COLORADO
Division of Reclamation, Mining and Safety
Department of Natural Resources

MEMORANDUM

Date: March 12, 2025

To: Brock Bowles, DRMS

From: Hunter Ridley, DRMS

RE: Colowyo Coal Mine, Permit No. C-1981-019, TR-166 Review, Revised Topsoil Replacement Plan & Seed Mix

On March 11, 2025, the Division of Reclamation, Mining and Safety (Division) received an application for Technical Revision No. 166 (TR-166) from Colowyo Coal Company L.P. (Colowyo) for the Colowyo Coal Mine. The purpose of TR-166 is to revise the current topsoil replacement plan and wildlife seed mixture for the site, as recent analysis has revealed that vegetative establishment in areas of final reclamation has not been achieving a desired outcome.

Currently, topsoil replacement is dictated by severity of slope, with slopes less than ten percent receiving four inches of topsoil and slopes greater than ten percent receiving a variable replacement depth from six to twelve inches. With this revision, Colowyo is proposing a uniform topsoil depth replacement of nine inches across all areas of wildlife and grazingland post mining land uses. Colowyo believes this more uniform replacement depth will provide additional moisture retention in topsoil and additional rooting zones for vegetation. TR-166 also proposes to revise the current wildlife seed mixture to incorporate more rhizomatous grasses which will allow for quicker establishment and limited erosion.

I would like to request your assistance in reviewing this Technical Revision application. Attached to this memo is Figure 5-3 from Colowyo's 2024 Annual Reclamation Report, as referenced in the TR submittal letter, which may be useful for your review. Additionally, I have attached Colowyo's currently approved Reclamation Plan narrative section and wildlife and grazingland seed mixture tables for your comparative review. The current decision date is set for May 11, 2025. Please submit a memorandum to me by April 21, 2025, if possible. If you need more time, let me know. Feel free to reach out if you have any additional questions or concerns

Sincerely,
Hunter C. Ridley
Hunter Ridley

CC: Zach Trujillo, DRMS

Figure 5-3 –Topsoil Balance

1	Disturbed Lands (See Figure 2-1)	5,239.1	acres
2	Lands with Redistributed Topsoil (See Figure 2-1)	1,999.7	acres
3	Lands Yet to be Retopsoiled (Line 1 Minus 2)	3,239.4	acres
4	Lands Yet to be Retopsoiled	141,108,000.0	sq. feet
5	Volume of Topsoil in Stockpiles (From Figure 5-2)	5,488,912	cu. yards*
6	Line 5 times 27	148,201,000	cu. ft
7	Average Replacement Depth Available (Line 6 divided by Line 4)	1.1	feet
8	Average Replacement Depth Available	12.6	inches

Note: Values presented above represent an estimate of areas and volumes as of the date shown above.
Stockpile inventories change frequently as mining plans vary.

Table 2.05-7 Grazingland Seed Mixture

App.	Species	Synonym	Common Name	Origin	Life Form	Seeds/ lb.	Rec. PLS lbs. / acre	Avg. seeds / sq. foot
Drilled	*Agropyron dasystachyum*	*Elymus lanceolatus ssp. lanceolatus*	Thickspike Wheatgrass	N	Grass	154,000	1.25	4.4
	Agropyron smithii	*Pascopyrum smithii*	Western Wheatgrass	N	Grass	110,000	1.50	3.8
	Agropyron spicatum inerme	*Pseudoroegneria spicata ssp. inerme*	Beardless Bluebunch Wheatgrass	N	Grass	117,000	2.00	5.4
	Agropyron trachycaulum	*Elymus trachycaulus ssp. trachycaulus*	Slender Wheatgrass	N	Grass	159,000	0.75	2.7
	Bromus marginatus	*Bromopsis marginatus*	Mountain Brome	N	Grass	90,000	1.00	2.1
	Elymus cinereus	*Leymus cinereus*	Great Basin Wildrye	N	Grass	130,000	0.50	1.5
	Stipa viridula (New Taxon to CCC)	*Nassella viridula*	Green Needlegrass	N	Grass	181,000	0.75	3.1
	Astragalus cicer		Cicer Milkvetch	I	Forb	145,000	0.30	1.0
	Linum lewisii		Lewis Flax	N	Forb	293,000	0.25	1.7
	Atriplex canescens		Fourwing Saltbush	N	Shrub	52,000	1.60	1.9
	Symphoricarpos rotundifoliius		Mountain Snowberry	N	Shrub	75,000	0.75	1.3
						Subtotal =	**10.65**	**28.87**
Broadcast	*Festuca saximontana*		Rocky Mountain Fescue	N	Grass	680,000	0.50	7.8
	Achillea millifolium		Western Yarrow	N	Forb	2,770,000	0.10	6.4
	Penstemon strictus		Rocky Mountain Penstemon	N	Forb	592,000	0.25	3.4
	Artemisa tridentata vaseyana		Mountain Big Sagebrush	N	Shrub	2,500,000	0.50	28.7
						Subtotal =	**1.35**	**46.26**
Grass PLS/ Seeds/ft^2 Subtotal = 8.25/30.8		**Forb PLS/ Seeds/ft^2 Subtotal =0.9/12.44**	**Shrub PLS/ Seeds/ft^2 Subtotal = 2.85/31.9**			**Total**	**12.00**	**75.13**

Note: Where desirable to draw Elk away from particular locations, *Elymus cinereus* may be substitued with Orchard Grass (sought by Elk) at the quantity indicated below (i.e. 0.5 lb of Elci replaced by 0.5 lb of Dagl). Furthermore, this substitution should not occur on more than approximately 25% of the acreage targeting the grazingland land use, and it would be most beneficial to be placed in or near draw bottoms. If at some future point it is desirable to substitute for a species other than Elci, or on more than 25% of the grazingland acreage, permission will first be gained from CDRMS.

