PacifiCorp
Thermal General Environmental Services
1407 West North Temple, Suite 210
Salt Lake City Utah, 84116

March 6, 2020

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 Cottonwood/Wilberg Leach Field Area, PacifiCorp, Cottonwood/Wilberg Mine, C/015/0019, Emery County, Utah

PacifiCorp, by and through its wholly-owned subsidiary, Interwest Mining Company (as mine manager), hereby submits an application for Phase II and Phase III bond release of the Cottonwood/Wilberg Leach Field Area. The said area covered by the bond is approximately 3.7 acres and is located in the NW1/4 of the NE1/4 of Section 34, 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: General History of the Leach Field Site
Attachment 7: Bond Summary (No bond reduction is being requested)

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

When Phase II and III Bond Release procedures are complete and application approved, the Cottonwood 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. If you have any questions or concerns regarding the enclosed information, please contact me at 801-220-4632.

Sincerely,

Dennis Oakley
Sr. Mine Engineer

Enclosures: C1 Form
Attachments 1 through 11

Cc: file

APPLICATION FOR COAL PERMIT PROCESSING

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

Permittee: PacifiCorp

Mine: Cottonwood/Wilberg Mine **Permit Number:** C/015/0019

Title: Application for Phase II and Phase III Bond Release of the Cottonwood/Wilberg Leach Field Area, PacifiCorp, Cottonwood/Wilberg Mine, C/015/0019, Emery County, Utah

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: 3.70 Disturbed Area: 3.70 ☐ 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 one (1) review copy of the application.

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.

Dennis Oakley
Print Name

Sr. Mine Engineer, 3/4/2020
Sign Name, Position, Date

Subscribed and sworn to before me this 4 day of March, 20 20

Notary Public

My commission Expires: 9-17-2020

Attest: State of Utah } ss:
County of Salt Lake

Notary Public
SALLY HILL
Commission #690575
My Commission Expires
September 17, 2020
State of Utah

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

Application for Phase II and III Bond Release

Cottonwood/Wilberg Mine Leach Field Area

Attachment 1

Notarized Signature

PacifiCorp
Cottonwood/Wilberg Mine
C/015/0019

Phase II and III Bond Release on Approximately 3.70 Acres of Land Related to the Cottonwood/Wilberg Mine Leach Field 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.

Dennis Oakley, Sr Mine Engineer
Print Name

Dennis Oakley Sr. Mine Engr. 3/4/20
Signature, Position, Date

Subscribed and sworn to before me this 4 day of March, 2020.

Sally Hill
Notary Public

My Commission Expires: 9-17, 2020
Attest: State of Utah
County of Salt Lake

Notary Public
SALLY HILL
Commission #690575
My Commission Expires
September 17, 2020
State of Utah

Application for Phase II and III Bond Release

Cottonwood/Wilberg Mine Leach Field Area

Attachment 2

Draft Letters to Interested Parties

PacifiCorp
Thermal General Environmental Services
1407 West North Temple, Suite 210
Salt Lake City Utah, 84116

Chris Conrad, Field Manager
Bureau of Land Management
Price Field Office
125 South 600 West
Price, Utah 84501

DATE, 2020

Subject: Application for Phase II and III Bond Release, Cottonwood/Wilberg Mine, Leach Field Area

PacifiCorp has filed with the Division of Oil, Gas and Mining an application for Phase II and III Bond Release for 3.70 acres of the Cottonwood/Wilberg Mine - Leach Field 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 XXX, XX 2020 and will run for four (4) consecutive weeks.

The Cottonwood/Wilberg Mine - Leach Field Area is located adjacent to SR 57. The said area, located in NW1/4 of the NE1/4 of Section 34, Township 17 South, Range 7 East, SLB&M. The site was developed in 1978 to support the Wilberg Mine facilities. In 1992, the Trail Mountain Mine was purchased by PacifiCorp. Because of the limited space at the Trail Mountain mine facilities, plans were developed to pump sewage from the mine site, across the enclosed and elevated belt line crossing to the other side of the canyon, through the Cottonwood Mine following the route of the underground beltline, and connecting into the existing sewage pipeline at the tipple in Grimes Wash. From the tipple area, the sewage line was buried on the west side adjacent to the mine access road and continued down SR 57 to the leach field area.

PacifiCorp staff, unfortunately, has not been successful in finding any information concerning the construction date of the leach field and pipeline except for the permit maps found in Volume 6 of the Cottonwood/Wilberg Mine Permit. PacifiCorp believes that additional laterals were constructed in the early to mid-1990's after the addition of the Trail Mountain facilities.

With the above information noted, the facility was backfilled and seeded for reclamation in early to mid-1990's. Vegetation has remained undisturbed since this time and has become capable of plant regeneration and succession. A two year vegetation survey for cover, density, production, and diversity was performed by a third party contractor starting in 2017. The results of these surveys are included in the application. Phase I Bond Release for the Cottonwood/Wilberg Mine and all its satellite facilities, including the leach field, was approved on May 7, 2019.

The period of extended responsibility requirement has been met and the vegetation parameters identified in R645-301-356.200 has exceed the approved success standards during the two growing seasons of the survey. Vegetation sampling for bond release was conducted during the fall of 2017 and 2018.

PacifiCorp currently maintains a $977,232.00 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 (801) 220-4632.

Sincerely,

Dennis Oakley
Sr. Mine Engineer

Cc Emery County Board of Commissioners
Ray Peterson, Emery County Public Lands
Ryan Nehl, Forest Supervisor, USFS, Region 4, Manti-LaSal National Forest
Chris Conrad, Field Manager, Price Field Office, Bureau of Land Management
Chris Wood, Regional Supervisor, Price Field Office, Division of Wildlife Resources
Mark Stilson, Regional Engineer, Price Field Office, Division of Water Rights
File

PacifiCorp
Thermal General Environmental Services
1407 West North Temple, Suite 210
Salt Lake City Utah, 84116

Mark Stilson, Regional Engineer
Utah Division of Water Rights
Price Field Office
319 North Carbonville Rd
Price, Utah 84501

DATE, 2020

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Chris Conrad, Field Manager, Price Field Office, Bureau of Land Management
Chris Wood, Regional Supervisor, Price Field Office, Division of Wildlife Resources
Mark Stilson, Regional Engineer, Price Field Office, Division of Water Rights
File

PacifiCorp
Thermal General Environmental Services
1407 West North Temple, Suite 210
Salt Lake City Utah, 84116

Ryan Nehl, Forest Supervisor
United States Forest Service
Manti-La Sal National Forest
599 Price River Drive
Price, Utah 84501

DATE, 2020

Subject: Application for Phase II and III Bond Release, Cottonwood/Wilberg Mine, Leach Field Area

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Chris Conrad, Field Manager, Price Field Office, Bureau of Land Management
Chris Wood, Regional Supervisor, Price Field Office, Division of Wildlife Resources
Mark Stilson, Regional Engineer, Price Field Office, Division of Water Rights
File

PacifiCorp
Thermal General Environmental Services
1407 West North Temple, Suite 210
Salt Lake City Utah, 84116

Ray Peterson
Emery County Public Lands
75 East Main Street
Castle Dale, Utah 84513

DATE, 2020

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PacifiCorp
Thermal General Environmental Services
1407 West North Temple, Suite 210
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Commissioners
Emery County Commission
75 East Main Street
Castle Dale, Utah 84513

DATE, 2020

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PacifiCorp
Thermal General Environmental Services
1407 West North Temple, Suite 210
Salt Lake City Utah, 84116

Chris Wood, Regional Supervisor
Utah Division of Wildlife Resources
Price Field Office
319 North Carbonville Rd, Suite A
Price, Utah 84501

DATE, 2020

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Mark Stilson, Regional Engineer, Price Field Office, Division of Water Rights
File

Application for Phase II and III Bond Release

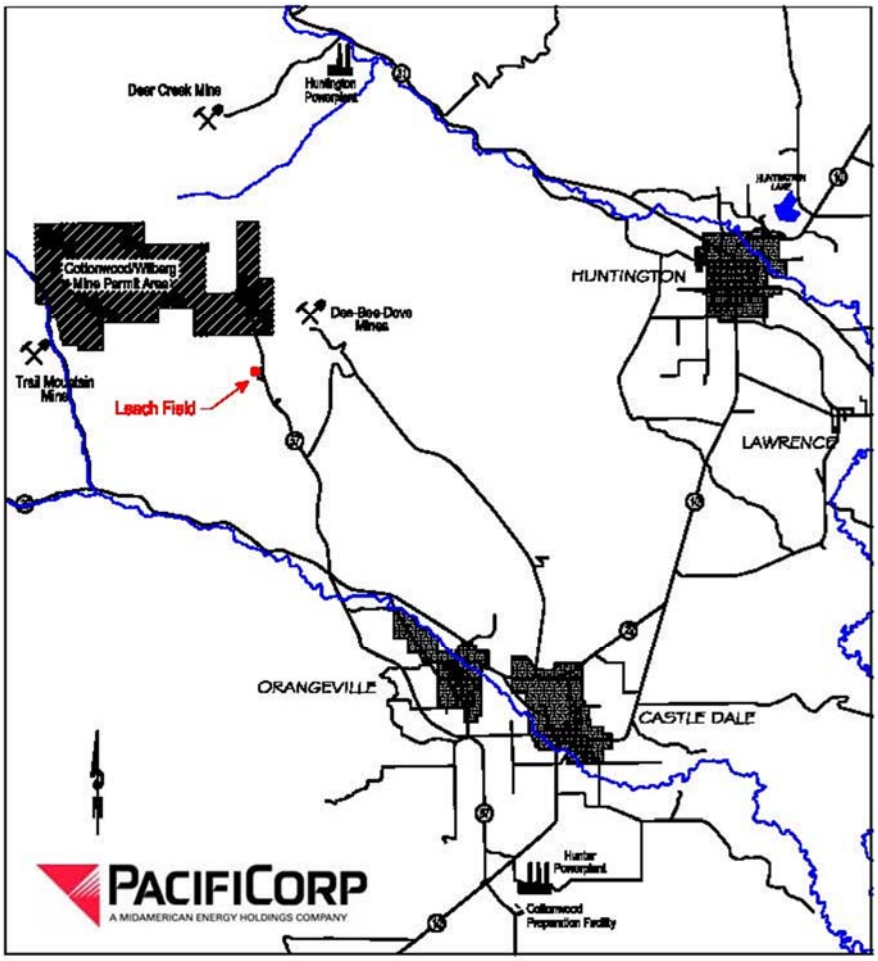
Cottonwood/Wilberg Mine Leach Field Area

Attachment 3

Draft Newspaper Advertisement

Phase II and III Bond Release Application
PacifiCorp
Cottonwood/Wilberg Mine – Leach Field Area
C/015/0019
Permit Approval Date: July 6, 2014 (revised May 18, 2015)

PacifiCorp, as mine manager, with a street address as 1407 West North Temple, Salt Lake City, Utah, has filed with the Division of Oil, Gas and Mining an application for Phase II and III Bond Release for 3.70 acres of the Cottonwood/Wilberg Mine – Leach Field Area. The general location of this site is shown below.



