

July 22, 2024



Rob Zuber
Environmental Protection Specialist
Colorado Division of Reclamation, Mining and Safety
1313 Sherman Street, Room 215
Denver, Colorado 80203

Re: Adequacy Review Response for Phase III Bond Release Application SL-12 – Keenesburg Mine (Permit #C-1981-028)

Dear Mr. Zuber,

Coors Energy Company (CEC) received your adequacy review for SL-12, dated July 19, 2024, and has the following responses to your adequacy items.

1. The total precipitation for Sept 2020 – July 2021 was 8.9” as was shown in Attachment 1. However, the numbers were transposed in Table 4 (9.8” instead of 8.9”). This has been corrected in the attached version of the Revegetation Success Demonstration. The correct number was used in the statistical calculations for the cover data, so the results are unchanged.
2. In addition to the precipitation total in Table 4, there was also an error in the calculation used for the production standard during hypothesis testing. It was accidentally calculated as $(0.4666 \times x)^{2.1405}$ instead of $0.4666 \times x^{2.1405}$. Tables 4, 7, and 8 have been updated with the corrected values in the attached version of the Revegetation Success Demonstration. All three areas still pass the standard in both years.

Please contact me or Ben Moline at Coors Energy Company if you have any questions regarding the information presented in this adequacy response.

Thank you,

Robin F. Bay
Principal Environmental Scientist

CC: Benjamin Moline, Coors Energy Company
Brock Bowles, Colorado Division of Reclamation, Mining and Safety

Enclosures: Keenesburg Mine Phase III bond release application (SL-12) – Revised Revegetation Success Demonstration



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**Coors Energy Company Keenesburg Mine
Phase III Bond Release Application
SL-12**

**Revegetation Success Demonstration
Areas 29/23, 30, and 31**

**May 2024
Revised July 2024**

*Coors Energy Company Keenesburg Mine – Phase III Bond Release Application
Revegetation Success Demonstration*

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1 Introduction

The information contained in this application includes results and analysis of 2021 and 2022 vegetation sampling. This information supports Phase III bond release for Reclamation Areas 23, 29, 30, and 31 totaling 30.6 acres. Figure 1 shows the location and extent of the Phase III application area within the Keenesburg Mine. Per approval from DRMS, Reclamation Area 23 was combined with Reclamation Area 29 in 2019 for vegetation sampling. This combined area is referred to as Area 29/23 in this report.

2 Revegetation and Bond Release History

Reclamation Areas 23, 29, 30, and 31 were formerly part of the B Pit mining area. These areas were graded to blend into the undisturbed area to the west and the reclaimed mining and operational areas to the east resulting in a gentle, east-facing slope. Each area was backfilled and graded. Final revegetation seeding with the DRMS-approved permanent seed mixture in each area took place in the year shown in Table 1.

Table 1: Reclamation Year by Reclamation Area

Area	Acres	Year Seeded
23	0.67	2002
29	8.31	2003
30	9.68	2006
31	11.89	2009

Phase I bond release was granted for Areas 23 and 29 in 2004 with SL-02 and for Areas 30 and 31 in 2014 with SL-07. Phase II bond release was granted for Areas 23 and 29 in 2010 with SL-05 and for Area 31 in 2019 with SL-10. Area 30 has not yet received Phase II bond release but has met the Phase II requirements as demonstrated in this application.

3 Vegetation Sampling

The monitoring methods and revegetation standards used to evaluate these areas are those currently in effect under the Colorado Surface Coal Mining Reclamation Act (CRS 34-33-101) and the Keenesburg Mining and Reclamation Permit. Vegetation monitoring occurred on August 9 – 13, 2021 and August 15 – 25, 2022. Monitoring coincided with maximum vegetation development of most plant species found in the reclaimed and adjacent native areas.

3.1 Sampling Design

Thirty sample points were placed prior to going into the field using mapping software to create a square grid overlaid on each Reclamation Area being sampled. The sample points were located at the intersection of each square created by the grid. The grid size was adjusted to create the appropriate number of sample locations within each Reclamation Area. Sample numbers (1-30) were randomly assigned to each generated sample point along with a randomly generated azimuth (Figure 2 and Figure 3). A minimum of 15 vegetation cover samples were collected in each Reclamation Area with additional samples collected, if necessary, to meet sample adequacy per DRMS guidelines (DRMS 1995) up to a maximum of 30 samples. The maximum of 30 production samples were collected in each area.

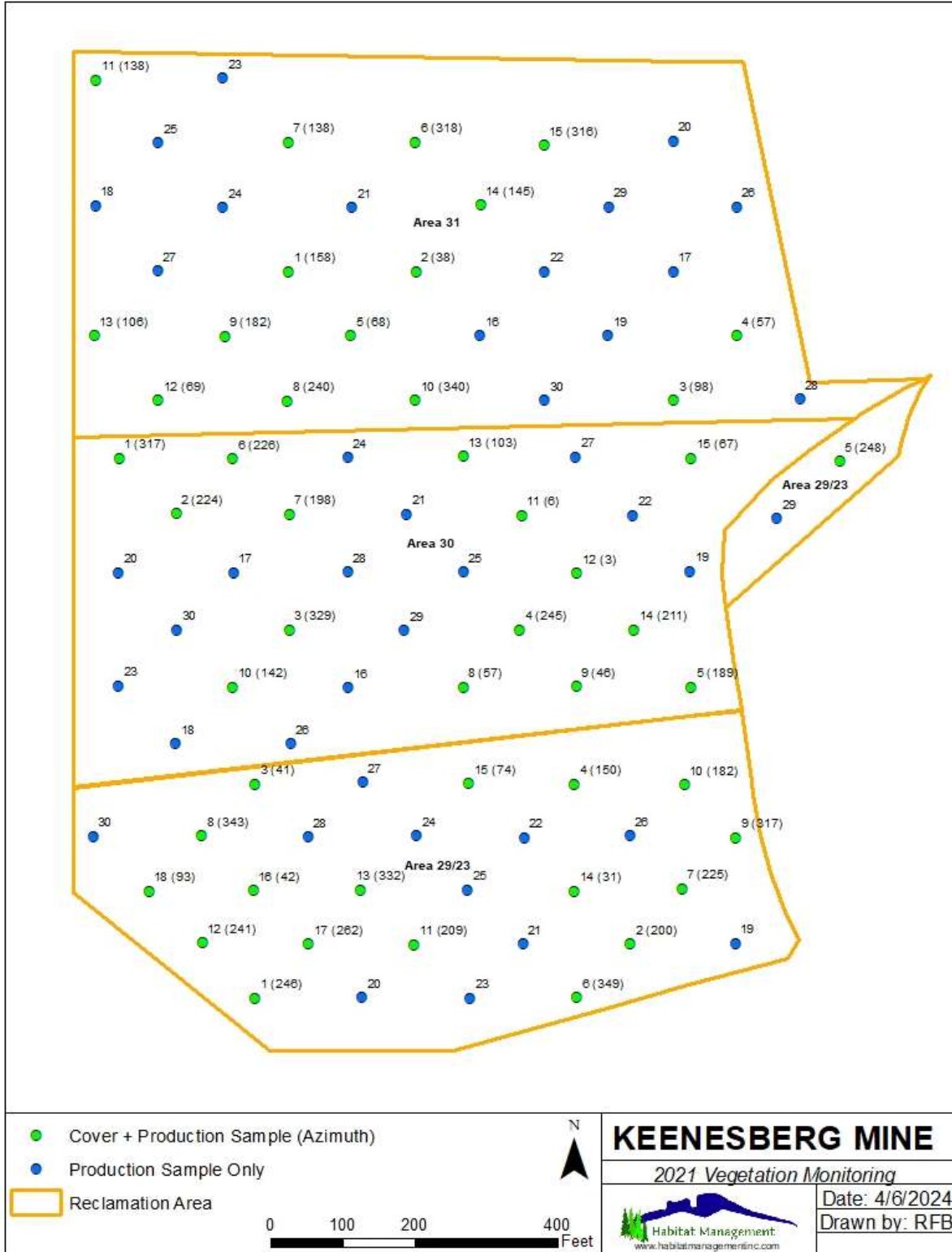
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Figure 1: Keenesburg Mine Site Map



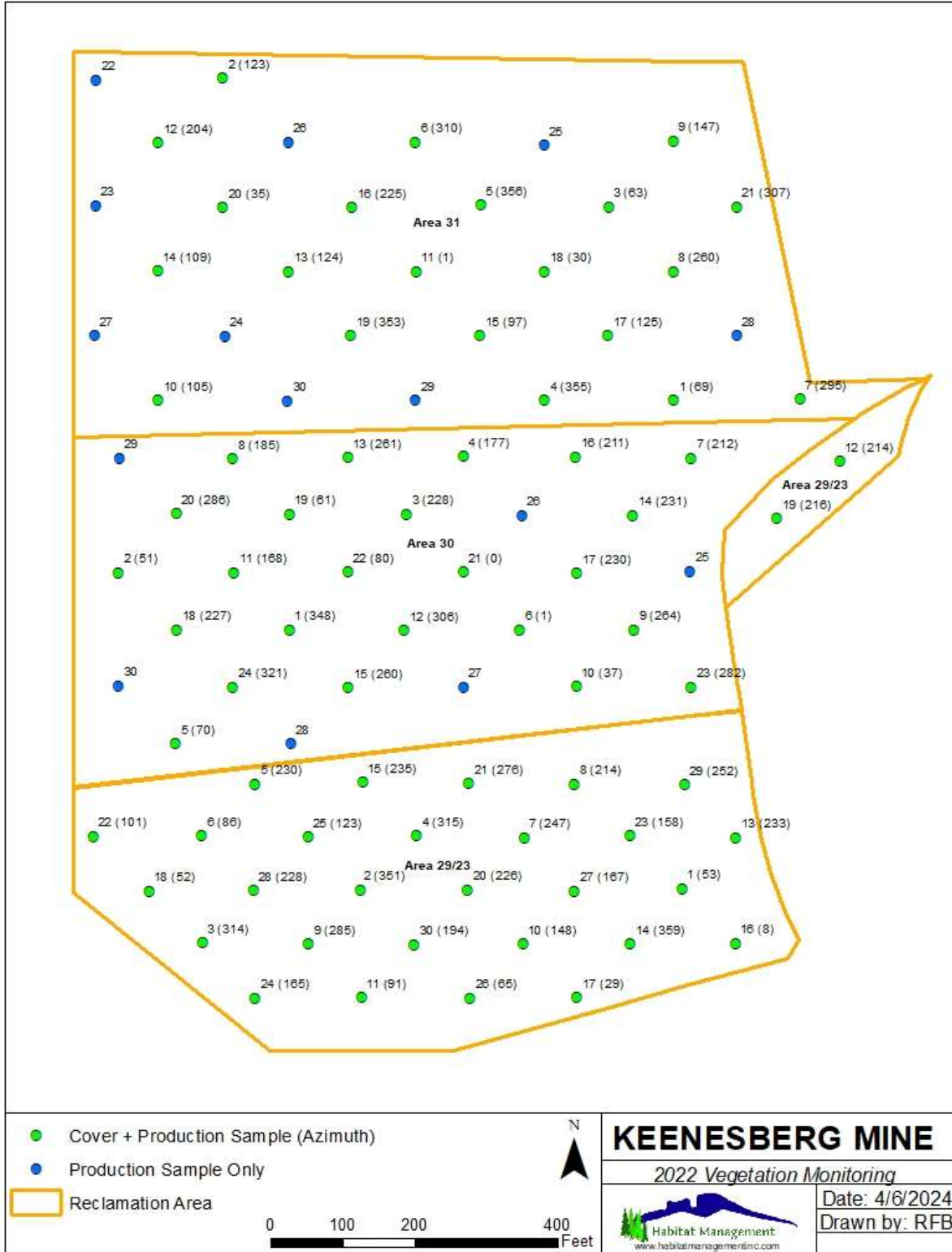
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Figure 2: 2021 Sample Point Locations Reclamation Areas 29/23, 30, and 31



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Figure 3: 2022 Sample Point Locations Reclamation Areas 29/23, 30, and 31



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3.2 Sample Adequacy

Sample size was based on either:

1. A minimum of 15 samples with sample adequacy being met;
2. Sampling to a statistically adequate sample size; or
3. Sampling to a maximum of 30 samples.