Dactylis glomerata	Orchard Grass	I	Grass	654,000	0.50	7.51

Seed Mix Comments

1) The correct sagebrush seed (*Artemisia vaseyana – pauciflora*) from sources as close as possible to the Axial Basin will be requested from seed suppliers along with tag verification. A stipulation will be added to bid documentation to require the successful supplier(s) to verify sage subspecies and collection location and elevation.

Table 2.05-8 Wildlife Habitat Seed Mixture

Seed Mix Comments

App.	Species	Synonym	Common Name	Origin	Life Form	Seeds/ lb.	Rec. PLS lbs. / acre	Avg. seeds / sq. foot
Drilled or Broadcast * (w/ Trillion or similar)	*Agropyron spicatum inerme*	*Pseudoroegneria spicata ssp. inerme*	Beardless Bluebunch Wheatgrass	N	Grass	117,000	0.50	1.3
	Agropyron trachycaulum	*Elymus trachycaulus ssp. trachycaulus*	Slender Wheatgrass	N	Grass	159,000	0.20	0.7
	Bromus marginatus	*Bromopsis marginatus*	Mountain Brome	N	Grass	90,000	0.30	0.6
	Elymus cinereus	*Leymus cinereus*	Great Basin Wildrye	N	Grass	130,000	0.20	0.6
	Stipa viridula (New Taxon to CCC)	*Nassella viridula*	Green Needlegrass	N	Grass	181,000	0.20	0.8
	Artemisia ludoviciana		Louisiana Sagewort	N	Forb	33,600	0.50	0.4
	Astragalus cicer		Cicer Milkvetch	I	Forb	145,000	0.30	1.0
	Linum lewisii		Lewis Flax	N	Forb	293,000	0.20	1.3
	Atriplex canescens		Fourwing Saltbush	N	Shrub	52,000	1.25	1.5
	Purshia tridentata		Bitterbrush	N	Shrub	15,000	3.00	1.0
	Rosa woodsii		Wood's Rose	N	Shrub	45,300	0.50	0.5
	Symphoricarpos rotundifoliius		Mountain Snowberry	N	Shrub	75,000	1.00	1.7
						Subtotal =	**8.15**	**11.62**
Broadcast * (w/ Trillion or similar)	*Poa ampla*		Big Bluegrass	N	Grass	882,000	0.20	4.0
	Festuca saximontana		Rocky Mountain Fescue	N	Grass	680,000	0.20	3.1
	Achillea millifolium		Western Yarrow	N	Forb	2,770,000	0.10	6.4
	Penstemon palmeri		Palmer Penstemon	N	Forb	610,000	0.10	1.4
	Penstemon strictus		Rocky Mountain Penstemon	N	Forb	592,000	0.20	2.7
	Artemisia cana		Silver Sagebrush	N	Shrub	850,000	0.75	14.6
	Artemisa tridentata vaseyana		Mountain Big Sagebrush	N	Shrub	2,500,000	2.00	114.8
	Chrysothamnus nauseosus		Rubber Rabbitbrush	N	Shrub	400,000	0.30	2.8
						Subtotal =	**3.85**	**149.82**
Grass PLS/ Seeds/ft^2 Subtotal = 1.8/11.25		**Forb PLS/ Seeds/ft^2 Subtotal =1.4/13.21**	**Shrub PLS/ Seeds/ft^2 Subtotal = 8.8/136.94**			**Total**	**12.00**	**161.44**

*** The application techniques indicated here should be implemented as follows at the discretion of the reclamation coordinator. 1) If a seed drill is to be used, only those species under that subheading should be drilled. Those species under the broadcast heading should be broadcast by one of two methods. If a standard rotary seed spreader is utilized to "spray" seed across the ground, then a very light harrowing should follow (e.g., light tine method). Under this scenario, a single pass procedure could occur if the rotary spreader is attached to the seed drill and the seed drill also pulls a light tine harrow. If the second broadcast method is utilized (such as use of a Truax "Trillion" seeder that "dribbles" seed between cultipacker wheels), a second pass with different equipment would be necessary. However, a third scenario would also be a very effective means to plant seed. Under this last scenario, all seed would be broadcast with the use of equipment such as the Truax "Trillion" seeder. This would be a single pass protocol and NO harrowing should be utilized. This last method is preferred.**

1) The correct sagebrush seed (*Artemisia vaseyana – pauciflora*) from sources as close as possible to the Axial Basin will be requested from seed suppliers along with tag verification. A stipulation will be added to bid documentation to require the successful supplier(s) to verify sage subspecies and collection location and elevation.