Final reclamation of the Cottonwood/Wilberg mine was completed in the left and right forks of Grimes Wash and the rock and soil storage area in March of 2018. Phase I Bond Release for all disturbed areas outlined in the above table was approved by the Division of Oil Gas and Mining on May 7, 2019.

The Cottonwood/Wilberg Mine Leach Field Area is located adjacent to SR 57. The said area, located in NW1/4 of the NE1/4 of Section 34, Township 17 South, Range 7 East, SLB&M. The site was developed in

1978 to support the Wilberg Mine facilities. The Trail Mountain Mine facilities also used this leach field during its operatons while owned by PacifiCorp.

Reclamation of the site was conducted in early to mid-1990's. Vegetation on this site has remained undisturbed since that time and has become capable of plant regeneration and succession. A two year vegetation survey for cover, density, production, and diversity was performed by a third party contractor during the fall of 2017 and 2018.. The results of these surveys shows that vegetation standards have exceed the approved success standards during the two growing seasons of the survey. The period of extended responsibility requirement has also been achieved.

PacifiCorp currently maintains a $977,232.00 surety bond payable to the Division of Oil, Gas, and Mining and the Office of Surface Mining Reclamation and Enforcement (OSM). No reduction of this bond is being requested for the release of the site.

A copy of the Phase II and III Bond Release 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 Recorders 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 Division of Oil, Gas, and Mining address above. 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 ETV News Progress for four consecutive weeks beginning XXX XX, 2020.

Application for Phase II and III Bond Release

Cottonwood/Wilberg Mine Leach Field Area

Attachment 4

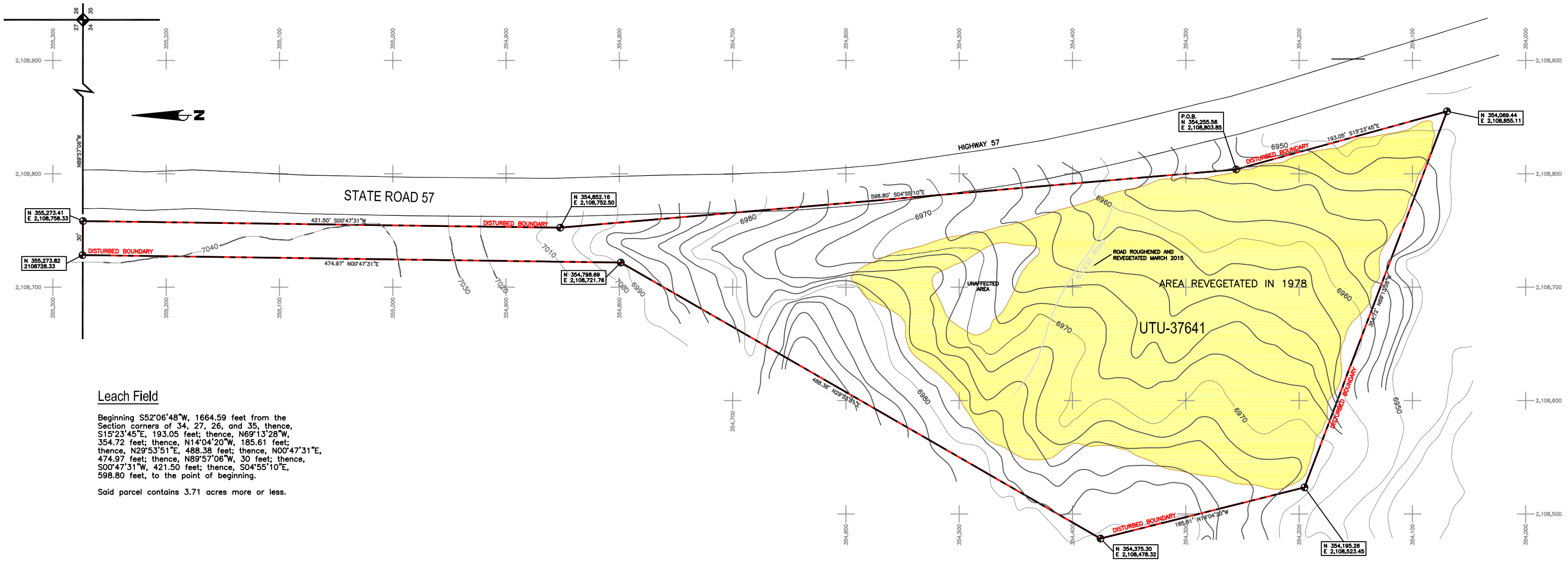
Legal Description and Map

Phase II and III Bond Release Application for the Cottonwood/Wilberg Mine – Leach Field Area

Attachment 4 – Bonded Area Description

The **Leach Field** is located in the NW¼NE¼ of section 34, Township 17 South, Range 7 East. It is better described as follows:

Beginning S52°06'48"W, 1664.59 ft. from the Sec. corners of 34, 27, 26, and 35, thence, S15°23'50"E, 193.05 feet; thence, N69°13'28"W, 354.72 feet; thence, N14°04'20"W, 185.61 feet; thence, N29°53'51"E, 488.38 feet; thence, N00°47'31"E, 474.97 feet; thence, E, 30 feet; thence, S00°47'31"W, 421.50 feet; thence, S04°55'10"E, 598.80 feet, to the point of beginning. Said parcel contains 3.70 acres more or less.



Leach Field

Beginning S52°06'48"W, 1664.59 feet from the Section corners of 34, 27, 26, and 35, thence, S15°23'45"E, 193.05 feet; thence, N69°13'28"W, 354.72 feet; thence, N14°04'20"W, 185.61 feet; thence, N29°53'51"E, 488.38 feet; thence, N00°47'31"E, 474.97 feet; thence, N89°57'06"W, 30 feet; thence, S00°47'31"W, 421.50 feet; thence, S04°55'10"E, 598.80 feet, to the point of beginning.

Said parcel contains 3.71 acres more or less.

PLAN VIEW OF LEACH FIELD

SCALE: 1"=40'

LEGEND

UTU-37641	BLM RIGHT OF WAY
———	DISTURBED BOUNDARY
	REGRADED AREA = 2.08 ACRES

BLM Right-of-Way UTU-37641

T.17S., R.7E., S.L.B. & M.

THIS DRAWING IS REPRODUCED FROM THE ORIGINAL ROBERTS & SCHAEFER DESIGN 7704–PP10

CAD FILE NAME/DISK#: PHASE I–MAP 2

DATE	REVISIONS	BY	CK
2/13/19	UPDATED DISTURBED AREA AND RECLAIMED AREA	BCD	

INTERWEST MINING COMPANY
A SUBSIDIARY OF PACIFICORP

COTTONWOOD/WILBERG COAL MINE
PHASE I FINAL RECLAMATION
LEACH FIELD AS–BUILT MAP

DRAWN BY: K. LARSEN
SCALE: 1"=40'
DATE: JULY 16, 2007
DRAWING #: PHASE I–MAP 2
SHEET 1 OF 1
REV. ___

Application for Phase II and III Bond Release

Cottonwood/Wilberg Mine Leach Field Area

Attachment 5

Reclamation Treatments

Attachment 5 – **Reclamation Treatments Utilized at the Cottonwood/Wilberg Mine - Leach Field Area**

PacifiCorp conducted and extensive file search to locate any information concerning the construction and/or reclamation of the leach field site. The file search did not uncover any information that could be helpful to identifying what reclamation treatments were used.

However, as shown on the attached drawing, the sewer pipeline was buried from the Cottonwood/Wilberg minesite to the leach field adjacent to SR57. The only area that is considered disturbed is the area of the lateral lines within the leach field site itself. It can only be assumed that after the last upgrade of the leach field system in the 1990's, the site was regraded and seeded with the approved seed mix (refer to Table below).

A two year vegetation monitoring program was conducted in 2017 and 2018. The program collected quantitative data for the vegetation within the site and documented estimates for cover, frequency, composition, woody species density, and production. The data for the site was statistically compared to data from a reference area in the same general location of the leach field. The results of the two year monitoring program shows that the vegetation has become adequately established to become diverse, effective, and permanent. Vegetation success standards for Phase III Bond Release have been met as required by the State of Utah, R645 Coal Mining Rules.

The reports for the 2017 and 2018 vegetation monitoring program can be found in the application for Phase II and III Bond Release Attachment 8.

Approved Seed Mix for the Cottonwood/Wilberg Mine Leach Field

Common Name	Scientific Name	Equivalent PLS Lbs/Acre
GRASSES		
Western wheatgrass	*Agropyron smithii*	2
Indian ricegrass	*Oryzposis hymenoides*	2
Needle and thread grass	*Stipa comata*	2
Galleta	*Pleuraphis*	2
Crested wheatgrass	*Agronpyron cristatum*	1
FORBS		
Scarlet globemallow	*Sphaeralcea coccinea*	1
Yellow sweet clover	*Melilotus altissimus*	1
SHRUBS		
Fourwing saltbush	*Atriplex canescens*	2
Curlleaf mountain mahogany	*Cerocarpus ledifolius*	2
Ephedra Mormon Tea	*Ephedra viridis*	4
Vasey big sagebrush	*Artemisia tridentata var. vaseyana*	0.2
TOTAL		19.2

Application for Phase II and III Bond Release

Cottonwood/Wilberg Mine Leach Field Area

Attachment 6

General History of the Site

Attachment 6 – **General History of the Cottonwood/Wilberg Mine - Leach Field Area**

The Cottonwood/Wilberg Mine Leach Field Area is located adjacent to SR 57. The said area, located in NW1/4 of the NE1/4 of Section 34, Township 17 South, Range 7 East, SLB&M. The site was developed in 1978 to support the Wilberg Mine facilities. In 1992, the Trail Mountain Mine was purchased by PacifiCorp. Because of the limited space at the Trail Mountain mine facilities, plans were developed to pump sewage from the mine site, across the enclosed and elevated belt line crossing the canyon through the Cottonwood Mine following the route of the underground beltline. This line connected into the existing sewage pipeline at the Cottonwood/Wilberg mine tipple in Grimes Wash. From the tipple area, the sewage line was buried on the west side adjacent to the mine access road and continued down SR 57 to the leach field area.