Table 2 and Table 3 present the actual sample size and sample adequacy calculations for each Reclamation Area in 2021 and 2022, respectively. Non-noxious cover was used in the field estimate sample adequacy while allowable cover was used in hypothesis testing. Sample adequacy was calculated using the following formula:

$$n_{min} = \frac{t^2 s^2}{(d\bar{x})^2}$$

where:

n_{min} = Minimum sample size

s^2 = Sample variance (n-1 degrees of freedom)

d = Precision (0.10)

\bar{x} = Sample arithmetic mean

t = The ($\alpha=0.10$) t-table value for a 1 tail t-test, n-1 degrees of freedom (infinite degrees of freedom may be used if $n>30$)

n = Sample size

Table 2: Area 29/23, 30, and 31 Sample Adequacy 2021

Reclamation Area	N*	1-tailed t-value	Non-Noxious Cover			Allowable Cover		
			Mean	St. Dev.	Nmin **	Mean	St. Dev.	Nmin **
Area 29/23	18	1.333	35.9	9.9	14	29.1	9.9	21
Area 30	15	1.345	30.5	8.5	14	27.5	8.5	18
Area 31	15	1.345	37.7	9.6	12	37.7	9.6	12

* N = Sample Size

** N-min = Minimum sample size necessary to detect a 10% reduction in the mean with 90% confidence using n-1 degrees of freedom

Table 3: Area 29/23, 30, and 31 Sample Adequacy 2022

Reclamation Area	N*	1-tailed t-value	Non-Noxious Cover			Allowable Cover		
			Mean	St. Dev.	Nmin **	Mean	St. Dev.	Nmin **
Area 29/23	30	1.311	43.9	13.2	16	18.9	13.1	83
Area 30	24	1.319	31.5	10.8	21	18.7	10.8	58
Area 31	21	1.325	27.4	6	9	22.6	6	13

* N = Sample Size

** N-min = Minimum sample size necessary to detect a 10% reduction in the mean with 90% confidence using n-1 degrees of freedom

3.3 Vegetation Cover

Point-intercept methods were used to collect vegetation and ground cover, as well as species composition data. Each 25-meter (m) transect represents a single sampling unit. Two data points were recorded at 1-m intervals along each transect, 0.5 m to each side of and at a right angle to the transect. A laser bar was used to determine intercepts, with the beam projected vertically to the ground surface. Each point-intercept represented an absolute cover value of 2%.

“First-hit” point-intercepts (the first item that the laser beam intercepts) were recorded as either: live vegetation (by plant species), litter, rock, or bare ground. Litter included all dead plant material. Subsequent “hits” on vegetation (prior to interception of the ground) were also recorded. Vegetation cover was reported in absolute percentages from the point-intercept data using all 50 first-hit observations for each sample point. Additional interceptions were used to calculate relative cover of individual plant species and life forms. The quantitative cover data also provided the basis for calculation of species composition and relative importance.

Per permit specification, allowable vegetation cover was calculated for each transect to be used in hypothesis testing calculations. Allowable cover was calculated as total vegetation cover minus:

- Noxious weeds; and
- Annual/biennial cover > 10% of the average total live vegetation cover across all transects.

3.4 Herbaceous Production

Herbaceous production was sampled using 0.5-square meter (m²) circular plots. For samples where cover data was also collected, the plots were located adjacent to the start point to the right of the transect. Production samples where no cover data were collected were placed with the plot centered on the sample point.

All herbaceous non-noxious growth within each plot’s vertical projection was clipped, separated by growth form, and placed in labeled paper bags. Current year’s herbaceous growth of shrubs was collected in the same manner, but no woody tissue was harvested. The bags containing the clipped material were returned to the Habitat Management, Inc. office and dried at 30 degrees Celsius until weights stabilized to within 0.1 gram. Herbaceous production was reported in grams per square meter (g/m²).

3.5 Species Composition

During cover sampling, all plant species occurring within 1 m on either side of the cover sample transect were noted as present within each sample. These species are presented in the data tables for each Reclamation Area (Attachment 2). Species that were not readily identified in the field were collected for later identification. Specimens were identified using floral keys (Weber and Wittmann 2001 and Wingate 1994); however, nomenclature follows the NRCS Plants Database (2022).

Species composition information for comparison to the bond release standards was derived from quantitative relative vegetation cover data. The total hits (first hits and subsequent hits) for each species were used to calculate relative cover as a basis for evaluation of the importance of each encountered plant species and life form.

4 Bond Release Standards

The Keenesburg Mine Reclamation Permit includes a species composition standard and predictive equations to determine the success standards for vegetation cover and herbaceous production. The equations for both cover and production were revised in 2012 with a Technical Revision to the permit (TR43) and the cover standard was revised again in 2014 with a Minor Revision (MR46) to the permit. Both the vegetation cover and herbaceous production equations use the previous year's precipitation (September – July) to predict the success standard for any given year. These equations are as follows, where x is equal to the cumulative September – July precipitation:

$$\text{Vegetation Cover Standard} = -0.0127x^3 + 0.2115x^2 + 2.1772x$$

$$\text{Herbaceous Production Standard} = 0.4666x^{2.1405}$$

To meet the reclamation standard specified in the permit, data are subjected to statistical testing as described in the DRMS Regulations of the Colorado Mined Land Reclamation Board for Coal Mining (DRMS 2020). Per this guideline,

1. If the sample mean for the Reclamation Area is equal to or greater than 90% of the approved technical standard, and a statistically adequate sample size was collected, revegetation is considered successful.
2. If the sample mean for the Reclamation Area is less than 90% of the approved technical standard, and a statistically adequate sample size was collected, the dataset is subjected to hypothesis testing using a one-sample T-test with a one-tailed confidence interval of 90%.
3. If the sample mean for the Reclamation Area is equal to or greater than 90% of the approved technical standard, and a statistically adequate sample size was not collected, the dataset is subjected to hypothesis testing using a one-sample T-test with a reverse null hypothesis and a one-tailed confidence interval of 80%.

Noxious species cover or production is removed as well as annual vegetation cover or production in excess of 10% of the overall average for each Reclamation Area to derive the allowable vegetation cover or production value used for hypothesis testing per the DRMS Guideline Regarding Selected Coal Mine Bond Release Issues (DRMS 1995).

Species composition is considered an indicator of successful vegetation establishment and a diverse vegetation community. The species composition standard for the Keenesburg Mine was modified in 2020 with a Technical Revision to the permit (TR47). The revised standard requires that there be at least four perennial grass species, each of which comprise between 3% and 40% relative cover. Any perennial grass species, native or introduced, that is not defined as a noxious species may be used in the calculation of species composition.

The Phase III bond release guidelines require that vegetation cover, herbaceous production, and species composition meet the standards for two years. Table 4 presents the Phase III bond release standards for 2021 and 2022. Monthly precipitation data used to calculate these standards is presented in Attachment 1.

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Table 4: 2021 and 2022 Bond Release Standards

Year	Sept-July Precipitation (inches)	Vegetation Cover (%)	Herbaceous Production (g/m²)	Species Composition
2021	8.9	27.2	50.2	4 perennial grass species, 3%-40% relative cover
2022	6.6	19.9	26.3	

5 Revegetation Success Evaluation Results

A summary of each parameter evaluated for Phase III bond release is presented below. Vegetation cover and species composition data from 2021 for each Reclamation Area is presented in Attachment 2. Herbaceous production data from 2021 for each Reclamation Area is presented in Attachment 3. Vegetation cover and species composition data from 2022 for each Reclamation Area is presented in Attachment 4. Herbaceous production data from 2022 for each Reclamation Area is presented in Attachment 5. Photographs taken of each cover transect in 2021 and 2022 are presented in Attachment 6 and Attachment 7 respectively.

5.1 Vegetation Cover

The average allowable vegetation cover for Reclamation Area 31 was greater than 90% of the calculated standard and a statistically adequate sample was collected, thus no hypothesis testing was required in 2021 or 2022 (Table 5 and Table 6, respectively). Reclamation Areas 29/23 and 30 were both subjected to hypothesis testing with a reverse null hypothesis in both 2021 and 2022 (Table 5 and Table 6, respectively). Both areas passed the standard in both years.

Table 5: Vegetation Cover Success Standard Comparison for 2021

Vegetation Cover	2021		
	Area 29/23	Area 30	Area 31
Average Allowable Cover (%)	29.1	27.5	37.7
Technical Standard (%)	27.2		
90% of Standard (%)	24.5		
Statistical Testing	T-Test Reverse Null Hypothesis	T-Test Reverse Null Hypothesis	Direct Comparison
T-Value	2.01	1.36	n/a
T Critical Value	-0.863	-0.868	n/a
Standard Passed?	Yes	Yes	Yes

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Table 6: Vegetation Cover Success Standard Comparison for 2022

Vegetation Cover	2022		
	Area 29/23	Area 30	Area 31
Average Allowable Cover (%)	18.9	18.7	22.6
Technical Standard (%)	19.9		
90% of Standard (%)	17.9		
Statistical Testing	T-Test Reverse Null Hypothesis	T-Test Reverse Null Hypothesis	Direct Comparison
T-Value	0.41	0.34	n/a
T Critical Value	-0.854	-0.858	n/a
Standard Passed?	Yes	Yes	Yes

5.2 Herbaceous Production

An error was made in the annual reports submitted in 2021 and 2022 such that the herbaceous production reported was in grams per plot (0.5 m²) rather than g/m². The values presented here are corrected. Reclamation Areas 29/23, 30, and 31 were all subjected to hypothesis testing with a reverse null hypothesis in both 2021 and 2022 (Table 7 and Table 8, respectively). All three areas passed the standard in both years.

Table 7: Herbaceous Production Success Standard Comparison for 2021

Herbaceous Production	2021		
	Area 29/23	Area 30	Area 31
Average Allowable Production (g/m ²)	107.6	87.0	118
Standard (g/m ²)	50.2		
90% of Standard (g/m ²)	45.2		
Statistical Testing	T-Test Reverse Null Hypothesis	T-Test Reverse Null Hypothesis	T-Test Reverse Null Hypothesis
T-Value	1.89	3.01	4.85
T Critical Value	-0.854	-0.854	-0.854
Standard Passed?	Yes	Yes	Yes

Table 8: Herbaceous Production Success Standard Comparison for 2022

Herbaceous Production	2022		
	Area 29/23	Area 30	Area 31
Average Allowable Production (g/m ²)	91.4	66.4	69.8
Standard (g/m ²)	26.3		
90% of Standard (g/m ²)	23.7		
Statistical Testing	T-Test Reverse Null Hypothesis	T-Test Reverse Null Hypothesis	T-Test Reverse Null Hypothesis
T-Value	3.38	4.00	3.80
T Critical Value	-0.854	-0.854	-0.854
Standard Passed?	Yes	Yes	Yes

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5.3 Species Composition

Areas 29/23, 30, and 31 each exhibited four perennial grass species with a non-noxious relative cover of 3% to 40% (Table 9). Thus, all three areas have met the species composition criteria for Phase III bond release.