Table 2.05-9 List of Contingency Seed Mixture Substitutions

Priority	Species	Synonym	Common Name	Origin	Life Form	Seeds/ lb.	Rec. PLS lbs. / acre	Avg. seeds / sq. foot
2	*Agropyron spicatum*	*Pseudoroegneria spicata ssp spicata*	Bluebunch wheatgrass	N	Grass	140,000	0.5 - 2.0	1.3 - 5.4
1	*Bromus ciliatus*	*Bromopsis ciliatus*	Nodding Brome	N	Grass	80,000	0.3 - 1.0	0.6 - 1.8
4	*Festuca idahoensis*		Idaho Fescue	N	Grass	450,000	0.2 - 0.5	2.1 - 5.2
5	*Oryzopsis hymenoides*	*Achnatherum hymenoides*	Indian Ricegrass (needs sandy soi	N	Grass	141,000	0.50	1.6
3	*Poa sandbergii*		Sandberg Bluegrass	N	Grass	925,000	0.20	4.2
2	*Helianthelia uniflora*		Oneflower Sunflower	N	Forb	103,000	0.30	0.7
1	*Heliomeris multiflora*		Goldeneye	N	Forb	1,055,000	0.30	7.3
3	*Sanguisorba minor*		Small Burnet	I	Forb	55,000	0.25	0.3
4	*Vicia americana*		American Vetch	N	Forb	33,000	0.30	0.2
1	*Artemisia cana*		Silver Sagebrush	N	Shrub	850,000	0.50	9.8
2	*Chrysothamnus viscidiflorus*		Douglas Rabbitbrush	N	Shrub	782,000	0.30	5.4
4	*Rhus trilobata*		Skunkbrush Sumac	N	Shrub	20,300	0.50	0.2
3	*Symphoricarpos rotundifolius*		Snowberry	N	Shrub	75,000	0.75 - 1.0	1.3 - 1.7

Should one or more of the species in Table 2.05-7 and 8 be unavailable or proven ineffective, then substitutes from this list will be selected in the priority stated. They will be placed in the seed mix at the rate specified in the priority stated. They will be placed in the seed mix at the rate specified for the unavailable/unsuitable species or as appropriate. If more than one species of a given lifeform cannot be obtained or is otherwise unsuitable, then the first and second priorities in the substitute list will be used. Colowyo can also choose to increase a seeding rate of an approved species if a corresponding substitute is not available rather than choose a substitute from Table 2.05-9.

The topography following mining and reclamation activities is shown on the Postmining Topography Map (Map 19). Cross sections relating the premining and postmining topographic configurations are presented as the Premining and Postmining Cross Section Maps (Maps 20 and 20A).

Coal Handling Structures

Map 1 Surface ownership shows pre-mining contours and Map 19A Postmining Topography Gossard Area shows post-mining contours of the loadout. All facilities not to be included as part of the post-mining land use will be removed (see Section 2.05.5). After the facilities are removed, the land will be regraded to blend with the existing undisturbed topography, retopsoiled and revegetated in accordance with Section 2.05.4.

The detailed description of the various coal crushing, handling and loadout facilities for the Colowyo operation is found under the Mine Facilities Section in 2.05.3. The location of the coal processing facilities is found on the Existing Structures - North Map (Map 21), the Existing Structures - South Map (Map 22) and the Existing Structures- Lower Wilson/South Taylor Map (Map 22A).

Coal Processing Waste and Non-Coal Processing Waste

Not applicable. Colowyo uses dry crushing facility for coal preparation; no coal processing waste, as defined in Rule 1.04 "DEFINITIONS", is produced from any part of the mining operations.

Underground Development Waste

Not applicable. Colowyo is not conducting an underground operation.

Return of Coal Processing Waste to Abandon Workings

Not applicable. No coal processing waste as defined in Rule 1.04 "DEFINITIONS", is produced from any part of the Colowyo mining operations.

2.05.4 Reclamation Plan

The objective of the reclamation plan is to stabilize the soil, maintain hydrologic function, re-establish appropriate vegetation, and to restore the approximate original contour of the mined area. Ultimately, the areas being mined will be returned to an appropriate and productive post-mining land use, with watersheds having their approximate pre-mining character. In general, the long term appearance and beneficial uses of the mined area will be similar to that which would have been encountered prior to mining activity.

The principal basis of Colowyo's reclamation plan is to rebuild a post mine landscape that mimics the natural terrain features, accounting for local slope aspects, steepness, and topographic features. By incorporating variation in the terrain, the reclamation system will encourage the establishment, sucession, and persistence of mixed native vegetation communities. These efforts will facilitate

the estbalishment of reclaimed plant communities that meet the designated post mining land use of rangeland, with the subcomponents of grazingland and wildlife habitat. Please see Section 2.05.5 for a detailed description of the post mine land uses at Colowyo.

Areas designated as grazingland for the post mining land use will aim to establish vegetation communities comprised of species primarily selected for palatability and production, with incidental wildlife habitat. The reclamation seed mixes utilized in grazingland targeted areas are designed to establish highly productive stands of native perrennial grasses to support grazing and forage, yet the mixes contain forbs and shrubs to also provide additional benefits for incidental wildlife use. Topsoil replacement depths in grazingland areas vary based on slope, which will encourage species diversity and mimic soil development processes in native soil systems.