After the purchase of the Trail Mountain Mine, additional laterals were constructed in the early to mid 1990's. Although the Trail Mountain Mine contributed most to the leach field, the Cottonwood/Wilberg Mine staffed a small group to operate the tipple. Both operations were idled in 2001. In 2015, The Trail Mountain was sold and reclamation began on the Cottonwood/Wilberg Mine. This reclamation was completed at the Cottonwood/Wilberg Mine in March of 2018.

With the above information noted, the leachfield was backfilled and seeded for reclamation in early to mid-1990's after the final upgrade of the site. Vegetation has remained undisturbed since this time and has become capable of plant regeneration and succession. A two year vegetation survey for cover, density, production, and diversity was performed by a third party contractor. The results of these surveys are included in Attachment 8. Phase I Bond Release for the Cottonwood/Wilberg Mine and all its satellite facilities, including the leach field, was approved on May 7, 2019.

Application for Phase II and III Bond Release

Cottonwood/Wilberg Mine Leach Field Area

Attachment 7

Current Total Bond Amount and Incremental Amount Requested for Release

Attachment 7 – **Bond Summary for the Cottonwood/Wilberg Mine**

See bond summary next page.

Note: PacifiCorp will not be requesting a bond reduction for the Phase III Bond Release of the Leach Field area.

Cottonwood/Wilberg Mine
Bond Summary
C/015/0019

Revised June 2019

Direct Costs		
Grimes Wash Facility		
Demolition	$967,887.38	
Earthwork	$673,586.42	
Revegetation	$36,172.85	
Subtotal	$1,677,646.66	
Overland Conveyor		
Demolition	$23,494.49	
Earthwork	$10,825.80	
Revegetation	$3,061.91	
Subtotal	$37,382.20	
Total Direct Costs	**$1,715,028.86**	
Indirect Costs		
Mob/Demob	$171,503.00	10.0%
Contingency	$85,751.00	5.0%
Engineering Redesign	$42,876.00	2.5%
Main Office Expense	$116,622.00	6.8%
Project Mainagement Fee	$42,876.00	2.5%
Total Indirect Costs	**$459,628.00**	26.8%
Total Cost (2011 Dollars)	**$2,174,656.86**	
Escalation factor		0.017
Number of years		5
Escalation	$191,238.00	
Bond Amount (2016 Dollars)	**$2,365,895**	
Escalation factor		0.007
Number of years		5
Escalation	$77,186.00	
Bond Amount (2021 Dollars)	**$2,443,081**	
Phase I Bond Release (Approved 5/7/2019)	$1,465,848.52	
Revised Bond Amount after Bond Release (2021 Dollars)	**$977,232.34**	

Printed 6/17/2019

Application for Phase II and III Bond Release

Cottonwood/Wilberg Mine Leach Field Area

Attachment 8

Vegetation Analysis
(2017/2018 Field Seasons)

Attachment 8 – **Vegetation Report for the Cottonwood/Wilberg Mine – Leach Field Area**

See 2017 and 2018 report document included in this Attachment.

Note: The two year Vegetation Monitoring for bond release of the leach field area was conducted by a third party contractor.

Contractor Information:

Patrick Collins Ph. D.
Mt Nebo Scientific
330 East 400 South
Springville, Utah 84663
Phone: 801-489-6937

VEGETATION MONITORING
FOR PHASE III BOND RELEASE
AT THE LEACH FIELD
FOR THE COTTONWOOD MINE
YEAR ONE
2017

FOR
INTERWEST MINING COMPANY

Prepared by

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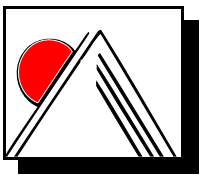
by
Patrick Collins, Ph.D.

for
INTERWEST MINING COMPANY
a Subsidiary of PacifiCorp
P.O. Box 310
Huntington, Utah 84528



December 2017

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INTRODUCTION

Study Objectives

This document contains the **Year 1** results of vegetation sampling that will be conducted for two consecutive years at the Leach Field for the Cottonwood Mine in Emery County, Utah. This site has been reclaimed long enough that the operator may soon apply for *Final* or *Phase III Bond Release*. For this to happen the reclaimed areas must meet specific revegetation success standards. The post-reclamation/bond release process requires at least 10 years of time to pass following final reclamation and revegetation activities at the mine site. This time-frame is called the *Responsibility Period*. For reclaimed western lands in this precipitation zone, this duration is considered to be enough time for vegetation to become adequately established so they can be studied for potential bond release applications. Phase III Bond Release is obtained through the State of Utah, Division of Oil, Gas and Mining (DOGM). That said, vegetation sampling in 2017 was conducted as the first step to initiate this process. Because two consecutive years of data are required, this dataset will be followed up by another sample year prior to applying of Phase III Bond Release.

METHODS

Methodologies used for sampling were performed in accordance with the *Vegetation Information Guidelines* provided by DOGM.

Transect and Quadrat Placement

Random placement of sample quadrats were designed as an attempt to provide unbiased accuracy of the data compiled. This was accomplished by establishing several randomly-placed transect lines along the entire length of each study site. Random numbers were generated and used to determine placement from the transect lines. The random numbers selected were high enough to position sample quadrats to the extreme lateral limits of the study areas and low enough to cover all areas in-between. This insured that the sample

quadrats were placed randomly over the entire study areas.

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. Plant nomenclature follows *A Utah Flora* (Welsh et al. 2008).

Sample Size and Adequacy

Sampling adequacy was calculated using the formula given below.

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

where,

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

Diversity

There are several well-documented methods to assess species diversity in plant communities. The diversity index that was employed to compare the reclaimed and reference areas was *MacArthur's Diversity Index* calculated by the following equation:

$$1/\sum pi^2$$

where,

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.

Photographs

Color photographs of the sample areas were taken at the time of sampling and submitted with this report.

RESULTS

Reclaimed Leach Field

The reclaimed Leach Field is located about 7.5 miles northwest from the town of Orangeville and 1.1 mile south of the Cottonwood Mine site (Map A). Quantitative sampling results for the cover and frequency by plant species are shown on Table 1; the dominant plant species of the reclaimed Leach Field included storksbill (*Erodium cicutarium*), tumbling mustard (*Sisymbrium altissimum*) and rubber rabbitbrush (*Chrysothamnus nauseosus*). The total living cover of the site was measured at 65.90% (Table 2A) which was comprised of 66.63% forbs, 32.09% shrubs and 1.29% grasses (Table 2B).

The total number of woody plants per acre was 779, which was comprised of mostly rubber rabbitbrush but also had a fair representation of broom snakeweed (*Gutierrezia sarothrae*). Refer to Table 3 to see the results. Total annual production of the site was measured at 1,440.64 pounds per acre; this total was comprised of 976.41 pounds of woody plants and 464.23 herbaceous plants (Table 4).

Reference Area

The Cottonwood Mine site has two Pinyon-Juniper reference areas that were previously chosen to represent revegetation success standards for different reclaimed areas (Map A). The one that is nearest the reclaimed Leach Field and most representative of the land prior to disturbance is located adjacent to the reclaimed Old Waste Rock Site. Sample results

show that the dominant species for this reference area included pinyon pine (*Pinus edulis*), Utah juniper (*Juniperus osteosperma*) and Mormon tea (*Ephedra viridis*). Refer to Table 5 to see all species encountered in the sample quadrats. The total living cover was estimated at 30.32%, 13.16% was from overstory and 17.16% was from understory cover (Table 6A). Understory composition was mostly comprised of shrub species (Table 6B).

The total number of woody plants for the reference area was 984 individuals per acre, most of which were pinyon pine, Utah juniper and Mormon tea (Table 7). Annual production here was estimated at a total of 591.80 pounds per acre, and was mostly comprised woody species (Table 8).

Dataset Comparisons

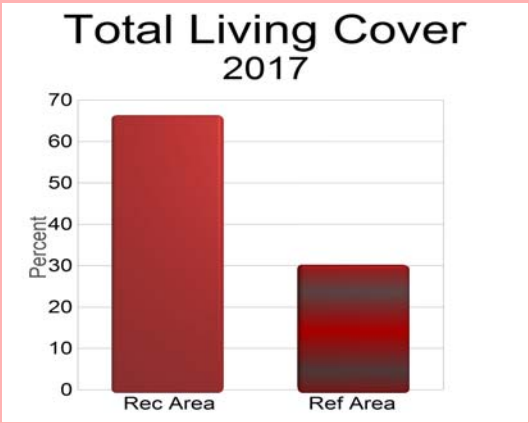
Total Living Cover

When the total living cover of the reclaimed Leach Field was compared statistically with the Pinyon-Juniper Reference Area employing a Student's t-test, the cover was significantly different – the cover of the reference area, that included both overstory and understory cover combined, was significantly lower than the reclaimed area (Fig. 1).

FIG. 1. STUDENT'S T-TEST - A Total Living Cover Comparison Between the Reclaimed and Reference Areas.

