July 2, 2020

Habitat Management
Environmental & Natural Resource Services

Rob Zuber
Division of Reclamation Mining Safety
Department of Natural Resources
1313 Sherman St., Room 215
Denver, CO 80203

Re: Keenesburg Mine Permit C-1981-028 Technical Revision #47 –Species Composition Bond Release Standard Modification

Dear Mr. Zuber,

Habitat Management, Inc. is submitting the enclosed Technical Revision #47 (TR47) application package to the Colorado Division of Reclamation Mining and Safety (DRMS) on behalf of Coors Energy Company (CEC) for their Keenesburg Mine north of Keenesburg, CO. TR47 modifies the plant species composition final bond release standard for the post-mining land use of rangeland in Permit C-1981-028.

The need to modify the plant species composition final bond release requirement was discussed with Janet Binns (DRMS) during a 2018 field inspection at the mine. Based on this discussion and relevant supporting information, TR47 modifies the current grass species seasonality requirement. The current standard requires a minimum of four grass species including three warm and one cool season species each with a relative cover percentage between 3% and 40%. The modified standard requires that any four non-noxious perennial grass species meeting the relative cover requirement may be used to meet the standard regardless of seasonality.

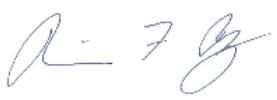
The following documents are enclosed to support this modification:

1. Application Form for a Revision to a Coal Mining and Reclamation Permit
2. Technical Revision 47 – Modification of Reclamation Success Standard
3. Revised Permit pages 116 and 116b of Section 2.05: Operations and Reclamation Plan
4. Public Notice to be published in the Ft Lupton Press

Copies of the TR47 application package will be delivered to the Keenesburg Town Hall and to the Weld County Clerk and Recorder's office for public review after completeness approval is received and concurrently with publication of the Public Notice in the Ft. Lupton Press.

The time taken and guidance provided to us by DRMS personnel during development of TR #47 is greatly appreciated. As DRMS proceeds with completeness and technical adequacy reviews of this revision please contact me (719-928-1717) or Ben Moline, CEC Environmental Manager (303-927-3680) at your convenience with questions.

Sincerely,



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COLORADO DIVISION OF RECLAMATION, MINING AND SAFETY
1313 Sherman Street, Room 215, Denver, Colorado 80203, (303) 866-3567

APPLICATION FORM FOR A REVISION TO A COAL MINING AND RECLAMATION PERMIT

This form must be completed and submitted with all requests for minor revisions, as defined in Rule 1.04(73), technical revisions, as defined in Rule 1.04(136), and permit revisions, as defined in Rule 1.04(90). All revisions are to address the requirements of Rule 2.08.4. Three (3) copies of the revision, including maps, must be submitted in order for it to be complete.

All revisions are to be formatted so they can be inserted into the permit to replace the revised sections, maps, tables and/or figures, with a revised table of contents, if necessary. The revision submittal date should be printed in the lower right corner of each revision page. A cover letter to the revision should explain the nature of the revision and reference the specific permit sections being revised.

For federal mines, a copy of the revision application must be submitted to all agencies on the federal mailing list (except OSM) at the same time the application is submitted to the Division, and proof of distribution must be submitted to the Division along with the application. Copies of revision pages modified during the review process must be distributed in the same manner, along with proof of distribution. Proof of distribution must be submitted prior to implementation of the revision.

Permit No.: C - 1981 - 028 Date: 7 / 2 / 2020

Permittee: Coors Energy Company

Street: PO Box 467

City: Golden

State: CO Zip Code: 80402 - 0467

Brief Description of Revision: Change species composition bond release standard to remove species seasonality requirement.

Public Notice Attached: Yes ☑ No ☐ *(Required for PRs and TRs)*

Bond Increase: Yes ☐ No ☑ **Federal** ☐ **Non-Federal** ☑ **Mine**

Proposed Change in:

Permit Area -

Disturbed (+/-) __ __ __ . __ Acres

Permit (+/-) __ __ __ . __ Acres

Affected (+/-) __ __ __ . __ Acres

Surface Ownership -

Private Land (+/-) __ __ __ . __ Acres

Federal Land (+/-) __ __ __ . __ Acres

State Land (+/-) __ __ __ . __ Acres

Mineral Ownership -

Mineral Private (+/-) __ __ __ . __Acres

Mineral Federal (+/-) __ __ __ . __ Acres

Mineral State (+/-) __ __ __ . __ Acres

1 INTRODUCTION

Technical Revision 47 (TR47) changes the reclamation success standard for species composition at the Keenesburg Mine. Current plant species composition success criteria require that there be at least four perennial species each meeting minimum and maximum relative cover percentages, of which three are warm season grasses and one is a cool season grass. This revision removes the cool season grass composition requirement and now requires that at least four perennial non-noxious grass species be present that meet the minimum/maximum relative cover percentages for final vegetation bond release.

The following sections provide explanation and supporting references to show that the current standard is:

1. Inappropriate for the location;
2. Improbable given the current seed mixture; and
3. Unnecessary to provide the diversity and high-quality forage needed to support the post-mining land use.

