine at location 288 is largely caved, but the coal appears unaffected by weather, and a sample was taken for analysis. Little coal has been taken from the mine and the entry is only about 75 feet long. A few short rooms have been turned off.

¹ Speiker, E.M., 1931, The Wasatch Plateau Coal Field, Utah: U.S. Geological Survey Bulletin 819, p.160.

² Taff, J.A., 1906, The Book Cliffs coal field: U.S. Geological Survey Bulletin 285, p. 300.

The mine at location 289 is more extensive, but it could not be explored in 1922 because of water. It is a true wagon mine; the road leads directly to the mine mouth and wagons were driven into the mine, loaded at the face, and driven out again through a second entry near the first. An older entry south of these two, now caved shut probably served to ventilate the mine.

At the both of these mines the coal is about 13 feet thick and is of that hard, massive type characteristics of the field. The road to the mines was in bad condition in 1922, but it is of even gradient, and when well kept it affords a good route for heavy wagons. "

Remnants from the old mine include two partially open portals, coal handling area south of the portals and evidence of a wooden coal chute above the current Wilberg Mine Fan.

The following plan will address final reclamation of the 9th East breakouts including the access road from the Wilberg Mine fan. Even though the 9th East breakouts are part of the Deer Creek Mine, because of its location, environmental resources are documented in the Cottonwood Mine MRP. The plan will use the following format to described the reclamation project:

R645-301-100 General

R645-301-200 Soils

R645-301-300 Biology

R645-301-400 Land Use

R645-301-500 Engineering

R645-301-600 Geology

R645-301-700 Hydrology

R645-301-800 Bonding

Application for Phase II and III Bond Release

Deer Creek Mine, 9th East Breakout Portal Site

Attachment 7

**Current Total Bond Amount
and Incremental
Amount Requested for Release**

Current Total Bond Amount and Incremental Amount Requested for Release

The incremental bond amount calculated for the Deer Creek Mine, 9th East Breakout Portal area consisted of the sealing of three (3) portals. Since this amount is small and insignificant to the total bond, PacifiCorp is not requesting any surety reduction associated with this bond release action.

Application for Phase II and III Bond Release

Deer Creek Mine, 9th East Breakout Portal Site

Attachment 8

**Vegetation Analysis
(2008/2009 Field Seasons)**

Vegetation Monitoring
For Phase III Bond Release: Year 1
for the
Deer Creek Mine
2008

9th East Portal Areas &
Pinyon-Juniper Reference Area
Located in the
Cottonwood Mine Area



Prepared by

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P.O. Box 337
Springville, Utah 84663
(801) 489-6937

Patrick D. Collins, Ph.D.

for

ENERGY WEST MINING COMPANY
P.O. Box 310
Huntington, Utah 84528



April 2009

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INTRODUCTION

This document provides quantitative data comparisons of a *reclaimed area* that was previously disturbed by coal mining activities and a *reference area* that was chosen previously to represent revegetation success standards at the time of final reclamation. Even though the sites are located near Cottonwood Mine, the reclaimed site is associated with the Deer Creek Mine, located approximately 2.5 air-miles northward. In this document the study sites are called the **Reclaimed 9th East Portal Area** and the **Pinyon-Juniper Reference Area** (see Photographs).

The purpose of this document was to compare a reclaimed area of a mine site with specific pre-determined standards for revegetation success. The content of this report provides **Year 1** results of the two consecutive years of sampling required prior to submittal of an application for bond release by the mine operator through the State of Utah, Division of Oil, Gas & Mining (DOGM).

Following final reclamation and revegetation of a mine site, a “*responsibility period*” for at least 10 years is required before the mine operator can submit a request for *Final or Phase III Bond Release* through state and federal regulatory authorities. It has been estimated that this period of time is long enough to determine whether or not adequate re-establishment of a given reclaimed plant community has occurred on sites at this precipitation zone in western United States.

Rehabilitated vegetation is usually monitored throughout the responsibility period, but beginning at year 9 of the 10-year period, intensive sampling can be initiated for two consecutive years to

determine whether or not the reclaimed site has met pre-determined revegetation success standards. The vegetation of the reclaimed land must meet specific state and federal requirements. As dictated by the regulations, vegetative cover must be “*diverse, effective and permanent*”. Accordingly, there are often specific requirements associated with cover, density, productivity and diversity of reclaimed lands.

General Site Description

The Cottonwood Mine Area is located in Emery County, Utah approximately 7 air-miles northwest of the town of Orangeville. Elevation of the study sites ranged between 7,400 ft and 7,800 ft above sea level.

Prior to disturbance, the reclaimed area was most likely dominated by pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*), with Salina wildrye (*Elymus salinus*) as the dominant understory species.

A Pinyon-Juniper Reference Area at the Cottonwood Mine site was chosen earlier to be used to create standards for revegetation success following final reclamation. The reference area was dominated by the same plant species as those listed above for the reclaimed area (before it was disturbed). The reference area was chosen earlier to comply with guidelines by DOGM and was thought to have similar slopes, soils, exposure, species composition, precipitation, elevation and other environmental variables.

METHODS

Vegetation establishment on the reclaimed area has been monitored for several years following reclamation. Sampling methods have remained consistent for all monitoring years and follow those methods suggested in guidelines provided by DOGM.

Transect Placement

Transect lines for quantitative sampling were randomly placed the length of the reclaimed area and reference areas in an attempt to adequately represent each sample area as a whole. From these transect lines, sample locations were chosen using random numbers at right angles to them.

Cover, Frequency and Composition

Cover estimates were made using ocular methods with meter square quadrats. Species composition and relative frequencies were also assessed from the quadrats. Additional information recorded on the raw data sheets were: estimated precipitation, slope, exposure, grazing use, animal disturbance and other appropriate notes. Plant nomenclature follows "*A Utah Flora*" (Welsh et al. 2003).

Density

Density estimates for the woody plant species on the reclaimed and reference areas were made using a distance method called the point-quarter method. In this method, random points were placed on the sample sites and measured into four quarters. The distances to the nearest woody plant species were then recorded in each quarter. The average point-to-individual distance was equal to the square root of the mean area per individual.

Production

Total annual biomass production was estimated by clipping, drying and weighing current annual growth in each sample quadrat. "Double sampling" methods were employed by placing four additional quadrats around the clipped quadrat, then estimating the production of them relative to the clipped plot. Herbaceous and woody species production were recorded separately.

Sample Adequacy

Sample adequacy for cover and density was attempted with the goal that 90% of the samples were within 10% of the true mean for the plant communities in the area. The following formula was used:

$$nMIN = \frac{t^2 s^2}{(dx)^2}$$

where,

<i>nMIN</i>	= minimum adequate sample
t	= appropriate confidence t-value
s	= standard deviation
x	= sample mean
d	= desired change from mean

Diversity

Two diversity indices have been reported in this document for the reclaimed area and the reference area. To begin, *MacArthur's Diversity Index* was calculated. This index is an effective diversity measurement and is computed using the equation $1/\sum pi^2$ (MacArthur and Wilson 1976, *The Theory of Island Biogeography*, Princeton: Princeton University Press). In this equation *pi* is the proportion of sum frequency contributed by the *i*th species in the sample area of concern. The proportional contribution of each species is then squared and the values for all species in the sample areas are summed. This index integrates the number of species and the degree to which frequency of occurrence was equitably distributed among those species. In other words, this index provides greater weight to those species that are present more often (with greater frequency) than those that are merely “present” in one or two quadrats. The *average number of species per sample quadrat* is another measure of species diversity provided from the data in this report.

Photographs

Color photographs were taken of the sample areas and are included in this report.

