C/007/004 Incoming

CASTLE GATE HOLDING COMPANY
Castle Gate Mine
P.O. Box 30
Helper, Utah 84526
Office Phone (435) 472-4737
Cell Phone (435) 650-2951

April 28, 2014

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

Re: Phase II and Phase III Bond Release, Castle Gate Holding Company, Castle Gate Mine, C/007/0004

Dear Mr. Haddock:

Please find enclosed three copies and the Phase II and Phase III Bond Release Application for all that remains within the Castle Gate Permit. This application includes all the required documentation for phase II and phase III bond release including the C1 and C2 forms, reclamation history, vegetation information, sediment yield information, public notice, landowner and government agency notification letters, reclamation certification and bond calculations.

The public notice will be published in the Sun Advocate on May 1st, 8th, 15th and 22nd.

If you have any questions please give me a call.

Sincerely,

Dennis N. Ware
Company Representative

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Enclosures

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APPLICATION FOR COAL PERMIT PROCESSING

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

Permittee: CASTLE GATE HOLDING COMPANY
Mine: CASTLE GATE MINE **Permit Number:** C/007/0004
Title: PHASE II AND PHASE III BOND RELEASE APPLICATION

Description, Include reason for application and timing required to implement:
PHASE II BOND RELEASE

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

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

Please attach three (3) review copies of the application. If the mine is on or adjacent to Forest Service land please submit four (4) copies, thank you. (These numbers include a copy for the Price Field Office)

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

Dennis N. Ware	Authorized Representative	04/28/2014	
Print Name	Position	Date	Signature (Right-click above choose certify then have notary sign below)

Subscribed and sworn to before me this 28 day of April, 2014

Notary Public: Ruanne Leeflang, state of Utah.

My commission Expires: 6-30-17
Commission Number: 667709
Address: 25 No. Main
City: Orangeville State: Ut Zip: 84537

} ss:

Notary Public
RUANNE LEEFLANG
Commission #667709
My Commission Expires
June 30, 2017
State of Utah

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

Permittee: CASTLE GATE HOLDING COMPANY
Mine: CASTLE GATE MINE
Permit Number: C/007/0004
Title: PHASE II AND PHASE III BOND RELEASE APPLICATION

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

			DESCRIPTION OF MAP, TEXT, OR MATERIAL TO BE CHANGED
☒ Add	☐ Replace	☐ Remove	PHASE II AND PHASE III BOND RELEASE APPLICATION (stand alone document)
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☐ Add	☐ Replace	☐ Remove	
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Any other specific or special instruction required for insertion of this proposal into the Mining and Reclamation Plan.

Stand Alone Document

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Castle Gate Holding Company
Castle Gate Mine
C/007/0004

Phase II and Phase III Bond Release for the Castle Gate Mine Permit C/007/0004.

I herby certify to the best of my information and belief all the information contained in this application for phase II and phase III bond release is true and correct and that all applicable reclamation activities have been accomplished in accordance with the requirement of the Act, the regulatory program and the approved reclamation plan.

Dennis N. Ware
Print Name

Authorized Representative
Position

4/28/2014
Signature, Date

Subscribed and sworn to before me this 28th day of April, 2014

Ruanne Leeflang
Notary Public

Notary Public
RUANNE LEEFLANG
Commission #667709
My Commission Expires
June 30, 2017
State of Utah

My Commission Expires: 6-30, 2017
Attest: State of Utah
County of Emery

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Castle Gate Holding Company
Castle Gate Mine
C/007/0004

Phase III Bond Release Application

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April 2014

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CASTLE GATE MINE

PAASE II AND PHASE III BOND RELEASE

PERMIT NUMBER C/007/0004

Introduction

The Castle Gate Mine permit area is located approximately 10 miles north of Price, Utah and in the Wasatch Plateau coal fields in Carbon County. In October of 2012, 57.44 acres of land within the Castle Gate permit received phase III bond release. The permit currently consists of various separate areas of disturbed and reclaimed land including: the Hardscrabble Canyon Substation (0.72 acres); the Sowbelly Gulch Substation (1.84 acres); and the Price Canyon Adit No.1 (3.0 acres). The post mining land use is Wildlife and Grazing. This area has a history of various mining operations producing coal since the 1880's, when Teacum Pratt opened the first operation for house coal. Mining activities were consolidated in 1971 under the Braztah Corporation, which in turn became the Price River Coal Company in 1979, then Castle Gate Coal Company in 1986, Amax Coal Company in 1991, Amax Coal Holding Company in 1996, and Castle Gate Holding Company in 1998.

The permit was renewed on December 24, 2009 and expires on December 24, 2014. The current performance bond for the Castle Gate Mine is $226,600. This phase II and phase III bond release will result in full and final bond release.

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Reclamation History

Hardscrabble Canyon

Hardscrabble Canyon originally contained 39 acres within the disturbed area boundary. By the end of 1999, 38.28 acres in Hardscrabble Canyon not including the 0.72 acres associated with the substation had been reclaimed. Hardscrabble reclamation began in 1984 with reclamation of the Goose Island refuse pile followed by reclamation of the No.3 and 4 Mine areas during the years of 1993 through 1999. The road through the disturbed area was altered but left in place for the post

mining land use. In 1997, AMAX Coal Company, Castle Gate Holding Company's predecessor, received an Earth Day Award from the Board of Oil, Gas and Mining for "outstanding final reclamation and site restoration". The company was commended for enhancing the post mining land use by restoring the canyon to a more natural configuration and paying particular attention to wildlife habitat while providing better downstream water quality. Phase I bond release, not including the substation, was incorporated into the Permit in May of 2000 (see the Castle Gate Permit Section 3.3 for reclamation as-built information). Phase II bond release, not including the substation, was incorporated into the Permit in January of 2003 (see the Hardscrabble Canyon Phase II Bond Release, a stand-alone document). In 2003, the Hardscrabble Canyon site was nominated by the Division of Oil, Gas and Mining for an "Excellence in Surface Coal Mining Reclamation Award" and was selected by the Department of Interior's Office of Surface Mining as one of the "National Award" winners and went on to win the "Best of the Best" award. In 2008 Mt. Nebo Scientific, Inc. performed a year-9 vegetation study and in 2009 year-10 vegetation monitoring was conducted to demonstrate vegetation success in preparation for phase III bond release. Phase III bond release, not including the substation, was incorporated into the Permit as a standalone document in October of 2012.

Currently, Hardscrabble Canyon contains 0.72 acres of disturbed and reclaimed land within the disturbed area boundary all of which is associated with the electrical substation. This 0.72 acres was initially reclaimed in the fall of 2002. Phase I bond release was approved in May of 2005. See the Castle Gate Permit Section 3.3 for reclamation as-built information. In 2012 Mt. Nebo Scientific, Inc. performed the year-9 vegetation study and in 2013 the year-10 vegetation monitoring was conducted to demonstrate vegetation success in preparation for phase III bond release. Initially, Hardscrabble Canyon contained 39.0 acres of disturbed ground and in October of 2012 38.28 acres received phase III bond release. This phase II and phase III bond release includes the remaining 0.72 acres.

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Sowbelly Gulch/Canyon

Sowbelly Canyon originally contained approximately 21 acres within the disturbed area boundary. Reclamation in Sowbelly Canyon began in 1992 and by the end of 1995, 19.16 acres in Sowbelly Canyon, not including the 1.84 acres associated with the substation, had been reclaimed. Phase I bond release, not including the substation, was incorporated into the Permit in January of 1997 (see the Castle Gate Permit Section 3.2 for reclamation as-built information). Phase II bond release, not including the substation, was incorporated into the Permit in January of 2003 (see the Sowbelly Gulch Phase II Bond Release, a stand-alone document). In 2004 Mt. Nebo Scientific, Inc. performed a year-9 vegetation study and in 2005 year-10 vegetation monitoring was conducted to demonstrate vegetation success in preparation for phase III bond release. Phase III bond release, not including the substation, was incorporated into the Permit as a standalone document in October of 2012.

Currently, Sowbelly Canyon contains approximately 1.84 acres of disturbed and reclaimed land within the disturbed area boundary. This 1.84 acres was initially reclaimed in the fall of 2002. Phase I bond release was incorporated into the Permit in June of 2005. See the Castle Gate Permit Section 3.2 for reclamation as-built information. In 2012 Mt. Nebo Scientific, Inc. performed the year-9 vegetation study and in 2013 the year-10 vegetation monitoring was conducted to demonstrate vegetation success in preparation for phase III bond release. Initially, Sowbelly Canyon contained 21 acres of disturbed ground and in 2012 19.16 acres received phase III bond release. This phase II and phase III bond release covers the remaining 1.84 acres.

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Adit No. 1

The Adit No. 1 contains 3.0 acres within the disturbed area boundary of which 1.7 acres were disturbed and reclaimed. Reclamation work at the Adit No. 1 was performed during the fall of 2002. In March of 2006 phase I bond release was approved. See the Castle Gate Permit Section 3.5 for reclamation as-built information. In 2012 Mt. Nebo Scientific, Inc. performed a year-9 vegetation study and in 2013 year-10 vegetation monitoring was conducted to demonstrate

vegetation success in preparation for phase II and phase III bond release.

Vegetation

Mt. Nebo Scientific, Inc. conducted the year-9 and year-10 vegetation studies during the growing seasons of 2012 and 2013. These vegetation studies are included in this bond release application as Appendix 1. The results of these vegetation studies show that the reclaimed areas have met or exceeded the requirements of R645-301-350. The entire disturbed area remaining within the Castle Gate Permit had been reclaimed and seeded by the end of the year 2002. There has been no augmented seeding, fertilization, irrigation or other work, excluding accepted husbandry practices since the initial seeding was completed in 2002. The Extended Responsibility Period began in 2003 and reached the 10 year mark at the end of 2012.

Sediment Yields

There are no remaining sediment control structures (ponds, silt fences, straw bales or diversion) to be removed. EarthFax Engineering prepared sediment yield calculations for Hardscrabble and Sowbelly Canyons as well as the Adit NO. 1 incorporating data from the 2013 year-10 vegetation study, these calculations are included in this bond release application as Appendix 2. The results show that the reclaimed lands are contributing far less sediment to the stream flow than the pre-disturbance condition.

Other

The proposed Public Notice, the Landowner and Government Agency Notification Letters, the Reclamation Certification and the Bond Release Calculation are included in the bond release application as Appendices 3, 4, 5 and 6 respectively.

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Summary

The information included with this application provides documentation as required by Directive Number: Tech-006 and the R645-301-800 Utah Coal Regulations for phase II and phase III bond release.