Areas designated for wildlife habitat as the post mining land use will aim to establish a sagebrush steppe vegetation community. The reclamation seed mix utilized in sagebrush steppe targeted areas is designed to encourage sagebrush establishment by decreasing perennial grass competition through decreasing the number of grass species and seed numbers, and also incorporating only bunchgrasses (as opposed to sod-forming grasses), with a significant increase in the total amount and relative proportion of sagebrush seed. Reclamation techniques that will encourage the deposition and entrapment of blowing snow (to increase spring soil moisture) are also employed in sagebrush steppe targeted areas, to provide a competitive advantage to sagebrush over perennial grasses. These techniques include taking advantage of site-specific opportunities for the development of convex and concave surfaces along with the potential development of small berms along the contour and approximately perpendicular to prevailing winds. Topsoil replacement depths in sagebrush steppe targeted areas will be reduced relative to other areas, also to decrease competition from grasses.

The reclamation timetable and associated acreages for the various aspects of the mining operation are provided on Table 2.03-1.

In the South Taylor reclamation areas, geomorphic reclamation techniques will be implemented in the final PMT surface. Geomorphic reclamation techniques are used to design and construct a PMT, which beaks up long continuous slopes with smaller watersheds, adds sinuosity to the post mine permanent channels, and creates a landform that is erosionally stable. Part of the final configuration of the South Taylor geomorphic reclamation PMT surface specifically targets topography to harvest wind and snow for reestablishment of tall shrubs and aspens, which are required for the revegetation success of the South Taylor Pit.

Backfill and Grading Plan

As discussed in detail in Section 2.05.3, the mining method implemented by Colowyo is referred to as open-pit multiple seam/single seam dragline mining. The overburden material from the initial boxcut area was deposited in a permanent valley fill. As mining progresses, overburden material from each successive cut is backfilled into the previously mined out area. This cycle was repeated for the entire mining area. Because an open-pit mining technique is used, the regrading and backfilling of the spoil material is as contemporaneous as possible behind the mined-out area to facilitate proper leveling of the overburden material.

The backfilled mining areas are graded to establish the approximate original contour and to blend in with the undisturbed areas outside the mining limits. Additional information on the backfilling and regrading plan are discussed further in Section 2.05.3 and Section 4.14.

Final grading before topsoil placement will be conducted in a manner that minimizes erosion and provides a surface for the topsoil that minimizes slippage. If spoil compaction is a problem, the spoil will be ripped with a dozer to minimize compaction, assure stability, and minimize slippage after topsoil replacement. Where possible, development of concave landforms (to encourage snow entrapment) will be developed.

Where necessary, the overburden surface will be roughened by ripping or discing etc., to ensure a bond between the topsoil and spoil to reduce slippage. To date there is no evidence of topsoil slippage on reclaimed areas. A few small tension cracks resulting from settling of fill along tie in locations with highwall have occurred in a few areas. However these areas within a year or two after reclamation, soon stabilize and begin to fill in.

The final post mine surfaces are shown on Map 19, 19A, and 19B. Appropriate cross sections that show the anticipated final surface configuration of the reclaimed area, in conjunction with the existing pre-mining topography are shown Maps 20, 20A and 20B.

Topsoil Redistribution Plan

As discussed in Section 2.05.3, prior to any mining-related disturbances, all available topsoil will be removed from the site to be disturbed, and will be redistributed or stockpiled as necessary to satisfy the needs of the reclamation timetable described herein. The topsoil redistrubtion plan is also broken into three distinct timeframes which are pre-2005, 2005 to 2009, and post-2010. Each plan is described in more detail below.

Pre-2005 and 2005-2009 Topsoil Redistribution Plan

Prior to 2005, essentially all reclamation units were covered with an average of 18 inches of topsoil. From 2005 through 2009, reclamation areas received an approximate average of 8 inches of topsoil. Most of these reclamation areas have been Phase III released to date, and the remaining units on schedule for a near future Phase III bond release application.

Post-2010 Topsoil Redistribution Plan

Variable topsoil replacement depth has been utilized at Colowyo since 2010. Post-2010 topsoil replacement is directly tied to the post mine land uses presented in Section 2.05.5, targeting two rangeland components consisting of grazingland and wildlife habitiat (sagebrush steppe).

In grazingland targeted areas (areas with slopes greater than 10%), topsoil will be redistributed utilizing variable replacement depths. Thinner topsoil (approximately six inches) will be replaced on ridge tops, and topsoil replacement depth will gradually thicken moving down the slopes toward the drainage bottoms. This gradation in topsoil depth on slopes recreates native edaphic conditions and mimics soil development on local landforms. Lower-lying areas (relative to the surrounding landscape), such as natural swales, depressions, and subtle drainageways that tend to catch more

snow will also receive deeper topsoil replacement depths. These areas should store greater quantities of moisture, which will increase overall productivity, while providing enhanced opportunities for growth and development of the mountain shrub and snowberry communities (seed is a component of the grazingland seed mix). Even in areas where these shrub species do not initially germinate, the deeper soils systems with increased water holding capacity and altered hydrologic function of localized areas with increased snow capture will mimic the native conditions for mountain shrub and snowberry communities, setting the foundation for succession to progress in these areas over long-term time horizons.

In wildlife habitat (sagebrush steppe) targeted areas (flatter areas with less than 10% slopes), topsoil replacement depth will target an average of four inches, with a more uniform application depth to encourage proper seeding depth and conditions for sagebrush establishment. To encourage snow capture and increase spring soil moisture, reclamation techniques will attempt to take advantage of site-specific opportunities for the development of convex and concave surfaces along with the potential development of small berms along the contour and approximately perpendicular to prevailing winds.