2 RECLAMATION SUCCESS STANDARDS

Final revegetation success will continue to be evaluated using the methods currently contained in the permit. Vegetative cover and herbaceous production will be evaluated using the approved sampling and analytical methods.

Plant species composition will be evaluated using the approved evaluation method with new composition criteria. The current species composition standard requires that there be at least four perennial species, of which three are warm season grasses and one is a cool season grass. None of the four species may contribute greater than 40% nor less than 3% of the relative cover. The species composition standard is modified to remove the seasonal requirement and simply require that there be at least four perennial, non-noxious grass species none of which may contribute greater than 40% nor less than 3% of the relative cover.

3 APPROPRIATENESS FOR THE LOCATION

The current reclamation standards are based on data collected on the Osgood Sand Reference Area (OSRA) between 1994 and 2004 and presented in TR37 (Savage and Savage 2002 and 2005). TR37 explained that it is inappropriate to use the OSRA for a straight comparison to the reclaimed communities because the revegetated community is developing in a significantly altered physical environment, and revegetation success comparisons should not be made between a mature community and an early seral community. Instead, TR37 suggested the use of predictive equations for the vegetative cover and production standards and the use of a technical standard for diversity. However, these standards were still based on the reference area vegetation.

As stated in TR37, the OSRA was representative of the pre-disturbance community at the Keenesburg Mine which was dominated by sand sage (*Artemisia fillifolia*). The long-term data from the OSRA show a rangeland community dominated by sand sage with contributions from green needlegrass (*Nassella viridula*), blue grama (*Bouteloua gracilis*), cheatgrass (*Bromus tectorum*), prairie sandreed (*Calamovilfa longifolia*), and sand bluestem (*Andropogon hallii*).

Sandsage and needlegrass contribute an average of over 70% the relative cover in the last 5 years (2000-2004) of monitoring with the other three native species contributing another 15% and cheatgrass contributing 5% (Table 1).

Table 1: Osgood Sand Reference Area Data 2000-2004 (Savage and Savage 2005)

		Average Relative Cover (%)					
Scientific Name	**Common Name**	**2000**	**2001**	**2002**	**2003**	**2004**	**Average**
Grass: Annual Introduced							
Bromus tectorum	cheatgrass	2.1	9.5	1.5	4.8	7.7	5.1
Grass: Perennial Desirable (Cool)							
Nassella viridula	green needlegrass	25.1	12.1	12.0	25.5	26.9	20.3
Other Cool Season Perennial Grass		0.0	1.2	3.8	0.9	1.9	1.5
Grass: Perennial Desirable (Warm)							
Andropogon hallii	sand bluestem	10.2	3.5	5.3	2.3	0.0	4.2
Bouteloua gracilis	blue grama	8.1	4.3	15.8	1.1	1.9	6.2
Calamovilfa longifolia	prairie sandreed	5.1	6.3	7.5	2.8	1.2	4.6
Forbs							
Various species		0.4	8.9	8.3	13.0	5.9	7.3
Shrubs/Succulents: Perennial Native							
Artemisia fillifolia		48.9	53.7	45.1	49.6	53.9	50.2
Other Shrubs/Succulents		0.0	0.6	0.8	0.0	0.6	0.4
Total Vegetation Cover		**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

A majority (84%) of the reclamation areas are mapped by the Natural Resources Conservative Service (NRCS) within the Deep Sand Ecological Site Description (ESD) with another 13% in the Rolling Sands ESD (USDA, NRCS 2020). The reference plant community for both these ESDs is dominated by sand bluestem, prairie sandreed, and switchgrass (*Panicum virgatum*), with the Rolling Sands ESD also including little bluestem (*Schizachyrium scoparium*) and Indiangrass (*Sorghastrum nutans*) as dominants, all being native perennial warm season species (Sprock et al. 2004 and Tecklenburg 2016). The ESDs state that under continuous grazing without time for recovery, the community is expected to move toward shrubs, short grasses, and unpalatable species. If this occurs over a long period, the community will transition to the shrub state dominated by sand sage, annual weedy forbs, and short grasses.

This description suggests that the OSRA community composition was indicative of a native pasture that was in transition from the at-risk reference state to the shrub state but was not in the reference state. It was over 50% sand sage with less than 10% of the cover provided by the dominant reference species. While using data from this site as a model for creating the cover and production standards was arguably acceptable, using these data as a model for the diversity standard was inappropriate. The dominance of sand sage and green needlegrass was likely because these species are less palatable to livestock than most of the other species (USDA, NRCS 2019). Thus, if the reclamation goal is to establish a community with a diversity of viable forage opportunities, the OSRA did not meet that goal.

In 2019, data were collected in an undisturbed area on the mine property at the same time as the reclamation to evaluate the current composition of warm and cool season species. The sampled area has been managed to prevent livestock grazing for over twenty years and has received wildlife use similar to the reclaimed areas. While this area did have a large component of cheatgrass (25% of the relative cover), cool-season perennial grass species were not observed (Table 2).