Leach Field Area
Reclaimed Area: $\bar{x}$=65.90; s=13.18; n=50
Reference Area: $\bar{x}$=30.32; s=6.80; n=50
t =16.964 df =98 ; SL= p<0.001

```
x̄= sample mean,
s = sample standard deviation,
n = sample size,
NS = non-significant,
t = Student's t-value,
df = degrees of freedom,
SL = significance level,
p = probability level
```



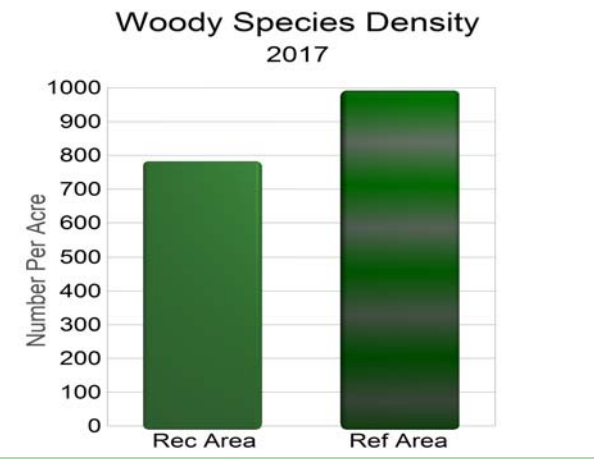
Woody Species Density

Although the total woody species density of the reference area was somewhat greater than the reclaimed area, the difference was not statistically significant using the same test as mentioned above (Fig. 2).

FIG. 2. STUDENT'S T-TEST - A Woody Species Density Comparison Between the Reclaimed and Reference Areas.

Leach Field Area
Reclaimed Area: $\bar{x}$=778.78; s=795.16; n=50
Reference Area: $\bar{x}$=984.23; s=344.92; n=50
t =1.676 df =98 ; SL= NS

$\bar{x}$= sample mean,
s = sample standard deviation,
n = sample size,
NS = non-significant,
t = Student's t-value,
df = degrees of freedom,
SL = significance level,
p = probability level



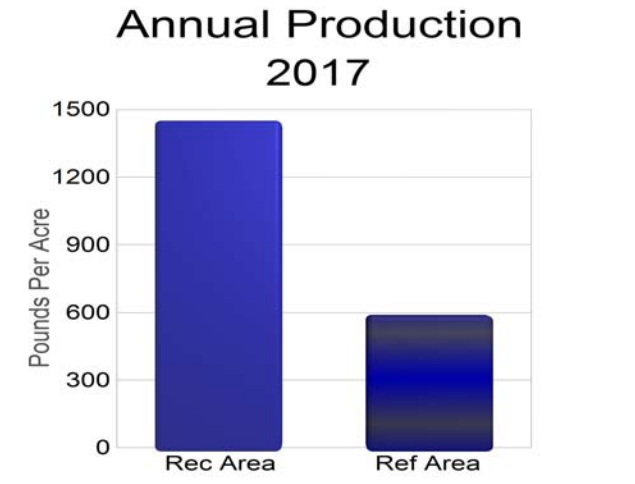
Annual Production

Total annual production of the Leach Field was greater in the reclaimed area compared to the reference area and this difference was statistically significant (Fig. 3).

FIG. 3. STUDENT'S T-TEST - A Total Annual Production Comparison Between the Reclaimed and Reference Areas.

Leach Field Area
Reclaimed Area: $\bar{x}$=1440.64; s=1258.85; n=50
Reference Area: $\bar{x}$=591.80; s=313.21; n=50
t =4.627 df =98 ; SL= p<.001

$\bar{x}$= sample mean,
s = sample standard deviation,
n = sample size,
NS = non-significant,
t = Student's t-value,
df = degrees of freedom,
SL = significance level,
p = probability level



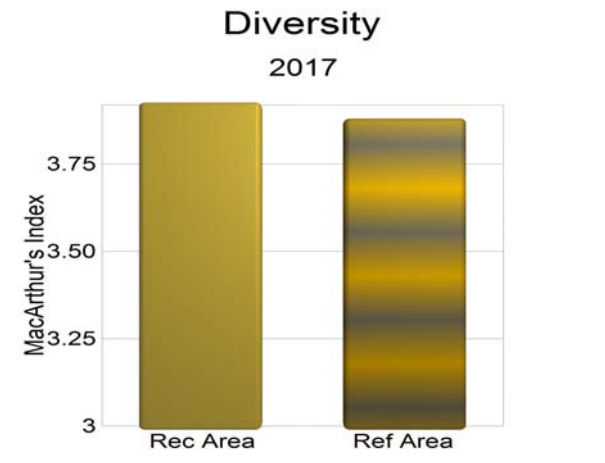
Diversity

Diversity of the two areas was similar, although the reclaimed Leach Field was slightly more diverse than the Pinyon-Juniper Reference Area (Fig. 4).

FIG. 4. MacARTHUR'S INDEX - A Comparison Between the Selected Reclaimed and Reference Areas.

$$1/\sum pi^2 =$$

Leach Field Area
Reclaimed Area: 3.919
Reference Area: 3.874



DISCUSSION

When the dataset of the reclaimed Leach Field at the Cottonwood Mine site was compared to those of the Pinyon-Juniper Reference Area, the plant community chosen to represent final revegetation success standards, the following results were determined: 1) the **total living cover** of the reclaimed area was significantly greater than the reference area, 2) the **woody species density** was somewhat greater in the reference area but the difference was not significant statistically, 3) **annual production** of the reclaimed area was significantly greater than the reference area and 4) **diversity** of the two areas were quite similar but the reclaimed area was slightly more diverse. There is one notable component in the vegetative cover of the reclaimed Leach Field – most of the forbs present were "weedy" or exotic species.

DATA SUMMARY TABLES

Table 1: Cottonwood Mine. Total cover, standard deviation and frequency by species (2017).

Reclaimed Leach Field n=50

	Mean Percent	Standard Deviation	Percent Frequency
TREES & SHRUBS			
Chrysothamnus nauseosus	18.10	20.27	54.00
Gutierrezia sarothrae	2.90	10.91	12.00
FORBS			
Cryptantha flava	0.10	0.70	2.00
Cirsium sp.	0.30	1.55	4.00
Erodium cicutarium	23.40	22.66	60.00
Sisymbrium altissimum	20.30	28.94	44.00
GRASSES			
Bromus tectorum	0.20	1.40	2.00
Elymus spicatus	0.20	1.40	2.00
Stipa hymenoides	0.40	1.96	4.00

Table 2: Cottonwood Mine. Total Cover and composition (2017).

Reclaimed Leach Field n=50

	Mean Percent	Standard Deviation
A. TOTAL COVER		
Understory	65.90	13.18
Litter	13.50	6.65
Bareground	7.06	3.78
Rock	13.54	10.73
B. COMPOSITION		
Shrubs	32.09	32.78
Forbs	66.63	33.99
Grasses	1.29	5.50

Table 3: Cottonwood Mine. Woody Species Density (2017).

Reclaimed Leach Field (n=50)

SPECIES	Number/Acre
Chrysothamnus nauseosus	658.07
Gutierrezia sarothrae	120.71
TOTAL	**778.78**

Table 4: Cottonwood Mine.
Annual Production (2017).
Reclaimed Leach Field

(n=50; double sampling n=200)

LIFEFORM	Pounds/Acre MEAN	STD. DEV.
Herbaceous	464.23	556.27
Woody	976.41	1477.10
TOTAL	**1440.64**	**1258.85**

Table 5: Cottonwood Mine. Total cover, standard deviation and frequency by species (2017).

Pinyon-Juniper Reference Area

(Located near the Old Waste Rock Site) n=50

	Mean Percent	Standard Deviation	Percent Frequency
OVERSTORY			
Juniperus osteosperma	7.46	12.04	30.00
Pinus edulis	5.70	11.36	22.00
UNDERSTORY			
TREES & SHRUBS			
Cercocarpus montanus	1.80	6.23	8.00
Ephedra viridis	2.36	5.99	18.00
Juniperus osteosperma	3.22	6.52	30.00
Pinus edulis	8.98	11.16	56.00
Stanleya pinnata	0.06	0.42	2.00
FORBS			
Eriogonum bicolor	0.64	1.37	22.00
Chamaesyce fendleri	0.10	0.70	2.00
GRASSES			

Table 6: Cottonwood Mine. Total Cover and composition (2017).

Pinyon-Juniper Reference Area

(Located near the Old Waste Rock Site) n=50

	Mean Percent	Standard Deviation
A. TOTAL COVER		
Overstory (O)	13.16	13.74
Understory (U)	17.16	11.30
Litter	30.30	19.59
Bareground	28.14	18.08
Rock	24.40	14.65
O + U	30.32	6.80
B. COMPOSITION		
Shrubs	92.13	20.88
Forbs	7.87	20.88
Grasses	0.00	0.00

Table 7: Cottonwood Mine. Woody Species Density (2017).

Pinyon-Juniper Reference Area

(Located near the Old Waste Rock Site) n=50

SPECIES	Number/Acre
Cercocarpus montanus	68.90
Ephedra viridis	206.69
Juniperus osteosperma	260.82
Opuntia polyacantha	4.92
Pinus edulis	442.90
TOTAL	**984.23**

Table 8: Cottonwood Mine.
Annual Production (2017).

Pinyon-Juniper Reference Area

(Located near the Old Waste Rock Site)