Appendix 1

Vegetation Monitoring
For Phase III Bond Release
Years 9 and 10

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VEGETATION MONITORING
FOR PHASE III BOND RELEASE
AT SELECTED SITES
AT THE CASTLE GATE MINE

YEAR TWO

2013

FOR THE
CASTLE GATE HOLDING COMPANY

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Prepared by

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by
Patrick Collins, Ph.D.

for
CASTLE GATE HOLDING COMPANY
P.O. Box 592
Orangeville, Utah 84537

March 2014

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INTRODUCTION

Study Objectives

This document contains **Year 2** results from quantitative sampling vegetation at *selected reclaimed areas* of the Castle Gate Mine site. Unlike other portions of the mine that have been reclaimed longer and have consequently been studied and sampled for final bond release, the sites reported herein have only now been reclaimed long enough that the mine owner may soon apply for *Final* or *Phase III Bond Release*. For this to happen the reclaimed areas must meet specific revegetation success standards. Following final reclamation, the bond release process requires at least 10 years of time to pass following final 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 it can be studied for potential bond release applications. Phase III Bond Release is applied for through the State of Utah, Division of Oil, Gas and Mining (DOGM). That said, vegetation sampling was accomplished in 2012 (Year 1) and 2013 (Year 2) as a means to provide information as to whether or not the sites have meet appropriate revegetation success standards to warrant reclamation bond release. The Year 1 sampling results were submitted in an earlier report.

The Reclaimed Sites

The reclaimed sites at the Castle Gate Mine that have been selected to be sampled for bond release include: **Hardscabble Substation, Adit No. 1** and the **Sowbelly Substation**. These sites are located apart from each other, and depending on the site, are about 1 to 3 air-miles apart (MAP A).

Reference Area

A Reference Area to be used as standards for final revegetation success at the reclaimed sites was chosen at a much earlier date. Castle Gate's Mining and Reclamation Plan (MRP) stated that "*the AML Reference Areas shown on Exhibit 9-6 will be used to evaluate previously*

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mined areas". Because the AML (Abandoned Mined Lands) areas were relatively extensive, at least for use as one reference area, biologists from DOGM along with representatives for the mine, chose a smaller portion of the AML areas as a reference area for reclaimed sites of the Castle Gate Mine. The **Sowbelly Reference Area** is located down-canyon (or south) of the reclaimed Sowbelly Substation site (MAP A).

METHODS

Methodologies used for sampling in 2013 were performed in accordance with the *Vegetation Information Guidelines* [1] provided by DOGM and were consistent to the previous sample year. The sampling was conducted August 30-31, 2013.

Transect & 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 & 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)[2].

---

[1] Vegetation Information Guidelines (Revised, February 1992). Utah Division of Oil, Gas and Mining, 1596 West North Temple, Suite 1210, Salt Lake City, Utah 84114-5801.

[2] 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.

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Sample Size & Adequacy

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

Sampling adequacy was calculated using theformula given below.

where,

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

The values used for "t" and "d" insured that sample adequacy was met with 90% confidence within a 10% deviation from the true mean.

Diversity and Similarity Indices

There are several well-documented methods to assess diversity and similarity in plant communities. The *Motyka Index* is a modified form of the *Sorenson Index*, both similarity indices. This index was used on the data; the equation is shown below:

$$IS_{MO} = \left(\frac{2MW}{MA + MB}\right) x100$$

where,

MW = $\sum$ of the smaller quantitative values of species of two communities,
MA = $\sum$ of the quantitative values of all species in one community,
MB = $\sum$ of the quantitative values of all species in another community.

Two diversity indices have been employed to measure the reclaimed and reference areas. *MacArthur's Diversity Index* is an effective diversity measurement and is computed using the following equation:

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$$1/\sum pi^2$$

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.

Another diversity measurement was provided that shows the *average number of species* encountered at each quadrat.

Photographs

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

RESULTS

Reclaimed Hardscrabble Substation

The most common plant species found in the sample quadrats of the reclaimed Hardscrabble Substation were rubber rabbitbrush (*Chrysothamnus nauseosus*), western wheatgrass (*Elymus smithii*), Gt. Basin wildrye (*E. cinereus*) and thickspike wheatgrass (*E. lanceolatus*). Table 1 lists all species encountered in the sample quadrats and shows the cover and frequency values of each.

The total living cover of this reclaimed area was estimated at 63.38% (Table 2-A). The lifeform composition of that cover was represented by grasses at 59.05, shrubs at 37.63% and forbs at 3.32% (Table 2-B).

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Reclaimed Adit No. 1

Table 3 shows the cover and frequency values for the reclaimed Adit No. 1 Area. The most common species here consisted of Gt. Basin wildrye, rubber rabbitbrush, western wheatgrass and fourwing saltbush (*Atriplex canescens*).

The total living cover for this site was estimated as 54.13% (Table 4-A); the composition of that cover was comprised of 53.38% grasses, 32.96% shrubs and 13.66% forbs (Table 4-B).

Reclaimed Sowbelly Substation

The remaining reclaimed site, the Sowbelly Substation, was dominated by plants similar to the above sites including western wheatgrass, rubber rabbitbrush, thickspike wheatgrass and fourwing saltbush (Table 5).

Also similar to the above sites, the total living cover at the Sowbelly Substation was estimated at 61.63% (Table 6-A) and had composition values at 48.71% grasses, 40.61% shrubs and 10.67% forbs (Table 6-B).

Reference Area

The Sowbelly Reference Area was the site chosen previously to be used for revegetation success standards at the time of final bond release. The most common species at this site consisted of rubber rabbitbrush, western wheatgrass and fourwing saltbush. For a list of all species found in the sample quadrats along with their cover and frequency values, refer to Table 7.

The total living cover for this reference area was estimated at 54.13%, of which 0.38% came from overstory and 53.75% was understory cover (Table 8-A). The understory composition was comprised of 42.22% shrubs, 37.39% grasses and 20.39% forbs and (Table 8-B).

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Dataset Comparisons

Total Living Cover

Dataset comparisons were made between the reclaimed sites and reference area. First, statistical tests were employed to compare the total living plant cover of the sites. Student's t-tests were performed on each reclaimed site and compared with the reference area. Results indicate that all sites, Hardscabble Substation, Adit No. 1 and Sowbelly Substation, all had more total living cover than the reference area – the differences were statistically significant (Fig. 1).

Diversity and Similarity Indices

Next, similarity and diversity indices were computed and compared. The Motyka Index was recommended to be used to compare species 'diversity' in the Mining and Reclamation Plan (MRP). Although this index is more of a *similarity index* than a *diversity index*, it nonetheless has been employed to compare the datasets. The MRP assigned the following categories to be used for comparisons in the Motyka Index:

Non-Weedy Shrub Cover,
Weedy Shrub Cover,
Native Perennial Grass Cover,
Introduced Perennial Grass Cover,
Non-Weedy Forb & Grass Cover,
Weedy Forb & Grass Cover.

Fig. 2 shows the results of employing the Motyka Index using the above categories for each reclaimed area when compared to the reference area; similarity values were 80.220% (Hardscabble Substation), 83.460% (Adit No. 1) and 85.403% (Sowbelly Substation).

MacArthur's Diversity Index was also employed to the datasets of the reclaimed and reference areas. In all cases, the reclaimed areas were more diverse than the reference area (Fig. 3).

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Finally, the Average Number of Species Per Square Meter also suggests greater diversity in

the reclaimed areas when compared to the reference area – the reclaimed areas averaged more species per sample quadrat (Fig. 4).

DISCUSSION

Representatives from the Caste Gate Mine and the State of Utah, Division of Oil, Gas and Mining (DOGM) worked together formulating revegetation success standards for the Mining & Reclamation Plan of the site. Because the area was disturbed by mining operations prior to the current revegetation regulations and requirements, standards for revegetation success were modified. State regulation R645-301-356.250 states that: "*for areas previously disturbed by mining that were not reclaimed to the requirements of R645-200 through R645-203 and R645-301 through R645-302 and that are remined or otherwise redisturbed by coal mining and reclamation operations, at a minimum, the vegetative ground cover will be not less than the ground cover existing before redisturbance and will be adequate to control erosion*".

The Castle Gate Mine was continuously mined since the time it was first disturbed by mining activities. Because of this there was no vegetative cover data 'existing before redisturbance' as mentioned above in the state regulation. Therefore, DOGM and Castle Gate biologists agreed that upon final reclamation the standards for revegetation success would be determined using a specific reference area – but success parameters would be dictated more from the species present, diversity, and similarity indices rather than strictly by cover, productivity and woody species density as the more recent regulations would dictate. Erosion control (as stated in the regulation above) should also be considered for a successful revegetation standard.

With the above considerations, sampling quantitatively for cover would still be necessary in the reclaimed and disturbed areas to adequately address the success standards. That said, and even though such a comparison was not necessary here, the total living cover of the reclaimed areas was better than the reference area in 2013. Moreover, the plant species present in the quadrats in the reclaimed areas were comprised almost exclusively of "desirable" rather than "weedy" species. Not only does this suggest successful revegetation from a cover perspective, but it also suggests that erosion control is probably

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better in the reclaimed areas when compared to the reference area.

In conclusion, the reclaimed areas sampled in 2013 have meet revegetation success standards for **Year 2** of the two consecutive sample years required for bond release considerations. As mentioned, Year 1 (2012) sampling results were submitted in a previous report. Results from that year were almost identical to the 2013 results presented herein.

The sampling results for 2012 and 2013 suggest that selected reclaimed areas at the Castle Gate Mine (Hardscrabble Substation, Adit No. 1 and Sowbelly Substation) have met or exceeded revegetation success standards and may be considered for Phase III Bond Release through the State of Utah.

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Table 1: Castle Gate Mine. Living Cover and Frequency by Plant Species (2013).

Reclaimed Hardscrabble Substation Area			n=40
	Mean Percent	**Standard Deviation**	**Percent Frequency**
TREES & SHRUBS			
Artemisia nova	0.88	3.14	2.50
Artemisia tridentata	4.50	10.17	17.50
Ceratoides lanata	1.50	7.35	5.00
Cercocarpus ledifolius	1.13	7.03	2.50
Chrysothamnus nauseosus	14.63	14.33	67.50
Rhus aromatica	1.25	4.44	7.50
FORBS			
Achillea millefolium	1.75	5.31	12.50
Aster glaucodes	0.50	3.12	2.50
GRASSES			
Elymus cinereus	6.38	11.07	30.00
Elymus lanceolatus	6.13	8.62	42.50
Elymus smithii	17.38	17.75	60.00
Elymus spicatus	1.13	5.64	5.00
Poa secunda	2.25	8.51	10.00
Poa secunda	0.25	1.56	2.50
Stipa hymenoides	3.75	8.04	25.00

Table 2: Castle Gate Mine. Total Cover and Composition (2013).