Table 2: 2019 Undisturbed Area Data

Scientific Name	Common Name	Average Absolute Cover (%)	Average Relative Cover (%)
Grass: Annual Native			
1 species		0.4	1.3
Grass: Annual Introduced			
Bromus tectorum	cheatgrass	11.8	25.7
Grass: Perennial Desirable (Warm)			
Andropogon hallii	sand bluestem	3.0	6.8
Bouteloua gracilis	blue grama	0.2	0.4
Calamovilfa longifolia	prairie sandreed	5.8	13.1
Panicum virgatum	switchgrass	0.4	0.8
Sporobolus cryptandrus	sand dropseed	14.0	30.8
Subtotal		23.4	51.9
Forbs: Annual & Biennial Native			
5 species		4.8	10.5
Forbs: Perennial Native			
5 species		1.6	3.8
Shrubs/Succulents: Perennial Native			
3 species		3.0	6.8
Total Vegetation Cover		**45.0**	**100.0**

4 SEED MIXTURE

The approved reclamation seed mixture for Keenesburg Mine includes seven warm season perennial grass species and two cool season perennial grass species (Table 3). If this seed mixture's composition was expressed exactly with no other species establishing in the reclamation, there would be one cool season species and seven warm season species with greater than 3% and less than 40% of the relative cover.

There are seven warm season grass species included in the seed mixture to meet the warm season standard when only three are needed. This mixture increases competition for plant available soil moisture and serves to decrease the likelihood of cool season species establishment.

Prevailing weather patterns in the region are variable with one of four typical patterns expressed annually:

1. Cooler temperatures and increased spring precipitation,
2. Warmer temperatures and more monsoonal summer precipitation,
3. Wet years with a mixture of both above scenarios; and
4. Dry years with warmer temperatures and little or no precipitation.

Scenario 1 above favors cool season grass germination and establishment. Scenarios 2, 3 and 4 favor warm season grass over cool season grass germination and establishment. Therefore, prevailing weather patterns in the region favor germination and establishment of warm season grasses. Also, warm season grass physiology is better adapted to the weather patterns in this region (i.e., typically deeper adventitious root systems and C4 photosynthesis). Because prevailing site conditions are unfavorable for cool season grass species establishment and warm season grasses are better adapted to the weather in this area, there is very little chance for the reclamation community to meet the current composition standard.

Table 3: Approved Reclamation Seed Mixture

Species	**Common Name**	**% by Seed**
Grass: Perennial Cool-Season		
Achnatherum hymenoides	Indian ricegrass	6%
Elymus lanceolatus	thickspike wheatgrass	2%
Subtotal		***8%***
Grass: Perennial Warm-Season		
Andropogon hallii	sand bluestem	10%
Bouteloua curtipendula	sideoats grama	12%
Bouteloua gracilis	blue grama	18%
Calamovilfa longifolia	prairie sandreed	18%
Panicum virgatum	switchgrass	8%
Schizachyrium scoparium	little bluestem	6%
Sorghastrum nutans	Indiangrass	11%
Subtotal		***82%***
Forb: Perennial		
Ratibida sp.	Prairie Coneflower	10%
Total		**100%**

Cool season grasses were not observed in 2019 in the undisturbed areas adjacent to reclaimed lands. This serves to confirm that cool season species are ill-adapted to this rangeland. It also indicates that a cool season seed source for volunteer introduction into the reclamation is nominal or absent.

The current composition standard was based on the OSRA and several of the older reclamation areas (seeded in 1995 – 1999). The data provided for these areas in TR37 primarily included two native cool season perennial species in the OSRA (green needlegrass and western wheatgrass, *Pascopyrum smithii*) and two more native (Indian ricegrass, *Achnatherum hymenoides* and

thickspike wheatgrass, *Elymus lanceolatus*) and two cultivated cool season perennial species (crested wheatgrass, *Agropyron cristatum* and intermediate wheatgrass, *Thinopyrum intermedium*) in the older reclamation. Only two of these six species (Indian ricegrass and thicksprike wheatgrass) are currently included in the seed mixture and only one of them (Indian ricegrass) is included at a seeding rate that would result in greater than 3% relative cover.

5 POST-MINING LAND USE

Revegetation cover and production success standards are set at minimum levels to support the permitted post-mining land use of rangeland (i.e., grazing and wildlife use). These success standards remain unchanged by this revision.

A diverse community provides a varied food source for cattle and wildlife and protects against pest or disease infestations that could impact a single-species monoculture. The species composition standard is set at a minimum level to represent a healthy vegetation community composition. TR47 does not change the overall goal of species diversity, nor does it change the goal of providing a vegetation community capable of supporting productive grazing and wildlife use.

5.1 Diversity

Reclaimed plant communities at the Keenesburg Mine have greater species diversity, as well as greater grass diversity, than was observed in the OSRA data in 2000-2004 or in the undisturbed area monitored in 2019 (Table 4). Also, reclaimed land diversity is greater than would be expected from the seed mixture. On average, in 2019, the seven reclamation units monitored had over 24 non-noxious species observed across all transects including almost eight warm season perennial grasses and over three cool season perennial grasses.

