J. E. STOVER & ASSOCIATES, INC.
2352 NORTH 7TH STREET, UNIT B
GRAND JUNCTION, COLORADO 81501
PHONE: (970) 245-4101, FAX: (970) 242-7908

MINE ENGINEERING
MINE RECLAMATION

CIVIL ENGINEERING
CONST. MANAGEMENT

September 18, 2018

Mr. Howard Strand
Office of Surface Mining
1999 Broadway, Ste 3320
Denver, CO 80202-3050

Re: Bowie Resources, LLC, Bowie No. 1 Mine
Technical Revision No. 63
Decision Date: April 25, 2018
Permit No. C-1981-038

Dear Mr. Strand:

Enclosed is a copy of the referenced data. The enclosed Division of Reclamation Mining and Safety decision forms list the pages and maps which were revised and are included with this transmittal.

The revised pages and/or maps should be inserted into your record permit.

Sincerely,

J. E. Stover

J. E. Stover, P.E.
Consulting Engineer

Enclosures

cc: Basil Bear
Janet Binns w/o enclosures

UBRA Mining Engineer (Electronic)
Bureau of Land Management
Uncompahgre Basin Resource Area
2505 South Townsend Avenue
Montrose, CO 81401

COLORADO
Division of Reclamation, Mining and Safety
Department of Natural Resources
1313 Sherman Street, Room 215, Denver, CO 80203 P 303.866.3567 F 303.832.8106 http://mining.state.co.us

COAL MINING PERMIT - TECHNICAL REVISION DECISION

Bowie No. 1 Mine, Bowie Resources, LLC
Permit No. C-1981-038

The Division of Reclamation, Mining and Safety has proposed the decision stated below. Provided there are no objections, the decision will become effective upon the termination of the ten (10) day public comment period, in accordance with Rule 2.08.4(6)(b)(iii).

Technical Revision No. 63 — Decision: Approve

Submittal Date: January 22, 2018 — Decision Date: April 25, 2018

Description of Revision: Revise Revegetation Success Standard

DIVISION OF RECLAMATION, MINING AND SAFETY

PERMITTEE

Authorized Representative - Division

Date: April 25, 2018

Authorized Representative - Permittee (if applicable)

Date:

CHANGE IN ACREAGE		REVISED TOTAL ACREAGE		PERFORMANCE BOND	
Disturbed:	0.00	Disturbed:	156.10	Prior Liability:	$2,779,202.33
Affected:	0.00	Affected:	2,999.00	Change in Liability:	$0.00
Permit:	0.00	Permit:	5,035.20	Revised Liability:	$2,779,202.33
State:	0.00	State:	0.00	Bond Held:	$3,315,000.00
Federal:	0.00	Federal:	1,466.00		
Private:	0.00	Private:	3,569.20		
County:	0.00	County:	0.00		

REVISED APPLICATION PAGES

Section 2.05.4 pgs. 74a and 75,
Vol. 9A Table of Contents, Vol. 9A Phase III Bond Release Success Standards-2017 p. 1,2 &3, Vol. 9A Harner and Associates July 1986 Report -pg. 6, Landowner consent-Pavlisick Mining, BLM TR63 concurrence letter

REVISED MAPS

NA

2.05 APPLICATION FOR PERMIT FOR SURFACE OR UNDERGROUND MINING ACTIVITIES -- MINIMUM REQUIREMENTS FOR OPERATION AND RECLAMATION PLANS.

2.05.4 Reclamation Plan

(2) (e) (v) (Con't)

Fertilization Methods

Soil testing will be performed on all final reclaimed areas that are not plated with topsoil. Soil samples shall be obtained from representative composite sampling of the upper 12 inches of growth media within logical reclamation parcels.

Soil will be analyzed for pH, electrical conductivity, organic matter, nitrate-nitrogen, phosphorus, potassium, calcium, magnesium, copper, manganese, iron, zinc, and texture/particle size. Standard analytical procedures shall be utilized. Saturated paste extract for pH, EC, Na, Ca and Mg. AB-DPTA extract for the remaining chemical parameters and hydrometer method for particle size analysis. Particle size analysis will be reported as percent sand silt and clay.

Phosphorus will be applied prior to seedbed preparation based on the results of the soil test analyses. Fertility will be visually assessed and nitrogen fertilizer will be added in a subsequent growing season, if vegetative growth indicates that such amendment is warranted.