Reclaimed Hardscrabble Substation Area		n=40
A. TOTAL COVER	**Mean Percent**	**Standard Deviation**
Total Living Cover	63.38	7.19
Litter	11.63	6.06
Bareground	6.88	2.42
Rock	18.13	7.80
B. % COMPOSITION		
Shrubs	37.63	26.53
Forbs	3.32	9.98
Grasses	59.05	26.97

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Table 3: Castle Gate Mine. Living Cover and Frequency by Plant Species (2013).

Reclaimed Adit No. 1 Area			n=40
	Mean Percent	Standard Deviation	Percent Frequency
SHRUBS			
Atriplex canescens	4.38	9.95	20.00
Ceratoides lanata	1.25	5.56	5.00
Chrysothamnus nauseosus	11.00	11.41	60.00
Rhus aromatica	1.25	3.83	10.00
FORBS			
Aster chilensis	3.50	9.03	15.00
Halogeton glomeratus	1.25	6.40	5.00
Linum lewisii	0.88	2.71	10.00
Machaeranthera canescens	0.25	1.56	2.50
Penstemon palmeri	1.38	4.61	10.00
GRASSES			
Elymus cinereus	14.13	15.20	62.50
Elymus lanceolatus	2.88	4.73	27.50
Elymus smithii	6.38	9.81	35.00
Elymus spicatus	3.13	7.39	17.50
Poa pratensis	1.13	4.11	7.50
Stipa hymenoides	1.38	4.33	10.00

Table 4: Castle Gate Mine. Total Cover and Composition (2013).

Reclaimed Adit No. 1 Area		n=40
A. TOTAL COVER	Mean Percent	Standard Deviation
Total Living Cover	54.13	12.14
Litter	11.38	4.47
Bareground	9.75	4.32
Rock	24.75	12.14
B. % COMPOSITION		
Shrubs	32.96	22.57
Forbs	13.66	21.80
Grasses	53.38	22.21

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Table 5: Castle Gate Mine. Living Cover and Frequency by Plant Species (2013).

Reclaimed Sowbelly Substation Area			n=40
	Mean Percent	**Standard Deviation**	**Percent Frequency**
SHRUBS			
Artemisia nova	0.75	4.68	2.50
Artemisia tridentata	4.25	11.16	17.50
Atriplex canescens	5.75	14.94	15.00
Ceratoides lanata	1.38	8.59	2.50
Chrysothamnus nauseosus	10.75	12.07	57.50
Rhus aromatica	3.13	8.57	15.00
Symphoricarpos oreophilus	0.25	1.56	2.50
FORBS			
Achillea millefolium	1.63	4.09	15.00
Artemisia ludoviciana	0.13	0.78	2.50
Linum lewisii	1.75	5.54	10.00
Machaeranthera canescens	0.25	1.56	2.50
Melilotus officinalis	0.13	0.78	2.50
Penstemon palmeri	3.00	5.45	30.00
GRASSES			
Elymus cinereus	5.50	9.00	32.50
Elymus lanceolatus	6.38	7.83	45.00
Elymus smithii	15.75	13.94	70.00
Stipa hymenoides	0.38	2.34	2.50
Poa pratensis	0.50	2.18	5.00

Table 6: Castle Gate Mine.
Total Cover and Composition (2013).

Reclaimed Sowbelly Substation Area		n=40
A. TOTAL COVER	**Mean Percent**	**Standard Deviation**
Total Living Cover	61.63	7.61
Litter	13.38	5.85
Bareground	9.88	4.94
Rock	15.13	7.46
B. % COMPOSITION		
Shrubs	40.61	26.04
Forbs	10.67	17.11
Grasses	48.71	20.74

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Table 7: Castle Gate Mine. Living Cover and Frequency by Plant Species (2013).

Reclaimed Sowbelly Reference Area			n=40
	Mean Percent	Standard Deviation	Percent Frequency
OVERSTORY			
Quercus gambelii	0.38	2.34	2.50
UNDERSTORY			
TREES & SHRUBS			
Artemisia tridentata	2.25	9.87	5.00
Atriplex canescens	8.63	14.79	27.50
Chrysothamnus nauseosus	12.50	17.10	47.50
Quercus gambelii	0.25	1.56	2.50
FORBS			
Artemisia ludoviciana	3.13	7.88	17.50
Aster glaucodes	5.88	9.99	32.50
Convolvulus arvense	0.25	1.56	2.50
Penstemon palmeri	0.50	1.87	7.50
Taraxacum officinale	0.25	1.56	2.50
GRASSES			
Bromus tectorum	2.00	5.89	12.50
Dactylis glomeratus	0.50	2.18	5.00
Elymus lanceolatus	4.25	6.85	35.00
Elymus smithii	11.38	18.20	37.50
Elymus spicatus	0.25	1.56	2.50
Sporobolus airoides	1.25	7.81	2.50
Stipa hymenoides	0.50	2.18	5.00

Table 8: Castle Gate Mine. Total Cover and Composition (2013).

Reclaimed Sowbelly Reference Area		n=40
A. TOTAL COVER	Mean Percent	Standard Deviation
Overstory (O)	0.38	2.34
Understory (U)	53.75	10.94
Litter	13.25	7.87
Bareground	13.75	8.71
Rock	19.25	11.54
O + U	54.13	10.18
B. % COMPOSITION		
Shrubs	42.22	30.97
Forbs	20.39	25.59
Grasses	37.39	28.35

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FIG. 1. STUDENT'S T-TEST - A Total Living Cover Comparison Between the Selected Reclaimed and Reference Areas (2013)..

Hardscrabble Substation
Reclaimed Area: $\bar{x}$=63.38; s=7.19; n=40
Reference Area: $\bar{x}$=54.13; s=10.18; n=40
t = 4.694; df =78 ; SL= p<0.01

Adit No. 1
Reclaimed Area: $\bar{x}$=60.88; s=12.14; n=40
Reference Area: $\bar{x}$=54.13; s=10.18; n=40
t =2.505; df =78 ; SL= p<0.05

Sowbelly Substation
Reclaimed Area: $\bar{x}$=61.63; s=7.61; n=40
Reference Area: $\bar{x}$=54.13; s=10.18; n=40
t =3.732; df =78 ; SL= p<0.01

$\bar{x}$= 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

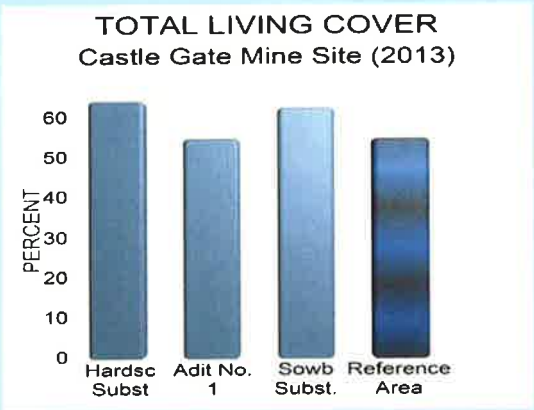

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FIG. 2. MOTYKA INDEX - A Comparison Between the Selected Reclaimed and Reference Areas (2013).

Hardscrabble Substation & Reference Area	$IS_{MO}=(\frac{2MW}{MA+MB})x100=80.220$
Adit No. 1 & Reference Area	$IS_{MO}=(\frac{2MW}{MA+MB})x100=83.460$
Sowbelly Substation & Reference Area	$IS_{MO}=(\frac{2MW}{MA+MB})x100=85.403$

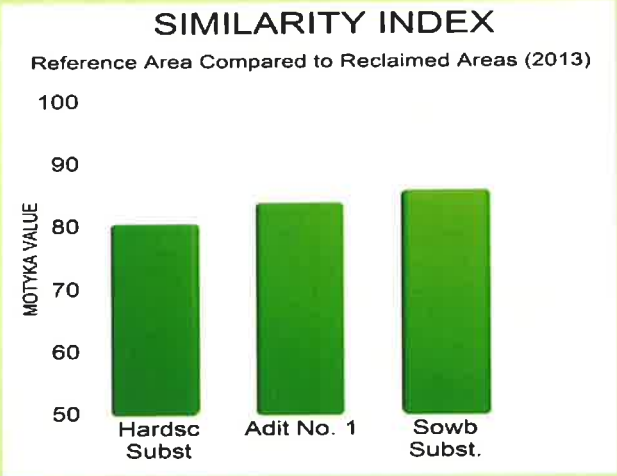

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FIG. 3. MacARTHUR'S INDEX - A Comparison Between the Selected Reclaimed and Reference Areas (2013).

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

Hardscrabble Substation
Reclaimed Area: 12.962
Reference Area: 7.910

Adit No. 1
Reclaimed Area: 8.383
Reference Area: 7.910

Sowbelly Substation
Reclaimed Area: 9.660
Reference Area: 7.910

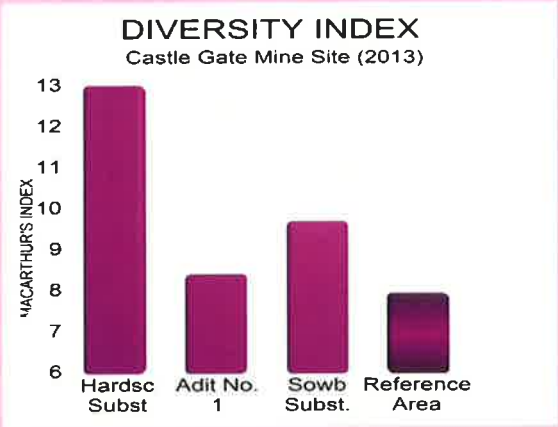

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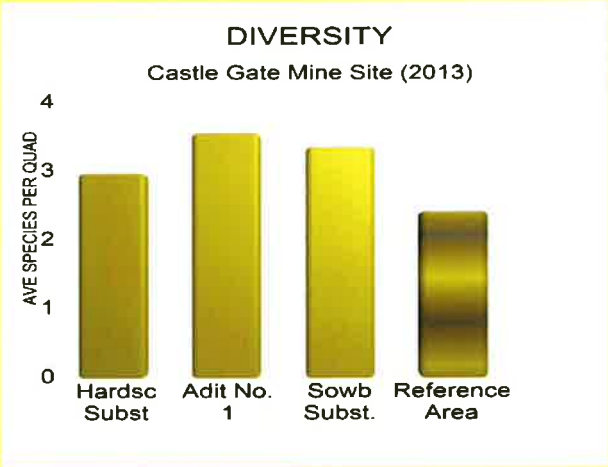
FIG. 4. AVERAGE NUMBER OF SPECIES PER SQUARE METER- A Comparison Between the Selected Reclaimed and Reference Areas (2013)..