Table 4: Non-Noxious Species Richness

	Reclamation Areas 2019							**Osgood Sand Reference Area**					**Un-disturbed Area 2019**	**Seed Mix**
Species	**25**	**29**	**30**	**31**	**32**	**33**	**34**	**2000**	**2001**	**2002**	**2003**	**2004**		
Warm Season Perennial Grass	8	8	9	8	7	7	8	3	3	3	3	2	5	7
Cool Season Perennial Grass	6	2	1	4	3	4	4	1	2	2	2	3	0	2
Other Non- Noxious Species	13	15	15	11	9	9	19	2	11	6	8	5	20	1
Total	**27**	**25**	**25**	**23**	**19**	**20**	**31**	**6**	**16**	**11**	**13**	**10**	**25**	**10**

5.2 Grazing Value

The value of a pasture for grazing is based on its herbaceous biomass production and the nutritional value of that biomass. Herbaceous production data are collected each year to determine if the reclamation meets the production standard. However, the biomass is not separated by species, it is only separated by growth duration (i.e., perennial or annual/biennial). The allowable biomass production that is compared to the standard includes all non-noxious perennial biomass and can include annual/biennial biomass up to 10% of the total.

The herbaceous production standard uses the previous 11 month's precipitation (September – July) to predict the success standard for any given year. For example, the 2019 standard was calculated for herbaceous biomass production using the September 2018 through July 2019 precipitation (11.4 inches) in the approved predictive equation:

$$\text{Herbaceous Production Standard} = 0.4666 * (11.4)^{2.1405} = 85.2 \text{ g/m}^2.$$

Revegetation is considered successful if the biomass production is at least 90% of this standard ($85.2 * 90\% = 76.7$ g/m^2). Because the herbaceous biomass production data are not separated by species, we cannot determine the exact production of warm versus cool season grasses; however, we can estimate this value using the relative cover data and published values for the maximum height of each grass species at maturity (USDA, NRCS 2019).

The most important component of the plant biomass for determining nutritional value is crude protein content. Published crude protein data for each species was used to estimate the average annual crude protein percentage. In some cases, published data were available for all months of the year, but in other cases, data were only available for some months. Using the published data, a logarithmic trend line was found to have the best fit across all species ($R^2 = 0.74$, Figure 1). The available data was plotted for each species and a species-specific logarithmic trendline was used to estimate the protein in the other months (R^2 ranged from 0.74 to 1). This process was completed for all perennial grass species observed in the reclamation areas in the past two years (2018 and 2019) as well as those species observed in the last two years of monitoring in the Osgood Reference Area (2003 and 2004, Table 5).