(vi) Revegetation Success

Data obtained from species diversity studies performed by Harrier-White Ecological Consultants of Littleton, Colorado, during 1981 and 1982 on three vegetation reference areas near the East Mines were initially used not only to develop a reclamation seed mixture, but also to determine a reclamation success standard for the Mines. However, after two vegetation studies performed by Cedar Creek Associates in 2013 and 2016, it was determined the initial success standards were not representative of actual revegetation composition. Cedar Creek compares the species composition to the approved post-mining land use and proposes a revised revegetation success criteria which lowers both the woody plant density standard and revises the diversity standard. Both changes will provide excellent early erosion control and quality forage for livestock and wildlife. Refer to the Vegetation Appendix in Volume 9A for further information regarding the revised development of the success standard.

2.05.4 Reclamation Plan

(2) (e) (vi) (Con't)

The following revegetation success standards are as follows;

1. Achieve a total plant cover of ≥ 90% of the Total Plant Cover Standard of 60% (54%) – West Mine.
2. Achieve a Total Plant Cover of ≥ 90% of the Total Plant Covert Standard of 40% (36%) – East Mine and Run of Mine.
3. Achieve annual herbaceous production levels of ≥ 90% of 450 pounds per acre (405) – West Mine.
4. Achieve annual herbaceous production levels of ≥ 90% of 400 pounds per acre (360) – East Mine and Run of Mine.
5. Achieve a species diversity of ≥ 5 native or introduced, perennial herbaceous species with between 0.5% and 60% relative cover.
6. Achieve a woody plant density ≥90% of 100 shrub, sub-shrub or trees per acre (90).
7. Achieve species diversity of ≥3 native perennial cool season grass species with between 0.5% and 60% relative cover.
8. Achieve a species diversity of ≥2 native or introduced perennial forb species with between 0.5% and 60% relative cover.
9. Achieve a diversity of ≥2 native shrub, tree or sub-shrub species, not exceeding a relative cover value of greater than or equal to 80%.

(vii) Soil Testing

Before removal of topsoil, sampling will take place to determine the quantity to be removed and saved. To make this determination, test pits will be dug and samples taken from each horizon. These samples will be lab analyzed. The depth of each horizon, as well as results of the analysis, will be recorded for

BOWIE #1 MINE

PHASE III BOND RELEASE REVEGETATION SUCCESS STANDARDS - 2017

Introduction

The Bowie#1 Mine is located approximately three miles northwest of Paonia, Colorado in a semi-arid mountain ecosystem. Small tree and dense shrub vegetation communities surround the mine area and are dominated by Utah juniper (*Juniperus osteosperma*) and Gambel oak (*Quercus gambelii*). The post-mining land use of revegetation is livestock grazing, as well as deer and elk winter habitat. The three revegetation units of the mine were evaluated by Cedar Creek Associates, Inc. (Cedar Creek) for Phase II Bond Release Success in 2013 (West Mine and Run of Mine) and East Mine (2016). This included sampling of vegetative cover only and calculation of species diversity from these results. Herbaceous production and woody plant density values were estimated but not sampled. Based on these values, technical revision of Phase III Bond Release revegetation success standards developed initially in the early 1980's are as follows (changes are in **boldface**):

- Achieve a Total Plant Cover of ≥ 90% of the Total Plant Cover Standard of 60% (54%) – West Mine
- Achieve a Total Plant Cover of ≥ 90% of the Total Plant Cover Standard of 40% (36%) – East Mine and Run of Mine.
- Achieve annual herbaceous production levels of ≥ 90% of 450 pounds per acre (405) – West Mine.
- Achieve annual herbaceous production levels of ≥ 90% of 400 pounds per acre (360) – East Mine and Run of Mine.
- Achieve a woody plant density of ≥ 90% of **100 shrub, sub-shrub or trees** per acre (**90**).
- Achieve a species diversity of ≥ 5 native **or introduced**, perennial herbaceous species with between **0.5%** and 60% relative cover.
- Achieve a species diversity of ≥ **3** native **perennial**, cool-season grass species with between **0.5%** and 60% relative cover.
- Achieve a species diversity of ≥ **2** native **or introduced perennial** forb species with between **0.5%** and 60% relative cover.
- Achieve a species diversity of ≥ 2 native shrub, **tree or sub-shrub** species, not exceeding a relative cover value of ≥ 80%.

Background

According to permit documents, success standards that were established for this mine were as follows:

- Achieve a Total Plant Cover of ≥ 90% of the Total Plant Cover Standard of 60% (54%) – West Mine
- Achieve a Total Plant Cover of ≥ 90% of the Total Plant Cover Standard of 40% (36%) – East Mine and Run of Mine.
- Achieve annual herbaceous production levels of ≥ 90% of 450 pounds per acre (405) – West Mine.
- Achieve annual herbaceous production levels of ≥ 90% of 400 pounds per acre (360) – East Mine and Run of Mine.
- Achieve a woody plant density of ≥ 90% of 1,000 stems per acre (900).
- Achieve a species diversity of ≥ 5 native, perennial herbaceous species with between 3% and 60% relative cover.
- Achieve a species diversity of ≥ 4 native, cool-season grass species with between 3% and 60% relative cover.
- Achieve a species diversity of ≥ 1 native forb species with between 3% and 60% relative cover.
- Achieve a species diversity of ≥ 2 native shrub species, not exceeding a relative cover value of ≥ 80%.