RESULTS

Reclaimed 9th East Portal Area

This reclaimed area was dominated by the following plant species: sagebrush (*Artemisia tridentata*), Pacific aster (*Aster chilensis*), fourwing saltbush (*Atriplex canescens*) and thickspike wheatgrass (*Elymus lanceolatus*). All species present in the sample quadrats along with their cover and frequency values are shown on Table 1.

The total living cover of this reclaimed area was estimated at 47.50% (Table 2-B). Of this cover, shrubs comprised 42.03%, grasses 34.77% and forbs 23.20% (Table 2-B).

Woody species density totaled 4,154 plants per acre (Table 3) and was dominated by sagebrush, shadscale (*Atriplex confertifolia*), fourwing saltbush and rabbitbrush (*Chrysothamnus nauseosus*).

The total annual biomass productivity of the area was estimated at 407.84 pounds per acre, of which was divided into herbaceous (217.01 lbs/ac) and woody plants (190.83 lbs/ac).

Productivity measurements are shown on Table 4.

Pinyon-Juniper Reference Area

The reference area chosen earlier to be used for final revegetation success standards was an undisturbed pinyon-juniper plant community. This community was also sampled during the same period to enable the results to be compared to the results of the reclaimed slopes.

Overstory cover of the reference area was comprised of Utah serviceberry (*Amelanchier utahensis*), Utah juniper (*Juniperus osteosperma*), pinyon-pine (*Pinus edulis*) and white fir (*Abies concolor*). The understory living cover had many species present, but was dominated by Salina wildrye (*Elymus salinus*) by a rather wide margin. For a cover and frequency listing of all species present in the sample quadrats refer to Table 5.

The total living cover of the Pinyon-Juniper Reference Area was estimated at 33.00%, of which 28.00% was from understory cover and 5.00% from overstory (Table 6-A). The composition of this cover consisted of 59.52% grasses, 30.51% shrubs and 9.97% forbs (Table 6-B).

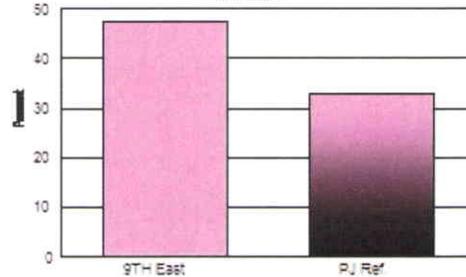
Woody species density of this area consisted of 1,106 individuals per acre with the most common plants for this parameter consisting of Utah serviceberry and pinyon-pine (Table 7).

Total annual biomass production was estimated at 302.02 pounds per acre, or 151.55 pounds from herbaceous plants and 150.47 pounds from woody species (Table 8).

DISCUSSION & SUMMARY

Statistical analyses (Student's t-tests) suggest that the reclaimed 9th East Portal Area had significantly higher total living cover, woody species density and biomass productivity when compared to the Pinyon-Juniper Reference Area

**Fig. 1: Total Living Cover
2008**



(Table 9). These parameters have been shown graphically. Figure 1 shows the **total living covers**

of for the 9th East Portal area and the Pinyon-Juniper

Reference Area. Figure 2 compares the **woody**

species densities of these two areas, whereas Figure

3 shows the **productivity** values. Additionally, two

diversity indices were calculated from the

quantitative data. Figure 4 suggests that the

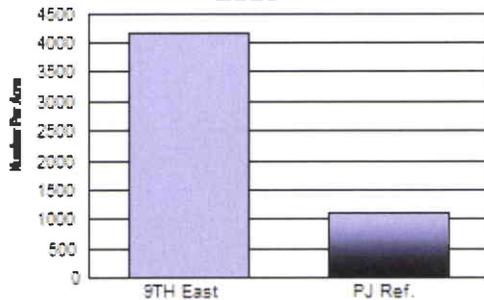
reclaimed area is more diverse than the reference

area using MacArthur's Index. Finally, diversity measured by the average number of species

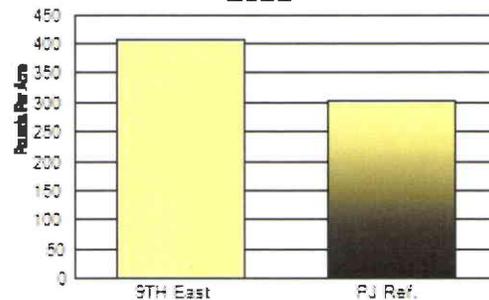
found in each quadrat (Figure 5) also suggests that the

reclaimed area was more diverse.

**Fig. 2: Woody Species Density
2008**



**Fig. 3: Biomass Production
2008**



Results from quantitative sampling the vegetation of the reclaimed and reference areas suggest that revegetation of the site is proceeding well in Year 1 of the two consecutive sample years required for final bond release through the State of Utah.

Fig. 4: Diversity 2008

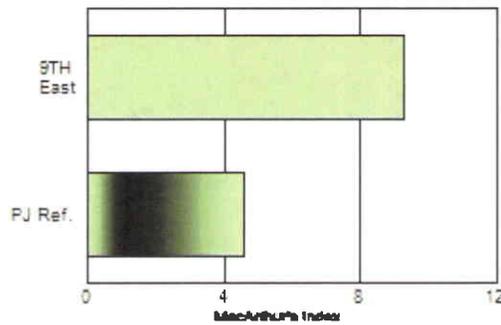
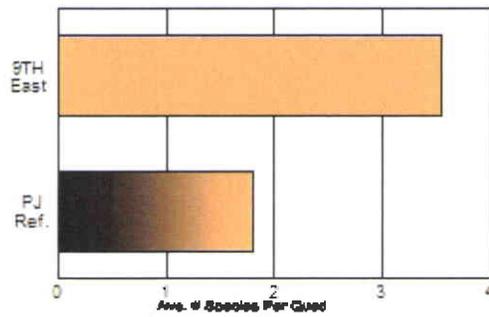


Fig. 5: Diversity 2008



DATA SUMMARY TABLES

Table 1: Cover and frequency by plant species (2008).

9th East Portals of Grimes Wash			
	MEAN	STD. DEV.	FREQUENCY
TREES & SHRUBS			
<i>Artemisia tridentata</i>	12.25	12.23	70.00
<i>Atriplex canescens</i>	5.00	8.94	27.50
<i>Atriplex confertifolia</i>	1.68	6.10	10.00
<i>Chrysothamnus nauseosus</i>	1.50	4.77	12.50
<i>Cercocarpus ledifolius</i>	0.13	0.78	2.50
FORBS			
<i>Linum lewisii</i>	1.25	2.90	17.50
<i>Aster chilensis</i>	9.18	10.76	60.00
<i>Penstemon palmeri</i>	0.25	1.56	2.50
<i>Hedysarum boreale</i>	0.45	1.63	7.50
GRASSES			
<i>Bromus carinatus</i>	0.25	1.56	2.50
<i>Poa secunda</i>	1.38	3.71	12.50
<i>Elymus spicatus</i>	2.33	4.93	20.00
<i>Elymus salinus</i>	2.50	5.36	22.50
<i>Elymus lanceolatus</i>	4.75	6.80	45.00
<i>Elymus smithii</i>	2.00	4.15	20.00
<i>Stipa hymenoides</i>	1.38	3.53	15.00
<i>Elymus trachycaulus</i>	0.63	3.90	2.50
<i>Elymus cinereus</i>	0.63	3.20	5.00

Table 2: Total cover and composition (2008).

9th East Portals of Grimes Wash

A. COVER		
Total Living Cover	MEAN	STD. DEV.
	47.50	11.35
Litter	15.63	6.04
Bareground	11.38	5.00
Rock	25.50	10.59
B. % COMPOSITION		
Shrubs	42.03	25.85
Forbs	23.20	24.15
Grasses	34.77	21.51

Table 3: Woody species density (2008).