Figure 1: Best Fit Trendline for Published Crude Protein Data for All Species

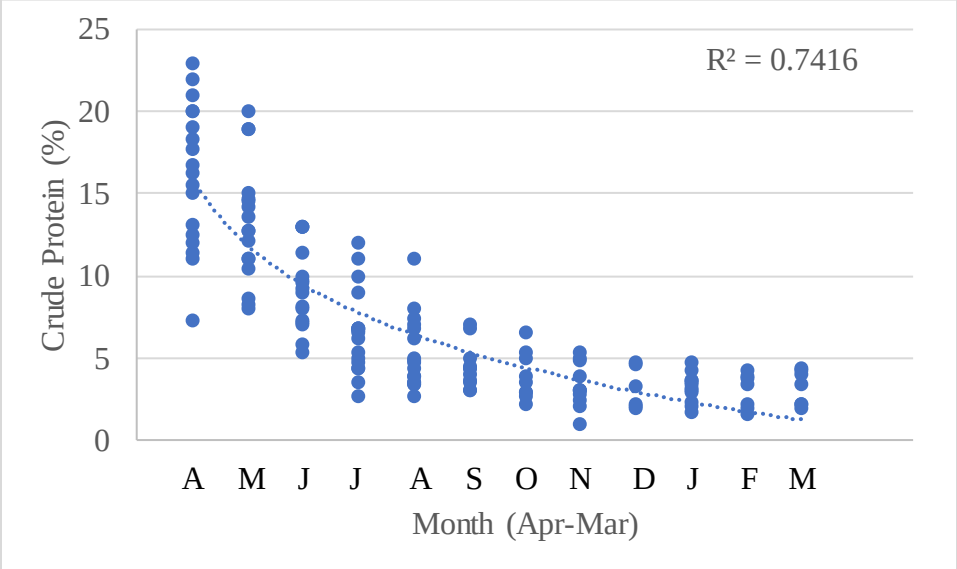

Table 5: Crude Protein Content for All Grasses

Scientific Name	Height (Ft)[1]	Summer (%)						Winter (%)						Summer Average	Winter Average	Annual Average
		Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar			
Cool Season Perennial Grass																
Achnatherum hymenoides[2]	2	13.1	10.3	8.6	7.4	6.5	5.8	5.2	4.6	4.1	3.7	3.3	3.0	8.6	4.0	6.3
Agropyron cristatum[3]	2	22.0	19.0	13.0	11.0	5.0	3.0	3.3	2.5	0.6	0.6	0.6	0.6	12.2	1.4	6.8
Bromus inermis[3]	2.5	23.0	20.0	13.0	12.0	11.0	5.0	5.4	3.0	2.9	1.9	0.9	0.1	14.0	2.4	8.2
Cyperus sp.[4]	1.5	7.4	6.6	5.9	6.9	4.9	4.6	3.9	4.0	3.8	3.1	3.1	3.1	6.0	3.5	4.8
Elymus lanceolatus[5]	3	11.5	8.3	9.7	6.8	6.8	6.1	5.7	5.3	4.9	4.3	4.3	4.3	8.2	4.8	6.5
Elymus trachycaulus[5]	3	11.7	8.1	5.2	3.3	3.3	3.6	3.1	2.6	2.1	2.1	2.1	2.1	5.9	2.4	4.1
Juncus sp. [6]	2	14.0	12.5	10.0	8.0	7.5	5.9	5.1	3.1	3.1	3.1	3.1	3.1	9.6	3.4	6.5
Hesperostipa comata7	4	12.0	9.3	7.7	6.5	5.6	4.9	4.3	3.8	3.3	2.9	2.5	2.2	7.7	3.2	5.4
Nassella viridula[5]	2	12.5	8.6	5.9	3.6	3.6	4.6	4.1	3.6	3.2	3.5	2.6	2.3	6.5	3.2	4.8
Pascopyrum smithii[5]	2	16.8	14.7	5.4	2.7	2.7	5.1	4.3	3.6	3.0	3.7	1.9	1.5	7.9	3.0	5.4
Poa compressa[8]	2	18.7	12.5	8.8	6.3	4.3	2.6	1.3	0.1	0.1	0.1	0.1	0.1	8.9	0.3	4.6
Pseudoroegneria spicata[3]	2.5	20.0	19.0	13.0	10.0	8.0	4.5	4.7	3.0	2.4	1.4	0.6	0.6	12.4	2.1	7.3
Thinopyrum ponticum[3]	5	20.0	15.0	10.0	9.0	7.0	4.0	3.7	3.0	1.6	0.7	0.7	0.7	10.8	1.7	6.3
Warm Season Perennial Grass																
Andropogon hallii[9]	6.1	18.3	14.5	8.1	4.8	3.4	4.3	2.2	2.8	2.1	2.3	2.2	2.3	8.9	2.3	5.6
Bouteloua curtipendula[9]	3	15.5	12.2	7.2	4.4	3.9	4.4	3.5	4.9	3.2	3.2	3.4	4.3	7.9	3.8	5.8
Bouteloua gracilis[9]	1	17.8	10.4	11.4	6.7	7.4	6.8	5.4	5.4	4.6	3.4	3.8	3.4	10.1	4.3	7.2
Calamovilfa longifolia[10]	4.5	15.0	11.6	9.2	6.0	4.4	3.0	2.9	1.0	0.7	0.7	0.7	0.7	8.2	1.1	4.6
Eragrostis sp. [11]	3.5	8.8	7.0	6.3	6.3	5.2	4.5	4.5	4.2	3.9	3.7	3.5	3.3	6.3	3.9	5.1
Panicum virgatum[9]	5	19.1	13.6	8.0	5.0	3.4	3.6	2.7	2.1	2.2	1.8	2.0	2.2	8.8	2.2	5.5
Schizachyrium scoparium[9]	3	16.3	12.8	7.3	4.3	4.0	3.7	3.0	3.9	2.0	2.1	1.6	2.0	8.1	2.4	5.2
Sorghastrum nutans[12]	6	11.0	8.0	7.0	6.4	5.7	5.2	5.0	4.3	3.9	3.6	3.6	3.6	7.2	4.0	5.6
Sporobolus airoides[13]	3	8.2	6.4	6.6	6.8	6.9	7.1	8.7	6.8	4.2	4.2	4.2	4.2	7.0	5.4	6.2
Sporobolus cryptandrus[9]	3	21.0	14.2	9.6	6.8	6.2	7.1	6.6	4.9	4.7	4.7	3.9	4.0	10.8	4.8	7.8

Values in red were estimated using a logarithmic trend line in Microsoft Excel. Values in green were estimated from averages.

[1] USDA, NRCS 2019
[2] Tirmenstein 1999
[3] Sedivec et al. 2007
[4] Muthuri and Kinyamario 1989
[5] Johnson and Bezeau 1962
[6] Hauser 2005b
[7] Zlatnik 1999
[8] Speer 1890
[9] Savage and Heller 1947
[10] Hauser 2005a
[11] Conner 1940
[12] Brakie 2017
[13] Nelson et al. 1970

Using the average relative cover, published height at maturity, and calculated average annual crude protein percentage, a relative crude protein percentage was calculated for each species in each data set. If we assume that each reclamation area and reference area had the herbaceous production calculated for the annual bond release standard, then we can compare the amount of protein available to grazing animals from these different species compositions. Using this approximation, all of the reclamation areas monitored in 2019 would have greater crude protein content than the OSRA given a comparable total biomass production, and most would have greater crude protein than would be expected from the seed mixture (Table 6). The same calculations were made using the 2018 reclamation data (which was a much better precipitation year) with similar results (Table 7).