$\bar{x}$ NO. SPP/M^2 =

Hardscrabble Substation
Reclaimed Area: 2.93
Reference Area: 2.38

Adit No. 1
Reclaimed Area: 3.50
Reference Area: 2..38

Sowbelly Substation
Reclaimed Area: 3.30
Reference Area: 2.38



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COLOR PHOTOGRAPHS OF THE STUDY SITES

Hardscrabble Substation

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Adit No. 1

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Sowbelly Substation

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Sowbelly Reference Area

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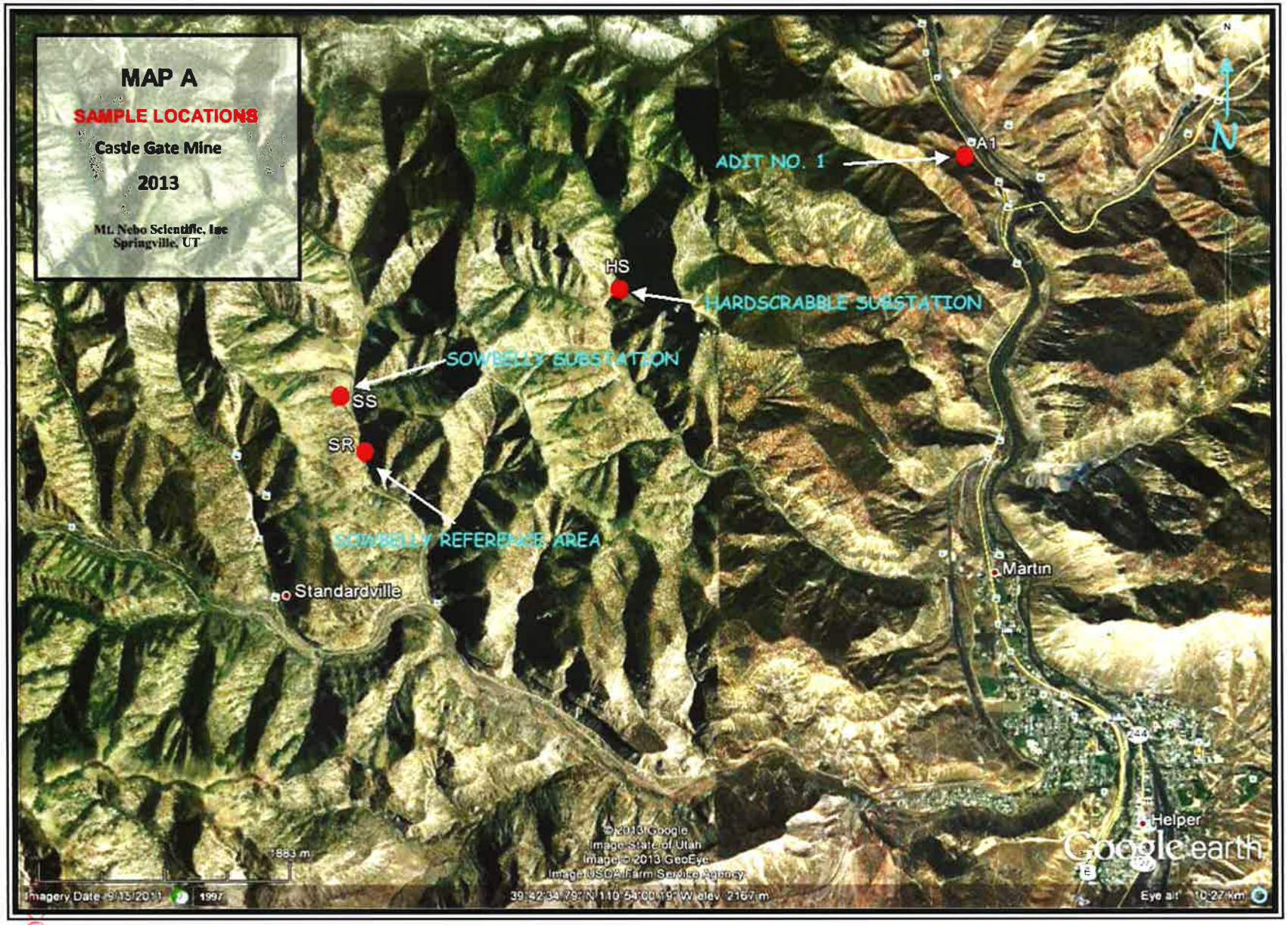

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VEGETATION MONITORING FOR PHASE III BOND RELEASE AT SELECTED SITES AT THE CASTLE GATE MINE

YEAR ONE

2012

FOR THE
CASTLE GATE HOLDING COMPANY

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March 2013

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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 *selected* reclaimed sites of the Castle Gate Mine. Unlike other portions of the mine that have been reclaimed longer and have consequently been studied and sampled for final bond release, the sites reported herein have only now been reclaimed long enough that the mine owner 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 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 applied for through the State of Utah, Division of Oil, Gas and Mining (DOGM). That said, vegetation sampling in 2012 was conducted as the first step to initiate this process.

The Reclaimed Sites

The reclaimed sites at the Castle Gate Mine that have been selected to be sampled for bond release include: **Hardscabble Substation**, **Adit No. 1** and the **Sowbelly Substation**. These sites are located apart from each other, and depending on the site, are about 1 to 3 air-miles apart (MAP A).

Reference Area

A Reference Area to be used as a standards for final revegetation success at the reclaimed sites was chosen at a much earlier date. Castle Gate's Mining and Reclamation Plan (MRP) stated that "*the AML Reference Areas shown on Exhibit 9-6 will be used to evaluate previously mined areas*". Because the AML (Abandoned Mined Lands) areas were relatively extensive, at least for use as one reference area, biologists from DOGM along with representatives for the mine, chose a smaller portion of the AML areas as a reference area for reclaimed areas of the Castle Gate Mine. The **Sowbelly Reference Area** is located down-canyon (or south)

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of the reclaimed Sowbelly Substation site (MAP A).

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 theformula given below.

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

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where,

nMIN	= minimum adequate sample
t	= appropriate confidence t-value
s	= standard deviation

x = sample mean
d = desired change from mean

The values used for "t" and "d" insured that sample adequacy was met with 90% confidence within a 10% deviation from the true mean.

Diversity and Similarity Indices

There are several well-documented methods to assess diversity and similarity in plant communities. The *Motyka Index* is a modified form of the *Sorenson Index,* both similarity indices. This index was used on the data; the equation is shown below:

$$IS_{MO}=\left(\frac{2MW}{MA+MB}\right)x100$$

where,

MW = $\sum$ of the smaller quantitative values of species of two communities,
MA = $\sum$ of the quantitative values of all species in one community,
MB = $\sum$ of the quantitative values of all species in another community.

Two diversity indices have been employed to measure the reclaimed and reference areas. *MacArthur's Diversity Index* is an effective diversity measurement and is computed using 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.

Another diversity measurement was provided that shows the *average number of species* encountered at each quadrat.

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Photographs

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

RESULTS

Reclaimed Hardscrabble Substation

The most common plant species found in the sample quadrats of the reclaimed Hardscrabble Substation were rubber rabbitbrush (*Chrysothamnus nauseosus)*, bluebunch wheatgrass *(Elymus spicatus*), Indian ricegrass (*Stipa hymenoides*), western wheatgrass (*Elymus smithii*) and thickspike wheatgrass (*E. lanceolatus*). Table 1 lists all species encountered in the sample quadrats and shows the cover and frequency values of each.

The total living cover of this reclaimed area was estimated at 63.78% (Table 2-A). The lifeform composition of that cover was nearly equally represented by grasses and shrubs at 49.69% and 46.91%, respectively, whereas forbs comprised only 3.39% of the cover (Table 2-B).

Reclaimed Adit No. 1

Table 3 shows the cover and frequency values for the reclaimed Adit No. 1 Area. The most common species here consisted of Gt. Basin wildrye (*Elymus cinereus)*, rubber rabbitbrush, bluebunch wheatgrass, thickspike wheatgrass, western wheatgrass and fourwing saltbush (*Atriplex canescens)*.

The total living cover for this site was estimated as 60.88% (Table 4-A); the composition of that cover was comprised of 59.40% grasses, 27.81% shrubs and 12.79% forbs (Table 4-B).

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Reclaimed Sowbelly Substation

The remaining reclaimed site, the Sowbelly Substation, was dominated by plants similar to the above sites including western wheatgrass, rubber rabbitbrush, bluebunch wheatgrass and fourwing saltbush (Table 5).

Also similar to the above sites, the total living cover at the Sowbelly Substation was estimated at 63.25% (Table 6-A) and had composition values at 54.20% grasses, 33.34% shrubs and 12.46% forbs (Table 6-B).

Reference Area

The Sowbelly Reference Area was the site chosen previously to be used for revegetation success standards at the time of final bond release. The most common species at this site consisted of western wheatgrass, thickspike wheatgrass, rubber rabbitbrush, and Louisiana sagewort *(Artemisia ludoviciana*). For a list of all species found in the sample quadrats along with their cover and frequency values, refer to Table 7.

The total living cover for this reference area was estimated at 54.51%, of which 0.38% came from overstory and 54.13% was understory cover (Table 8-A). The understory composition was comprised of 60.69% grasses, 23.52% forbs and 15.79% shrubs (Table 8-B).

Dataset Comparisons

Total Living Cover

Dataset comparisons were made between the reclaimed sites and reference area. First, statistical tests were employed to compare the total living plant cover of the sites. Student's t-tests were performed on each reclaimed site and compared with the reference. Results indicate that all sites, Hardscabble Substation, Adit No. 1 and Sowbelly Substation, all had more total living cover than the reference area – the differences were statistically significant (Fig. 1).

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Diversity and Similarity Indices

Next, similarity and diversity indices were computed and compared. The Motyka Index was recommended to be used to compare species 'diversity' in the Mining and Reclamation Plan (MRP). Although this index is more of a *similarity index* than a *diversity index*, it nonetheless has been employed to compare the datasets. The MRP assigned the following categories to be used for comparisons in the Motyka Index:

Non-Weedy Shrub Cover,
Weedy Shrub Cover,
Native Perennial Grass Cover,
Introduced Perennial Grass Cover,
Non-Weedy Forb & Grass Cover,
Weedy Forb & Grass Cover.

Fig. 2 shows the results of employing the Motyka Index using the above categories for each reclaimed area when compared to the reference area; similarity values were 81.961% (Hardscabble Substation), 92.294% (Adit No. 1) and 90.060% (Sowbelly Substation).

MacArthur's Diversity Index was also employed to the datasets of the reclaimed and reference areas. In all cases, the reclaimed areas were more diverse than the reference area (Fig. 3).