9th East Portals of Grimes Wash	
	Number/Acre
<i>Artemisia tridentata</i>	2873.28
<i>Atriplex canescens</i>	346.18
<i>Atriplex confertifolia</i>	346.18
<i>Cercocarpus ledifolius</i>	51.93
<i>Chrysothamnus nauseosus</i>	328.87
<i>Eriogonum corymbosum</i>	155.78
<i>Gutierrezia sarothrae</i>	51.93
TOTAL	4154.14

Table 4: Production (2008).

9th East Portals of Grimes Wash		
	Pounds/Acre	
LIFEFORM	MEAN	STD. DEV.
Herbaceous	217.01	185.20
Woody	190.83	206.81
TOTAL	407.84	187.72

Table 5: Cover and frequency by plant species (2008).

Pinyon-Juniper Reference Area			
	MEAN	STD. DEV.	FREQUENCY
OVERSTORY			
TREES & SHRUBS			
<i>Abies concolor</i>	0.50	3.12	2.50
<i>Amelanchier utahensis</i>	2.13	7.49	7.50
<i>Juniperus osteosperma</i>	1.25	5.45	5.00
<i>Pinus edulis</i>	1.13	4.94	5.00
UNDERSTORY			
TREES & SHRUBS			
<i>Abies concolor</i>	1.00	4.36	5.00
<i>Amelanchier utahensis</i>	2.88	7.49	17.50
<i>Artemisia tridentata</i>	0.50	3.12	2.50
<i>Chrysothamnus nauseosus</i>	0.13	0.78	2.50
<i>Eriogonum corymbosum</i>	0.50	3.12	2.50
<i>Gutierrezia sarothrae</i>	0.70	2.80	7.50
<i>Juniperus osteosperma</i>	0.88	3.52	7.50
<i>Pinus edulis</i>	1.88	5.56	12.50
FORBS			
<i>Galium bifolium</i>	0.13	0.78	2.50
<i>Hedysarum occidentale canone</i>	2.63	5.74	22.50
<i>Machaeranthera grindelioides</i>	0.25	1.09	5.00
GRASSES			
<i>Elymus salinus</i>	14.50	12.03	75.00
<i>Stipa hymenoides</i>	2.05	5.42	17.50

Table 6: Total cover and composition (2008).**Pinyon-Juniper Reference Area**

A. COVER	MEAN	STD. DEV.
Overstory (o)	5.00	10.12
Understory (u)	28.00	8.65
Litter	12.25	8.87
Bareground	9.88	6.17
Rock	49.88	13.58
o + u	33.00	7.65
B. % COMPOSITION		
Shrubs	30.51	35.92
Forbs	9.97	18.01
Grasses	59.52	34.73

Table 7: Woody species density (2008).

Pinyon-Juniper Reference Area	Number/Acre
<i>Abies concolor</i>	23.05
<i>Amelanchier utahensis</i>	378.05
<i>Artemisia tridentata</i>	4.61
<i>Atriplex confertifolia</i>	9.22
<i>Chrysothamnus nauseosus</i>	101.43
<i>Ephedra viridis</i>	13.83
<i>Eriogonum corymbosum</i>	50.71
<i>Gutierrezia sarothrae</i>	106.04
<i>Juniperus osteosperma</i>	92.21
<i>Pinus edulis</i>	272.01
<i>Pseudotsuga menziesii</i>	55.32
TOTAL	1106.47

Table 8: Production (2008).

Pinyon-Juniper Reference Area	Pounds/Acre	
	MEAN	STD. DEV.
LIFEFORM		
Herbaceous	151.55	102.45
Woody	150.47	214.55
TOTAL	302.02	162.40

TABLE 9: Statistical summary sheet for the reclaimed and reference areas (2008).

RECLAIMED 9th East Portal Area

Total Living Cover	\bar{x} =47.50	s=11.35	n=40	nMIN=15.54
Density	\bar{x} =4154.14	s=1966.91	n=60	nMIN=60.67
Production	\bar{x} =407.84	s=187.72	n=60	nMIN=57.33

P-J REFERENCE AREA

Total Living Cover (u+o)	\bar{x} =33.00	s=7.67	n=40	nMIN=14.62
Density	\bar{x} =1106.47	s=306.96	n=60	nMIN=20.83
Production	\bar{x} =302.02	s=162.40	n=80	nMIN=78.24*

STATISTICAL ANALYSES

Total Living Cover	t=4.181	df=78	SL=p<.01
Density	t=11.859	df=118	SL=p<.01
Production	t=3.568	df=138	SL=p<.01

\bar{x} = sample mean, s = sample standard deviation, n = sample size,

nMIN= minimum adequate sample (@ 90% ± .10)

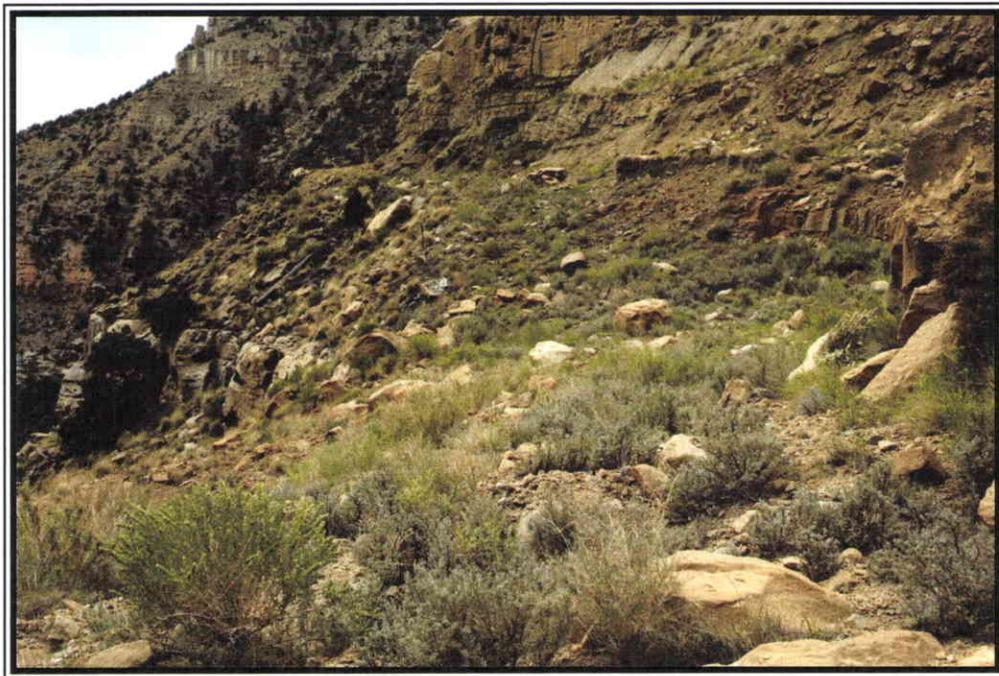
NS = non-significant, t = Student's t-value, df = degrees of freedom,