Table 6: Calculated Relative 2019 Crude Protein Content for Various Species Compositions

		OSRA		2019 Reclamation Data						
Protein Component	**Seed Mix**	**2003**	**2004**	**Area 25**	**Area 29**	**Area 30**	**Area 31**	**Area 32**	**Area 33**	**Area 34**
Cool Season	0.29	2.70	3.66	0.20	0.13	0.00	0.04	0.56	0.14	0.36
Warm Season	4.39	1.54	0.50	5.62	5.14	5.66	4.84	3.81	4.22	5.65
Total Protein	**4.68**	**4.25**	**4.17**	**5.82**	**5.27**	**5.66**	**4.88**	**4.37**	**4.36**	**6.01**

* Based on 2019 production standard (85.2 g/m^2) and species composition

Table 7: Calculated Relative 2018 Crude Protein Content for Various Species Compositions

		OSRA		2019 Reclamation Data						
Protein Component	**Seed Mix**	**2003**	**2004**	**Area 25**	**Area 29**	**Area 30**	**Area 31**	**Area 32**	**Area 33**	**Area 34**
Cool Season	0.52	4.81	6.48	0.32	0.20	0.00	0.03	0.75	10.18	0.49
Warm Season	7.79	2.73	0.91	9.59	9.36	9.98	8.47	7.12	0.00	10.33
Total Protein	**8.31**	**7.53**	**7.40**	**9.91**	**9.56**	**9.98**	**8.49**	**7.86**	**10.18**	**10.82**

* Based on 2018 production standard (151.2 g/m^2) and species composition

6 SUMMARY

This technical revision modifies the vegetation composition standard for reclaimed rangelands at Keenesburg Mine. The improved vegetation composition final bond release standard now requires a minimum of four non-noxious, perennial grass species each contributing a minimum of 3% and a maximum of 40% to relative cover. Seasonality in species composition is no longer a requirement (i.e., either cool or warm season species in any combination may qualify to meet this requirement). This revision documents that this standard is appropriate for the site, that it can be met using the current seed mixture; and that it will provide a permanent, adequately diverse vegetation community capable of supporting the post-mining land use of rangeland.

7 LITERATURE CITED

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Revised pages for 2.05 Operation Reclamation Plan

DETERMINING FINAL REVEGETATION SUCCESS

CEC has elected to use standards developed from vegetation monitoring events between 1994 and 2005 at the Osgood Sand Reference Area, for the evaluation of revegetation success at the Keenesburg Mine site. With the approval of TR-37 *(6/15/2006),* sampling of the Osgood Reference Area was discontinued. Beginning with the 2006 sampling event, total vegetation cover and total herbaceous production are evaluated through values calculated from predictive equations based on growing season precipitation at the mine. For the parameter of species composition, a quantitative success standard based on relative cover was developed by the Colorado Division of Reclamation, Mining and Safety, and CEC. Since there is no requirement for the replanting of woody plants, there are no woody plant density success criteria.

In 2012, CEC revised the predictive equations for establishing final revegetation success standards for vegetation cover and herbaceous production. The revised equations removed plant species identified as ineligible by CDRMS, and provided an equitable basis for comparison of the derived standards for current and future revegetation at the mine. These revised equations (and standards) were approved in TR-43.

In 2020, CEC revised the species composition standard to remove the species seasonality requirement for current and future revegetation at the mine. This revised standard was approved in TR-47.

Sampling Methods

The reclaimed area(s) will be sampled to allow a determination of sample adequacy. The reclaimed area may be treated as a single type or divided into parcels, based on seeding date or other logical criteria. Sample locations within all reclaimed parcels will be randomly selected using randomly generated grid coordinates overlain on a map of the mine.

Transect and quadrat locations are randomly selected prior to the commencement of field work. The reclaimed area(s) to be sampled are divided into a grid on the mine map. Horizontal and vertical axes are assigned a unique alphabetic or numeric character. Characters are then randomly generated, and sample points established based on their unique [x,y] Cartesian coordinates. Extra sample points are generated and plotted to be used if a given location is not available for sampling (e.g., the sample point falls on an existing road or other structure).

Total vegetation cover. Vegetation cover transects will be randomly located within the reclaimed areas. Transects will be of a length consistent with Colorado Division of Reclamation, Mining and Safety regulations. At this time, quadrants of 25-50 meters in length are proposed for the reclaimed areas at the mine. A total of fifty points will be collected per transect, using point transect methods. Each transect will serve as a sample unit. Points will be collected using a stationary optical sighting device to maximize reproducibility and precision. In multiple layers of vegetation, first hits are recorded for total vegetation cover, while subsequent "hits" will be used to calculate relative vegetation species cover. Vegetation cover data will be collected from the appropriate reclaimed area(s). For bond release, sufficient numbers of samples will be collected to reach sample adequacy.