Finally, the Average Number of Species Per Square Meter also suggests greater diversity in the reclaimed areas when compared to the reference area – the reclaimed areas averaged more species per sample quadrat (Fig. 4).

DISCUSSION

Representatives from the Caste Gate Mine and the State of Utah, Division of Oil, Gas and Mining (DOGM) worked together formulating revegetation success standards for the Mining & Reclamation Plan of the site. Because the area was disturbed by mining operations prior to the current revegetation regulations and requirements, standards for revegetation success were modified. State regulation R645-301-356.250 states that: *"for areas previously disturbed by mining that were not reclaimed to the requirements of R645-200 through R645-203 and R645-301 through R645-302 and that are remined or otherwise*

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redisturbed by coal mining and reclamation operations, at a minimum, the vegetative ground cover will be not less than the ground cover existing before redisturbance and will be adequate to control erosion".

The Castle Gate Mine was continuously mined since the time it was first disturbed by mining activities. Because of this there was no vegetative cover data 'existing before redisturbance' as mentioned above in the state regulation. Therefore, DOGM and Castle Gate biologists agreed that upon final reclamation the standards for revegetation success would be determined using a specific reference area – but success parameters would be dictated more from the species present, diversity, and similarity indices rather than strictly by cover, productivity and woody species density as the more recent regulations would dictate. Erosion control (as stated in the regulation above) should also be considered for a successful revegetation standard.

With the above considerations, sampling quantitatively for cover would still be necessary in the reclaimed and disturbed areas to adequately address the success standards. That said, and even though such a comparison was not necessary here, the total living cover of the reclaimed areas was better than the reference area in 2012. Moreover, the plant species present in the quadrats in the reclaimed areas were comprised almost exclusively of "desirable" rather than "weedy" species. Not only does this suggest successful revegetation from a cover perspective, but it also suggests that erosion control is probably better in the reclaimed areas when compared to the reference area.

With consideration to Phase III Bond Release, the results in this report suggests that the reclaimed areas sampled in 2012 may soon be candidates. **Year 2** of the two consecutive sample years will be sampled in 2013.

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DATA SUMMARY TABLES

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Table 1: Castle Gate Mine. Living Cover and Frequency by Plant Species (2012).

Reclaimed Hardscrabble Substation Area			n=40
	Mean Percent	Standard Deviation	Percent Frequency
SHRUBS			
Artemisia nova	0.83	4.07	5.00
Artemisia tridentata	5.15	10.68	25.00
Atriplex canescens	3.50	9.23	15.00
Ceratoides lanata	1.50	6.91	5.00
Cercocarpus ledifolius	1.13	4.11	7.50
Chrysothamnus nauseosus	16.43	14.10	77.50
Rhus aromatica	1.38	5.59	7.50
FORBS			
Achillea millefolium	0.50	2.18	5.00
Linum lewisii	0.25	1.56	2.50
Machaeranthera canescens	0.50	2.18	2.50
Penstemon palmeri	1.00	3.00	10.00
GRASSES			
Bromus carinatus	0.25	1.56	2.50
Elymus cinereus	3.13	6.29	22.50
Elymus lanceolatus	4.63	7.86	30.00
Elymus salinus	1.75	7.03	7.50
Elymus smithii	5.25	8.44	35.00
Elymus spicatus	6.38	12.09	30.00
Poa secunda	3.88	9.32	17.50
Stipa hymenoides	6.38	10.19	37.50

Table 2: Castle Gate Mine. Total Cover and Composition (2012).

Reclaimed Hardscrabble Substation Area		n=40
A. TOTAL COVER	Mean Percent	Standard Deviation
Total Living Cover	63.78	9.71
Litter	9.35	3.74
Bareground	7.43	4.39
Rock	19.45	9.73
B. % COMPOSITION		
Shrubs	46.91	23.00
Forbs	3.39	7.09
Grasses	49.69	22.27

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Table 3: Castle Gate Mine. Living Cover and Frequency by Plant Species (2012).

Reclaimed Adit No. 1 Area			n=40
	Mean Percent	Standard Deviation	Percent Frequency
SHRUBS			
Artemisia tridentata	0.63	2.78	5.00
Atriplex canescens	5.38	10.15	30.00
Ceratoides lanata	1.13	3.79	10.00
Chrysothamnus nauseosus	9.63	10.69	60.00
Rhus aromatica	0.25	1.56	2.50
FORBS			
Aster chilensis	3.50	7.92	17.50
Halogeton glomeratus	0.50	2.18	5.00
Linum lewisii	0.88	2.93	10.00
Medicago sativa	1.38	8.59	2.50
Melilotus officinalis	0.50	2.45	5.00
Penstemon palmeri	0.63	3.20	5.00
GRASSES			
Elymus cinereus	13.13	15.32	62.50
Elymus elymoides	1.13	7.03	2.50
Elymus lanceolatus	6.13	10.28	32.50
Elymus smithii	5.75	6.94	47.50
Elymus spicatus	9.50	12.64	47.50
Poa pratensis	0.50	3.12	2.50
Stipa hymenoides	0.38	2.34	2.50

Table 4: Castle Gate Mine. Total Cover and Composition (2012).

Reclaimed Adit No. 1 Area		n=40
A. TOTAL COVER	Mean Percent	Standard Deviation
Total Living Cover	60.88	12.04
Litter	11.85	5.70
Bareground	7.03	5.87
Rock	20.25	12.89
B. % COMPOSITION		
Shrubs	27.81	21.25
Forbs	12.79	20.51
Grasses	59.40	26.31

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Table 5: Castle Gate Mine. Living Cover and Frequency by Plant Species (2012).

Reclaimed Sowbelly Substation Area			n=40
	Mean Percent	Standard Deviation	Percent Frequency
SHRUBS			
Artemisia tridentata	3.63	7.74	25.00
Atriplex canescens	4.25	10.46	17.50
Ceratoides lanata	1.88	6.29	10.00
Chrysothamnus nauseosus	11.00	13.24	60.00
Rhus aromatica	0.75	3.27	7.50
FORBS			
Achillea millefolium	1.25	3.11	15.00
Linum lewisii	1.63	3.43	20.00
Machaeranthera canescens	0.13	0.78	2.50
Melilotus officinalis	2.25	5.12	20.00
Penstemon palmeri	2.25	3.86	30.00
Viguiera multiflora	0.13	0.78	2.50
GRASSES			
Elymus cinereus	5.13	8.91	30.00
Elymus lanceolatus	4.88	8.18	32.50
Elymus smithii	16.50	11.52	77.50
Elymus spicatus	6.38	11.29	30.00
Stipa hymenoides	1.25	4.58	7.50

Table 6: Castle Gate Mine. Total Cover and Composition (2012).

Reclaimed Sowbelly Substation Area		n=40
A. TOTAL COVER	Mean Percent	Standard Deviation
Total Living Cover	63.25	7.46
Litter	9.75	3.34
Bareground	8.75	3.83
Rock	18.25	6.76
B. % COMPOSITION		
Shrubs	33.34	21.25
Forbs	12.46	13.33
Grasses	54.20	24.01

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Table 7: Castle Gate Mine. Living Cover and Frequency by Plant Species (2012).

Reclaimed Sowbelly Reference Area			n=40
	Mean Percent	Standard Deviation	Percent Frequency
OVERSTORY			
Acer glabrum	0.38	2.34	2.50
UNDERSTORY			
SHRUBS			
Atriplex canescens	3.00	10.54	10.00
Chrysothamnus nauseosus	5.75	8.98	35.00
Gutierrezia sarothrae	0.13	0.78	2.50
FORBS			
Antennaria sp.	0.25	1.56	2.50
Artemisia ludoviciana	5.25	9.22	35.00
Aster glaucodes	3.63	8.21	20.00
Penstemon palmeri	0.25	1.56	2.50
Sisymbrium altissimum	0.38	2.34	2.50
Taraxacum officinale	0.63	3.90	2.50
Viguiera multiflora	2.25	5.80	15.00
GRASSES			
Bromus tectorum	0.63	2.78	5.00
Elymus lanceolatus	11.13	17.98	35.00
Elymus smithii	18.13	19.86	57.50
Stipa hymenoides	2.75	10.00	10.00

Table 8: Castle Gate Mine. Total Cover and Composition (2012).

Reclaimed Sowbelly Reference Area		n=40
A. TOTAL COVER	Mean Percent	Standard Deviation
Overstory (O)	0.38	2.34
Understory (U)	54.13	10.36
Litter	13.23	7.41
Bareground	9.65	5.59
Rock	23.00	12.43
O + U	54.51	10.65
B. % COMPOSITION		
Shrubs	15.79	20.37
Forbs	23.52	23.69
Grasses	60.69	27.34

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FIGURES

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

Hardscrabble Substation
Reclaimed Area: $\bar{x}$=63.78; s=9.71; n=40
Reference Area: $\bar{x}$=54.51; s=10.65; n=40
t = 4.068; df =78 ; SL= p<0.01

Adit No. 1
Reclaimed Area: $\bar{x}$=60.88; s=12.04; n=40
Reference Area: $\bar{x}$=54.51; s=10.65; n=40
t =2.506; df =78 ; SL= p<0.05

Sowbelly Substation
Reclaimed Area: $\bar{x}$=63.25; s=7.46; n=40
Reference Area: $\bar{x}$=54.51; s=10.65; n=40
t =4.251; df =78 ; SL= p<0.01

$\bar{x}$= 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

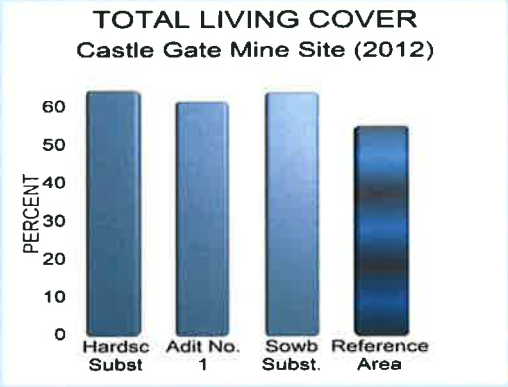

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FIG. 2. MOTYKA INDEX - A Comparison Between the Selected Reclaimed and Reference Areas.

Hardscrabble Substation & Reference Area	$IS_{MO}=(\frac{2MW}{MA+MB})x100=81.961$
Adit No. 1 & Reference Area	$IS_{MO}=(\frac{2MW}{MA+MB})x100=92.294$
Sowbelly Substation & Reference Area	$IS_{MO}=(\frac{2MW}{MA+MB})x100=90.060$

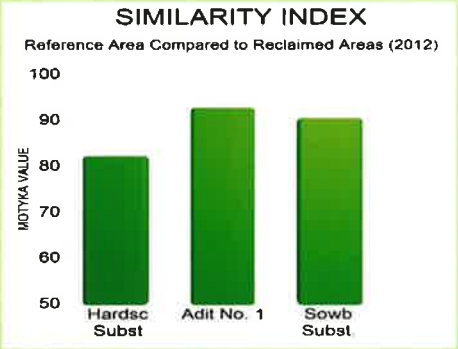

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FIG. 3. MacARTHUR'S INDEX - A Comparison Between the Selected Reclaimed and Reference Areas.