SL = significance level, p = probability level

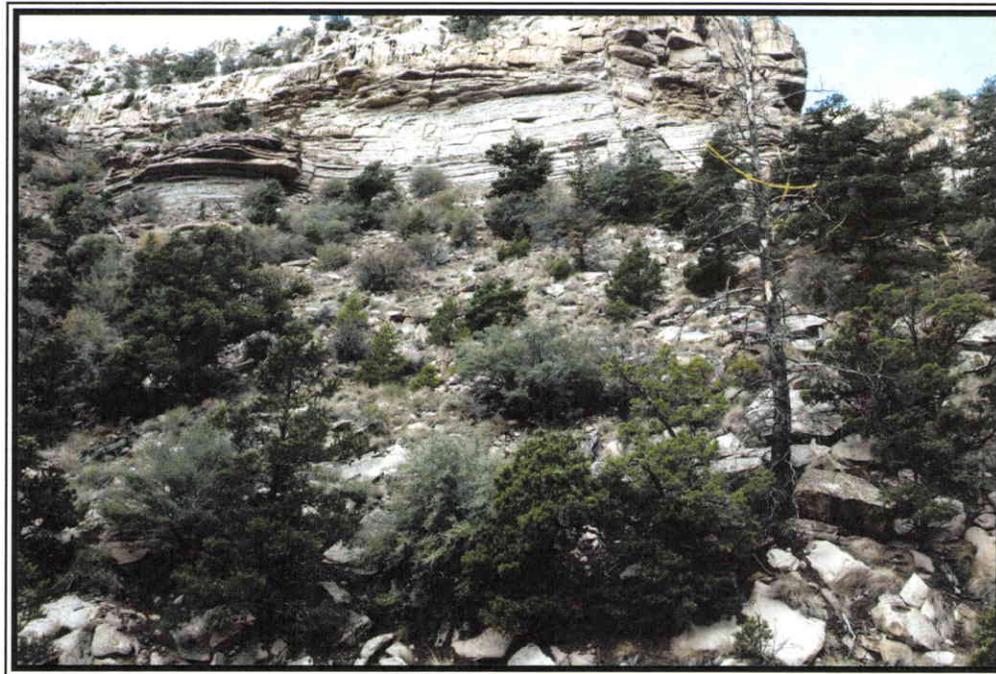
o=overstory; u=understory

* sample adequacy here was met by disregarding the single highest and single lowest sample values.

RECLAIMED 9TH EAST PORTAL AREA



PINYON-JUNIPER REFERENCE AREA



Vegetation Monitoring
For Phase III Bond Release: Year 2
for the
Deer Creek Mine
2009

9th East Portal Areas &
Pinyon-Juniper Reference Area
Located in the
Cottonwood Mine Area



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INTRODUCTION

An area where the land surface was once disturbed by coal mining and related activities has been reclaimed and revegetated to a state that approximates its pre-mining condition. The vegetation of the reclaimed land must meet specific state and federal requirements. As dictated by the regulations, vegetative cover must be “*diverse, effective and permanent*”. Accordingly, there are often specific requirements associated with cover, density, productivity and diversity of reclaimed lands. The purpose of this document is to compare the vegetation of a reclaimed area of a mine site to specific pre-determined standards for final revegetation success.

The content of this report provides **Year 2** results of the two consecutive years of quantitative sampling required prior to submittal of an application for *Final or Phase III Bond Release* by the mine operator. The bond release application process is conducted through the State of Utah, Division of Oil, Gas & Mining (DOGM).

A **Year 1** study was also conducted; the final report for that study was submitted previously to Energy West Mining Company. The earlier report was called *Vegetation Monitoring for Phase III Bond Release: Year 1 (2008)*.

Even though the study sites were in the vicinity of the Cottonwood Mine, the reclaimed site was located in Grimes Wash and is associated with the Deer Creek Mine, which is located approximately 2.5 air-miles northward. The study sites in this report are called the **Reclaimed**

9th East Portal Area and the **Pinyon-Juniper Reference Area** (see photographs included in this document for views of the study areas).

General Site Description

The Cottonwood Mine Area is located in Emery County, Utah approximately 7 air-miles northwest of the town of Orangeville. Elevation of the study sites ranged between 7,400 ft and 7,800 ft above sea level.

Prior to disturbance by the mining activities, the reclaimed area was most likely dominated by pinyon-pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) trees, with Salina wildrye (*Elymus salinus*) as the dominant grass understory species.

A Pinyon-Juniper Reference Area at the Cottonwood Mine site was chosen at an earlier date to be used to create standards for revegetation success at the time final reclamation. This reference area was dominated by the same plant species as those mentioned above for the reclaimed area before it was disturbed. The reference area was chosen to comply with guidelines provided by DOGM and was thought to generally have similar slopes, soils, exposure, species composition, precipitation, elevation and other environmental variables as the reclaimed areas of the mine site.

METHODS

Prior to the two-year bond release studies, vegetation establishment on the reclaimed area has been monitored for several years following reclamation. Quantitative sampling for this report, or Year 2 at the site, was conducted in September 2009. Methods have remained consistent for all monitoring years and follow those methods suggested in guidelines provided by DOGM.

Transect Placement

Transect lines for quantitative sampling were randomly placed the entire length of the reclaimed and reference areas in an attempt to adequately represent each sample area as a whole. From these transect lines, sample locations were chosen using random numbers at right angles to them.

Cover, Frequency and Composition

Cover estimates were made using ocular methods with meter square quadrats. Species composition and relative frequencies were also assessed from the quadrats. Additional information recorded on the raw data sheets were: estimated precipitation, slope, exposure, grazing use, animal disturbance and other appropriate notes. Plant nomenclature follows "*A Utah Flora*" (Welsh et al. 2008).

Density

Density estimates for the woody plant species on the reclaimed and reference areas were made using a distance method called the point-quarter method. In this method, random points were placed on the sample sites and measured into four quarters. The distances to the nearest woody plant species were then recorded in each quarter. The average point-to-individual distance was equal to the square root of the mean area per individual.

Production

Total annual biomass production was estimated by clipping, drying and weighing current annual growth in each sample quadrat. "Double sampling" methods were employed by placing four additional quadrats around the clipped quadrat, then estimating the production of them relative to the clipped plot. Herbaceous and woody species production were recorded separately.

Sample Adequacy

Sample adequacy for cover and density was attempted with the goal that 90% of the samples were within 10% of the true mean for the plant communities in the area. The following formula was used:

$$nMIN = \frac{t^2 s^2}{(dx)^2}$$

where,

nMIN = minimum adequate sample
 t = appropriate confidence t-value
 s = standard deviation
 x = sample mean
 d = desired change from mean

Diversity

Two diversity indices have been provide in this document for the reclaimed area and the reference area. To begin, *MacArthur's Diversity Index* was calculated. This index is an effective diversity measurement and is computed using the equation $1/\sum pi^2$ (MacArthur and Wilson 1976, *The Theory of Island Biogeography*, Princeton: Princeton University Press). In this equation *pi* is the proportion of sum frequency contributed by the *i*th species in the sample area of concern. The proportional contribution of each species is then squared and the values for all species in the sample areas are summed. This index integrates the number of species and the degree to which frequency of occurrence was equitably distributed among those species. In other words, this index provides greater weight to those species that are present more often (with greater frequency) than those that are merely “present” in one or two quadrats.

The *average number of species* per sample quadrat is another measure of species diversity provided from the data in this report.

Photographs

Color photographs were taken of the sample areas and are included in this report.

RESULTS

Reclaimed 9th East Portal Area

Quantitative sampling the vegetation at the Reclaimed 9th East Portal Area at Grimes Wash indicated that the area was dominated a shrub, sagebrush (*Artemisia tridentata*), a forb, Pacific aster (*Aster chilensis*), and a grass, Salina wildrye (*Elymus salinus*). All species present in the sample quadrats along with their cover and frequency values are shown on Table 1.

The total living cover of this reclaimed area was estimated at 48.38% (Table 2-A). Of this cover, grasses comprised 43.78%, shrubs 39.23% and forbs 16.99% (Table 2-B).

Woody species density totaled 3,872 plants per acre (Table 3) and was dominated by sagebrush, fourwing saltbush (*Atriplex canescens*), shadscale (*Atriplex confertifolia*) and rubber rabbitbrush (*Chrysothamnus nauseosus*).

The total annual biomass productivity of the area was estimated at 1,026.64 pounds per acre, of which was divided into herbaceous (446.21 lbs/ac) and woody plants (580.43 lbs/ac). Results for all productivity measurements are shown on Table 4.