Table 9: Non-Noxious Relative Cover (%) of Perennial Grasses in Areas 29/23, 30, and 31

Scientific Name	Common Name	2021			2022		
		Area			Area		
		29/23	30	31	29/23	30	31
<i>Andropogon hallii</i>	sand bluestem	23.6	39.8	24.1	7.7	27.3	7.3
<i>Bouteloua curtipendula</i>	sideoats grama			3.1			
<i>Bouteloua gracilis</i>	blue grama	8.0			4.7	3.1	3.1
<i>Calamovilfa longifolia</i>	prairie sandreed	10.9	7.2	39.9	7.9	3.3	
<i>Schizachyrium scoparium</i>	little bluestem		3.0				
<i>Sporobolus airoides</i>	alkali sacaton						3.1
<i>Sporobolus cryptandrus</i>	sand dropseed	24.8	26.7	20.6	9.1	18.1	8.7
Total Species $\geq 3\%$ and $\leq 40\%$		4	4	4	4	4	4
Standard Passed?		Yes	Yes	Yes	Yes	Yes	Yes

6 Summary

Quantitative monitoring of Reclamation Areas 29/23, 30, and 31 revealed that all three areas met the revegetation success standards for Phase III bond release (Table 10).

Table 10: Success Standard Summary for Areas 29/23, 30, and 31

Reclamation Standard	2021			2022		
	Area 29/23	Area 30	Area 31	Area 29/23	Area 30	Area 31
Vegetation Cover	Yes	Yes	Yes	Yes	Yes	Yes
Herbaceous Production	Yes	Yes	Yes	Yes	Yes	Yes
Species Composition	Yes	Yes	Yes	Yes	Yes	Yes
Eligible for Release	Yes	Yes	Yes	Yes	Yes	Yes

7 References

- Colorado Division of Reclamation, Mining and Safety (DRMS). 1995. Guideline Regarding Selected Coal Mine Bond Release Issues, April 18, 1995. URL: <https://mining.state.co.us/Programs/Coal/RulesRegs/Documents/BondReleaseGuidelines.pdf>.
- Colorado Division of Reclamation, Mining and Safety (DRMS). 2020. Regulations for Coal Mining 2 CCR 407-2, effective July 1, 2020. URL: <https://drive.google.com/file/d/1DA6xsyecomnlZZDgxoYZFOTTcYS8O4YAh/view>.
- USDA, NRCS. 2022. The PLANTS Database. National Plant Data Team, Greensboro, NC. URL: <http://plants.usda.gov>, accessed August 2018.

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Attachment 1: Precipitation Data

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2021, 2022, and 30-Year Average Precipitation

Month	2020-2021	2021-2022	Mean (1993-2022)
September	0.61	0.47	0.99
October	0.36	0.24	0.98
November	0.21	0.01	0.45
December	0.42	0.05	0.44
January	0.19	0.62	0.35
February	0.22	0.31	0.29
March	1.06	1.28	0.79
April	1.15	0.36	1.6
May	2.84	2.08	2.71
June	0.95	0.4	1.69
July	0.89	0.76	1.37
August	1.29	0.29	1.41
Total (Sept-Aug)	10.19	6.87	13.07
Total (Sept-Jul)	8.90	6.58	11.66

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Attachment 2: 2021 Vegetation Cover Data

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Reclamation Area 29/23 Vegetation Cover Data

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	Total Hits	Average Absolute Cover (%)	Average Relative Cover (%)	Non-Noxious Relative Cover (%)
Scientific Name	Common Name	1st 2nd	1st 2nd	1st 2nd	1st 2nd	1st 2nd	1st 2nd	1st 2nd	1st 2nd	1st 2nd	1st 2nd	1st 2nd	1st 2nd	1st 2nd	1st 2nd	1st 2nd	1st 2nd	1st 2nd	1st 2nd	1st All			
Grass: Annual Native																							
Munroa squarrosa	false buffalograss			p		p			p		p									0 0	0.0	0.0	0.0
Subtotal				p		p			p		p									0 0	0.0	0.0	0.0
Grass: Annual Introduced																							
Bromus tectorum	cheatgrass	p		p	p	9	2	p	p	3 1	p		p	1	p	5 1	p	2	p	22 24	2.4	6.6	
Eragrostis cilianensis	stinkgrass					p														0 0	0.0	0.0	0.0
Subtotal		p		p	p	9	2	p	p	3 1	p		p	1	p	5 1	p	2	p	22 24	2.4	6.6	0.0
Grass: Perennial Desirable (Cool)																							
Pascopyrum smithii	western wheatgrass	1								p			2							3 3	0.3	0.8	0.9
Subtotal		1								p			2							3 3	0.3	0.8	0.9
Grass: Perennial Desirable (Warm)																							
Andropogon hallii	sand bluestem	3	7		1	11 1		10 1	7	5	9	2	5 1	5	4		1 1		5 1	75 80	8.3	22.0	23.6
Bouteloua curtipendula	sideoats grama			p											p				0 0	0.0	0.0	0.0	
Bouteloua gracilis	blue grama	1	p	5	2		p	5	p 1	1	p	p	p	2 1		2	1	2	4	25 27	2.8	7.4	8.0
Calamovilfa longifolia	prairie sandreed	p	p	1		p	p	6	8	7	1	1	6	1	3	p			3	37 37	4.1	10.2	10.9
Panicum virgatum	switchgrass	1																	1 1	0.1	0.3	0.3	
Schizachyrium scoparium	little bluestem							1						p					1 1	0.1	0.3	0.3	
Sorghastrum nutans	Indiangrass													1					1 1	0.1	0.3	0.3	
Sporobolus cryptandrus	sand dropseed	2	p	4	3	9 1	1 1	2	1	8 2	3	2 1	p	1	7	17	6	10 1	2	78 84	8.7	23.1	24.8
Subtotal		7	7	10	6	20 2	1 1	24 1	16 1	21 2	13	5 1	11 1	10 1	14	19	8 1	12 1	14 1	218 231	24.2	63.6	68.1
Total Grass Cover		8 0	7 0	10 0	6 0	29 2	3 1	24 1	16 1	24 3	13 0	5 1	13 1	11 1	14 0	24 1	8 1	14 1	14 1	243 258	27.0	71.1	69.0
Forbs: Annual & Biennial Native																							
Amaranthus retroflexus	redroot amaranth	12	6	1	3	p	10 1	7		1	2	5	p	p		1		3	1	52 53	5.8	14.6	15.6
Ambrosia artemisiifolia	annual ragweed										1		p	p	p					1 1	0.1	0.3	0.3
Argemone polyanthemus	crested pricklypoppy		p	p			p			2	p 1	1		p						3 4	0.3	1.1	1.2
Chamaesyce glyptosperma	ribseed sandmat	p		1				p												1 1	0.1	0.3	0.3
Chenopodium leptophyllum	narrowleaf goosefoot			p														1		1 1	0.1	0.3	0.3
Conyza canadensis	Canadian horseweed											p	p			p		p		0 0	0.0	0.0	0.0
Erigeron bellidiastrum	western daisy fleabane						p													0 0	0.0	0.0	0.0
Helianthus annuus	common sunflower	2	2	1	3		3	p	p	1	p	1	2	2	p	1	4	p	1	23 23	2.6	6.3	6.8
Polygonum ramosissimum	bushy knotweed				1				1		p		p							2 2	0.2	0.6	0.6
Subtotal		14	8	3	7	p	13 1	7	1	4	3 1	7	2	2	p	2	4	3	3	83 85	9.2	23.4	25.1
Forbs: Annual & Biennial Introduced																							
Amaranthus blitoides	mat amaranth			p		p		p		1							2			3 3	0.3	0.8	0.9
Bassia scoparia	burningbush					p							1							1 1	0.1	0.3	0.3
Dysphania botrys	Jerusalem oak goosefoot															p				0 0	0.0	0.0	0.0
Lactuca serriola	prickly lettuce				p		p			p							p			0 0	0.0	0.0	0.0
Salsola tragus	prickly Russian thistle			2		p		p	1	p		1	p	p		2	p	p		6 6	0.7	1.7	1.8
Tribulus terrestris	puncturevine			p						p										0 0	0.0	0.0	0.0
Subtotal				2	p	p	p	p	1	1		1	1	p		2	2	p		10 10	1.1	2.8	2.9

Coors Energy Company Keenesburg Mine – Phase III Bond Release Application
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Reclamation Area 29/23 Vegetation Cover Data (continued)

		1		2		3		4		5		6		7		8		9		10		11		12		13		14		15		16		17		18		Total Hits		Average Absolute Cover (%)	Average Relative Cover (%)	Non-Noxious Relative Cover (%)
Scientific Name	Common Name	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	All					
Forbs: Perennial Native																																										
Lithospermum incisum	narrowleaf stoneseed									p																											0	0	0.0	0.0	0.0	
Lygodesmia juncea	rush skeletonplant																																				0	0	0.0	0.0	0.0	
Mirabilis hirsuta	hairy four o'clock												p																								0	0	0.0	0.0	0.0	
Physalis hispida	prairie groundcherry									p																											0	1	0.0	0.3	0.3	
Ratibida columnifera	upright prairie coneflower																																				0	0	0.0	0.0	0.0	
Subtotal										p																											0	1	0.0	0.3	0.3	
Total Forb Cover		14	0	8	0	5	0	7	1	0	0	13	1	7	0	2	0	5	0	3	1	8	0	3	0	2	0	0	0	4	0	6	0	3	0	93	96	10.3	26.4	28.3		
Subshrubs/Shrubs/Succulents: Perennial Native																																										
Artemisia filifolia	sand sagebrush	1						2				1				p				3						1								p	9	9	1.0	2.5	2.7			
Opuntia phaeacantha	tulip pricklypear							p								p				p					p		p		p							0	0	0.0	0.0	0.0		
Subtotal		1						2				1				p				3					p		1		p		p		1		p	9	9	1.0	2.5	2.7		
Total Shrub Cover		1	0	0	0	0	0	2	0	0	0	1	0	0	0	0	0	0	0	3	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	9	9	1.0	2.5	2.7	
Rock																																										
Litter		27		27		19		21		20		19		10		17		19		21		29		25		27		14		20		25		28		16		384	384	42.7		
Bare Ground				8		16		14		1		14		9		15		2		10		8		9		9		22		2		10		5		16		170	170	18.9		
Total Hits		50	0	50	0	50	0	50	1	50	2	50	2	50	1	50	1	50	3	50	1	50	1	50	1	50	1	50	0	50	1	50	1	50	1	50	1	900	918	100.0		
Total Vegetation Cover		46	0	30	0	30	0	30	2	58	4	34	4	62	2	36	2	58	6	38	2	26	2	32	2	28	2	28	0	56	2	30	2	34	2	34	2			38.3	100.0	100.0
Non-Noxious Vegetation Cover		46	0	30	0	30	0	30	2	40	4	30	4	62	2	36	2	52	4	38	2	26	2	32	2	26	2	28	0	46	0	30	2	30	2	34	2			35.9		
Total Ground Cover		100		84		68		72		98		72		82		70		96		80		84		82		82		56		96		80		90		68				81.1		
Allowable Vegetation Cover		39.3		23.3		23.3		23.3		33.3		23.3		55.3		29.3		45.3		31.3		19.3		25.3		19.3		21.3		39.3		23.3		23.3		27.3				29.1		

Non-Noxious Annual Cover	10.3
Excess Annual Cover	6.7

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Reclamation Area 30 Vegetation Cover Data