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

Hardscrabble Substation
Reclaimed Area: 9.551
Reference Area: 7.174

Adit No. 1
Reclaimed Area: 8.383
Reference Area: 7.174

Sowbelly Substation
Reclaimed Area: 9.660
Reference Area: 7.174

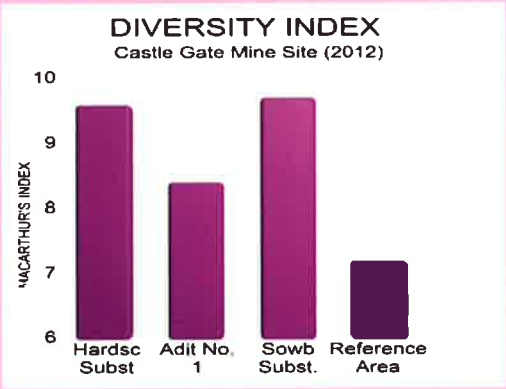

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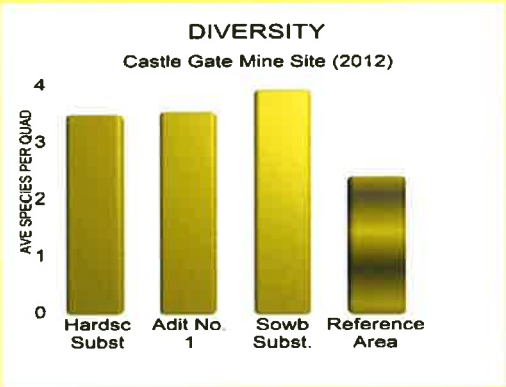
FIG. 4. AVERAGE NUMBER OF SPECIES PER SQUARE METER- A Comparison Between the Selected Reclaimed and Reference Areas.

$\bar{x}$ NO. SPP/M^2 =

Hardscrabble Substation
Reclaimed Area: 3.45
Reference Area: 2.38

Adit No. 1
Reclaimed Area: 3.50
Reference Area: 2.38

Sowbelly Substation
Reclaimed Area: 3.88
Reference Area: 2.38



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COLOR PHOTOGRAPHS
OF THE
STUDY AREAS

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Hardscrabble Substation

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Adit No. 1

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Sowbelly Substation

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Sowbelly Reference Area

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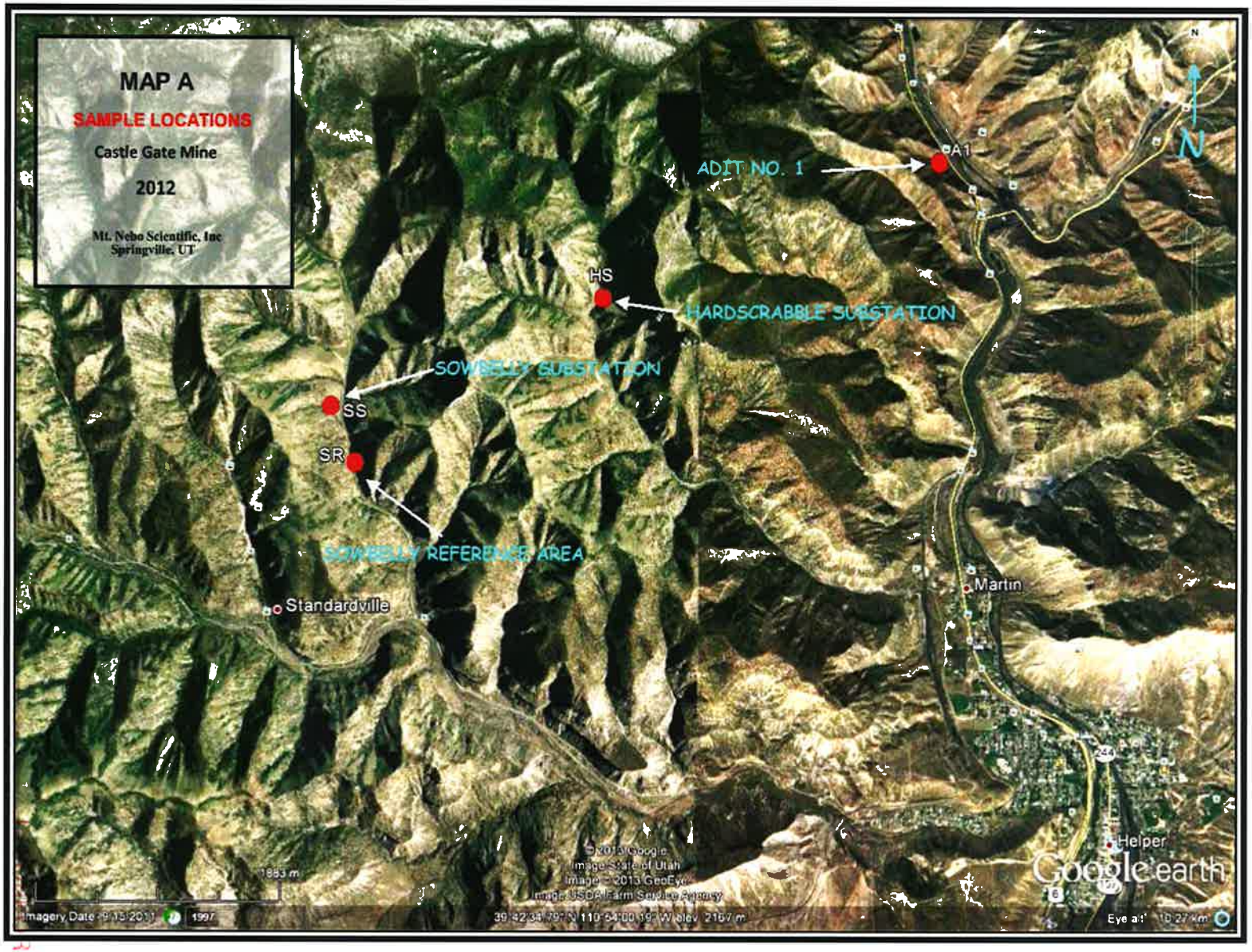

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Appendix 2

Sediment Yield Calculations For Phase III Bond Release

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Sediment Yield Calculations
Phase III Bond Release
Castle Gate Mine
Hardscrabble Canyon Substation
Castle Gate Holding Company

REGISTERED PROFESSIONAL ENGINEER
No. 168246
RICHARD B. WHITE
3 Apr 2014
STATE OF UTAH

April 2014

submitted by

EarthFax Engineering Group, LLC
7324 South Union Park Avenue
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Sediment Yield Calculations
Phase III Bond Release
Castle Gate Mine (Hardscrabble Canyon Substation)
Castle Gate Holding Company

Summary

The Revised Universal Soil Loss Equation (RUSLE) was used to calculate sediment yields from an area of the Castle Gate Mine under both pre-disturbance and post-reclamation conditions. Details regarding this methodology and the associated references are provided on the following pages. Under the pre-disturbance condition, slopes were taken as 100 feet long. Deep gouging was used in reclaimed areas, thereby limiting the post-reclamation slope length to approximately 3 feet. The changes in sediment yields resulting from revegetation of the site were also accounted for by comparing plant growth in the reclaimed area to the growth in an undisturbed reference area. The following calculations indicate that sediment yields for the reclaimed condition are 0.01 ton/acre/year, while those from the pre-disturbance condition are 0.06 tons/acre/year. Hence, sediment yields are estimated to be less after reclamation than before the area was disturbed by mining.

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Sediment Yield Calculation

	R	K	LS	C	P	A (t/ac/yr)
Hardscrabble Canyon Substation (Pre-Disturbance)	11	0.05	1.80	0.059	1	0.06
Hardscrabble Canyon Substation (Post Reclamation)	11	0.05	0.31	0.032	1	0.01

Notes:

1. A = R K LS C P, where A is the annual sediment yield (tons/acre/year). This is the Revised Universal Soil Loss Equation (RUSLE). Each of the coefficients is explained below.
2. R = Rainfall-Runoff Erosivity Factor (unitless) = 11 from Map 7 (Isrealsen et al., 1984). R is identical for both the pre-disturbed and post-reclamation conditions.
3. K = Soil Erodibility Factor (unitless) = 0.05 for the Travessilla-Rock outcrop Gerst complex and Pathead-Curecanti family association as stated in the published NRCS soil survey for this area (Jensen and Borchert, 1988). The K Factor for the pre-disturbance condition was taken to be the same as the post-reclamation condition since on-site topsoil was used for reclamation.
4. LS = Length-Slope Factor (unitless), taken from the following LS Calculation Table.
5. C = Cover Management Factor (unitless), taken from the following Determination of C Factor Table.
6. P = Support Practice Factor (unitless). Since during both the pre-disturbance and reclamation conditions the site is left undisturbed, this factor does not apply. Thus, it will be taken as 1.

References:

1. Israelsen, C. Earl, Joel E. Fletcher, Frank W. Haws, and Eugene K. Israelsen, 1984. *Erosion and Sedimentation in Utah: A Guide for Control*. Hydraulics and Hydrology Series UWRL/H-84/03. Utah Water Research Laboratory, College of Engineering, Utah State University, Logan, Utah.
2. Jensen, E.H. and J.W. Borchert, 1988. *Soil Survey of Carbon Area, Utah.* U.S. Natural Resources Conservation Service, Salt Lake City, Utah.

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LS Calculation Table

Location	s	l	m	LS
Hardscrabble Canyon Substation (Pre-Disturbance)	12	100	0.5	1.80
Hardscrabble Canyon Substation (Post Reclamation)	12	3	0.5	0.31

Notes:

1. s = slope angle (%). Because pre-disturbance topography is unknown, the steepest slope in the reclaimed area (12%) was used for both the post-reclamation and pre-disturbance conditions.
2. l = slope length (ft). This value is defined as the distance from the origin of overland flow to the point of deposition or channelized flow. Slope lengths rarely exceed 400 feet, and in this case, the presence of rocks, trees, and roads are conservatively estimated to limit the pre-disturbance slope length to 100 feet. Post-reclamation slope lengths are taken as 3 feet, which is the average distance from the top to the bottom of a deep gouge.
3. m = a factor in the LS equation which is 0.5 for slopes steeper than 5%.
4. $LS = ((65.41s^2/(s^2+10{,}000)) + 4.56s/(s^2+10{,}000)^{0.5} + 0.065) / (l/72.6)^m$ (Israelsen et al., 1984)

References:

1. Israelsen, C. Earl, Joel E. Fletcher, Frank W. Haws, and Eugene K. Israelsen, 1984. *Erosion and Sedimentation in Utah: A Guide for Control*. Hydraulics and Hydrology Series UWRL/H-84/03. Utah Water Research Laboratory, College of Engineering, Utah State University, Logan, Utah.