General Topsoil Handling Procedures

Colowyo will ensure proper topsoil resource management through various quality assurance and control procedures. Procedures utilized to account for topsoil volumes include an annual analysis of the topsoil balance, accounting for volumes in stockpiles, current and following year's reclamation areas, the total disturbance area, and the results of topsoil stripping activities each year. Detailed soil maps for the permit area assist operations and guide management in preparation and scheduling for topsoil salvage activities. Topsoil resources are generally segregated by area (East Pit, West Pit, Section 16, South Taylor Area, facilities, Gossard Loadout, etc.), to ensure that these resources are reapplied to the general areas from which they came.

During topsoil removal in advancement of the mining operations, dozers will be utilized to pile up the topsoil so it can be loaded and hauled to stockpile or immediately to a reclamation area. Scrapers may also be employed for topsoil removal as deemed appropraiote. Topsoil salvage is guided by the existing soil maps and resources available to Colowyo personnel. Topsoil salvage is avoided during times of soil saturation, as a best management practice to avoid overly compacting the soil.

Topsoil stockpiles are revegetated as soon as is practicable to prevent losses from wind and water erosion. Stockpiles are seeded with a mix of native reclamation species to stabilize the stockpile. All stockpiles are properly labeled as topsoil to avoid mishandling, and detailed as-built information is collected to accurately calculate stockpile volumes as a quality control procedure. All topsoil stockpiles are protected with a ditch and berm around their perimeter to conserve the resource.

When topsoil is to be reapplied following stockpiling, topsoil is normally loaded from stockpile with loaders and trucks, and then hauled to the backfill reclamation areas, where it is dumped and graded for final placement. Topsoil hauled in trucks will be dumped strategically to minimize handling and disturbance, and then pushed out with dozers and/or scrapers until spread to the appropriate locations and depths. Reapplied topsoil will be graded in a manner that maintains

surface roughness to help minimize sheet flow and erosion while also creating microtopography to assist vegetative diversity on the reclamation. On steeper slopes (typically greater than 10% slope) Colowyo will also employ the use of contour furrows and cross ripping following topsoil laydown to create slope breaks and increase surface roughness on otherwise long and straight slopes.

At the discreation of Colowyo, native soil, collected from the local ecosystems, will be used to inoculate reclamation areas with beneficial mycorrhizae. Mycorrhizae are symbiotic relationships that form between fungi and plants. The fungi colonize the root system of a host plant, providing increased water and nutrient absorption capabilities while the plant provides the fungus with carbohydrates formed from photosynthesis.

Revegetation Plan

Following the topsoiling of an area, Colowyo will reseed the topsoiled area as soon as is practicable in accordance with the targeted post mining land use as described in Section 2.05.5. Seeding is targeted to occur during in the fall, prior to the first snowfall event (typically mid to late October).

Colowyo typically uses a rangeleand drill to complete seeding on both targeted post mine land uses. However, Colwoyo also has the ability to utilize a Truax (Trillon) drill if deemed necessary. At times, broadcast seeding may be required on steeper areas, wet areas, very rocky areas, or simply on areas that were missed by the other seeding equipment. If seeding cannot be completed prior to seasonal snowfall, broadcast seeding may occur in the spring as soon as ground conditions allow. Broadcast seeding of the sagebrush steppe areas may also be seeded directly into snowbanks if winter or spring conditions allow. When broadcasting is utilized and ground conditions allow, a very light tine harrow or similar equipment may be dragged behind the seeder to facilitate improved soil to seed contact.

Seed Mixes

Two seed mixes are utilized at Colowyo, with each mix designed to facilitate revegetation meeting the designated post mining land use of rangeland, subcomponents of grazingland and wildlife habitat (sagebrush steppe). The mixes have been adapted over time in response to changing regulatory requirements, and thorough evaluations of quantitative emergence and dominance data from reclaimed and released reclamation areas. The mixes represent the seasonal varieties and lifeforms present in the pre-mine area, and are comprised almost entirely of native species. The lone introduced taxon included in both seed mixes (cicer milkvetch), which provides excellent forage for wildlife and livestock, is very successful on Colowyo's existing reclamation, and is an excellent species for providing necessary habitat requisites for a variety of insects that in turn are especially important to other wildlife.

Grazingland Seed Mixture

The reclamation seed mixture for post mine areas targeting grazingland is presented on Table 2.05-7. The grazingland seed mixture contains sufficient diversity for ecological stability, erosion control for steeper slopes, and will meet the goals of the designated post mining land use. The seed mixture contains a variety of grasses, forbs and shrub species well adapted to the soil and moisture conditions found at Colowyo. The seed mixture includes species capable of occupying the anticipated micro-habitats encountered in the reclaimed areas. This seed mixture will be

quickly effective for erosion control in young reclamation, while also facilitating the desired post-mining vegetative community with the same seasonal varieties and lifeforms of the pre-mined area.

The species and seeding rates indicated on this grazingland mix have been adapted from an analyses of the success of past mixes, and the resulting emergence and dominance data within previously successful revegetated areas.

Wildlife Habitat Seed Mixture
The reclamation seed mixture for areas targeting wildlife habitate (sagebrush steppe) is presented in Table 2.05-8. The sagebrush steppe seed mixture also contains sufficient diversity for ecological stability. This mixture contains a variety of grasses, forbs and shrub species well adapted to the soil and moisture conditions found at Colowyo and should provide both the structural diversity and life form diversity necessary for the designated sagebrush steppe wildlife habitat. The seed mixture includes species capable of occupying the anticipated micro-habitats encountered in the reclaimed areas and contains sufficient sagebrush seed to hopefully encourage at least some emergence each year, and occasional substantial emergence when climatic conditions are favorable.