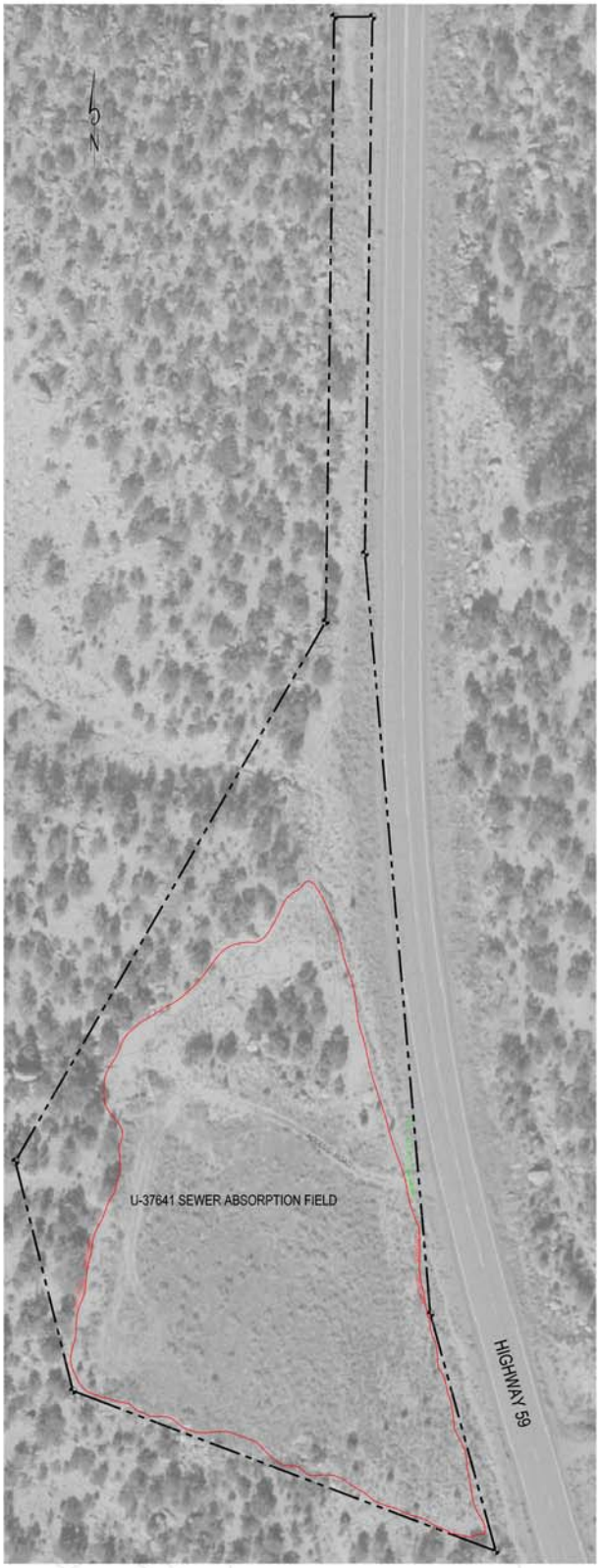
(n=50)

	Pounds/Acre	
LIFEFORM	**MEAN**	**STD. DEV.**
Herbaceous	16.42	81.15
Woody	575.38	332.28
TOTAL	**591.80**	**313.21**

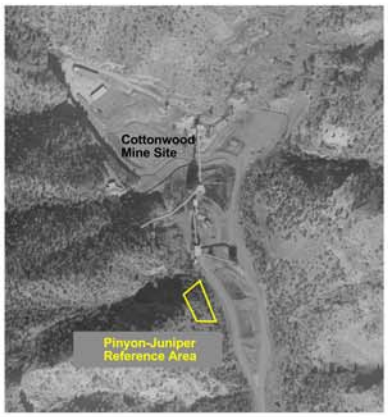
COLOR PHOTOGRAPHS OF THE SAMPLE AREAS

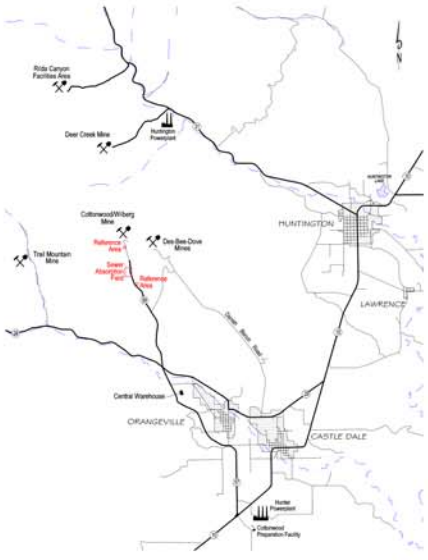
Photo 1: Reclaimed Leach Field

Photo 2: Pinyon-Juniper Reference Area



PLAN OF MAIN ABSORPTION FIELD





GENERAL LOCATION MAP
Not to Scale

Revised by: P. COLLINS
Date: December 20, 2017

PACIFICORP

COTTONWOOD/WILBERG MINE
MAIN ABSORPTION FIELD

Drawn by:	K. LARSEN	MAP A
Scale:	1" =40'	
Date:	AUGUST 7, 2017	Sheet 1 of 1

VEGETATION MONITORING
FOR PHASE III BOND RELEASE
AT THE LEACH FIELD
FOR THE COTTONWOOD MINE
YEAR TWO
2018

FOR
INTERWEST MINING COMPANY

Prepared by

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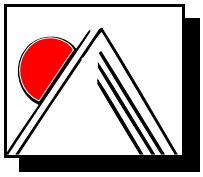
by
Patrick Collins, Ph.D.

for
INTERWEST MINING COMPANY
a Subsidiary of PacifiCorp
P.O. Box 310
Huntington, Utah 84528



January 2019

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INTRODUCTION

Reasons for the Study

The Leach Field study area, located about 7.5 miles northwest from the town of Orangeville and 1.1 miles south of the Cottonwood Mine in Emery County, Utah (Map A), has been reclaimed long enough that the operator may soon apply for *final* or *Phase III Bond Release*. For this to happen, reclaimed areas must meet specific revegetation success standards. The final bond release process requires at least 10 years of time to pass following final reclamation and revegetation activities at the site. This time-frame is called the *Responsibility Period*. For reclaimed western lands in this precipitation zone, this duration is considered to be enough time for vegetation to become adequately established to be "*diverse, effective, and permanent*" so they can be studied for potential bond release applications. *Phase III Bond Release* is obtained through the State of Utah, Division of Oil, Gas and Mining (DOGM). Because two consecutive years of quantitative data are required for Phase III Bond Release, vegetation sampling was conducted in the growing seasons of 2017 and 2018. That said, **Year 1** sampling was first conducted and reported in 2017. Subsequently, this document contains the **Year 2** results of vegetation sampling that was conducted in 2018. Although a separate report was prepared for Year 1 (*Vegetation Monitoring for Phase III Bond Release at the Leach Field for the Cottonwood Mine: Year One 2017*), some of the data for that year have also been included in this document to facilitate comparisons between years.

METHODS

Methodologies used for sampling were performed in accordance with the *Vegetation Information Guidelines* provided by DOGM.

Transect and Quadrat Placement

Random placement of sample quadrats were designed as an attempt to provide unbiased

accuracy of the data compiled. This was accomplished by establishing several randomly-placed transect lines along the entire length of each study site. Random numbers were generated and used to determine placement from the transect lines. The random numbers selected were high enough to position sample quadrats to the extreme lateral limits of the study areas and low enough to include all areas in-between. This insured that the sample quadrats were placed randomly over the entire study areas.

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. Plant nomenclature follows *A Utah Flora* (Welsh et al. 2008 [1]).

Woody Species Density

Woody plant numbers were measured using a distance method called the point-quarter technique. In this method, random points were placed on the sample sites and measured into four quarters. The distances to the nearest woody plant species were then recorded in each quarter. The average point-to-individual distance was equal to the square root of the mean area per individual. The counts were then summarized and converted into the number of individual woody plants per acre.

Annual Production

Total production was estimated by clipping, drying and weighing current annual growth in sample quadrats. Herbaceous and woody species production samples were recorded separately.

---

[1] Welsh, S.L., N.D. Atwood, S. Goodrich and L.C. Higgins. 2008. A Utah flora. Print Services, Brigham Young University, Provo, UT. 1019 pp.

Sample Size and Adequacy

Sampling adequacy was calculated using the formula given below.

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

where,

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

Diversity

There are several well-documented methods to assess species diversity in plant communities. The diversity index that was employed to compare the reclaimed and reference areas was *MacArthur's Diversity Index* calculated by the following equation:

$$1/\sum pi^2$$

where,

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.

Photographs

Color photographs of the sample areas were taken at the time of sampling and submitted with this report.

RESULTS

Reclaimed Leach Field

The dominant plant species of the reclaimed Leach Field included storksbill (*Erodium cicutarium*), rubber rabbitbrush (*Chrysothamnus nauseosus*), tumbling mustard (*Sisymbrium altissimum*) and Indian ricegrass (*Stipa hymenoides*). For a list of all species encountered in the sample quadrats, refer to Table 1. The total living cover of the site was measured at 53.70% (Table 2A) which consisted of 55.96% forbs, 33.59% shrubs and 10.46% grasses (Table 2B).

The total number of woody plants per acre was 1,440, comprised mostly of rubber rabbitbrush, but also had a fair representation of broom snakeweed (*Gutierrezia sarothrae*). Refer to Table 3 to see the results. Total annual production of the site was measured at 836.41 pounds per acre and was comprised of 599.75 pounds of woody plants and 276.66 pounds of herbaceous plants (Table 4).

Reference Area

The Cottonwood Mine site has two Pinyon-Juniper Reference Areas that were chosen previously to represent revegetation success standards for different reclaimed areas. The reference area that is nearest the reclaimed Leach Field and most representative of the land prior to disturbance is located adjacent to the reclaimed Old Waste Rock Site (Map A). Sample results show that the dominant species for this reference area included pinyon pine (*Pinus edulis*), Utah juniper (*Juniperus osteosperma*), Mormon tea (*Ephedra viridis*) and alder-leaf mountain-mahogany (*Cercocarpus montanus*). Refer to Table 5 to see all species encountered in the sample quadrats. The total living cover was estimated at 30.30%, 10.40% was from overstory and 19.90% was from understory cover (Table 6A). Understory composition in the sample quadrats was comprised of only woody species (Table 6B).

The total number of woody plants for the reference area was 840 individuals per acre, most of which were pinyon pine, Utah juniper and Mormon tea (Table 7). Annual production here was estimated at a total of 409.05 pounds per acre, which nearly all came from woody plant species (Table 8).

Dataset Comparisons

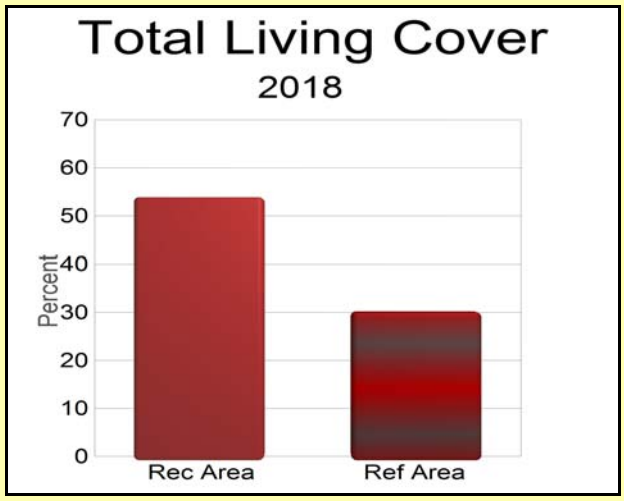
Total Living Cover

When the total living cover of the reclaimed Leach Field was compared statistically with the Pinyon-Juniper Reference Area by employing a Student's t-test, the cover was significantly different – the cover of the reference area, that included both overstory and understory cover combined, was significantly lower than the reclaimed area (Fig. 1).