Pinyon-Juniper Reference Area

The reference area chosen earlier to be used for final revegetation success standards was an undisturbed pinyon-juniper plant community. This community was also sampled during the same period to enable the results to be compared to the results of the reclaimed slopes.

Overstory cover of the reference area was comprised of Utah serviceberry (*Amelanchier utahensis*), pinyon-pine (*Pinus edulis*), white fir (*Abies concolor*) and Douglas fir (*Pseudotsuga menziesii*). The understory living cover had several species present, but was dominated by Salina wildrye (*Elymus salinus*) by a rather wide margin. For a cover and frequency listing of all species present in the sample quadrats refer to Table 5.

The total living cover of the Pinyon-Juniper Reference Area was estimated at 30.83%, of which 26.83% was from understory cover and 4.00% from overstory (Table 6-A). The composition of the understory cover consisted of 53.80% grasses, 36.43% shrubs and 9.77% forbs (Table 6-B).

Woody species density of this area consisted of 742 individuals per acre with the most common plants for this parameter consisting of Utah serviceberry and pinyon-pine (Table 7).

Total annual biomass production was estimated at 341.49 pounds per acre, or 84.63 pounds from herbaceous plants and 256.87 pounds from woody species (Table 8).

DISCUSSION & CONCLUSIONS

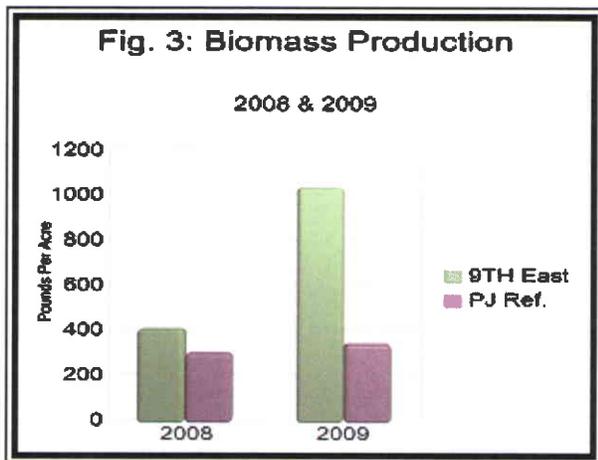
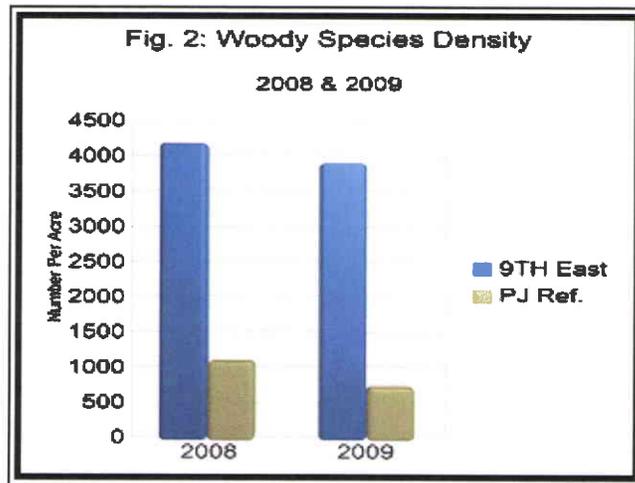
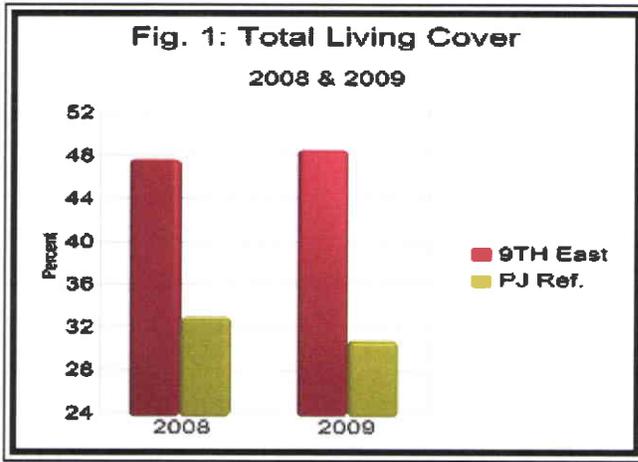
Results from quantitative sampling the vegetation in **Year 2** suggest that the Reclaimed 9th East Portal Area exceeded those revegetation standards set by using a native, undisturbed Pinyon-Juniper Reference Area for parameter comparisons. Or, total living cover, woody species density and total annual biomass productivity was significantly higher in the reclaimed areas when these parameters were compared statistically using Student's t-tests (Table 9).

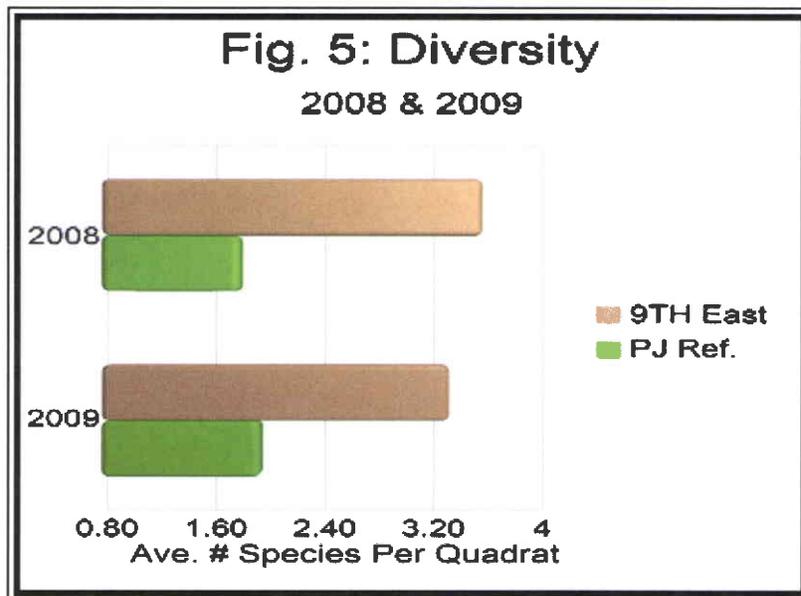
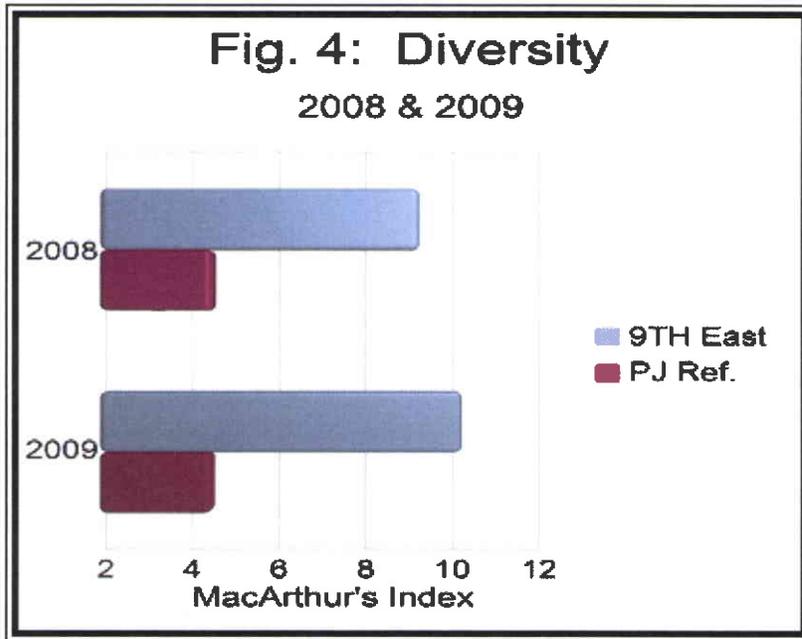
Results of these parameters can also be compared graphically for the two areas by reviewing Figures 1, 2 and 3. [NOTE: In those figures, **Year 1** (2008) results were also included along with the **Year 2** (2009) results to facilitate a review of the two consecutive years of data necessary for Phase III Bond Release]

Diversity was also compared graphically between the reclaimed and reference areas for **Year 1** and **Year 2** sampling results. Figure 4 shows a comparison of MacArthur's Index; the reclaimed area was obviously more diverse according to this index. Figure 5 compared another diversity index, or the average number of species encountered in each sample quadrat. Again, this measurement suggests that the reclaimed area was more diverse.