Similar to the seed mixture for grassland areas, the species and seeding rates indicated on this sagebrush steppe mix resulted from in-depth analyses of past mixes and the resulting emergence and dominance within successful revegetated areas at Colowyo. Furthermore, it is anticipated that the reduced competition from grasses, especially sod-forming species such as thickspike wheatgrass, will result in elevated diversity and better performance from slower growing species.

Although not yet identified as an issue on Colowyo's reclamation, because the amount of grasses (and all sod-formers) has been substantially reduced for this sagebrush steppe mix, it is possible that on occasion, grass emergence may not be satisfactory for erosion control or life form diversity. If this scenario occurs in the future, a supplemental inter-seeding with the grassland mix may be utilized to increase the grass and forb component of the specific area. This activity is allowed under Rule 4.15.7 (5)(g).

Contingency Seed Substitutions
Table 2.05-9 provide a list of contingency species for Table 2.05-7 and Table 2.05-8, should certain taxa be unavailable or unwarranted in any given year.

Fencing

Where Colowyo deems appropriate, smaller areas within a larger areas seeded to wildlife habitat may be fenced to encourage shrub development and to limit browsing by local wildlife.

Mulching Techniques

Mulching techniques are not currently employed at Colowyo, except in rare instances. During the initial permitting processes, Colowyo proposed that on slopes flatter than 4h:lv that rather than utilize a hay mulch, a stubble mulch or no mulch be used on reclaimed areas. The use of mulch on

these relatively flat slopes was demonstrated to be of no value towards reclamation at the Colowyo site. The application of mulch was identified to produced problems with delayed germination on the reclaimed areas, rather than solving an assumed erosion problem, which is addressed through other methods.

Mulches tend to shade the soil, thus slowing the rise in soil temperature needed for germination of seeds. At Colowyo, the higher elevation and typical late spring snows result in cooler spring temperatures and delayed soil thawing. By eliminating the use of mulch, the soil temperature is increased earlier in the spring, thus enabling the seeds to germinate earlier when soil moisture conditions are optimum, immediately following snowmelt. Earlier growth also results in further root development by the plants, aiding survival through the dry and hot summer months.

Without the use of a mulch, erosion control has been maintained with surface manipulation methods such as contour furrows, drainage benches and permanent drainage channels. The initial reclamation at Colowyo that began in 1978 is indisputable evidence that the methods used at Colowyo have proven highly successful in controlling erosion on slopes as steep as 3h:lv until vegetative cover has established. Where deemed necessary by Colowyo (e.g., sagebrush steppe targeted areas, south-facing slopes, high wind areas, etc.), mulching techniques (or other practices such as chisel plowing, or discing on the contour) will be reinstated as necessary.

Irrigation

No irrigation is planned for areas to be seeded.

Pest and Disease Control

Noxious plants, as defined in Section 1.04, will be managed in accordance with the following section – "Weed Management Plan". If insects become a problem to the point where they endanger the successful establishment of the seeded vegetation on the reclaimed area, they will also be controlled using methods suggested by the Colorado State University Extension Service. All herbicides and pesticides utilized will be those that are approved by the appropriate state and federal governmental agencies responsible for the approval and distribution of such agents.

Weed Management Plan

A listing of Colorado's noxious weeds (A, B, and C lists) as well as an indication of Rio Blanco and Moffat Counties' listed taxa are indicated on Table 2.05-10 along with an indication of those taxa that have been observed on or near the Colowyo mine. As indicated on this table, there are no "A" list taxa known from the area. "A" list taxa must be eradicated. To the contrary, there are seven (7) "B" list (must be managed) taxa known from the environs of the Colowyo Mine as well as three (3) "C" list (management may be required by local governments) species. Of these 10 species, common mullein and poison hemlock from the "C" list, and Russian olive from the "B" list are not overly problematic and will normally not require attention. In fact the Russian olive was purposefully planted in the reclamation. If "infestations" of common mullein or poison hemlock evolve, they will be treated in the same manner as the more problematic species.

The remaining seven species: hoary cress, musk thistle, Canada thistle, bull thistle, houndstongue, black henbane, and downy brome (cheatgrass) will be the primary focus of the program and will likely receive attention as appropriate at the Colowyo mine. In addition, continued monitoring of reclamation will focus on identification of any new noxious weeds.

For the most part, noxious weeds observed on or near Colowyo reclamation do not achieve "infestation" levels. By infestation, Colowyo means: 1) relative cover contribution of one noxious weed species or a combination of noxious weed species exceeding three percent in a revegetated stand; or 2) a "patch" of any listed species in which the noxious weed component exceeds 25% relative cover and occupies an area larger than 100 square feet on any disturbed area. Rather, noxious weeds tend to occur as scattered individuals or small pockets of individuals. This distribution suggests that spot control will be the only effective procedure that can be utilized.

To manage these seven noxious weed species populations, Colowyo will either perform itself, or contract out, annual weed control activities. Weed control will typically involve herbicide application at the appropriate rates and during the appropriate life stages (as possible) to effect control. Spot applications will be preferred over "blanket" applications to prevent loss of desirable reclaimed taxa such as seeded forbs and shrubs, however, blanket application may be necessary if any infestation areas are observed.