FIG. 1. STUDENT'S T-TEST - A Total Living Cover Comparison Between the Reclaimed and Reference Areas (2018).

Leach Field Area
Reclaimed Area: $\bar{x}$=53.70; s=15.77; n=50
Reference Area: $\bar{x}$=30.30; s=8.57; n=50
t =9.2189 df =98 ; SL= p<0.001

$\bar{x}$= sample mean,
s = sample standard deviation,
n = sample size,
NS = non-significant,
t = Student's t-value,
df = degrees of freedom,
SL = significance level,
p = probability level



Woody Species Density

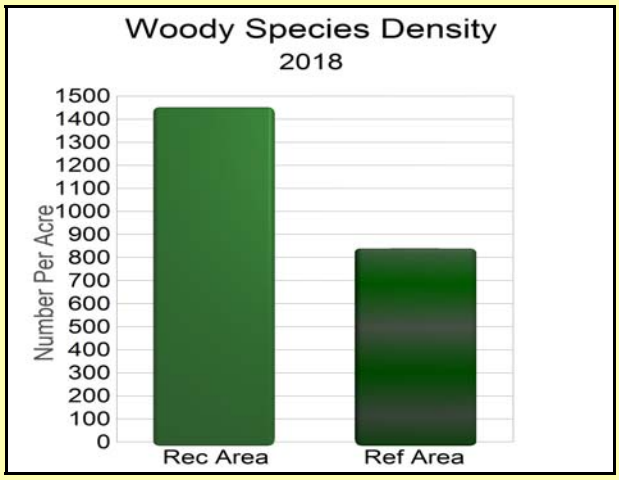
When the total woody species density of the reference area was compared to the reclaimed area, the later was greater

and the difference was again statistically significant using the same test as mentioned above (Fig. 2).

FIG. 2. STUDENT'S T-TEST - A Woody Species Density Comparison Between the Reclaimed and Reference Areas (2018).

Leach Field Area
Reclaimed Area: $\bar{x}$=1440.31; s=889.23; n=50
Reference Area: $\bar{x}$=839.57; s=258.53; n=50
t =4.5897 df =98 ; SL=p<0.001

```
x̄= sample mean,
s = sample standard deviation,
n = sample size,
NS = non-significant,
t = Student's t-value,
df = degrees of freedom,
SL = significance level,
p = probability level
```



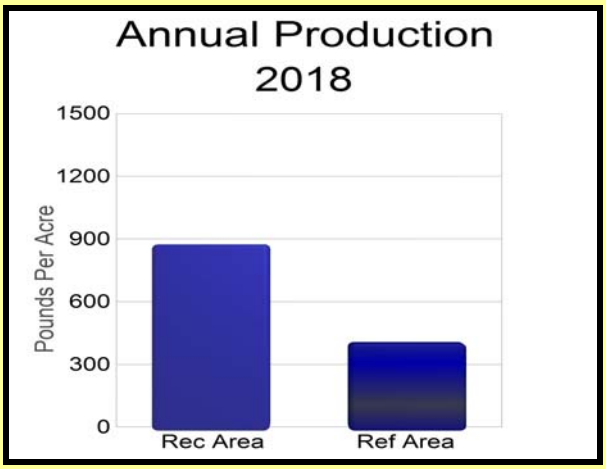
Annual Production

Total annual production of the Leach Field was also greater in the reclaimed area compared to the reference area and this difference was once again statistically significant (Fig. 3).

FIG. 3. STUDENT'S T-TEST - A Total Annual Production Comparison Between the Reclaimed and Reference Areas (2018).

Leach Field Area
Reclaimed Area: $\bar{x}$=836.41; s=419.28; n=50
Reference Area: $\bar{x}$=409.05; s=198.89; n=50
t =6.5118 df =98 ; SL= p<0.001

$\bar{x}$= sample mean,
s = sample standard deviation,
n = sample size,
NS = non-significant,
t = Student's t-value,
df = degrees of freedom,
SL = significance level,
p = probability level



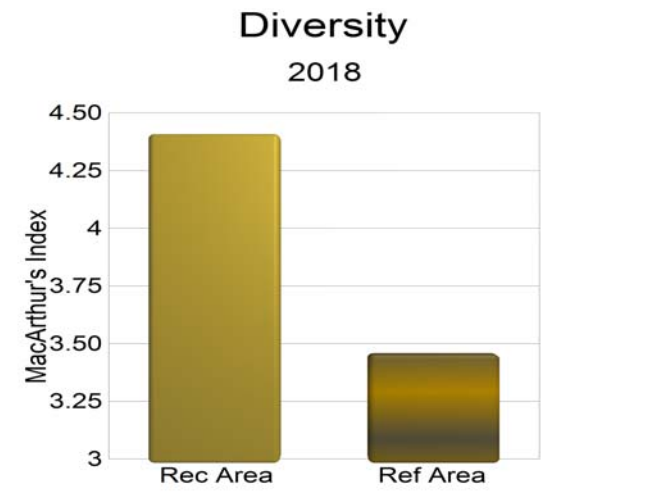
Diversity

Diversity of the two areas was also compared and was greater in reclaimed Leach Field compared to the Pinyon-Juniper Reference Area (Fig. 4).

FIG. 4. MacARTHUR'S INDEX - A Comparison Between the Selected Reclaimed and Reference Areas.

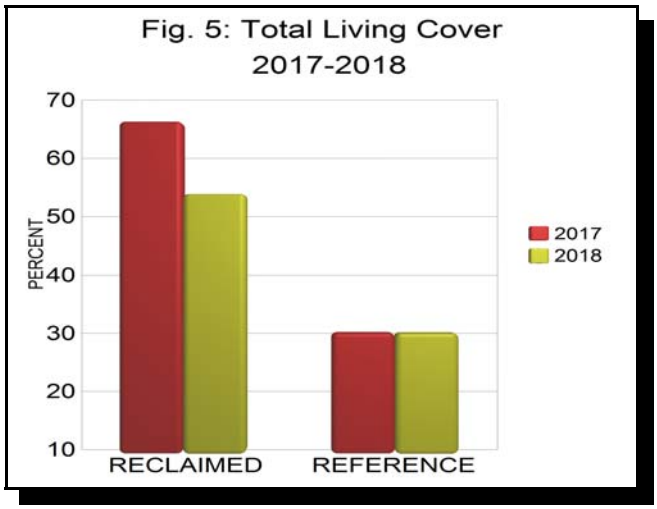
$$1/\sum pi^2 =$$

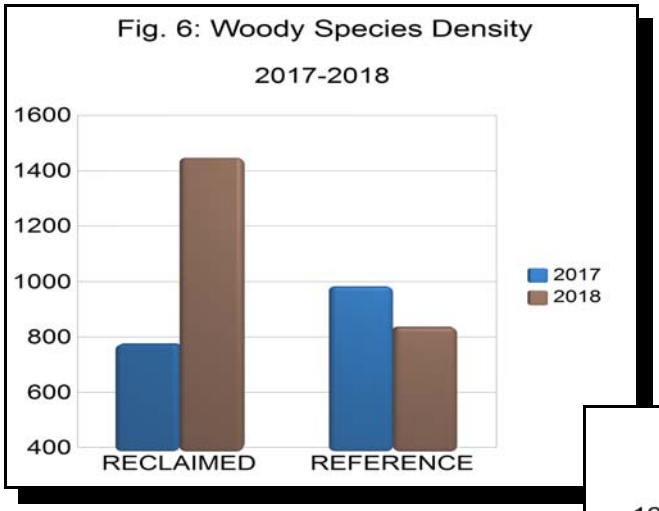
Leach Field Area
Reclaimed Area: 4.399
Reference Area: 3.461

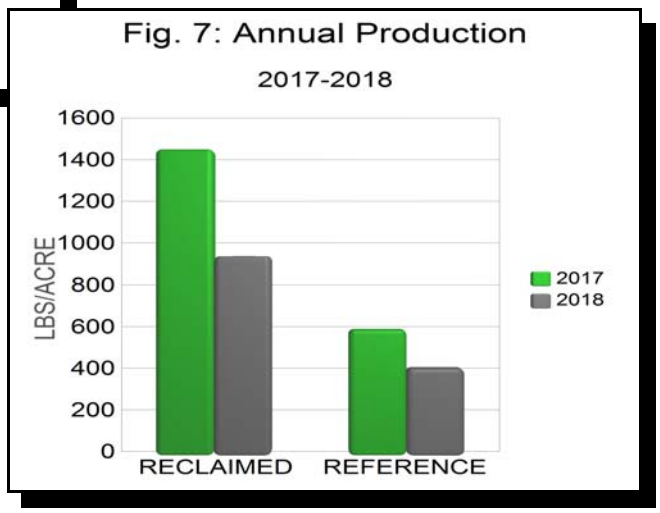


Comparisons Between Sample Years

This report provides the results from quantitative sampling the vegetation of the reclaimed Leach Field located near the Cottonwood Mine in 2018 ten years after reclamation and revegetation operations were performed at the site. The same sites were also sampled in 2017 and as mentioned, a report was submitted showing those results. Even though a separate report was submitted for the 2017 sample period, some of the results for that year have been included in the graphs below to facilitate comparison with the 2018 sample year for total living cover (Fig. 5), woody species density (Fig. 6) and total annual production (Fig. 7).







SUMMARY & DISCUSSION

In 2017 and 2018, quantitative sampling was conducted at the reclaimed Cottonwood Mine Leach Field and Pinyon-Juniper Reference Area to complete the required two consecutive sample years necessary for final bond release. Comparisons between the datasets for the restored vegetation and the area chosen to represent final revegetation success standards, the reference area, were made and presented in this report. When **total living cover** of the two areas were compared, the reclaimed area was greater, the difference being statistically significant. Next, the **woody species densities** of the datasets were compared – the results were similar - the reclaimed area had significantly more individual plants per acre. The **annual production** was also greater in the reclaimed area when compared to the reference area. Finally, the **diversity** of the reclaimed area was compared to the reference area using MacArthur's Index and the reclaimed area also had greater species diversity.