		1		2		3		4		5		6		7		8		9		10		11		12		13		14		15		Total Hits		Average Absolute Cover (%)	Average Relative Cover (%)	Non-Noxious Relative Cover (%)
Scientific Name	Common Name	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	All			
Grass: Annual Native																																				
Munroa squarrosa	false buffalograss	1		p		3		1		p		1		1		p		p		3		p		p		p		p		p		10	10	1.3	3.5	4.2
Vulpia octoflora	sixweeks fescue																								2		p		p		2	2	0.3	0.7	0.8	
Subtotal		1		p		3		1		p		1		1		p		p		3		p		p		2		p		p		12	12	1.6	4.2	5.1
Grass: Annual Introduced																																				
Bromus tectorum	cheatgrass	5		p		1		p		19		p		4		p		5		p		1		p		9		p		3		47	47	6.3	16.6	
Eragrostis cilianensis	stinkgrass	p		p																											0	0	0.0	0.0	0.0	
Subtotal		5		p		1		p		19		p		4		p		5		p		1		p		9		p		3		47	47	6.3	16.6	0.0
Grass: Perennial Desirable (Cool)																																				
Pascopyrum smithii	western wheatgrass															p															0	0	0.0	0.0	0.0	
Subtotal																p															0	0	0.0	0.0	0.0	
Grass: Perennial Desirable (Warm)																																				
Andropogon hallii	sand bluestem	p		4		5		6		4		7		5		14		3		9		2		11		8		8		8		94	94	12.5	33.2	39.8
Aristida purpurea	purple threeawn					1						p																			1	1	0.1	0.4	0.4	
Bouteloua curtipendula	sideoats grama	p				2						p						p													2	2	0.3	0.7	0.8	
Bouteloua gracilis	blue grama	p		p								p		p		p		1													1	1	0.1	0.4	0.4	
Calamovilfa longifolia	prairie sandreed			3				3				p		p		2		1		3					p		5		p		17	17	2.3	6.0	7.2	
Panicum virgatum	switchgrass					p						p		p									p								0	0	0.0	0.0	0.0	
Schizachyrium scoparium	little bluestem					1		1				p				1		1		1				1					1		7	7	0.9	2.5	3.0	
Sporobolus airoides	alkali sacaton																						1								1	1	0.1	0.4	0.4	
Sporobolus cryptandrus	sand dropseed	8	1	p		5		2		3	1	4		5		4		8	2	p		7		2		6		2		3		59	63	7.9	22.3	26.7
Subtotal		8	1	7		13		13		7	1	11		10		21		14	2	13		9		15		14		15		12		182	186	24.3	65.7	78.8
Total Grass Cover		14	1	7	0	17	0	14	0	26	1	12	0	15	0	21	0	19	2	16	0	10	0	15	0	25	0	15	0	15	0	241	245	32.1	86.6	83.9
Forbs: Annual & Biennial Native																																				
Amaranthus retroflexus	redroot amaranth	1		p	1	p				p		2		1				1		p		3		1		4		1		6		20	21	2.7	7.4	8.9
Ambrosia artemisiifolia	annual ragweed							1																							1	1	0.1	0.4	0.4	
Argemone polyanthemos	crested pricklypoppy					1		1																				p			2	2	0.3	0.7	0.8	
Chamaesyce glyptosperma	ribseed sandmat					p																			p						0	0	0.0	0.0	0.0	
Chenopodium leptophyllum	narrowleaf goosefoot	p				p																									0	0	0.0	0.0	0.0	
Conyza canadensis	Canadian horseweed	2		1		p		1		p		p		p		p		p		p		p		p				p			4	4	0.5	1.4	1.7	
Croton texensis	Texas croton									p																			p			0	0	0.0	0.0	0.0
Erigeron bellidiastrum	western daisy fleabane																											p				0	0	0.0	0.0	0.0
Helianthus annuus	common sunflower									p		1		p		p						p		2								3	3	0.4	1.1	1.3
Subtotal		3		1	1	1		3		p		2		2		p		1		p		3		3		4		1		6		30	31	4.0	11.0	13.1
Forbs: Annual & Biennial Introduced																																				
Amaranthus blitoides	mat amaranth					1		p																								0	0	0.0	0.0	0.0
Lactuca serriola	prickly lettuce					1		p		p										p											1	1	0.1	0.4	0.4	
Melilotus officinalis	sweetclover							p												p											0	0	0.0	0.0	0.0	
Salsola tragus	prickly Russian thistle							p												2		p				p		p		1		3	3	0.4	1.1	1.3
Subtotal						1		p												2		p				p		p		1		4	4	0.5	1.4	1.7

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Reclamation Area 30 Vegetation Cover Data (continued)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Total Hits	Average Absolute Cover (%)	Average Relative Cover (%)	Non-Noxious Relative Cover (%)
Scientific Name	Common Name	1st 2nd	1st 2nd	1st 2nd	1st 2nd	1st 2nd	1st 2nd	1st 2nd	1st 2nd	1st 2nd	1st 2nd	1st 2nd	1st 2nd	1st 2nd	1st 2nd	1st 2nd	1st All			
Forbs: Perennial Native																				
Ambrosia psilostachya	Cuman ragweed	p		1													1 1	0.1	0.4	0.4
Subtotal		p		1													1 1	0.1	0.4	0.4
Total Forb Cover		3 0	1 1	3 0	3 0	0 0	2 0	2 0	0 0	1 0	2 0	3 0	3 0	4 0	1 0	7 0	35 36	4.7	12.7	15.3
Subshrubs/Shrubs/Succulents: Perennial Native																				
Artemisia filifolia	sand sagebrush	p															0 0	0.0	0.0	0.0
Opuntia phaeacantha	tulip pricklypear			p		p	p	p 1		p	p		p 1	p	p		0 2	0.0	0.7	0.8
Subtotal		p			p		p	p 1		p	p		p 1	p	p		0 2	0.0	0.7	0.8
Total Shrub Cover		0 0	0 0	0 0	0 0	0 0	0 0	0 1	0 0	0 0	0 0	0 0	0 1	0 0	0 0	0 0	0 2	0.0	0.7	0.8
Rock																	0 0	0.0		
Litter		25	29	18	21	22	26	22	18	23	24	28	22	18	22	24	342 342	45.6		
Bare Ground		8	13	12	12	2	10	11	11	7	8	9	10	3	12	4	132 132	17.6		
Total Hits		50 1	50 1	50 0	50 0	50 1	50 0	50 0	50 1	50 2	50 0	50 0	50 0	50 1	50 0	50 0	750 757	100.0		
Total Vegetation Cover		34 2	16 2	40 0	34 0	52 2	28 0	34 0	42 2	40 4	36 0	26 0	36 0	58 2	32 0	44 0		36.8	100.0	100.0
Non-Noxious Vegetation Cover		24 2	16 2	38 0	34 0	14 2	28 0	26 0	42 2	30 4	36 0	24 0	36 0	40 2	32 0	38 0		30.5		
Total Ground Cover		84	74	76	76	96	80	78	78	86	84	82	80	94	76	92		82.4		
Allowable Vegetation Cover		20.9	12.9	34.9	30.9	10.9	24.9	22.9	38.9	26.9	32.9	20.9	32.9	36.9	28.9	34.9		27.5		

Non-Noxious Annual Cover	6.1
Excess Annual Cover	3.1

Coors Energy Company Keenesburg Mine – Phase III Bond Release Application
Revegetation Success Demonstration

Reclamation Area 31 Vegetation Cover Data

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Total Hits		Average Absolute	Average Relative	Non-Noxious
Scientific Name	Common Name	1st 2nd	1st 2nd	1st 2nd	1st 2nd	1st 2nd	1st 2nd	1st 2nd	1st 2nd	1st 2nd	1st 2nd	1st 2nd	1st 2nd	1st 2nd	1st 2nd	1st 2nd	1st 2nd	1st All	Cover (%)	Cover (%)	Relative Cover (%)
Grass: Annual Native																					
Munroa squarrosa	false buffalograss	1	p	p		1	p	p	p	p	p	p	p	p	p	p		2 2	0.3	0.7	0.7
Panicum capillare	witchgrass	p								p								0 0	0.0	0.0	0.0
Subtotal		1	p	p		1	p	p	p	p	p	p	p	p	p	p		2 2	0.3	0.7	0.7
Grass: Annual Introduced																					
Bromus tectorum	cheatgrass	p		p		1			p				p	1		p 1		2 3	0.3	1.0	
Eragrostis cilianensis	stinkgrass					p												0 0	0.0	0.0	0.0
Subtotal		p		p		1			p				p	1		p 1		2 3	0.3	1.0	0.0
Grass: Perennial Desirable (Cool)																					
Achnatherum hymenoides	Indian ricegrass					p	p									p		0 0	0.0	0.0	0.0
Subtotal						p	p									p		0 0	0.0	0.0	0.0
Grass: Perennial Desirable (Warm)																					
Andropogon hallii	sand bluestem	3	3	8	5		1	5	3	4	10	8	2	13 1	2	2		69 70	9.2	23.8	24.1
Bouteloua curtipendula	sideoats grama		1							3	1	1	p	3			9 9	1.2	3.1	3.1	
Bouteloua gracilis	blue grama	1	1	1	p	1	p	p		p	p	p	p		1	p	5 5	0.7	1.7	1.7	
Calamovilfa longifolia	prairie sandreed	6	9	6	3	6	3	11	10	2	8	11	9	10	13	8 1	115 116	15.3	39.5	39.9	
Panicum virgatum	switchgrass										p		p	1	1	1	3 3	0.4	1.0	1.0	
Schizachyrium scoparium	little bluestem			p						p				1			1 1	0.1	0.3	0.3	
Sorghastrum nutans	Indiangrass							p		p							0 0	0.0	0.0	0.0	
Sporobolus cryptandrus	sand dropseed	6 1	1	7 1	4	8 1	7	p	3	2	3	4	1	1	p	8 2	55 60	7.3	20.4	20.6	
Subtotal		16 1	15	22 1	12	15 1	11	16	16	11	22	24	12	29 1	17	19 3	257 264	34.3	89.8	90.7	
Total Grass Cover		17 1	15 0	22 1	12 0	17 1	11 0	16 0	16 0	11 0	22 0	24 0	12 0	30 1	17 0	19 4	261 269	34.8	91.5	91.4	
Forbs: Annual & Biennial Native																					
Amaranthus retroflexus	redroot amaranth	2	p	2	1	p	5	p	p	3	p	1	1	p	p	1	16 16	2.1	5.4	5.5	
Chamaesyce glyptosperma	ribseed sandmat	1		p						1		p		1			3 3	0.4	1.0	1.0	
Chenopodium desiccatum	aridland goosefoot		p						p						p		0 0	0.0	0.0	0.0	
Chenopodium leptophyllum	narrowleaf goosefoot													p		p	0 0	0.0	0.0	0.0	
Conyza canadensis	Canadian horseweed	p			p	p			p	p 1			p				0 1	0.0	0.3	0.3	
Helianthus annuus	common sunflower				p		1		p						p	p	1 1	0.1	0.3	0.3	
Polygonum ramosissimum	bushy knotweed												p		p		0 0	0.0	0.0	0.0	
Subtotal		3	p	2	1	p	6	p	p	4 1	p	1	1	1	p	1	20 21	2.7	7.1	7.2	
Forbs: Annual & Biennial Introduced																					
Amaranthus blitoides	mat amaranth	p				p						p					0 0	0.0	0.0	0.0	
Lactuca serriola	prickly lettuce					p							p				0 0	0.0	0.0	0.0	
Salsola tragus	prickly Russian thistle	p	p	p	p	p	p	p	1				1			1	3 3	0.4	1.0	1.0	
Subtotal		p	p	p	p	p	p	p	1			p	1			1	3 3	0.4	1.0	1.0	
Forbs: Perennial Native																					
Physalis hispida	prairie groundcherry			p						p	p		p			1	1 1	0.1	0.3	0.3	
Subtotal				p						p	p		p			1	1 1	0.1	0.3	0.3	
Total Forb Cover		3 0	0 0	2 0	1 0	0 0	6 0	0 0	1 0	4 1	0 0	1 0	2 0	1 0	0 0	3 0	24 25	3.2	8.5	8.6	

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Reclamation Area 31 Vegetation Cover Data (continued)