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Determination of C Factor

The cover and management factor (C) was determined using tabulated values provided by Haan et al. (1994). The vegetative cover at the site was taken from Figure 1 of a recent vegetation monitoring report for the site performed by Mt. Nebo Scientific, Inc. (2013). These tables present the percentages of vegetative growth in both reference areas (pre-disturbance) and reclaimed areas. The total ground cover at each area was taken as the sum of the percentages covered by trees, shrubs, forbs, and grasses. Note that litter was not included in the ground cover calculation, since its presence is implicit in the tabulations provided by Haan et al. (1994). The C values were determined as shown below.

Reference Area (Pre-Disturbance)		**Hardscrabble Canyon Substation (Post Reclamation)**	
%Ground Cover	C	%Ground Cover	C
54.13	0.059	63.38	0.032

References:

1. Haan, C.T., B.J. Barfield, and J.C. Hayes. 1994. Design *Hydrology and Sedimentology for Small Catchments*. Academic Press, San Diego, California.
2. Mt. Nebo Scientific, Inc., 2013, Vegetation Monitoring for Phase III Bond Release at Seleceted Sites at the Castle Gate Mine Year Two. prepared by Patrick Collins, Ph.D. for Castle Gate Holding Company.

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Sediment Yield Calculations
Phase III Bond Release
Castle Gate Mine
Sowbelly Canyon Substation
Castle Gate Holding Company

REGISTERED PROFESSIONAL ENGINEER
No. 168246
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30 Apr 2014
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April 2014

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Sediment Yield Calculations
Phase III Bond Release
Castle Gate Mine (Sowbelly Canyon Substation)
Castle Gate Holding Company

Summary

The Revised Universal Soil Loss Equation (RUSLE) was used to calculate sediment yields from an area of the Castle Gate Mine under both pre-disturbance and post-reclamation conditions. Details regarding this methodology and the associated references are provided on the following pages. Under the pre-disturbance condition, slopes were taken as 100 feet long. Deep gouging was used in reclaimed areas, thereby limiting the post-reclamation slope length to approximately 3 feet. The changes in sediment yields resulting from revegetation of the site were also accounted for by comparing plant growth in the reclaimed area to the growth in an undisturbed reference area. The following calculations indicate that sediment yields for the reclaimed condition are 0.15 ton/acre/year, while those from the pre-disturbance condition are 0.78 tons/acre/year. Hence, sediment yields are estimated to be less after reclamation than before the area was disturbed by mining.

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Sediment Yield Calculation

	R	K	LS	C	P	A (t/ac/yr)
Sowbelly Canyon Substation (Pre-Disturbance)	11	0.05	24.74	0.057	1	0.78
Sowbelly Canyon Substation (Post Reclamation)	11	0.05	7.32	0.037	1	0.15

Notes:

1. A = R K LS C P, where A is the annual sediment yield (tons/acre/year). This is the Revised Universal Soil Loss Equation (RUSLE). Each of the coefficients is explained below.
2. R = Rainfall-Runoff Erosivity Factor (unitless) = 11 from Map 7 (Isrealsen et al., 1984). R is identical for both the pre-disturbed and post-reclamation conditions.
3. K = Soil Erodibility Factor (unitless) = 0.05 for the Pathead-Curecanti family association and the Travesilla-Rock outcrop-Gerst complex as stated in the published NRCS soil survey for this area (Jensen and Borchert, 1988). The K Factor for the pre-disturbance condition was taken to be the same as the post-reclamation condition since on-site topsoil was used for reclamation.
4. LS = Length-Slope Factor (unitless), taken from the following LS Calculation Table
5. C = Cover Management Factor (unitless), taken from the following Determination of C Factor Table.
6. P = Support Practice Factor (unitless). Since during both the pre-disturbance and reclamation conditions the site is left undisturbed, this factor does not apply. Thus, it will be taken as 1.

References:

1. Israelsen, C. Earl, Joel E. Fletcher, Frank W. Haws, and Eugene K. Israelsen, 1984. *Erosion and Sedimentation in Utah: A Guide for Control*. Hydraulics and Hydrology Series UWRL/H-84/03. Utah Water Research Laboratory, College of Engineering, Utah State University, Logan, Utah.
2. Jensen, E.H. and J.W. Borchert, 1988. *Soil Survey of Carbon Area, Utah.* U.S. Natural Resources Conservation Service, Salt Lake City, Utah.

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LS Calculation Table

Location	s	l	m	LS
Sowbelly Canyon Substation (Pre-Disturbance)	63	100	0.5	24.74
Sowbelly Canyon Substation (Post Reclamation)	100	3	0.5	7.32

Notes:

1. s = slope angle (%). The steepest slopes at the Sowbelly Canyon substation site (100%) were used for the post-reclamation condition. Since pre-disturbance topography is unknown, the slopes were conservatively assumed to be 63%, based on surrounding topography.
2. l = slope length (ft). This value is defined as the distance from the origin of overland flow to the point of deposition or channelized flow. Slope lengths rarely exceed 400 feet, and in this case, the presence of rocks, trees, and roads are conservatively estimated to limit the pre-disturbance slope length to 100 feet. Post-reclamation slope lengths are taken as 3 feet, which is the average distance from the top to the bottom of a deep gouge.
3. m = a factor in the LS equation which is 0.5 for slopes steeper than 5%.
4. $LS = ((65.41s^2/(s^2+10{,}000)) + 4.56s/(s^2+10{,}000)^{0.5} + 0.065) / (l/72.6)^m$ (Israelsen et al., 1984)

References:

1. Israelsen, C. Earl, Joel E. Fletcher, Frank W. Haws, and Eugene K. Israelsen, 1984. *Erosion and Sedimentation in Utah: A Guide for Control*. Hydraulics and Hydrology Series UWRL/H-84/03. Utah Water Research Laboratory, College of Engineering, Utah State University, Logan, Utah.

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Determination of C Factor

The cover and management factor (C) was determined using tabulated values provided by Haan et al. (1994). The vegetative cover at the site was taken from Figure 1 of a recent vegetation monitoring report for the site performed by Mt. Nebo Scientific, Inc. (2013). These tables present the percentages of vegetative growth in both reference areas (pre-disturbance) and reclaimed areas. The total ground cover at each area was taken as the sum of the percentages covered by trees, shrubs, forbs, and grasses. Note that litter was not included in the ground cover calculation, since its presence is implicit in the tabulations provided by Haan et al. (1994). The C values were determined as shown below.

Reference Area (Pre-Disturbance)		**Sowbelly Canyon Substation (Post Reclamation)**	
%Ground Cover	C	%Ground Cover	C
54.13	0.057	61.63	0.037

References:

1. Haan, C.T., B.J. Barfield, and J.C. Hayes. 1994. Design *Hydrology and Sedimentology for Small Catchments*. Academic Press, San Diego, California.
2. Mt. Nebo Scientific, Inc., 2013, Vegetation Monitoring for Phase III Bond Release at Seleceted Sites at the Castle Gate Mine Year Two. prepared by Patrick Collins, Ph.D. for Castle Gate Holding Company.

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Sediment Yield Calculations
Phase III Bond Release
Castle Gate Mine
Adit No. 1
Castle Gate Holding Company

REGISTERED PROFESSIONAL ENGINEER
No. 168246
RICHARD B. WHITE
3 Apr 2014
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April 2014

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Phase III Bond Release
Castle Gate Mine (Adit No. 1)
Castle Gate Holding Company

Summary

The Revised Universal Soil Loss Equation (RUSLE) was used to calculate sediment yields from an area of the Castle Gate Mine under both pre-disturbance and post-reclamation conditions. Details regarding this methodology and the associated references are provided on the following pages. Under the pre-disturbance condition, slopes were taken as 100 feet long. Deep gouging was used in reclaimed areas, thereby limiting the post-reclamation slope length to approximately 3 feet. The changes in sediment yields resulting from revegetation of the site were also accounted for by comparing plant growth in the reclaimed area to the growth in an undisturbed reference area. The following calculations indicate that sediment yields for the reclaimed condition are 0.18 ton/acre/year, while those from the pre-disturbance condition are 0.90 tons/acre/year. Hence, sediment yields are estimated to be less after reclamation than before the area was disturbed by mining.

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Sediment Yield Calculation

	R	K	LS	C	P	A (t/ac/yr)
Adit No. 1 (Pre-Disturbance)	11	0.15	9.29	0.059	1	0.90
Adit No. 1 (Post Reclamation)	11	0.15	2.81	0.039	1	0.18

Notes:

1. A = R K LS C P, where A is the annual sediment yield (tons/acre/year). This is the Revised Universal Soil Loss Equation (RUSLE). Each of the coefficients is explained below.
2. R = Rainfall-Runoff Erosivity Factor (unitless) = 11 from Map 7 (Isrealsen et al., 1984). R is identical for both the pre-disturbed and post-reclamation conditions.
3. K = Soil Erodibility Factor (unitless) = 0.15 for the Doney families complex, as stated in the published NRCS soil survey for this area (Jensen and Borchert, 1988). The K Factor for the pre-disturbance condition was taken to be the same as the post-reclamation condition since on-site topsoil was used for reclamation.
4. LS = Length-Slope Factor (unitless), taken from the following LS Calculation Table
5. C = Cover Management Factor (unitless), taken from the following Determination of C Factor Table.
6. P = Support Practice Factor (unitless). Since during both the pre-disturbance and reclamation conditions the site is left undisturbed, this factor does not apply. Thus, it will be taken as 1.

References:

1. Israelsen, C. Earl, Joel E. Fletcher, Frank W. Haws, and Eugene K. Israelsen, 1984. *Erosion and Sedimentation in Utah: A Guide for Control*. Hydraulics and Hydrology Series UWRL/H-84/03. Utah Water Research Laboratory, College of Engineering, Utah State University, Logan, Utah.
2. Jensen, E.H. and J.W. Borchert, 1988. *Soil Survey of Carbon Area, Utah.* U.S. Natural Resources Conservation Service, Salt Lake City, Utah.