Even though a subset of data recorded in 2017 (Year 1) have also been presented herein, another complete report was submitted previously for that sample year. This report was called: *Vegetation Monitoring for Phase III Bond Release at the Leach Field for the Cottonwood Mine, Year One, 2017*.

One remark mentioned in the report for the 2017 dataset was that there was *a notable component in the vegetative cover of the reclaimed Leach Field – most of the forbs present were "weedy" or exotic species*. This was also the case for the 2018 dataset. When this fact was discussed with a biologist from DOGM with the question as to whether the bond release sampling should continue for the second consecutive year because of the "weedy" species present, the following statement was made in an email dated March 2, 2018 from Joe Helfrich (DOGM) to Dennis Oakley (InterWest Mining Company):

> "*I spoke with Pat Collins yesterday, 3/1/18, and several weeks earlier at his office with Todd Miller regarding 1st year vegetation results for the CTW leach field. I also spoke with Priscilla Burton in that regard. The species composition data indicated that there were several weedy species present at the reclaimed leach field site. Since they currently do not pose a threat to the overall success (phase III bond release) of the other species, the Division is recommending the reclaimed leach field be left as is for the second consecutive year of quantitative sampling*".

With the above results and considerations in mind, sample datasets from Year 1 *(2017) and* Year 2 (2018) suggest that when applicable parameters of the reclaimed Leach Field and Pinyon-Juniper Reference Area were compared, the reclaimed area has met or exceeded the requirements necessary for Phase III or Final Bond Release.

DATA SUMMARY TABLES

Table 1: Cottonwood Mine. Total cover, standard deviation and frequency by species (2018).

Reclaimed Leach Field n=50

	Mean Percent	Standard Deviation	Percent Frequency
SHRUBS			
Artemisia nova	0.80	3.92	4.00
Artemisia tridentata	1.50	10.50	2.00
Chrysothamnus nauseosus	13.50	14.40	60.00
Gutierrezia sarothrae	3.10	9.05	18.00
FORBS			
Cryptantha flava	0.40	1.96	4.00
Erodium cicutarium	21.80	18.02	70.00
Sisymbrium altissimum	7.00	15.49	32.00
GRASSES			
Bromus tectorum	1.00	7.00	2.00
Hordeum jubatum	0.20	1.40	2.00
Stipa hymenoides	4.40	11.43	18.00

Table 2: Cottonwood Mine. Total Cover and composition (2018).

Reclaimed Leach Field n=50

	Mean Percent	Standard Deviation
A. TOTAL COVER		
Understory	53.70	15.77
Litter	18.04	10.23
Bareground	12.20	7.74
Rock	16.06	11.36
B. COMPOSITION		
Shrubs	33.59	27.69
Forbs	55.96	33.50
Grasses	10.46	24.73

Table 3: Cottonwood Mine. Woody Species Density (2018).

Reclaimed Leach Field

(n=50)

SPECIES	Number/Acre
Artemisia nova	21.60
Artemisia tridentata	21.60
Chrysothamnus nauseosus	1152.24
Gutierrezia sarothrae	244.85
TOTAL	**1440.31**

Table 4: Cottonwood Mine.
Annual Production (2018).
Reclaimed Leach Field

(n=50; double sampling n=200)

Pounds/Acre LIFEFORM	MEAN	STD. DEV.
Herbaceous	276.66	374.60
Woody	599.75	552.14
TOTAL	**836.41**	**419.28**

Table 5: Cottonwood Mine. Total cover, standard deviation and frequency by species (2018).

Pinyon-Juniper Reference Area
(Located near the Old Waste Rock Site) n=50

	Mean Percent	Standard Deviation	Percent Frequency
OVERSTORY			
Juniperus osteosperma	5.50	11.28	20.00
Pinus edulis	4.90	9.87	22.00
UNDERSTORY			
TREES & SHRUBS			
Cercocarpus montanus	4.00	9.64	16.00
Ephedra viridis	5.40	10.67	22.00
Juniperus osteosperma	2.60	5.77	24.00
Opuntia polyacantha	0.20	1.40	2.00
Pinus edulis	7.70	10.83	48.00
FORBS			
GRASSES			

Table 6: Cottonwood Mine. Total Cover and composition (2018).

Pinyon-Juniper Reference Area
(Located near the Old Waste Rock Site) n=50

	Mean Percent	Standard Deviation
A. TOTAL COVER		
Overstory (O)	10.40	13.07
Understory (U)	19.90	11.34
Litter	27.80	17.27
Bareground	27.80	18.71
Rock	24.50	18.15
O + U	30.30	8.57
B. COMPOSITION		
Trees & Shrubs	100.00	0.00
Forbs	0.00	0.00
Grasses	0.00	0.00

Table 7: Cottonwood Mine. Woody Species Density (2018).

Pinyon-Juniper Reference Area

(n=50)

SPECIES	Number/Acre
Cercocarpus montanus	79.76
Ephedra viridis	235.08
Juniperus osteosperma	209.89
Opuntia polyacantha	8.40
Pinus edulis	306.44
TOTAL	**839.57**

Table 8: Cottonwood Mine. Annual Production (2018).

Pinyon-Juniper Reference Area

(Located near the Old Waste Rock Site)

(n=50)

Pounds/Acre LIFEFORM	MEAN	STD. DEV.
Herbaceous	9.28	46.71
Woody	399.77	211.65
TOTAL	**409.05**	**198.89**

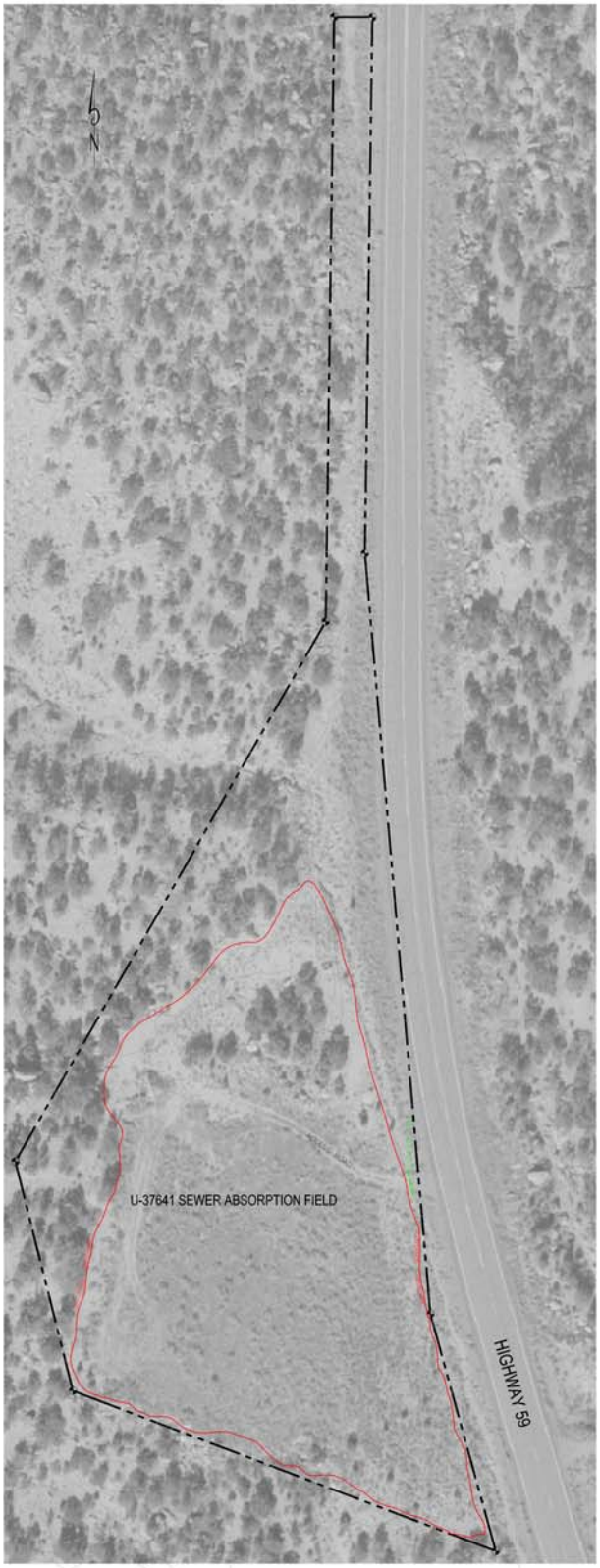
COLOR PHOTOGRAPHS OF THE SAMPLE AREAS

Photo 1: Reclaimed Leach Field

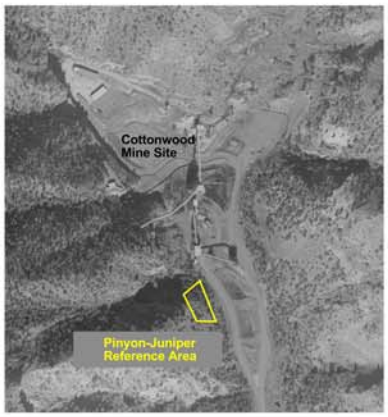
Photo 2: Reclaimed Leach Field

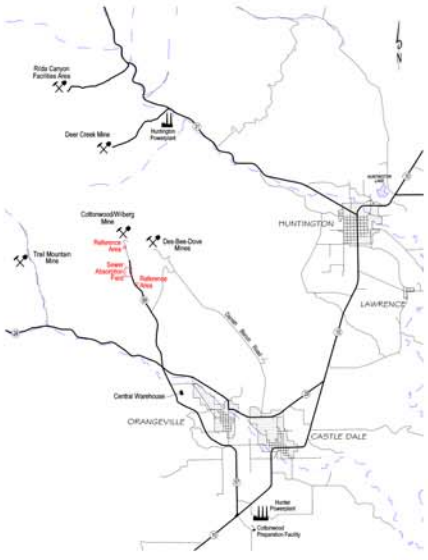
Photo 3: Pinyon-Juniper Reference Area

Photo 4: Pinyon-Juniper Reference Area



PLAN OF MAIN ABSORPTION FIELD





GENERAL LOCATION MAP
Not to Scale

Revised by: P. COLLINS
Date: December 20, 2017

PACIFICORP

COTTONWOOD/WILBERG MINE
MAIN ABSORPTION FIELD

Drawn by:	K. LARSEN	MAP A
Scale:	1" =40'	
Date:	AUGUST 7, 2017	Sheet 1 of 1

Application for Phase II and III Bond Release

Cottonwood/Wilberg Mine Leach Field Area

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 determine whether the site is contributing suspended solids outside the permit area, typically permittees would utilize RUSLE, a computer modeling program that estimates soil loss and other erosion variables for a user selected site. RUSLE considers four main factors that affect soil erosion and its associated overland flow. These factors are: Climate, Soil, Topography, and Land Use. Since the climate, soil, and topography inputs are relatively similar between the undisturbed (reference) area and the disturbed area, the major factor affecting RUSLE's output, in this instance, is the land use factor.