All Colowyo staff remain vigilant for pockets of noxious weeds in the reclamation. If larger concentrations are observed, they will be mapped, recorded with GPS, or other means of identification to facilitate control by weed spraying crews. Both the weed spraying crew and the revegetation monitoring crews will be especially important in this regard.

In addition to revegetated areas, vigilance will be maintained for other locations conducive to noxious weed populations. Such areas include: riparian areas, topsoil piles, major traffic areas, road cuts and fill slopes, ditches, pond embankments, non-use areas, etc.

Weed control measures may include mowing, discing (conventional cultivation), burning, grazing, or applying an approved herbicide. Weedy annual species (such as pennycress) with a single season life cycle provide initial site stabilization and moisture conservation in newly seeded reclamation sites; as such they will not be specifically targeted for control. Historically, seedings on reclaimed sites have greatly out competed annual weed infestations within three or four growing seasons.

Specific control measures will be selected by evaluating the location, growth characteristics and vulnerability of each weed. Management efforts will begin after proper planning and evaluation are performed. Proper use of chemicals applied during weed control is ensured by oversight of weed spraying activities by individual(s) certified by the State of Colorado to handle and apply herbicides.

Measures for Determining Success of Revegetation

Measures for determining successful revegetation are outlined in Section 4.15.

Soil Testing Plan

From conception to the mid-1990's, Colowyo tested for topsoil fertility. In order to assure that the reapplied topsoil would support the proposed post-mining land use of rangeland, a soil sampling program wase implemented. Soil samples were taken randomly over each retopsoiled area and were analyzed for nitrate-nitrogen, phosphorus, and potassium. Historical results indicated adequate nutrient value to support post-mining revegetation.

Colowyo has demonstrated through numerous years of monitoring that topsoil fertility is not a concern at the mine; this is mainly due to the nutrient rich soil that is commonly present throughout the region. As a result, Colowyo has suspended the soil testing program requirements, until such time as Colowyo determines that the soil fertility adversely affects the reclamation and/or the post-mining land use.

As needed, other soil amendments could be considered for addition to the reclaimed areas to support reclamation efforts.

Acid-Forming and Toxic-Forming Materials

No significant acid-forming materials exist within the overburden soil or coal seams to be mined. Therefore, Colowyo will not undertake special handling procedures as described in Section 2:05.3. A detailed description of the chemical characteristics of soils and overburden materials is presented under Sections 2.04.6 and 2.04.9.

For a detailed description of the special handling of spoil material and sampling programs, refer to the Production Methods and Equipment Segment of this section.

Flammable liquids, such as oil and fuel, will be protected from spilling into other areas by earthen, concrete or HDPE lined structures surrounding each storage facility. A spill containment control plan has been developed to protect against spills.

All major equipment on the mine site will be equipped with portable fire extinguishers or automatic fire suppression systems. The water truck used for dust suppression at the mine site could also be used to control most fires.

Sealing of Exploration and Mine Holes

Exploration and mine holes which remain open for use as a water supply well or for use as a groundwater monitoring well will be completed with casing or piezometers at sufficient height above the land surface to prevent drainage of surface water or entrance of foreign material into the well, and will be fitted with caps to prevent the introduction of objects other than monitoring and sampling equipment. When the groundwater monitoring wells are no longer needed or required for any purpose, each well will be eliminated by plugging with concrete to the surface and removal of the associated surface structure.

Plugging procedures utilized for exploration drill holes that will not be mined through during the

current Permit term are as follows:

1. Drill holes drilled deeper than the stripping limit (450-500 feet) will be plugged by pumping cement or heavy solids bentonite Plug Gel or chips through the drill stem from the bottom up to within 3 feet of the ground surface.
2. Drill holes shallower than stripping limits (450-500 feet) may be plugged with the ready-mix concrete method instead the method in #1 to within 3 feet of the ground surface.
3. Drill holes with no water or coal zones may be plugged by backfilling with cuttings, and placing a plug ten feet below the ground surface to support a cement plug or bentonite chips to within 3 feet of the ground surface.

For safety considerations, exploration drill holes that will eventually be mined through during normal mining activites need only be covered with wood, plastic or other such material or otherwise bermed to prevent access until mining operations mine through each hole.

Those holes completed in aquifers will be sealed entirely with cement or other suitable sealant to within 3 feet of the ground surface.

Where possible, the sealed holes will be marked. At times reclamation operations will cover up the sealed drill holes and marking of holes will not be possible.

Within 60 days of the abandonment of a drill hole, approved drilling program or when requested by the Division, the following information will be submitted:

a) Location of drill hole as plotted accurately on a topographic map.
b) Depth of drill hole.
c) Surface elevation of drill hole.
d) Intervals where water was encountered during drilling activities.
e) Diameter of drill hole
f) Type of amount of cement or other sealant used.
g) Name of drilling contractor and license number of rig.
h) How the hole was worked.

Exploration taking place inside and outside of the permit area will be handled through the Notice of Intent (NOI) procedures. See the appropriate NOI for details for each program.