In conclusion, it appears evident that the 9th East Portal revegetation has met or exceeded the revegetation success standards when compared to the Pinyon-Juniper Reference Area located at the Cottonwood Mine for: 1) total living cover, 2) woody species density, 3) annual biomass productivity and 4) diversity. Therefore, the reclaimed area appears to be a likely candidate for Phase III Bond Release through the State of Utah.

FIGURES





DATA SUMMARY TABLES

Table 1: Cover and frequency by plant species at the Deer Creek Mine (2009).

9 th East Portals of Grimes Wash	MEAN	STANDARD DEVIATION	FREQUENCY
TREES & SHRUBS			
<i>Artemisia tridentata</i>	13.35	14.76	60.00
<i>Atriplex canescens</i>	3.63	8.25	17.50
<i>Atriplex confertifolia</i>	1.06	4.31	7.50
<i>Cercocarpus ledifolius</i>	0.19	0.95	3.75
<i>Chrysothamnus nauseosus</i>	1.13	3.87	8.75
<i>Eriogonum corymbosum</i>	0.40	2.35	5.00
<i>Gutierrezia sarothrae</i>	0.06	0.56	1.25
FORBS			
<i>Aster chilensis</i>	6.75	9.46	51.25
<i>Linum lewisii</i>	1.09	2.92	15.00
<i>Hedysarum boreale</i>	0.13	0.78	2.50
<i>Penstemon palmeri</i>	0.25	1.09	5.00
GRASSES			
<i>Agropyron cristatum</i>	0.25	2.22	1.25
<i>Bromus carinatus</i>	0.56	3.26	3.75
<i>Elymus cinereus</i>	1.06	4.38	6.25
<i>Elymus lanceolatus</i>	2.38	4.26	30.00
<i>Elymus salinus</i>	5.04	11.84	21.25
<i>Elymus smithii</i>	4.21	6.69	40.00
<i>Elymus spicatus</i>	2.94	7.36	22.50
<i>Elymus trachycaulus</i>	1.00	3.91	8.75
<i>Poa secunda</i>	1.69	7.33	10.00
<i>Stipa hymenoides</i>	1.23	4.17	10.00

Table 2: Total cover and composition at the Deer Creek Mine (2009).

9th East Portals of Grimes Wash

A. COVER	MEAN	STD. DEV.
Total Living Cover	48.38	12.52
Litter	12.88	5.74
Bareground	14.38	8.45
Rock	24.38	12.26
B. % COMPOSITION		
Shrubs	39.23	28.97
Forbs	16.99	18.75
Grasses	43.78	25.80

Table 3: Woody species density at the Deer Creek Mine (2009).

9th East Portals of Grimes Wash	Number/Acre
<i>Artemisia nova</i>	24.20
<i>Artemisia tridentata</i>	2670.30
<i>Atriplex canescens</i>	395.30
<i>Atriplex confertifolia</i>	250.09
<i>Cercocarpus ledifolius</i>	32.27
<i>Chrysothamnus nauseosus</i>	354.96
<i>Eriogonum corymbosum</i>	129.08
<i>Gutierrezia sarothrae</i>	16.13
TOTAL	3872.33

Table 4: Production at the Deer Creek Mine (2009).

9th East Portals of Grimes Wash

LIFEFORM	Pounds/Acre	
	MEAN	STD. DEV.
Herbaceous	446.21	361.69
Woody	580.43	489.90
TOTAL	1026.64	406.13

Table 5: Cover and frequency by plant species at the Deer Creek Mine (2009).

Pinyon-Juniper Reference Area			
	MEAN	STANDARD DEVIATION	FREQUENCY
OVERSTORY			
<i>Abies concolor</i>	0.17	1.28	1.67
<i>Amelanchier utahensis</i>	2.92	9.46	10.00
<i>Pinus edulis</i>	0.75	3.39	5.00
<i>Pseudotsuga menziesii</i>	0.17	1.28	1.67
UNDERSTORY			
TREES & SHRUBS			
<i>Abies concolor</i>	0.50	3.84	1.67
<i>Amelanchier utahensis</i>	3.83	9.05	23.33
<i>Artemisia tridentata</i>	0.17	1.28	1.67
<i>Chrysothamnus nauseosus</i>	1.50	5.27	10.00
<i>Gutierrezia sarothrae</i>	0.92	2.66	13.33
<i>Juniperus osteosperma</i>	1.17	5.43	5.00
<i>Pinus edulis</i>	2.25	6.02	15.00
<i>Pseudotsuga menziesii</i>	0.17	1.28	1.67
FORBS			
<i>Aster chilensis</i>	0.08	0.64	1.67
<i>Galium bifolium</i>	0.08	0.64	1.67
<i>Hedysarum occidentale canone</i>	1.45	3.42	21.67
<i>Machaeranthera grindelioides</i>	0.50	1.76	8.33
GRASSES			
<i>Elymus salinus</i>	13.13	9.46	81.67
<i>Stipa hymenoides</i>	1.08	4.84	8.33

Table 6: Total cover and composition at the Deer Creek Mine (2009).

Pinyon-Juniper Reference Area

A. COVER	MEAN	STD. DEV.
Overstory (o)	4.00	9.87
Understory (u)	26.83	8.71
Litter	18.25	8.36
Bareground	15.67	11.38
Rock	39.25	11.93
o + u	30.83	9.14

B. % COMPOSITION		
Trees & Shrubs	36.43	36.51
Forbs	9.77	20.13
Grasses	53.80	34.50

Table 7: Woody species density at the Deer Creek Mine (2009).

Pinyon-Juniper Reference Area

	Number/Acre
<i>Abies concolor</i>	12.36
<i>Amelanchier utahensis</i>	259.60
<i>Artemisia tridentata</i>	6.18
<i>Atriplex confertifolia</i>	6.18
<i>Chrysothamnus nauseosus</i>	67.99
<i>Ephedra viridis</i>	12.36
<i>Eriogonum corymbosum</i>	15.45
<i>Gutierrezia sarothrae</i>	27.81
<i>Juniperus osteosperma</i>	55.63
<i>Opuntia polyacantha</i>	9.27
<i>Pinus edulis</i>	210.15
<i>Pseudotsuga menziesii</i>	40.18
<i>Symphoricarpos oreophilus</i>	18.54
TOTAL	741.70

Table 8: Production at the Deer Creek Mine (2009).

Pinyon-Juniper Reference Area

LIFEFORM	Pounds/Acre	
	MEAN	STD. DEV.
Herbaceous	84.63	89.51
Woody	256.87	385.34
TOTAL	341.49	353.10

TABLE 9: Statistical summary sheet for the reclaimed and reference areas (2009).