Land use conditions, as described in the RUSLE2 users manual, describes those conditions that refer to the cover-management practices on the slope as well as supporting practices that might be applied in addition to the cover-management practices. At the Cottonwood/Wilberg – Leach Field Area supporting practices included mulching, seeding, and maintain sediment control (silt fence) until vegetation establishment. All of these supporting practices slow runoff, and enhances water infiltration and sediment deposition, reducing soil loss from the site.

The site and reference area is flat with a very established cover on the surface. Therefore, to simplify this demonstration, the permittee depends solely on the results of the vegetation sampling conducted in 2017 and 2018. These surveys compare the disturbed to the reference area for cover, density, productivity, and diversity. It would come to reason that if these factors are statistically similar, then it would also seem reasonable to assume that RUSLE would find similar results for off-site soil losses.

As required by bond release procedures, two consecutive years of vegetation sampling is required prior to the submittal of the bond release application. Dr. Patrick Collins of Mt. Nebo Scientific performed this sampling to determine whether the vegetation has met success standards or not. Sampling was conducted during the late summer, early fall time of the year.

Results of the vegetation sampling found that for cover, density, productivity, and diversity, the reclaimed area is statistically significant when compared to the reference area. The figures on the following pages graphically illustrate the results for both sampling years.

Note: Figures below were cut and pasted from the "Vegetation Monitoring for Phase III Bond Release at the Leach Field for the Cottonwood Mine, 2018."

Fig. 5: Total Living Cover
2017-2018

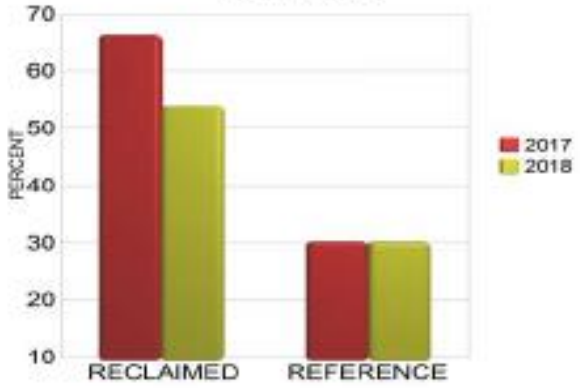


Fig. 6: Woody Species Density
2017-2018

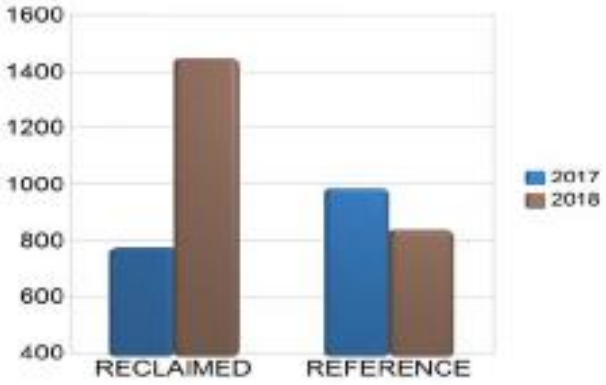
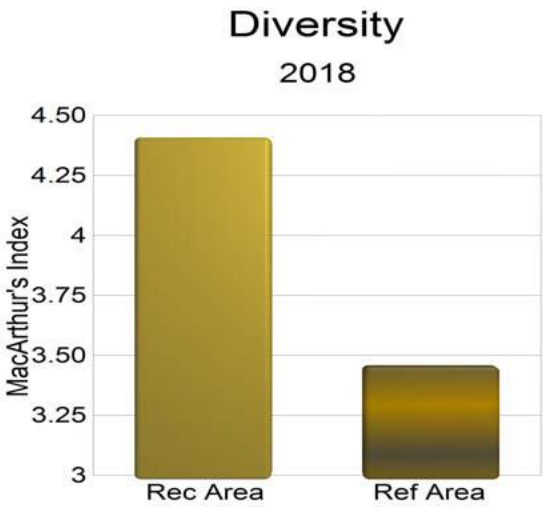


Fig. 7: Annual Production
2017-2018



As illustrated from the figures, cover, density, productivity, and diversity in most cases showed better results from the reclaimed area and reference area. The actual data results for the 2018 sampling for the reclaimed area found that total living cover was 33.34% comprising mostly of forbs. Woody species density was 1441.31 individuals per acre and dominated by Rubber Rabbitbrush. Productivity was 836.41 pounds per acre.

The Pinyon/Juniper reference area found total living cover to be 15.15%. Approximately 19.9% was understory cover consisting mainly of pinion pine. Woody species density was 839.57 individuals per acre and being mainly composed of pinyon-pine and Mormon tea. Total biomass production was 409.05 pounds per acre.

Reviewing these results, the only conclusion that can be made is that the reclaimed area has succeeded the vegetation growth of the reference area. Therefore, erosion and sedimentation of the reclaimed area will be equal to or less then background levels. And the demonstration that the area is not contributing additional suspended solids off the Cottonwood/Wilberg Leach Field Area has been made.

Application for Phase II and III Bond Release

Cottonwood/Wilberg Mine Leach Field Area

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.

The last augmented seeding of the site occurred when additional laterals were installed in support of the Trail Mountain Mine facilities in mid-1990's. In 2015, a small access road was reclaimed and reseeded. Because the area was 3% of the total disturbed area, this reclamation does not restart the bond clock extending the responsibility period. Refer to the area calculations accompanying this attachment.

Starting in 2017, the two year vegetation monitoring for bond release was conducted. The contractor (Mt. Nebo Scientific). Refer to email communication between PacifiCorp and the Division dated March 2018.

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.

Because of the amount of precipitation that the Cottonwood/Wilberg receives each year, a 10 year responsibility period is required. The last seeding was conducted in the mid-1990's and therefore, the site has been reclaimed for 24 years except as described above. The two consecutive years for monitoring was in 2017 and 2018 and found that the vegetation has become capable of plant regeneration and succession and exceeds the approved success standard.

Oakley, Dennis

From: Oakley, Dennis
Sent: Friday, March 02, 2018 11:59 AM
To: 'Joseph Helfrich'; OGMCOAL DNR; Todd Miller; Steve Christensen; Daron Haddock; Pat Collins; Priscilla Burton
Cc: Semborski, Chuck; Fleck, Ken
Subject: RE: [INTERNET] Re: Cottonwood Leach Field

Thanks Joe! We'll proceed with vegetation monitoring for Phase III bond release and have Mt Nebo continue with year 2 monitoring this fall.

Later this spring, I will submit Phase I and II on this site.

Thanks for your help!!

From: Joseph Helfrich [mailto:joehelfrich@utah.gov]
Sent: Friday, March 02, 2018 10:56 AM
To: Oakley, Dennis <Dennis.Oakley@pacificorp.com>; OGMCOAL DNR <ogmcoal@utah.gov>; Todd Miller <toddmiller@utah.gov>; Steve Christensen <stevechristensen@utah.gov>; Daron Haddock <daronhaddock@utah.gov>; Pat Collins <mt.nebo@xmission.com>; Priscilla Burton <priscillaburton@utah.gov>
Subject: [INTERNET] Re: Cottonwood Leach Field

Hi Dennis,
I spoke with Pat Collins yesterday, 3/1/2018, and several weeks earlier at his office with Todd Miller regarding the 1st year vegetation monitoring results for the CTW leach field. I also spoke with Priscilla Burton in that regard. The species composition data indicated that there were several weedy species present at the reclaimed leach field site. Since they currently do not pose a threat to the overall success (phase III bond release) of the other species, the Division is recommending that the reclaimed leach field be left as is for the second consecutive year of quantitative sampling. Let us know if that will meet your needs. If we need to discus further give us a call.....Joe

On Wed, Feb 28, 2018 at 4:07 PM, Oakley, Dennis <Dennis.Oakley@pacificorp.com> wrote:

Joe,

A few weeks ago we talked about Mt Nebo Scientific's 1st year monitoring results for the CTW leach field. I indicated to you that the site exceeded the standards for cover, diversity, woody species density, and productivity. However, the majority of the cover was made up of a weedy specie ground cover. I ask you if could look into any variance to the bond release requirements we could use to proceed with Phase III bond

release for the site. We would still provide for husbandry practices such as chemical spot treating of the weedy species and reseed. If we're able to treat and reseed, I would like to do this as early as possible in the spring so that we can get a native cover growing by the time we need to monitor again so as to not impact our cover counts.

Could you provide me with any update you may have?

Thanks in advance.

Dennis Oakley

Senior Mine Engineer

INTERWEST MINING COMPANY
A SUBSIDIARY OF PACIFICORP

Huntington Office:

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

Phone: 435.687.4825 | Mobile: 435.650.9233 | Fax: 435.687.2695

dennis.oakley@pacificorp.com

--

Joseph C. Helfrich
Wildlife Biologist
Utah Division of Oil Gas & Mining
801 538-5290 W
801 971-7685 M

Application for Phase II and III Bond Release

Cottonwood/Wilberg Mine Leach Field Area

Attachment 11

Demonstration that Post Mining Land Use has been Achieved

Demonstration that Post Mining Land Use has been Met

Land use for the Cottonwood/Wilberg Mine – Leach Field area was established in 1978 as grazing and wildlife. This land use information is found in Volume 1, Part 2, starting on page 37 of the mining and reclamation plan. The stated land use will be that use of the surrounding adjacent areas of grazing and wildlife.

Since all success standards for vegetation establishment have been met, land uses for grazing and wildlife have been met as demonstrated by a successful vegetative stand for the Cottonwood/Wilberg Mine – Leach Field Area.