Final Revegetation Success Standards

Final revegetation success will be judged for vegetative cover and herbaceous production through the use of the approved predictive equations for total vegetation cover and total herbaceous production. Species composition will be evaluated using the approved success standard.

Quantitative comparisons for vegetation cover and herbaceous production will be made using the Student's t-test or Confidence Interval test. Reclaimed area cover and herbaceous production values will be evaluated for statistical equality to the values from the respective predictive equations if the reclaimed area values do not equal or exceed the predictive values. Species composition will be judged on meeting the species composition standard.

Total vegetation cover. Reclaimed areas will be considered successfully reclaimed if the total vegetation cover on the reclaimed area(s) is not less than 90 percent of the total vegetation cover value from the equation: $y = 0.0127x^3 + 0.2115x^2 + 2.1772x$ (where x is the cumulative September - July precipitation at the mine) with 90 percent statistical confidence using a one-tailed Student's t or Confidence Interval test.

Herbaceous production. Reclaimed areas will be considered successfully reclaimed if the total herbaceous production on the reclaimed area(s) is not less than 90 percent of the total herbaceous production value from the equation: $y = 0.4666x^{2.1405}$ (where x is the cumulative September - July precipitation at the mine) with 90 percent statistical confidence using a one tailed Student's t or Confidence Interval test.

Woody plant density. There is no woody plant density revegetation success standard.

Species composition. Reclaimed areas will be considered successfully reclaimed if the grass species composition on any reclaimed area includes at least four perennial species of any seasonality combination. Relative cover of each of these grass species must be greater than or equal to 3% and less than or equal to 40%. Grass species that may be used in evaluating species composition may be any that not defined as noxious or prohibited by the State of Colorado, and may be native or introduced.

Public Notice

To be published in Ft Lupton Press

PUBLIC NOTICE

Coors Energy Company (1801 California Street, Suite 4600, Denver, CO 80202) has applied to the Colorado Division of Reclamation, Mining and Safety (DRMS) for a technical revision to the final bond release standard for plant species composition at the Keenesburg Mine (DRMS Permit C-1981-028, approved November 3, 1981).

The current species composition success standard requires at least four perennial species each meeting approved minimum/maximum relative cover percentages (>3% and <40%), of which three are warm season grasses and one is a cool season grass. The revised species composition success standard requires at least four perennial, non-noxious grass species each meeting the currently approved minimum/maximum relative cover percentages.

The Keenesburg Mine is located 7 miles north of Keenesburg, CO and is accessed by Weld County Road 59. The permitted area is portions of Sections 25 and 36, T3N R64W, 6th Principal Meridian, Weld County, CO on the Klug Ranch and Tampa USGS 7.5-minute quad maps. Copies of the application may be viewed at the Keenesburg Town Hall (140 S. Main, Keenesburg, CO), at the Weld County Clerk and Recorder's Office (1402 N 17th Ave, Greeley, CO 80631), at the DRMS (1313 Sherman St, Room 215, Denver, CO 80203) and online in the DRMS Laserfiche system at https://dnrweblink.state.co.us/drms/search.aspx. All comments, objections, and requests must be submitted in writing to the DRMS at 1313 Sherman St, Room 215, Denver, CO 80203. The public comment period extends for ten days following the date of publication of this notice.

Notice of Public Review

July 2, 2020

Town of Keenesburg
PO Box 312
Keenesburg CO 80643

Re: Coors Energy Company, Keenesburg Mine, DRMS Permit # C-1981-028, Technical Revision Application 47

Dear Sir or Madam

Please retain the enclosed mining permit technical revision application for the Keenesburg Mine on file for public review in accordance with your normal procedures. We are aware that public access may be limited due to COVID-19 and have made arrangements for public review online. If you have any questions, please contact me.

Thank you,

Robin F. Bay
Senior Environmental Scientist

Enclosure: Keenesburg Mine Technical Revision Application TR47

Habitat Management, Inc.
14 Inverness Drive East · Suite A-100 · Englewood · CO · 80112
Robin Bay · Senior Environmental Scientist · 719-928-1717
rbay@habitatmanagementinc.com · www.habitatmanagementinc.com

Habitat Management
Environmental & Natural Resource Services

July 2, 2020

Weld County Clerk and Recorder
1402 N 17th Avenue
Greeley, CO 80631

Re: Coors Energy Company, Keenesburg Mine, DRMS Permit # C-1981-028, Technical Revision Application 47

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Thank you,

Robin F. Bay
Senior Environmental Scientist

Enclosure: Keenesburg Mine technical revision application TR#46

Habitat Management, Inc.
14 Inverness Drive East · Suite A-100 · Englewood · CO · 80112
Robin Bay · Senior Environmental Scientist · 719-928-1717
rbay@habitatmanagementinc.com · www.habitatmanagementinc.com

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4. The Postal Service insures "negotiable items" (defined by postal regulations as items that can be converted to cash without forgery), currency, or bullion up to a maximum of $15 per mailpiece.
5. The Postal Service does not provide coverage for consequential losses due to loss, damage, or delay of Priority Mail Express items or for concealed damage, spoilage of perishable items, and articles improperly packaged or too fragile to withstand normal handling in the mail.