		1		2		3		4		5		6		7		8		9		10		11		12		13		14		15		Total Hits		Average Absolute Cover (%)		Average Relative Cover (%)		Non-Noxious Relative Cover (%)																															
Scientific Name	Common Name	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	All																																				
Subshrubs/Shrubs/Succulents: Perennial Native																																																																					
Artemisia filifolia	sand sagebrush					p				p		p		p				p						p		p						0		0		0.0		0.0		0.0																													
Opuntia phaeacantha	tulip pricklypear							p		p		p		p				p						p								0		0		0.0		0.0		0.0																													
Yucca glauca	soapweed yucca																							p								0		0		0.0		0.0		0.0																													
Subtotal						p		p		p		p		p				p		p				p		p						0		0		0.0		0.0		0.0																													
Total Shrub Cover		0		0		0		0		0		0		0		0		0		0		0		0		0		0		0		0		0		0.0		0.0		0.0																													
Rock																														0		0		0.0																																			
Litter		27		23		21		23		30		16		27		16		28		18		13		23		15		22		20		322		322		42.9																																	
Bare Ground		3		12		5		14		3		17		7		17		7		10		12		13		4		11		8		143		143		19.1																																	
Total Hits		50		1		50		0		50		1		50		0		50		0		50		0		50		1		50		0		50		4		750		759		100.0																											
Total Vegetation Cover		40		2		30		0		48		2		26		0		34		2		34		0		32		0		34		0		30		2		44		0		50		0		28		0		62		2		34		0		44		8				38.0		100.0		100.0	
Non-Noxious Vegetation Cover		40		2		30		0		48		2		26		0		32		2		34		0		32		0		34		0		30		2		44		0		50		0		28		0		60		2		34		0		44		6				37.7					
Total Ground Cover		94				76				90				72				94				66				86				66				86				80				76				74				92				78				84						80.9					
Allowable Vegetation Cover		40.0				30.0				48.0				26.0				32.0				34.0				32.0				34.0				30.0				44.0				50.0				28.0				60.0				34.0				44.0						37.7					

Non-Noxious Annual Cover	3.3
Excess Annual Cover	0.0

*Coors Energy Company Keenesburg Mine – Phase III Bond Release Application
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Attachment 3: 2021 Herbaceous Production Data

Coors Energy Company Keenesburg Mine – Phase III Bond Release Application
Revegetation Success Demonstration

Reclamation Area 29/23 Herbaceous Production Data

Sample	Herbaceous Production (g/m2)			
	Annual Species	Perennial Species	Total	Allowable
1	4	711.6	715.6	676.1
2	0	34	34	0.0
3	210.8	71.6	282.4	242.9
4	0	14.6	14.6	0.0
5	0	46.6	46.6	7.1
6	763.4	0	763.4	723.9
7	0	30.2	30.2	0.0
8	0	22	22	0.0
9	0	5	5	0.0
10	0	59.4	59.4	19.9
11	0	41.4	41.4	1.9
12	0	143.2	143.2	103.7
13	201.8	108.4	310.2	270.7
14	0	48.2	48.2	8.7
15	0	333.8	333.8	294.3
16	0	108.4	108.4	68.9
17	0	70.8	70.8	31.3
18	0	5.6	5.6	0.0
19	95.8	1.6	97.4	57.9
20	123.2	38.6	161.8	122.3
21	0	198.4	198.4	158.9
22	0	27.2	27.2	0.0
23	163	0	163	123.5
24	2.2	87	89.2	49.7
25	1.2	122.2	123.4	83.9
26	0	114.6	114.6	75.1
27	0	17.6	17.6	0.0
28	0	9.4	9.4	0.0
29	43.4	29.6	73	33.5
30	0	114.8	114.8	75.3
Average	53.6	87.2	140.8	107.6

Excess Annual Production	39.5
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If average annual production is greater than 10%, subtract the average excess

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Reclamation Area 30 Herbaceous Production Data

Sample	Herbaceous Production (g/m2)			
	Annual Species	Perennial Species	Total	Allowable
1	0	12.4	12.4	0.0
2	33.8	63.4	97.2	82.6
3	17.4	31.2	48.6	34.0
4	27.6	93.2	120.8	106.2
5	0	0	0	0.0
6	13.4	46.8	60.2	45.6
7	48.6	89	137.6	123.0
8	0	283	283	268.4
9	45	150.2	195.2	180.6
10	23.2	89.6	112.8	98.2
11	7.6	44	51.6	37.0
12	5.2	7.8	13	0.0
13	6	163	169	154.4
14	0	87.8	87.8	73.2
15	12.2	32.2	44.4	29.8
16	10.4	111.6	122	107.4
17	240.2	52.4	292.6	278.0
18	0	272.2	272.2	257.6
19	0	88	88	73.4
20	0	137	137	122.4
21	20.2	30.2	50.4	35.8
22	0	109.4	109.4	94.8
23	11	56.8	67.8	53.2
24	76	12.8	88.8	74.2
25	58.8	32.8	91.6	77.0
26	12.2	61	73.2	58.6
27	46.2	41.6	87.8	73.2
28	3.2	15.8	19	4.4
29	23.4	48	71.4	56.8
30	0	23	23	8.4
Average	24.7	76.2	100.9	86.9

Excess Annual Production	14.6
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If average annual production is greater than 10%, subtract the average excess

*Coors Energy Company Keenesburg Mine – Phase III Bond Release Application
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Reclamation Area 31 Herbaceous Production Data

Sample	Herbaceous Production (g/m2)			
	Annual Species	Perennial Species	Total	Allowable
1	165.6	42.6	208.2	199.7
2	6.6	101.8	108.4	99.9
3	1.2	81.8	83	74.5
4	9.6	25.6	35.2	26.7
5	0	316.8	316.8	308.3
6	0	95.8	95.8	87.3
7	0	58.2	58.2	49.7
8	0	127.6	127.6	119.1
9	27.4	132.8	160.2	151.7
10	19	121.2	140.2	131.7
11	34	297.6	331.6	323.1
12	119	46.8	165.8	157.3
13	2.6	97.4	100	91.5
14	4.6	51	55.6	47.1
15	0	79.4	79.4	70.9
16	84.6	63	147.6	139.1
17	0	202.6	202.6	194.1
18	55.4	270.4	325.8	317.3
19	0	27.8	27.8	19.3
20	0	91.2	91.2	82.7
21	0	184.6	184.6	176.1
22	0	70	70	61.5
23	17	47.8	64.8	56.3
24	15.8	15.4	31.2	22.7
25	3	84	87	78.5
26	0	90	90	81.5
27	0	136.6	136.6	128.1
28	40	78.8	118.8	110.3
29	0.8	61	61.8	53.3
30	29.2	63	92.2	83.7
Average	21.2	105.4	126.6	118.1

Excess Annual Production	8.5
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If average annual production is greater than 10%, subtract the average excess

*Coors Energy Company Keenesburg Mine – Phase III Bond Release Application
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Attachment 4: 2022 Vegetation Cover Data

Coors Energy Company Keenesburg Mine – Phase III Bond Release Application
Revegetation Success Demonstration

Reclamation Area 29/23 Vegetation Cover Data

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Scientific Name	Common Name	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2
Grass: Annual Native																			
Vulpia octoflora	sixweeks fescue					p		p			p	p							
Subtotal						p		p			p	p							
Grass: Annual Introduced																			
Bromus tectorum	cheatgrass	p	p	p	p	1		p		p	1	p	1	p	p	p	1	p	
Subtotal		p	p	p	p	1		p		p	1	p	1	p	p	p	1	p	
Grass: Perennial Desirable (Cool)																			
Pascopyrum smithii	western wheatgrass			p					p										
Subtotal				p					p										
Grass: Perennial Desirable (Warm)																			
Andropogon hallii	sand bluestem	1	6	9		p		4 1			3	p	7	2	3	p	p	p	
Bouteloua curtipendula	sideoats grama			p		p										p	p	p	p
Bouteloua gracilis	blue grama	p	6 1	p 1	1 1	p 1	3	2	p	2	2	p		1	p	1	1	1	1
Calamovilfa longifolia	prairie sandreed	3	p	12		1		3		1 1	p	2		1	9	p	p	p	1
Panicum virgatum	switchgrass	5				p		p				1		1		2	2	2	
Schizachyrium scoparium	little bluestem											p			p				
Sorghastrum nutans	Indiangrass			p						1									
Sporobolus airoides	alkali sacaton					p				p									
Sporobolus cryptandrus	sand dropseed		p	1	4 1	p	3	1	8 1		2		3 2	p	2	1	2	3	2 1
Subtotal		9	12 1	22 1	5 2	1 1	6	10 1	8 1	4 1	7	3	10 2	5	14	4	5	5	3 1
Total Grass Cover		9 0	12 1	22 1	5 2	2 1	6 0	10 1	8 1	4 1	8 0	3 0	11 2	5 0	14 0	4 0	6 0	5 0	3 1
Forbs: Annual & Biennial Native																			
Amaranthus retroflexus	redroot amaranth					p	p		p	p	p 1	p	p		p		p 1	2	p
Argemone polyanthemus	crested pricklypoppy													p			p	p	
Chenopodium leptophyllum	narrowleaf goosefoot							p											
Chenopodium sp.	goosefoot																		
Conyza canadensis	Canadian horseweed	p	p		p	p	p	p	p	p		p		p	p	p	p		p
Helianthus annuus	common sunflower	p	2	p	2	1	3	1	p 1	1	1	p		1	1	2	1	2	1
Subtotal		p	2	p	2	1	3	1	p 1	1	1 1	p	p	1	1	2	1 1	4	1
Forbs: Annual & Biennial Introduced																			
Ambrosia artemisiifolia	annual ragweed													p					
Bassia scoparia	burningbush												2	p	p			p	
Lactuca serriola	prickly lettuce	p	p		p		p	p	1	p	p			p		p	p	p	p
Salsola tragus	prickly Russian thistle	7	17 1	4	20	13	17	8	14 2	35 2	4	18	6	13	5	30 1	11	13	16
Tragopogon dubius	yellow salsify													p					
Subtotal		7	17 1	4	20	13	17	8	15 2	35 2	4	18	8	13	5	30 1	11	13	16

Coors Energy Company Keenesburg Mine – Phase III Bond Release Application
Revegetation Success Demonstration

Reclamation Area 29/23 Vegetation Cover Data (continued)

Scientific Name Common Name		1 1 2	2 1 2	3 1 2	4 1 2	5 1 2	6 1 2	7 1 2	8 1 2	9 1 2	10 1 2	11 1 2	12 1 2	13 1 2	14 1 2	15 1 2	16 1 2	17 1 2	18 1 2
Forbs: Perennial Native																			
Ambrosia psilostachya	Cuman ragweed	p									p	p		p					
Physalis hispida	prairie groundcherry													p					
Mentzelia nuda	bractless blazingstar																		
Physalis hispida	prairie groundcherry																		
Symphotrichum falcatum	white prairie aster														p				
Subtotal		p									p	p		p	p				
Total Forb Cover		7 0	19 1	4 0	22 0	14 0	20 0	9 0	15 3	36 2	5 1	18 0	8 0	14 0	6 0	32 1	12 1	17 0	17 0
Subshrubs/Shrubs/Succulents: Perennial Native																			
Artemisia filifolia	sand sagebrush									p		2				p		p	2
Opuntia phaeacantha	tulip pricklypear	p	p					1						p			p		
Subtotal		p	p					1		p		2		p		p	p	p	2
Total Shrub Cover		0 0	0 0	0 0	0 0	0 0	0 0	1 0	0 0	0 0	0 0	2 0	0 0	0 0	0 0	0 0	0 0	0 0	2 0
Rock							1		1										
Litter		27	12	20	13	18	12	19	17	7	22	20	27	23	27	11	24	14	20
Bare Ground		7	7	4	10	16	11	11	9	3	15	7	4	8	3	3	8	14	8
Total Hits		50 0	50 2	50 1	50 2	50 1	50 0	50 1	50 4	50 3	50 1	50 0	50 2	50 0	50 0	50 1	50 1	50 0	50 1
Total Vegetation Cover		32 0	62 4	52 2	54 4	32 2	52 0	40 2	46 8	80 6	26 2	46 0	38 4	38 0	40 0	72 2	36 2	44 0	44 2
Non-Noxious Vegetation Cover		32 0	62 4	52 2	54 4	30 2	52 0	40 2	46 8	80 6	24 2	46 0	36 4	38 0	40 0	72 2	34 2	44 0	44 2
Total Ground Cover		86	86	92	80	68	78	78	82	94	70	86	92	84	94	94	84	72	84
Allowable Vegetation Cover		6.9	36.9	26.9	28.9	4.9	26.9	14.9	20.9	54.9	0.0	20.9	10.9	12.9	14.9	46.9	8.9	18.9	18.9