Water and Air Quality Control Techniques

Steps to be taken to comply with the Clean Water Act and other applicable water quality laws and regulations and health and safety standards include a comprehensive drainage and sediment control plan described in Section 2.05.3 and Sections 4.05.1 through 4.05.18. With respect to compliance with the Clean Water Act, Colowyo has a discharge permit from the Colorado State Department of Health under the National Pollutant and Discharge Elimination System (NPDES). Compliance with this permit will serve to effect compliance with the Clean Water Act and the Colorado Water Quality Control Act. A copy of this submittal is presented in Exhibit 7, Hydrology Information.

Colowyo, likewise, operates under several emission permits from the Colorado Department of Health, Air Pollution Control Division. Fugitive dust control measures will be employed as an integral part of the mining and reclamation operations.

Colowyo conducts air quality monitoring at the site in accordance with the requirements of emission permits approved by the Colorado Air Pollution Control Division. A copy of all applicable emission permits has been included in Exhibit 8 of the application.

Details of pollution control measures are discussed in section 2.05.6.

2.05.5 Post-mining Land Uses

The implementation of the reclamation plan as described in Section 2.05.4 will restore the disturbed land to the pre-mining use of rangeland, with two targeted subcomponents of grazingland and wildlife habitat (sagebrush steppe). Replacement of grazingland will be facilitated by targeting revegetation efforts toward primarily grassland communities. Because grasslands are effective for erosion control, this post mine land use will be implemented on those lands with slopes greater than 10%. Replacement of wildlife habitat will be facilitated by targeting revegetation efforts toward the re-establishment of a sagebrush steppe community. Because early-seral sagebrush steppe is less able to preclude erosion, it will be limited to those lands with slopes less than 10%.

The post mining land use of rangeland for the reclaimed area has been designed to match the pre-mining land uses found in the area. Specifically, Colowyo will reclaim the mined areas to a rangeland condition capable of supporting both domestic livestock and wildlife. One of the objectives of the reclamation plan will be to provide grazing for livestock, and the other objective will be to restore and improve habitats for deer, elk, and sage grouse.

Comments from the Bureau of Land Management and the State of Colorado approving the post mining land use are provided in Exhibit 1, Documents and Leases.

The observation of hundreds of deer and elk consistently utilizing reclaimed areas at Colowyo confirm success in meeting these goals. It is generally recognized that the herbaceous communities of grasses and forbs found on older reclaimed mining areas and other similar areas in northwest Colorado have in fact attracted these important wildlife species from surrounding native rangelands. Therefore, even though the grassland targeted areas are designed for livestock grazing, they exhibit a considerable component of wildlife habitat benefits as well.

Shrubs will also be replaced through seeding techniques to meet applicable regulatory requirements as described in Section 4.15.8. The post-mining land use is graphically shown on the Post-mining Topography Map (Map 19).

To support the proposed post-mining land use, small water impoundments (stock ponds) will be constructed to encourage an even distribution of grazing animals over the reclaimed site and to enhance the areas for wildlife. These small structures will also replace the existing water rights associated with the stock ponds that existed pre-mining. If necessary, Colowyo will submit

designs for these small impoundments to the Division prior to their construction.

Also, to provide access in the area for ranching purposes, the access road from Highway 13 will be left in place after mining is complete, and a number of "ranch roads" will be provided on the reclaimed area to approximate the roads that were in the area before mining. The access road will be narrowed from 26 to 12 feet, the asphalt removed, sideslopes reduced to 4:1 and the sides revegetated.

The consideration of rangeland as a post-mining land use is identical to the discussion in Section 2.04.3. The limitations on changing to an alternative land use are fully discussed in that Section.

2.05.6 Mitigation of Surface Mining Operation Impacts

Air Pollution Control Plan

Colowyo maintains fugitive dust control measures as an integral part of all mining and reclamation activities. Presently, Colowyo operates under numerous Emission Permits issued from the Colorado Department of Health, Air Pollution Control Division, as more particularly described in Section 2.03.10. Copies of all applicable emission permits issued by the Colorado Department of Health are available onsite and can be reviewed by request. Colowyo conducts air quality monitoring at the site in accordance with the requirements of the emission permits.

The principal fugitive dust control practices employed by Colowyo are as follows:

Roads

Colowyo employs a dust suppression program for in pit roads and other unpaved roads which primarily involves periodic watering. Mine water trucks run periodically as needed over the roads wetting down any dusty conditions. During the dryer months of the year, the water trucks will wet down the roads which are being utilized a minimum of two or three times per shift. If determined to be necessary as an addition to periodic watering, a chemical dust suppression agent may be used during the dry months on the primary in pit roads. To this date, however, chemical stabilization of the unpaved in pit roads has not been successful for more than a short period of time due to changing weather conditions and the use of heavy haulage trucks.

Colowyo has surfaced “in-pit” roads with gravel or crushed rock; however, no roads in the pit area will be paved with asphalt. Asphalt could not sustain the enormous weights of the haulage equipment currently in use. Likewise, crawler equipment would rip the asphalt surface causing an extremely hazardous condition for all equipment and personnel. All roads in the mining operation will be constantly maintained by a motor grader, scraper, or rubber tired dozer to remove any coal, rock, or any other debris. Smooth and clean road surfaces are essential for not only minimizing dust, but also for allowing efficient, safe and economic use of haulage equipment.

The haul roads have been paved with asphalt to provide for emission control. The paved roads include approximately five miles of road from State Highway 13to the main office building, the road from the main office building to the Gossard coal loadout, and the road from the shop facility