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LS Calculation Table

Location	s	l	m	LS
Adit No. 1 (Pre-Disturbance)	33	100	0.5	9.29
Adit No. 1 (Post Reclamation)	47	3	0.5	2.81

Notes:

1. s = slope angle (%). The steepest slopes at the Adit No. 1 site (47%) were used for the post-reclamation condition. Since pre-disturbance topography is unknown, slopes of 33% were conservatively used for this condition, based on surrounding topography.
2. l = slope length (ft). This value is defined as the distance from the origin of overland flow to the point of deposition or channelized flow. Slope lengths rarely exceed 400 feet, and in this case, the presence of rocks, trees, and roads are conservatively estimated to limit the pre-disturbance slope length to 100 feet. Post-reclamation slope lengths are taken as 3 feet, which is the average distance from the top to the bottom of a deep gouge.
3. m = a factor in the LS equation which is 0.5 for slopes steeper than 5%.
4. $LS = ((65.41s^2/(s^2+10{,}000)) + 4.56s/(s^2+10{,}000)^{0.5} + 0.065) / (l/72.6)^m$ (Israelsen et al., 1984)

References:

1. Israelsen, C. Earl, Joel E. Fletcher, Frank W. Haws, and Eugene K. Israelsen, 1984. *Erosion and Sedimentation in Utah: A Guide for Control*. Hydraulics and Hydrology Series UWRL/H-84/03. Utah Water Research Laboratory, College of Engineering, Utah State University, Logan, Utah.

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Determination of C Factor

The cover and management factor (C) was determined using tabulated values provided by Haan et al. (1994). The vegetative cover at the site was taken from Figure 1 of a recent vegetation monitoring report for the site performed by Mt. Nebo Scientific, Inc. (2013). These tables present the percentages of vegetative growth in both reference areas (pre-disturbance) and reclaimed areas. The total ground cover at each area was taken as the sum of the percentages covered by trees, shrubs, forbs, and grasses. Note that litter was not included in the ground cover calculation, since its presence is implicit in the tabulations provided by Haan et al. (1994). The C values were determined as shown below.

Reference Area (Pre-Disturbance)		**Adit No. 1 (Post Reclamation)**	
%Ground Cover	C	%Ground Cover	C
54.13	0.059	60.88	0.039

References:

1. Haan, C.T., B.J. Barfield, and J.C. Hayes. 1994. Design *Hydrology and Sedimentology for Small Catchments*. Academic Press, San Diego, California.
2. Mt. Nebo Scientific, Inc., 2013, Vegetation Monitoring for Phase III Bond Release at Seleceted Sites at the Castle Gate Mine Year Two. prepared by Patrick Collins, Ph.D. for Castle Gate Holding Company.

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Appendix 3

Public Notice
Phase III Bond Release

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Public Notice
Phase II and Phase III Bond Release Application
Castle Gate Holding Company, Castle Gate Mine
Permit C/007/0004, Renewed 12/24/2009

Notice is hereby given that Castle Gate Holding Company, P.O. Box 30, Helper, Utah 84526, has filed an application with the Utah Department of Natural Resources, Division of Oil, Gas and Mining pursuant to R645-301-880 for phase II and phase III bond release for the Castle Gate Mine Permit C/007/0004. Castle Gate Holding Company has completed phase II and phase III of the approved reclamation plan based on meeting the vegetation and water quality requirements in accordance with the approved reclamation plan. This bond release applies to the entire permit which includes 5.56 acres of disturbed and reclaimed land.

In accordance with the provision of R645-301-880, of the State of Utah R645 Coal Mining Rules, notice is hereby given that Castle Gate Holding Company is applying for complete release of the performance bond posted for this permit. The surety bond posted for the Castle Gate Mine is $226,600.

The permit area is located in Carbon County, Utah as follows:

Township 12 South, Range 9 East, SLBM
Section 22: Portions of SE1/4 SW1/4 and S1/2 SE1/4
Section 26: Portions of W1/2
Section 27: All except portions of NW1/4 and NW1/4 NW1/4 SW/14
Section 28: All except portions of the SE1/4 SE1/4 NE1/4, SE1/4 and SW1/4
Section 29: All except N1/2 NW1/4, NW1/4 NE1/4, and portions of S1/2 NE/4 and N1/2SE1/4
Section 30: All except N1/2 N1/2
Section 31: All
Section 32: All
Section 33 All
Section 34: All
Section 35: Portions of N1/2, W1/2S W1/4, SE1/4

Township 13 South, Range 9 East, SLBM
Section 1: Portions of NW1/4 NW1/4
Section 2: Portions of NE1/4 and NW1/4
Section 3: NW1/4 and portions of NE1/4, SE1/4 and SW1/4
Section 4: N1/2 and portions of SE1/4, SW1/4
Section 5: NE/4 and portions of NW1/4, SE1/4 and SW1/4
Section 6: N1/2, portions of SW1/4, SE1/4
Section 8: Portions of NE1/4
Section 9: Portions of NE1/4, NW1/4 and SW1/4
Section 10: Portions of NE1/4, NW1/4.

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The permit area is shown on the following U.S. Geological Survey 7.5-minute quadrangle maps: Standardville, Kyune, Matt's Summit, Helper and Deadman Canyon.

The Utah Division of Oil, Gas and Mining will now evaluate the proposal to determine whether it meets all the criteria of the Permanent Program Performance Standards according to the requirements of the Utah Coal Mining Rules.

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

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

Closing date for submission of such comments, objections and requests for public hearing or informal conference on this proposal will be received within 30 days of the last date of publication.

Published in the Sun Advocate on May 1, 8, 15 and 22, 2014.

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Appendix 4

Landowner and Government Agency Notification
Phase III Bond Release

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CASTLE GATE HOLDING COMPANY
April 28, 2012

Interested Party

Re: **Notification of Application for Phase II and Phase III Bond Release, Castle Gate Holding Company, Castle Gate Mine, C/007/0004, Carbon County, Utah**

Notice is hereby given that Castle Gate Holding Company, P.O. Box 30, Helper, Utah 84526, has filed an application with the Utah Department of Natural Resources, Division of Oil, Gas and Mining pursuant to R645-301-880 for phase II and phase III bond release for the Castle Gate Mine Permit C/007/0004. Castle Gate Holding Company has completed phase II and phase III of the approved reclamation plan based on meeting the vegetation and water quality requirements in accordance with the approved reclamation plan. This bond release applies to the entire permit which includes 5.56 acres of disturbed and reclaimed land.

In accordance with the provision of R645-301-880, of the State of Utah R645 Coal Mining Rules, notice is hereby given that Castle Gate Holding Company is applying for complete release of the performance bond posted for this permit. The surety bond posted for the Castle Gate Mine is $226,600.

The permit area is located in Carbon County, Utah as follows:

Township 12 South, Range 9 East, SLBM
Section 22: Portions of SE1/4 SW1/4 and S1/2 SE1/4
Section 26: Portions of W1/2
Section 27: All except portions of NW1/4 and NW1/4 NW1/4 SW/14
Section 28: All except portions of the SE1/4 SE1/4 NE1/4, SE1/4 and SW1/4
Section 29: All except N1/2 NW1/4, NW1/4 NE1/4, and portions of S1/2 NE/4 and N1/2SE1/4
Section 30: All except N1/2 N1/2
Section 31: All
Section 32: All
Section 33 All
Section 34: All
Section 35: Portions of N1/2, W1/2S W1/4, SE1/4

Township 13 South, Range 9 East, SLBM
Section 1: Portions of NW1/4 NW1/4
Section 2: Portions of NE1/4 and NW1/4
Section 3: NW1/4 and portions of NE1/4, SE1/4 and SW1/4
Section 4: N1/2 and portions of SE1/4, SW1/4

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Section 5: NE/4 and portions of NW1/4, SE1/4 and SW1/4
Section 6: N1/2, portions of SW1/4, SE1/4
Section 8: Portions of NE1/4
Section 9: Portions of NE1/4, NW1/4 and SW1/4
Section 10: Portions of NE1/4, NW1/4.

The permit area is shown on the following U.S. Geological Survey 7.5-minute quadrangle maps: Standardville, Kyune, Matt's Summit, Helper and Deadman Canyon.

The Utah Division of Oil, Gas and Mining will now evaluate the proposal to determine whether it meets all the criteria of the Permanent Program Performance Standards according to the requirements of the Utah Coal Mining Rules.

Comments concerning this phase II and phase III bond release from the legal or equitable owner of record of the surface areas to be affected and from the Federal, Utah and local government agencies which would have to initiate, implement, approve or authorize the proposed use of the land following reclamation should be mailed to: Castle Gate Holding Company, P.O. Box 30 Helper, Utah 84526.

Sincerely,

Dennis Ware
Authorized Representative
Castle Gate Holding Company
P.O. Box 30
Helper, Utah 84526
(435) 472-4737
dware@alphanr.com

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Mailed to:

Carbon County Planning and Zoning
120 East Main Street
Price, Utah 84501

Director Land Management
Blackhawk Coal Company
700 Morrison Road
Gahanna, Ohio 43230-6642

Carbon County Commissioners
120 East Main Street
Price, Utah 84501

Mr. Steven Rigby
Bureau of Land Management
125 South 600 West
Price, Utah 84501

Director
School and Institutional Trust Lands Administration
675 East 500 South, Suite 500
Salt Lake City, Utah 84102-2818

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

Mark Stilson, Regional Engineer
State of Utah
Division of Water Rights
319 Carbonville Rd. Suite B
Price, Utah 804501

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Director
State Historic Preservation Office
300 Rio Grande
Salt Lake City, Utah 84101

Office of Surface Mining
1999 Broadway St., Suite 3320
Denver, CO 80202-3050

Utah Department of Transportation
940 South Carbon Avenue
Price, Utah 84501

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Appendix 5

Reclamation Certification
Phase III Bond Release

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Castle Gate Holding Company
Castle Gate Mine
C/007/0004

Phase II and Phase III Bond Release for the Castle Gate Mine Permit C/007/0004.

I herby certify to the best of my information and belief all the information contained in this application for phase II and phase III bond release is true and correct and that all applicable reclamation activities have been accomplished in accordance with the requirement of the Act, the regulatory program and the approved reclamation plan.

Dennis N. Ware
Print Name

Authorized Representative
Position

4/28/2014
Signature, Date

Subscribed and sworn to before me this 28th day of April, 2014

Ruanne Leeflang
Notary Public

Notary Public
RUANNE LEEFLANG
Commission #667709
My Commission Expires
June 30, 2017
State of Utah

My Commission Expires: 6-30, 2017
Attest: State of Utah
County of Emery

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Appendix 6

Bond Release Calculation
Phase II Bond Release

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Bond Release Calculation

The current reclamation bond amount for the Castle Gate Mine (C/007/0004) is $226,600. Castle Gate Holding Company is requesting complete and final Phase III bond release, therefore, the full amount of the bond or $226,600 is requested to be released upon approval of this bond release application.

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