Non-Noxious Annual Cover	29.5
Excess Annual Cover	25.1

Coors Energy Company Keenesburg Mine – Phase III Bond Release Application
Revegetation Success Demonstration

Reclamation Area 29/23 Vegetation Cover Data (continued)

Scientific Name	Common Name	19	20	21	22	23	24	25	26	27	28	29	30	Total Hits		Absolute Cover (%)	Relative Cover (%)	Relative Cover (%)
		1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1st	All			
Grass: Annual Native																		
Vulpia octoflora	sixweeks fescue													0	0	0.0	0.0	0.0
Subtotal														0	0	0.0	0.0	0.0
Grass: Annual Introduced																		
Bromus tectorum	cheatgrass	2		1				p				1		8	8	0.5	1.2	1.2
Subtotal		2		1				p				1		8	8	0.5	1.2	1.2
Grass: Perennial Desirable (Cool)																		
Pascopyrum smithii	western wheatgrass						1							1	1	0.1	0.1	0.1
Subtotal							1							1	1	0.1	0.1	0.1
Grass: Perennial Desirable (Warm)																		
Andropogon hallii	sand bluestem	p	1 1	1	p	2	4	2	2		3	1		51	53	3.4	7.6	7.7
Bouteloua curtipendula	sideoats grama													0	0	0.0	0.0	0.0
Bouteloua gracilis	blue grama	p	p	p	p	p	p	1	p	1	1	p	4	28	32	1.9	4.6	4.7
Calamovilfa longifolia	prairie sandreed		6		5	5	1			3	p			53	54	3.5	7.8	7.9
Panicum virgatum	switchgrass	1		1		2				2				17	17	1.1	2.5	2.5
Schizachyrium scoparium	little bluestem		p									p		0	0	0.0	0.0	0.0
Sorghastrum nutans	Indiangrass							p						1	1	0.1	0.1	0.1
Sporobolus airoides	alkali sacaton									p				0	0	0.0	0.0	0.0
Sporobolus cryptandrus	sand dropseed	9	2	3	3		p	p	1	1	4 1	p	1	56	62	3.7	8.9	9.1
Subtotal		10	9 1	5	8	9	5	3	3	7	8 1	1	5	206	219	13.7	31.6	32.0
Total Grass Cover		12 0	9 1	6 0	8 0	9 0	6 0	3 0	3 0	7 0	8 1	2 0	5 0	215	228	14.3	32.9	33.3
Forbs: Annual & Biennial Native																		
Amaranthus retroflexus	redroot amaranth	p		p 1	p		1		p	p		p	1	4	7	0.3	1.0	1.0
Argemone polyanthemus	crested pricklypoppy													0	0	0.0	0.0	0.0
Chenopodium leptophyllum	narrowleaf goosefoot													0	0	0.0	0.0	0.0
Chenopodium sp.	goosefoot										p			0	0	0.0	0.0	0.0
Conyza canadensis	Canadian horseweed	p	p	p		p	p	p		p	p		p	0	0	0.0	0.0	0.0
Helianthus annuus	common sunflower		p	2	p		1	2	p	2	2	1	p	29	30	1.9	4.3	4.4
Subtotal		p	p	2 1	p	p	2	2	p	2	2	1	1	33	37	2.2	5.3	5.4
Forbs: Annual & Biennial Introduced																		
Ambrosia artemisiifolia	annual ragweed													0	0	0.0	0.0	0.0
Bassia scoparia	burningbush	p												2	2	0.1	0.3	0.3
Lactuca serriola	prickly lettuce		1	p	1	1		1	p	p	p	p		5	5	0.3	0.7	0.7
Salsola tragus	prickly Russian thistle	6	12	21	16 1	4	22	16	8 1	12	10 1	11	13	402	411	26.8	59.3	60.0
Tragopogon dubius	yellow salsify													0	0	0.0	0.0	0.0
Subtotal		6	13	21	17 1	5	22	17	8 1	12	10 1	11	13	409	418	27.3	60.3	61.0

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Reclamation Area 29/23 Vegetation Cover Data (continued)

Scientific Name	Common Name	19	20	21	22	23	24	25	26	27	28	29	30	Total Hits	Absolute Cover (%)	Relative Cover (%)	Relative Cover (%)
		1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1st All			
Forbs: Perennial Native																	
Ambrosia psilostachya	Cuman ragweed					1				1	p	p		0 0	0.0	0.0	0.0
Physalis hispida	prairie groundcherry													2 2	0.1	0.3	0.3
Mentzelia nuda	bractless blazingstar													0 0	0.0	0.0	0.0
Physalis hispida	prairie groundcherry								2					2 2	0.1	0.3	0.3
Symphotrichum falcatum	white prairie aster													0 0	0.0	0.0	0.0
Subtotal						1			2	1	p	p		4 4	0.3	0.6	0.6
Total Forb Cover		6 0	13 0	23 1	17 1	6 0	24 0	19 0	10 1	15 0	12 1	12 0	14 0	446 459	29.7	66.2	67.0
Subshrubs/Shrubs/Succulents: Perennial Native																	
Artemisia filifolia	sand sagebrush											1		5 5	0.3	0.7	0.7
Opuntia phaeacantha	tulip pricklypear					p		p		p		p		1 1	0.1	0.1	0.1
Subtotal						p		p		p		1		6 6	0.4	0.9	0.9
Total Shrub Cover		0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	1 0	0 0	6 6	0.4	0.9	0.9
Rock														2 2	0.1		
Litter		28	24	11	12	23	17	20	20	10	22	23	15	558 558	37.2		
Bare Ground		4	4	10	13	12	3	8	17	18	8	12	16	273 273	18.2		
Total Hits		50 0	50 1	50 1	50 1	50 0	50 0	50 0	50 1	50 0	50 2	50 0	50 0	1500 1526	100.0		
Total Vegetation Cover		36 0	44 2	58 2	50 2	30 0	60 0	44 0	26 2	44 0	40 4	30 0	38 0		44.5	100.0	101.2
Non-Noxious Vegetation Cover		32 0	44 2	56 2	50 2	30 0	60 0	44 0	26 2	44 0	40 4	28 0	38 0		43.9		
Total Ground Cover		92	92	80	74	76	94	84	66	64	84	76	68		81.8		
Allowable Vegetation Cover		6.9	18.9	30.9	24.9	4.9	34.9	18.9	0.9	18.9	14.9	2.9	12.9		18.9		

Non-Noxious Annual Cover	29.5
Excess Annual Cover	25.1

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Reclamation Area 30 Vegetation Cover Data

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Scientific Name Common Name		1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2
Grass: Annual Native																			
Munroa squarrosa	false buffalograss	p		2			p			p		p	p		p		p		p
Vulpia octoflora	sixweeks fescue			p									p					1	p
Subtotal		p		2			p			p		p	p		p		p	1	p
Grass: Annual Introduced																			
Bromus tectorum	cheatgrass	p	p	1	3	1		3	p	3	p	p		1	p	p	2		p
Subtotal		p	p	1	3	1		3	p	3	p	p		1	p	p	2		p
Grass: Perennial Desirable (Cool)																			
Achnatherum hymenoides	Indian ricegrass											1							
Agropyron cristatum	crested wheatgrass				p														
Pascopyrum smithii	western wheatgrass										p								
Subtotal					p						p	1							
Grass: Perennial Desirable (Warm)																			
Andropogon hallii	sand bluestem	5	4	2 1	4 1	2 1	3 1	6	4 3	2 3	4	11	3	2	10 4			5 1	5 1
Bouteloua curtipendula	sideoats grama		p						p		p 1	p	p	1	p			p	p
Bouteloua gracilis	blue grama	p	p		p		p		p	2	1	1	1	p			1	p	3
Calamovilfa longifolia	prairie sandreed			1			1	1		p	p	2	1		1			p	1
Panicum virgatum	switchgrass	p					p					p	p		p			1	1
Schizachyrium scoparium	little bluestem	p				1	p		p	p				p					p
Sporobolus cryptandrus	sand dropseed	6	4	3 1	3 1	1	3 2	p	3	4 4	6	p	p	2 1	1	2	2	2	1
Subtotal		11	8	6 2	7 2	4 1	7 3	7	7 3	8 7	11 1	13	5	5 1	12 4	2	3	8 1	11 1
Total Grass Cover		11 0	8 0	9 2	10 2	5 1	7 3	10 0	7 3	11 7	11 1	14 0	5 0	6 1	12 4	2 0	5 0	9 1	11 1
Forbs: Annual & Biennial Native																			
Amaranthus retroflexus	redroot amaranth		p	3	1	p	p	p	2	p	p	1	p	6	2		1	1	p
Argemone polyanthemus	crested pricklypoppy																		p
Conyza canadensis	Canadian horseweed	p	p	p	p	p	p	p	1	p	p	p	p	p	p	p	p	p	p
Croton texensis	Texas croton																		
Helianthus annuus	common sunflower		p		p	p								p	p		p		p
Subtotal		p	p	3	1	p	p	p	3	p	p	1	p	6	2	p	1	1	p
Forbs: Annual & Biennial Introduced																			
Amaranthus blitoides	mat amaranth						p						1						
Ambrosia artemisiifolia	annual ragweed								p										
Bassia scoparia	burningbush																		
Lactuca serriola	prickly lettuce					p	p				p					p			
Salsola tragus	prickly Russian thistle	12	3	3 1	p	18	2	7	4	10 1	15	5	7	2	p	19	4	3	5
Subtotal		12	3	3 1	p	18	2	7	4	10 1	15	5	8	2	p	19	4	3	5

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Reclamation Area 30 Vegetation Cover Data (continued)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Scientific Name	Common Name	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2
Forbs: Perennial Native																			
Ambrosia psilostachya	Cuman ragweed	p	2			p						p							p
Lygodesmia juncea	rush skeletonplant							p											
Physalis hispida	prairie groundcherry	p																	
Subtotal		p	2			p		p				p							p
Total Forb Cover		12 0	5 0	6 1	1 0	18 0	2 0	7 0	7 0	10 1	15 0	6 0	8 0	8 0	2 0	19 0	5 0	4 0	5 0
Subshrubs/Shrubs/Succulents: Perennial Native																			
Artemisia filifolia	sand sagebrush							p					p		p				
Yucca glauca	soapweed yucca							p											
Opuntia phaeacantha	tulip pricklypear	p	p		p			p	p	p		p	p	p		p			
Subtotal		p	p		p			p	p	p		p	p	p	p	p			
Total Shrub Cover		0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
Rock																			
Litter		22	28	21	34	21	35	27	28	20	17	22	26	21	23	19	28	19	22
Bare Ground		5	9	14	5	6	6	6	8	9	7	8	11	15	13	10	12	18	12
Total Hits		50 0	50 0	50 3	50 2	50 1	50 3	50 0	50 3	50 8	50 1	50 0	50 0	50 1	50 4	50 0	50 0	50 1	50 1
Total Vegetation Cover		46 0	26 0	30 6	22 4	46 2	18 6	34 0	28 6	42 16	52 2	40 0	26 0	28 2	28 8	42 0	20 0	26 2	32 2
Non-Noxious Vegetation Cover		46 0	26 0	28 6	16 4	44 2	18 6	28 0	28 6	36 16	52 2	40 0	26 0	26 2	28 8	42 0	16 0	26 2	32 2
Total Ground Cover		90	82	72	90	88	88	88	84	82	86	84	78	70	74	80	76	64	76
Allowable Vegetation Cover		33.2	13.2	15.2	3.2	31.2	5.2	15.2	15.2	23.2	39.2	27.2	13.2	13.2	15.2	29.2	3.2	13.2	19.2