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6855 S DAYTON ST
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(800)275-8777
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Product	Qty	Unit Price	Pr
PM Exp 1-Day	1	$26.35	$26
Domestic			
GREELEY, CO 80631			
Weight:0 Lb 5.30 Oz			
Signature Waiver			
Scheduled Delivery Day			
Tuesday 07/07/2020 03:00 PM			
Money Back Guarantee			
USPS Tracking #			
EJ182038524US			
PM Exp Insurance			$0
Up to $100.00 included			

Total: $26

Credit Card Remtd $26
Card Name:MasterCard
Account #:XXXXXXXXXXXX6628
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Note: The Postal Service does not offer money-back guarantee for military or DPO shipments delayed due to customs inspections or the item was destined for an APO/FPO/DPO that was closed on the intended day of delivery or the delay was caused by one of the situations in DMM 604.9.5.5. Consult USPS.com® or your local Post Office for information on delivery commitments and Priority Mail Express Military Service (PMEMS). For details, see DMM 703.2.6, which is available at *pe.usps.com.*

When a mailer submits a Priority Mail Express item requiring a signature and the Postal Service cannot deliver the item on the first attempt, the Postal Service leaves a notice for the addressee. If the addressee does not claim the item within 5 calendar days, the Postal Service returns the item to the sender at no additional charge.

Insurance coverage: The Postal Service provides insurance only in accordance with postal regulations in the DMM, which is available at *pe.usps.com.* The DMM sets forth the specific types of losses that are covered, the limitations on coverage, terms of insurance, conditions of payment, and adjudication procedures. Certain items are not insurable. The DMM consists of federal regulations, and USPS personnel are not authorized to change or waive these regulations or grant exceptions. A mailer who requires information on Priority Mail Express insurance may contact the Postal Service before submitting an item. Limitations prescribed in the DMM provide, in part, that:

1. Insurance coverage extends to the actual value of the contents at the time of mailing or the cost of repairs, not to exceed the insured limit for the item.
2. The Postal Service insures the contents of Priority Mail Express "merchandise" items (with "merchandise" defined by postal regulations) against loss, damage, or missing contents. The Postal Service includes coverage up to $100 per mailpiece at no additional charge. Additional merchandise insurance up to $5,000 per mailpiece may be available for purchase. Additional insurance for Priority Mail Express items is not available unless a signature is required.

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3. The Postal Service insures "nonnegotiable documents" (as defined by postal indemnity regulations) against loss, damage, or missing contents up to $100 per mailpiece for document reconstruction, subject to additional limitations for multiple pieces lost or damaged in a single catastrophic occurrence. Document reconstruction insurance provides reimbursement for the reasonable costs incurred in reconstructing duplicates of nonnegotiable documents mailed. Document reconstruction insurance coverage above $100 per mailpiece is not available. The mailer should not attempt to purchase additional document insurance, because additional document insurance is void.
4. The Postal Service insures "negotiable items" (defined by postal regulations as items that can be converted to cash without forgery), currency, or bullion up to a maximum of $15 per mailpiece.
5. The Postal Service does not provide coverage for consequential losses due to loss, damage, or delay of Priority Mail Express items or for concealed damage, spoilage of perishable items, and articles improperly packaged or too fragile to withstand normal handling in the mail.

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Indemnity Claims (Loss, Damaged or Missing Contents): Either the mailer or the addressee may file an indemnity claim for loss, damaged or missing contents. The claimant may submit the claim online at *usps.com,* or by mail; for more information see Publication 122, *Domestic Claims, Customer Reference Guide.* The timelines for claims are as follows: claims for loss – no sooner than 7 days but no later than 60 days after the date of mailing; claims for damage or missing contents – immediately but no later than 60 days from the date of mailing. Retain the original USPS retail receipt or eReceipt/electronic receipt for claims purposes. For claims involving damage or missing contents, also retain the article, container, and packaging for Postal Service inspection when requested.

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PM Exp 1-Day 1 $26.35 $26.35
Domestic
KEENESBURG, CO 80643
Weight:0 Lb 5.40 Oz
Signature Waiver
Scheduled Delivery Day
Tuesday 07/07/2020 03:00 PM
Money Back Guarantee
USPS Tracking #
EJ182038515US

PM Exp Insurance $0.00
Up to $100.00 included

Total: $26.35

Credit Card Remtd $26.35
Card Name:MasterCard
Account #:XXXXXXXXXXXX6628
Approval #:004818
Transaction #:040
AID:A0000000041010 Chip
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Due to limited transportation availability as a result of nationwide COVID-19 impacts package delivery times may be extended. Priority Mail Express® service will not change.

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