RECLAIMED 9th East Portal Area

Total Living Cover	\bar{x} =48.38	s=12.52	n=80	nMIN=18.12
Density	\bar{x} =3872.33	s=2279.56	n=120	nMIN=93.78
Production	\bar{x} =1026.64	s=406.13	n=80 (400)*	nMIN=42.35

P-J REFERENCE AREA

Total Living Cover (u+o)	\bar{x} =30.83	s=9.14	n=60	nMIN=23.78
Density	\bar{x} =741.70	s=335.16	n=60	nMIN=55.26
Production	\bar{x} =341.49	s=353.10	n=100 (500)*	nMIN=289.32 ⁽¹⁾

STATISTICAL ANALYSES

Total Living Cover	t=9.175	df=138	SL=p<.01
Density	t=10.567	df=178	SL=p<.01
Production	t=14.818	df=158	SL=p<.01

\bar{x} = sample mean, s = sample standard deviation, n = sample size,
nMIN= minimum adequate sample (@ 90% ± .10)
NS = non-significant, t = Student's t-value, df = degrees of freedom,
SL = significance level, p = probability level
o=overstory; u=understory
* with double sampling as described in the Methods section.

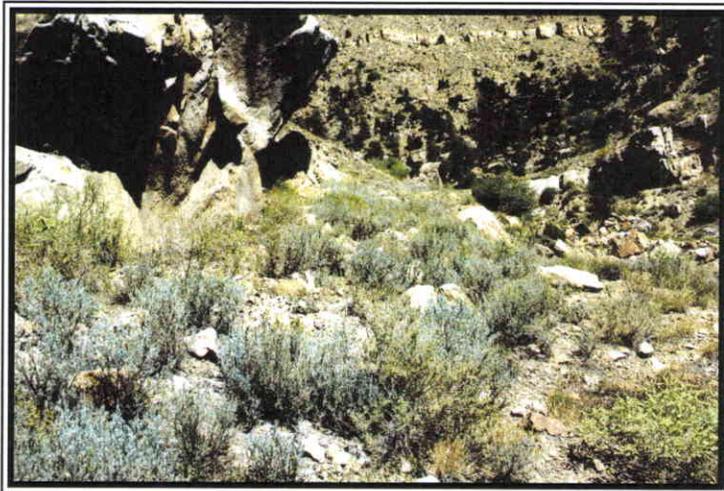
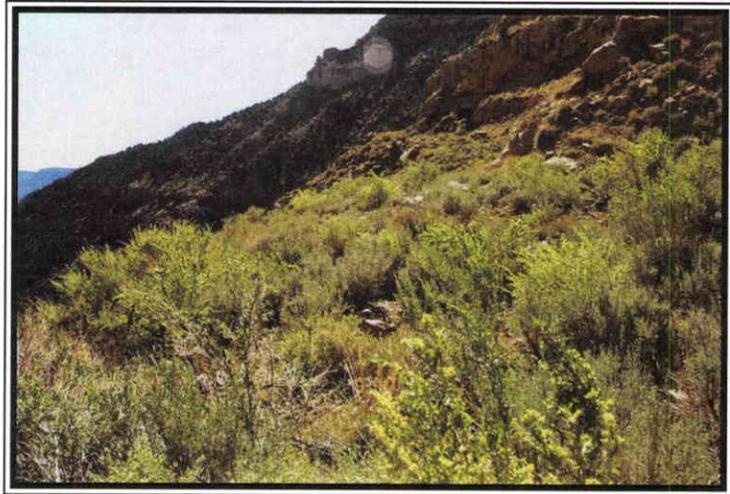
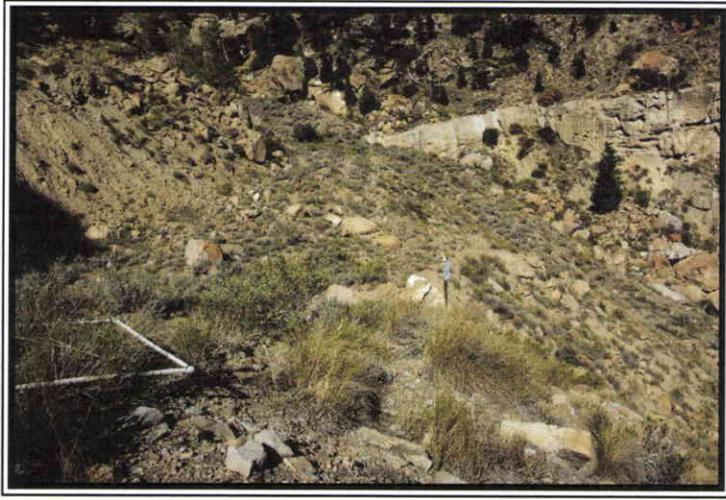
⁽¹⁾ NOTES ABOUT SAMPLE ADEQUACY: Results from sample adequacy for productivity were not surprising. Sample adequacy set at such a high confidence level [.90 ± 0.10 (90% of the samples would be within 10% of the true mean)] for production is often very difficult to achieve especially when the area is heterogenous in community structure as most native Pinyon-Juniper plant communities tend to be. Investigators can easily encounter one quadrat that is comprised of only grasses, and the next could be the middle of a pinyon-pine tree. The fact that the reclaimed area production was so much greater than the reference area, there is little doubt that revegetation success for this parameter was also achieved.

To further explore sample adequacy from a different angle, if one reduces variability in the reference area dataset by removing the extremes in both ends of the bell curve (or by removing the lightest and the heaviest production samples), additional insight can be gained. For example, when all samples were removed where the total pounds per acre were less than 100, and also removed were samples that were greater than 1,000 pounds per acre, sample adequacy would have been met with the number of samples taken (without consideration of double-sampling). Yet, in this scenario, the mean production value does not significantly change when statistics are applied (see below).

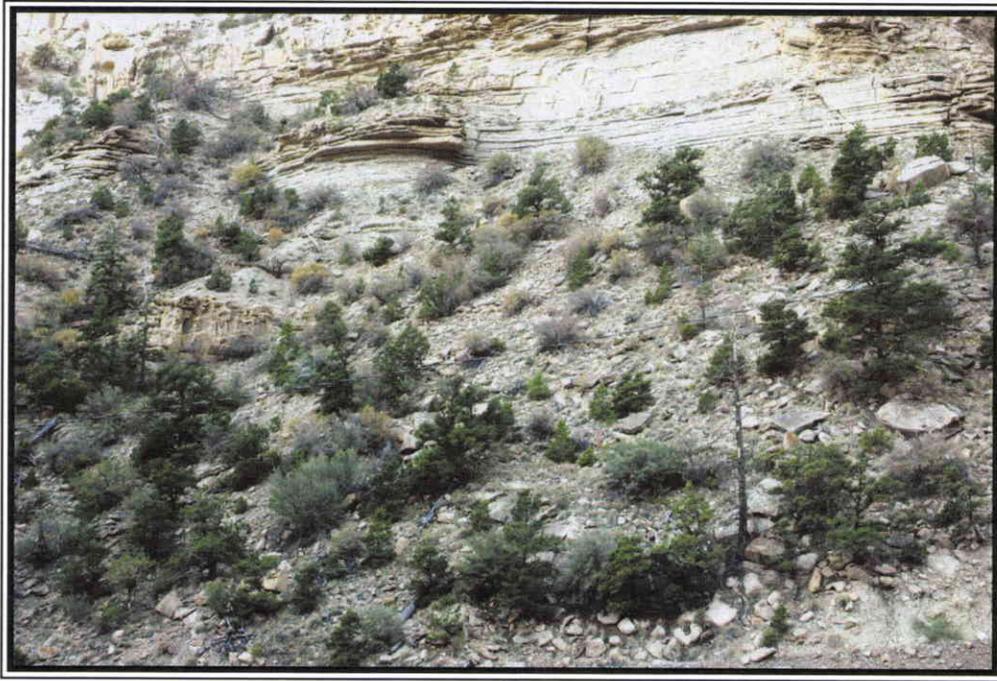
\bar{x} = 341.49; s=353.10 (actual lbs/ac using all samples)
 \bar{x} = 359.65; s=234.25 (minus samples where lbs/ac < 100 and > 1,000 were removed)
t = 0.361, df = 161, p< N.S. (Student t=values was non-significant)

It is also worth noting that similar production lbs/acre totals were found in 2008 and 2009 for the reference area even though sample adequacy for 2008 (which was used to drive the 2009 sample size) was much different.