Non-Noxious Annual Cover	16.0
Excess Annual Cover	12.9

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Reclamation Area 30 Vegetation Cover Data (continued)

		19	20	21	22	23	24	Total Hits	Average Absolute Cover (%)	Average Relative Cover (%)	Non-Noxious Relative Cover (%)
Scientific Name	Common Name	1 2	1 2	1 2	1 2	1 2	1 2	1st All			
Grass: Annual Native											
Munroa squarrosa	false buffalograss	1		p	1			4 4	0.3	0.9	1.0
Vulpia octoflora	sixweeks fescue						p	1 1	0.1	0.2	0.2
Subtotal		1		p	1		p	5 5	0.4	1.1	1.2
Grass: Annual Introduced											
Bromus tectorum	cheatgrass	p	p	p	p	4		18 18	1.5	4.1	
Subtotal		p	p	p	p	4		18 18	1.5	4.1	
Grass: Perennial Desirable (Cool)											
Achnatherum hymenoides	Indian ricegrass							1 1	0.1	0.2	0.2
Agropyron cristatum	crested wheatgrass							0 0	0.0	0.0	0.0
Pascopyrum smithii	western wheatgrass							0 0	0.0	0.0	0.0
Subtotal								1 1	0.1	0.2	0.2
Grass: Perennial Desirable (Warm)											
Andropogon hallii	sand bluestem	6 1	3 3	2	4 1	1	4 2	92 115	7.7	26.2	27.3
Bouteloua curtipendula	sideoats grama	p			p			1 2	0.1	0.5	0.5
Bouteloua gracilis	blue grama	1 1	1	p		p	1 1	11 13	0.9	3.0	3.1
Calamovilfa longifolia	prairie sandreed	4 2		p	p			12 14	1.0	3.2	3.3
Panicum virgatum	switchgrass				1			3 3	0.3	0.7	0.7
Schizachyrium scoparium	little bluestem							1 1	0.1	0.2	0.2
Sporobolus cryptandrus	sand dropseed	3	2	5 2	5 1	4 1	1	63 76	5.3	17.3	18.1
Subtotal		14 4	6 3	7 2	10 2	5 1	6 3	183 224	15.3	51.0	53.2
Total Grass Cover		15 4	6 3	7 2	11 2	9 1	6 3	207 248	17.3	56.5	58.9
Forbs: Annual & Biennial Native											
Amaranthus retroflexus	redroot amaranth	p	3	p	p	p		20 20	1.7	4.6	4.8
Argemone polyanthemus	crested pricklypoppy		p					0 0	0.0	0.0	0.0
Conyza canadensis	Canadian horseweed	p	1	p	p	p	p	2 2	0.2	0.5	0.5
Croton texensis	Texas croton		p					0 0	0.0	0.0	0.0
Helianthus annuus	common sunflower		p	p	p	p	p	0 0	0.0	0.0	0.0
Subtotal		p	4	p	p	p	p	22 22	1.8	5.0	5.2
Forbs: Annual & Biennial Introduced											
Amaranthus blitoides	mat amaranth							1 1	0.1	0.2	0.2
Ambrosia artemisiifolia	annual ragweed							0 0	0.0	0.0	0.0
Bassia scoparia	burningbush					p		0 0	0.0	0.0	0.0
Lactuca serriola	prickly lettuce					p	p	0 0	0.0	0.0	0.0
Salsola tragus	prickly Russian thistle	3	p	2	4	20	16	164 166	13.7	37.8	39.4
Subtotal		3	p	2	4	20	16	165 167	13.8	38.0	39.7

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Reclamation Area 30 Vegetation Cover Data (continued)

		19	20	21	22	23	24	Total Hits	Average Absolute Cover (%)	Average Relative Cover (%)	Non-Noxious Relative Cover (%)
Scientific Name	Common Name	1 2	1 2	1 2	1 2	1 2	1 2	1st All			
Forbs: Perennial Native											
Ambrosia psilostachya	Cuman ragweed							2 2	0.2	0.5	0.5
Lygodesmia juncea	rush skeletonplant							0 0	0.0	0.0	0.0
Physalis hispida	prairie groundcherry							0 0	0.0	0.0	0.0
Subtotal								2 2	0.2	0.5	0.5
Total Forb Cover		3 0	4 0	2 0	4 0	20 0	16 0	189 191	15.8	43.5	45.4
Subshrubs/Shrubs/Succulents: Perennial Native											
Artemisia filifolia	sand sagebrush							0 0	0.0	0.0	0.0
Yucca glauca	soapweed yucca							0 0	0.0	0.0	0.0
Opuntia phaeacantha	tulip pricklypear	p		p	p	p		0 0	0.0	0.0	0.0
Subtotal		p		p	p	p		0 0	0.0	0.0	0.0
Total Shrub Cover		0 0	0 0	0 0	0 0	0 0	0 0	0 0	0.0	0.0	0.0
Rock								0 0	0.0		
Litter		28	28	36	31	17	21	594 594	49.5		
Bare Ground		4	12	5	4	4	7	210 210	17.5		
Total Hits		50 4	50 3	50 2	50 2	50 1	50 3	1200 1243	100.0		
Total Vegetation Cover		36 8	20 6	18 4	30 4	58 2	44 6		33.0	100.0	100.0
Non-Noxious Vegetation Cover		36 8	20 6	18 4	30 4	50 2	44 6		31.5		
Total Ground Cover		92	76	90	92	92	86		82.5		
Allowable Vegetation Cover		23.2	7.2	5.2	17.2	37.2	31.2		18.7		

Non-Noxious Annual Cover	16.0
Excess Annual Cover	12.9

Coors Energy Company Keenesburg Mine – Phase III Bond Release Application
Revegetation Success Demonstration

Reclamation Area 31 Vegetation Cover Data

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Scientific Name	Common Name	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2
Grass: Annual Native																			
Munroa squarrosa	false buffalograss		p									p		p			p		p
Vulpia octoflora	sixweeks fescue																1		
Subtotal			p									p		p			1		p
Grass: Annual Introduced																			
Bromus tectorum	cheatgrass	p	p		p					p				p		p			p
Subtotal		p	p		p					p				p		p			p
Grass: Perennial Desirable (Cool)																			
Achnatherum hymenoides	Indian ricegrass				p					p						p			
Agropyron cristatum	crested wheatgrass									p									
Hesperostipa comata	needle and thread										p								
Subtotal					p					p	p					p			
Grass: Perennial Desirable (Warm)																			
Andropogon hallii	sand bluestem	p	1		1	1		1	p	1	2	2	2	p	1	3	1	p	2
Bouteloua curtipendula	sideoats grama			p								1	p		p		p		
Bouteloua gracilis	blue grama	p		p	p	p		p	p	1	p	p	1	p	1		1	1	2
Calamovilfa longifolia	prairie sandreed	10	4	9	4	3	p	11	3	4	11	7	10	6	9	6	8	5	4
Panicum virgatum	switchgrass											1	p			1			p
Sporobolus airoides	alkali sacaton		p				3						2					1	
Sporobolus cryptandrus	sand dropseed	p	1	p	2	3	p	3	4	p	p	2	p	p	p	5	1	2	1
Subtotal		10	6	9	7	7	3	15	7	6	13	13	15	6	11	15	1	12	8
Total Grass Cover		10	0	6	0	9	0	7	0	7	0	3	0	15	0	7	0	6	0
Forbs: Annual & Biennial Native																			
Amaranthus retroflexus	redroot amaranth	p	2		1	p	6	p	1	p	2	p	p	p		p	p	p	p
Chenopodium leptophyllum	narrowleaf goosefoot					p							p						
Conyza canadensis	Canadian horseweed		p				p	p			p		p	p					
Helianthus annuus	common sunflower		p		p	2	p			p			2	p	p		p		p
Machaeranthera canescens	hoary tansyaster			p															
Subtotal		p	2	p	1	2	6	p	1	p	2	p	2	p	p	p	p	p	p
Forbs: Annual & Biennial Introduced																			
Ambrosia artemisiifolia	annual ragweed		p							p									
Bassia scoparia	burningbush	p		p															p
Lactuca serriola	prickly lettuce		p			p	p				p		p	p		p			p
Melilotus officinalis	sweetclover																		p
Salsola tragus	prickly Russian thistle	3	2	6	6	5	6	4	6	4		2		2		3	1	4	2
Subtotal		3	2	6	6	5	6	4	6	4	p	2	p	2		3	1	4	2

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Reclamation Area 31 Vegetation Cover Data (continued)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Scientific Name	Common Name	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2
Forbs: Perennial Native																			
Ambrosia psilostachya	Cuman ragweed		p				p			p			1	1					p
Asclepias speciosa	showy milkweed							p											
Mirabilis hirsuta	hairy four o'clock																		
Physalis hispida	prairie groundcherry	p			p	1		p											1
Subtotal		p	p		p	1	p	p		p			1	1					1
Total Forb Cover		3 0	4 0	6 0	7 0	8 0	12 0	4 0	7 0	4 0	2 0	2 0	3 0	3 0	0 0	3 0	1 0	4 0	3 0
Subshrubs/Shrubs/Succulents: Perennial Native																			
Artemisia filifolia	sand sagebrush			1				1					p				p		
Yucca glauca	soapweed yucca						p										p		
Opuntia phaeacantha	tulip pricklypear		p	p	p		p			p	p	p		p			p	p	
Subtotal			p	1	p		p	1		p	p	p	p	p			p	p	
Total Shrub Cover		0 0	0 0	1 0	0 0	0 0	0 0	1 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
Rock																			
Litter		18	15	26	18	17	17	21	22	31	29	25	25	33	35	18	26	30	23
Bare Ground		19	25	8	18	18	18	9	14	9	6	10	7	8	4	14	10	8	16
Total Hits		50 0	50 0	50 0	50 0	50 0	50 0	50 0	50 0	50 0	50 0	50 0	50 0	50 0	50 0	50 1	50 0	50 0	50 0
Total Vegetation Cover		26 0	20 0	32 0	28 0	30 0	30 0	40 0	28 0	20 0	30 0	30 0	36 0	18 0	22 0	36 2	28 0	24 0	22 0
Non-Noxious Vegetation Cover		26 0	20 0	32 0	28 0	30 0	30 0	40 0	28 0	20 0	30 0	30 0	36 0	18 0	22 0	36 2	28 0	24 0	22 0
Total Ground Cover		62	50	84	64	64	64	82	72	82	88	80	86	84	92	72	80	84	68
Allowable Vegetation Cover		21.1	15.1	27.1	23.1	25.1	25.1	35.1	23.1	15.1	25.1	25.1	31.1	13.1	17.1	31.1	23.1	19.1	17.1

Non-Noxious Annual Cover	7.6
Excess Annual Cover	4.9

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Revegetation Success Demonstration

Reclamation Area 31 Vegetation Cover Data

Scientific Name	Common Name	19		20		21		Total Hits		Absolute Cover (%)	Relative Cover (%)	Relative Cover (%)
		1	2	1	2	1	2	1st	All			
Grass: Annual Native												
Munroa squarrosa	false buffalograss	p		p				0	0	0.0	0.0	0.0
Vulpia octoflora	sixweeks fescue							1	1	0.1	0.3	0.3
Subtotal		p		p				1	1	0.1	0.3	0.3
Grass: Annual Introduced												
Bromus tectorum	cheatgrass					p		0	0	0.0	0.0	0.0
Subtotal						p		0	0	0.0	0.0	0.0
Grass: Perennial Desirable (Cool)												
Achnatherum hymenoides	Indian ricegrass							0	0	0.0	0.0	0.0
Agropyron cristatum	crested wheatgrass							0	0	0.0	0.0	0.0
Hesperostipa comata	needle and thread							0	0	0.0	0.0	0.0
Subtotal								0	0	0.0	0.0	0.0
Grass: Perennial Desirable (Warm)												
Andropogon hallii	sand bluestem	p		3		p		21	21	2.0	7.3	7.3
Bouteloua curtipendula	sideoats grama							1	1	0.1	0.3	0.3
Bouteloua gracilis	blue grama	1		p		1		9	9	0.9	3.1	3.1
Calamovilfa longifolia	prairie sandreed	8		6		8		136	136	13.0	47.1	47.1
Panicum virgatum	switchgrass					p		2	2	0.2	0.7	0.7
Sporobolus airoides	alkali sacaton	3						9	9	0.9	3.1	3.1
Sporobolus cryptandrus	sand dropseed			1				24	25	2.3	8.7	8.7
Subtotal		12		10		9		202	203	19.2	70.2	70.2
Total Grass Cover		12	0	10	0	9	0	203	204	19.3	70.6	70.6
Forbs: Annual & Biennial Native												
Amaranthus retroflexus	redroot amaranth	p		1				13	13	1.2	4.5	4.5
Chenopodium leptophyllum	narrowleaf goosefoot							0	0	0.0	0.0	0.0
Conyza canadensis	Canadian horseweed	p						0	0	0.0	0.0	0.0
Helianthus annuus	common sunflower	p		p				4	4	0.4	1.4	1.4
Machaeranthera canescens	hoary tansyaster							0	0	0.0	0.0	0.0
Subtotal		p		1				17	17	1.6	5.9	5.9
Forbs: Annual & Biennial Introduced												
Ambrosia artemisiifolia	annual ragweed					p		0	0	0.0	0.0	0.0
Bassia scoparia	burningbush					p		0	0	0.0	0.0	0.0
Lactuca serriola	prickly lettuce			p				0	0	0.0	0.0	0.0
Melilotus officinalis	sweetclover							0	0	0.0	0.0	0.0
Salsola tragus	prickly Russian thistle	3		3		p		62	62	5.9	21.5	21.5
Subtotal		3		3		p		62	62	5.9	21.5	21.5

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Reclamation Area 31 Vegetation Cover Data (continued)

		19		20		21		Total Hits		Absolute Cover (%)	Relative Cover (%)	Relative Cover (%)
Scientific Name	Common Name	1	2	1	2	1	2	1st	All			
Forbs: Perennial Native												
Ambrosia psilostachya	Cuman ragweed	p		p		p		2	2	0.2	0.7	0.7
Asclepias speciosa	showy milkweed							0	0	0.0	0.0	0.0
Mirabilis hirsuta	hairy four o'clock							0	0	0.0	0.0	0.0
Physalis hispida	prairie groundcherry							2	2	0.2	0.7	0.7
Subtotal		p		p		p		4	4	0.4	1.4	1.4
Total Forb Cover		3	0	4	0	0	0	83	83	7.9	28.7	28.7
Subshrubs/Shrubs/Succulents: Perennial Native												
Artemisia filifolia	sand sagebrush	p						2	2	0.2	0.7	0.7
Yucca glauca	soapweed yucca							0	0	0.0	0.0	0.0
Opuntia phaeacantha	tulip pricklypear							0	0	0.0	0.0	0.0
Subtotal		p		p		p		2	2	0.2	0.7	0.7
Total Shrub Cover		0	0	0	0	0	0	2	2	0.2	0.7	0.7
Rock								0	0	0.0		
Litter		18		18		32		497	497	47.3		
Bare Ground		17		18		9		265	265	25.2		
Total Hits		50	0	50	0	50	0	1050	1051	100.0		
Total Vegetation Cover		30	0	28	0	18	0			27.4	100.0	100.0
Non-Noxious Vegetation Cover		30	0	28	0	18	0			27.4		
Total Ground Cover		66		64		82				74.8		
Allowable Vegetation Cover		25.1		23.1		13.1				22.6		

Non-Noxious Annual Cover	7.6
Excess Annual Cover	4.9

*Coors Energy Company Keenesburg Mine – Phase III Bond Release Application
Revegetation Success Demonstration*

Attachment 5: 2022 Herbaceous Production Data

*Coors Energy Company Keenesburg Mine – Phase III Bond Release Application
Revegetation Success Demonstration*

Reclamation Area 29/23 Herbaceous Production Data

Sample	Herbaceous Production (g/m2)			
	Annual Species	Perennial Species	Total	Allowable
1	18.2	76	94.2	0.0
2	144.2	160	304.2	179.8
3	0	134.6	134.6	10.2
4	580.2	25.8	606	481.6
5	224.8	43.6	268.4	144.0
6	174.6	30.8	205.4	81.0
7	176.2	23.4	199.6	75.2
8	152.8	47.2	200	75.6
9	375.4	19.6	395	270.6
10	96.4	28.2	124.6	0.2
11	18.8	14.6	33.4	0.0
12	112.8	34	146.8	22.4
13	15.6	26.2	41.8	0.0
14	23	311.2	334.2	209.8
15	130.2	7.8	138	13.6
16	317.2	3	320.2	195.8
17	196	39.2	235.2	110.8
18	371.2	24.6	395.8	271.4
19	66.6	22.8	89.4	0.0
20	22.8	186.4	209.2	84.8
21	192.4	2.8	195.2	70.8
22	214.2	24.2	238.4	114.0
23	4.4	44.2	48.6	0.0
24	30.6	108	138.6	14.2
25	177.6	22.4	200	75.6
26	84.2	100	184.2	59.8
27	24.8	14.6	39.4	0.0
28	129.6	51.4	181	56.6
29	45.4	57.8	103.2	0.0
30	215.6	30.2	245.8	121.4
Average	144.5	57.2	201.7	91.3

Excess Annual Production	124.4
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If average annual production is greater than 10%, subtract the average excess

*Coors Energy Company Keenesburg Mine – Phase III Bond Release Application
Revegetation Success Demonstration*

Reclamation Area 30 Herbaceous Production Data

Sample	Herbaceous Production (g/m2)			
	Annual Species	Perennial Species	Total	Allowable
1	0	60.2	60.2	5.1
2	24	76	100	44.9
3	55	44.4	99.4	44.3
4	31.6	65.6	97.2	42.1
5	86.2	22.6	108.8	53.7
6	44	56	100	44.9
7	95.8	23.8	119.6	64.5
8	48.6	110.4	159	103.9
9	161.4	26.8	188.2	133.1
10	220.4	54.4	274.8	219.7
11	255.6	35.2	290.8	235.7
12	25.2	90.6	115.8	60.7
13	58.8	34.2	93	37.9
14	0	92	92	36.9
15	83	14.4	97.4	42.3
16	91.6	18.4	110	54.9
17	0	56	56	0.9
18	0	165.8	165.8	110.7
19	51.4	90.6	142	86.9
20	21	7.2	28.2	0.0
21	7.6	9	16.6	0.0
22	0	83.4	83.4	28.3
23	173.2	16	189.2	134.1
24	13	71.4	84.4	29.3
25	0	82.4	82.4	27.3
26	0.6	27	27.6	0.0
27	92.2	10.2	102.4	47.3
28	151.4	18	169.4	114.3
29	109.2	46.4	155.6	100.5
30	106.2	36	142.2	87.1
Average	66.9	51.5	118.4	66.4

Excess Annual Production	55.1
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If average annual production is greater than 10%, subtract the average excess

*Coors Energy Company Keenesburg Mine – Phase III Bond Release Application
Revegetation Success Demonstration*

Reclamation Area 31 Herbaceous Production Data

Sample	Herbaceous Production (g/m2)			
	Annual Species	Perennial Species	Total	Allowable
1	0	33.2	33.2	10.4
2	13.8	11.2	25	2.2
3	0.2	43.4	43.6	20.8
4	204	76.6	280.6	257.8
5	0	59.6	59.6	36.8
6	83.6	8.6	92.2	69.4
7	0	42.4	42.4	19.6
8	0	82.6	82.6	59.8
9	12.4	15.6	28	5.2
10	2.4	113.4	115.8	93.0
11	0	26.2	26.2	3.4
12	7.4	22.2	29.6	6.8
13	0	68.6	68.6	45.8
14	0	99.6	99.6	76.8
15	0	111.8	111.8	89.0
16	0	133.4	133.4	110.6
17	51.2	0	51.2	28.4
18	51.6	51	102.6	79.8
19	32.4	17	49.4	26.6
20	174	37.6	211.6	188.8
21	0	86	86	63.2
22	0	115.4	115.4	92.6
23	9.2	258.2	267.4	244.6
24	1.4	38.6	40	17.2
25	100.6	35.8	136.4	113.6
26	0	72.2	72.2	49.4
27	0	52.2	52.2	29.4
28	16.6	27	43.6	20.8
29	71.6	60.4	132	109.2
30	130.8	16	146.8	124.0
Average	32.1	60.5	92.6	69.8

Excess Annual Production	22.8
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If average annual production is greater than 10%, subtract the average excess

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Revegetation Success Demonstration*

Attachment 6: 2021 Cover Transect Photographs

*Coors Energy Company Keenesburg Mine – Phase III Bond Release Application
Revegetation Success Demonstration*

Reclamation Area 29/23

Transect 1



Transect 2



Transect 3



Transect 4



Transect 5



Transect 6



*Coors Energy Company Keenesburg Mine – Phase III Bond Release Application
Revegetation Success Demonstration*

Reclamation Area 29/23

Transect 7



Transect 8



Transect 9



Transect 10



Transect 11



Transect 12



*Coors Energy Company Keenesburg Mine – Phase III Bond Release Application
Revegetation Success Demonstration*

Reclamation Area 29/23

Transect 13



Transect 14



Transect 15



Transect 16



Transect 17



Transect 18



*Coors Energy Company Keenesburg Mine – Phase III Bond Release Application
Revegetation Success Demonstration*

Reclamation Area 30

Transect 1



Transect 2



Transect 3



Transect 4



Transect 5



Transect 6



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Reclamation Area 30

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Transect 14



Transect 15



Reclamation Area 31

Transect 1



Transect 2



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Reclamation Area 31

Transect 3



Transect 4



Transect 5



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Transect 7



Transect 8



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Transect 9



Transect 10



Transect 11



Transect 12



Transect 13



Transect 14



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Reclamation Area 31

Transect 15



*Coors Energy Company Keenesburg Mine – Phase III Bond Release Application
Revegetation Success Demonstration*

Attachment 7: 2022 Cover Transect Photographs

*Coors Energy Company Keenesburg Mine – Phase III Bond Release Application
Revegetation Success Demonstration*

Reclamation Area 29/23

Transect 1



Transect 2



Transect 3



Transect 4



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Transect 18



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Reclamation Area 29/23

Transect 19



Transect 20



Transect 21



Transect 22



Transect 23



Transect 24



*Coors Energy Company Keenesburg Mine – Phase III Bond Release Application
Revegetation Success Demonstration*

Reclamation Area 29/23

Transect 25



Transect 26



Transect 27



Transect 28



Transect 29



Transect 30



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Revegetation Success Demonstration*

Reclamation Area 30

Transect 1



Transect 2



Transect 3



Transect 4



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Reclamation Area 30

Transect 19



Transect 20



Transect 21



Transect 22



Transect 23



Transect 24



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Reclamation Area 31

Transect 1



Transect 2



Transect 3



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Transect 20



Transect 21