RECLAIMED 9TH EAST PORTAL AREA



PINYON-JUNIPER REFERENCE AREA



Application for Phase II and III Bond Release

Deer Creek Mine, 9th East Breakout Portal Site

Attachment 9

**Demonstration that Area is
Not Contributing
Suspended Solids Outside Permit Area**

Demonstration that Area is Not Contributing Suspended Solids Outside Permit Area

To demonstrate that the area is not contributing suspended solids outside the permit area, the 2009 Vegetation Monitoring Report for the Deer Creek Mine, 9th East Breakout Portal Area will be reviewed. The results show that the reclaimed areas exceed the revegetation success standards of the reference area for total living cover, woody species density, productivity, and diversity. Although productivity and diversity are parameters that demonstrate the sustainability of the vegetation of a site, erosion and sediment control is better explained using the cover and density parameters.

Summarizing the 2009 report, the total living cover estimate for the reclaimed area was 48.38% (43.78% grasses, 39.23% shrubs, 16.99% forbs); whereas, the living cover for the reference area was estimated at 30.83% (26.83% understory cover and 4% for overstory cover). Understory cover consisted of 53.8% grasses, 36.43% shrubs, and 9.77% forbs.

The species densities estimates for the two sites shows that the reclaimed area totaled 3,872 plants per acre as compared to 742 plants per acre for the reference area. Dominate species of the reclaimed area include shrubs such as fourwing saltbrush, shadscale, and rubber rabbitbrush. A high density of these plants help to protect from; 1) raindrop impacts that dislodges soil particles contributing to sedimentation, 2) slows runoff by the shear number of plants within the ground cover, and 3) provides a higher root mass in the soil surface to better hold soil in place.

Modeling the variables in RUSLE2 verify the vegetation monitoring results of the 2009 monitoring. RUSLE2 (see attached) shows that the soil detachment of the reference area to be 4.7 tons/ac/year. The reclaimed area contributes only 1.5 tons/ac/year.

RUSLE2 Worksheet Erosion Calculation Record

Info:

Inputs:

Tract #: 01 Ref
 Owner name: Dennis Oakley
 Field name: 9th East - Reference Area
 Location: Emery County\UT_Emery_R_13
 Soil: Strych very bouldery fine sandy loam 85%
 Horiz. overland flow path length: 580 ft
 Avg. slope steepness: 27 %

Outputs:

Management	Contouring	Strips / barriers	Diversion/terrace, sediment basin	Soil loss erod. portion, t/ac/yr	Soil detachment, t/ac/yr	Cons. plan. soil loss, t/ac/yr	Average upslope erosion rate, t/ac/yr
default	default	(none)	(none)	4.7	4.7	4.7	4.7

RUSLE2 Worksheet Erosion Calculation Record

Info:

Inputs:

Tract #: 01 Ref
 Owner name: Dennis Oakley
 Field name: 9th East - Reclaimed Area
 Location: Emery County\UT_Emery_R_13
 Soil: Strych very bouldery fine sandy loam 85%
 Horiz. overland flow path length: 580 ft
 Avg. slope steepness: 9.0 %

Outputs:

Management	Contouring	Strips / barriers	Diversion/terrace, sediment basin	Soil loss erod. portion, t/ac/yr	Soil detachment, t/ac/yr	Cons. plan. soil loss, t/ac/yr	Average upslope erosion rate, t/ac/yr
default	default	(none)	(none)	1.5	1.5	1.5	1.5

Application for Phase II and III Bond Release

Deer Creek Mine, 9th East Breakout Portal Site

Attachment 10

**Demonstration that Responsibility
Period has been Met**

Demonstration that Responsibility Period has been Met

As stated in the Utah Coal Regulations, R645-301-357 Revegetation: Extended Responsibility Period:

357.100. The period of extended responsibility for successful vegetation will begin after the last year of augmented seeding, fertilization, irrigation, or other work, excluding husbandry practices that are approved by the Division in accordance with paragraph R645-301-357.300.

There has been no augmented seeding at the 9th East Portal Breakouts.

357.200. Vegetation parameters identified in R645-301-356.200 will equal or exceed the approved success standard during the growing seasons for the last two years of the responsibility period. The period of extended responsibility will continue for five or ten years based on precipitation data reported pursuant to R645-301-724.411, as follows:

357.210. In areas of more than 26.0 inches average annual precipitation, the period of responsibility will continue for a period of not less than five full years.

357.220. In areas of 26.0 inches or less average annual precipitation, the period of responsibility will continue for a period of not less than ten full years.

Meteorological weather data has been collected by PacifiCorp since 1980 (refer to Annual Report.) This data indicates that the 26 year average annual precipitation for the East Mountain area, which includes the Cottonwood/Wilberg Mine Site, is 12.9 inches. Since this amount is less than 25 inches, SMCRA specifies that the responsibility period [for Energy West mines] will be ten full years. The ten year responsibility period was completed in full for the 9th East Breakout Portal site in December of 2009.

Vegetation monitoring for Phase II and III bond release occurred in 2008 and 2009. The standards of success for this area were not set within the reclamation plan; however, the coal regulations dictate that vegetation will be diverse, effective, and permanent. As stated above, vegetation parameters will equal or exceed the approved standard. In this case, the standard must be the pinyon/juniper reference area of the Cottonwood/Wilberg mine site.

As concluded in the year 9 and year 10 vegetation monitoring report, the vegetation parameters (cover, density, productivity, diversity) monitored at the reclaimed area exceeds those same parameters monitored at the reference area. A summary of the standards for year 10 monitoring are outlined below.

Ground cover – living cover equals 157% of reference area.

Shrub density – reported by type and in numbers per acre equals 522% of the reference area.

Productivity – reported in pounds per acre equals 301% of the reference area.

Diversity – Although no value was reported in either the 2008 or 2009 monitoring report, the graphs in of figures 4 and 5 show that the reclaimed area is much more diverse than the reference area.

Refer to Attachment 8 for years 2008 and 2009 vegetation monitoring reports.

Application for Phase II and III Bond Release

Deer Creek Mine, 9th East Breakout Portal Site

Attachment 11

**Demonstration that Post Mining
Land Use has been Achieved**

Demonstration that Post Mining Land Use has been Met

Because of the proximity of the Deer Creek Mine, 9th East Breakout Portals to the Cottonwood/Wilberg Mine, it would be logical to require land use of the portals to follow the land use of the Cottonwood/Wilber Mine. Land use for this mine was established in the early 1980's as grazing and wildlife. This land use information for the 9th East Breakout Portals is found in Volume 3B, Appendix XIV, R645-301-400. The land use information for this site states...“The premining land use for this area was originally thought to be range forage and wildlife habitat. However, the terrain associated with the Grimes Wash area consists of very steep slopes and rock outcrop. It seems doubtful that cattle have in the past or will in the future use the steep slopes for grazing. Due to the conditions that inhibit cattle use of this slope, the premining land use was incorrect and will be changed to include wildlife habitat only. Postmining land use will also be wildlife habitat.”

Because the site is relatively small and inaccessible, vegetation establishment will be the only means of demonstrating post mining land use expectations. Since all success standards for vegetation establishment have been met, land uses for wildlife have been met as demonstrated by a successful vegetative stand in that area.