Rationale and justification for technical revision of vegetation success standards

Cover

No changes.

Production

No changes.

Woody Plant Density

The woody plant density standard will be lowered to 100 live shrubs, sub-shrubs or trees per acre. Initial shrub seeding of the revegetation has results in an estimated 100 to 200 shrubs per acre (2013 and 2016 estimates). Dense initial grass and forb establishment has been documented to preclude shrub germination and seedling establishment in Colorado and this appears to be the case at Bowie #1 also. Given that the post-mining land use of this revegetation is livestock grazing and deer and elk winter habitat, these relatively small patches of grass and forb communities provide the best vegetation composition for these land uses. The benefits of habitat diversity (including spatial, topographic, and structural diversity)

to wildlife is a basic tenet of the science. Monocultures of communities with little variability, such as the extensive stand of juniper woodland and mountain brush surrounding the mine, offer poor opportunities for wildlife. On the contrary, a mosaic of varied communities, especially when small in size, offer optimum variability and excellent opportunities for wildlife and mimic patchy wildfire burns. Furthermore, grazing animals such as the area elk population are favored in the long term by the added habitat diversity of the grassland community existing within the expanse of mountain brush and juniper woodlands. It is highly likely that native shrubs and trees will slowly invade the revegetation over the next 50 years unless wildfire returns this and the surrounding landscape to grassland before then.

Diversity

Several minor revisions have been made to the species diversity standards based on field results using the approved seed mixes. Standard use of western wheatgrass and thickspike wheatgrass in revegetation mixes have been shown repeatedly in semi-arid regions of Colorado to result in a dominance of these species in the first several decades after seeding. These species provide excellent early erosion control and quality forage for livestock and wildlife; however, their success leads to lower coverage of other seeded native grass, forb and shrub species. Therefore, the lower limit of relative cover for a grass or forb species to qualify is reduced from greater than or equal 3% to 0.5%. Additionally, the use of the introduced forb species, alfalfa (*Medicago sativa*) and cicer milkvetch (*Astragalus cicer*) in the approved seed mix has precluded widespread establishment of native forbs for similar reasons. Both these species establishing easily, provide early erosion control and are valuable forage for both livestock and wildlife. However, they also dominate the limited forb niche and should be able to be included in the species diversity requirements. Therefore, the overall and forb species diversity standard will be amended to include introduced species as countable toward the standard.

The overall number of species meeting the relative cover requirements will remain unchanged (five), however the number of perennial grasses and forbs will be changed from four grasses and one forb to three grasses and two forbs. This better reflects the revegetation outcomes of the seed mix, soils and precipitation after seeding.

Finally, the tree and sub-shrub lifeforms will be added to the species diversity requirements. These lifeforms were excluded from the original standards and best fit in with the shrub diversity requirements (two species with less than 80% relative cover).

Average herbaceous production in the mixed shrub type was 247 lbs/acre oven dry forage. Converting oven to air dry forage by a factor of 1.11, yields 275 lbs/acre available herbaceous air dry forage. Assuming a 50 per cent utilization factor and 900 lbs/acre cattle animal unit or 150 sheep animal unit, the cattle carrying capacity was 0.15 AUM's per acre and sheep carrying capacity was 0.9 AUM's per acre.

4.0 CONCLUSIONS

The vegetation at the Orchard Valley Mine is typical of the oakbrush and mixed shrub types found throughout Delta County and are similar to types studied for the 1983 permit.

4.1 Revegetation Success Standards

The approved revegetation success standard (1983 permit,Section 2.05.4 Revegetation Success) for the Orchard Valley Mine stated that revegetation was considered to be successful if:

The revegetation success standards in this section have been revised. Please see Volume I Section 2.05.4(2)(e)(vii).

These standards were developed based upon literature surveys of vegetation information from the Paonia area, data from local mines, data from Soil Conservation Service range sites, and data from OVM reference areas.

The cover data presented for the vegetation types studied for the proposed portal site is similar to the mixed shrub reference area cover which was used in the development of the cover success standard. Comparing the present data for the oakbrush and mixed shrub types with that presented for the mixed shrub type in 1983 revealed that vegetation cover was 70.4, 68.5 and 75 percent respectively. Total cover (vegetation, rock and litter combined) was 98.5, 88.7 and 96.0 respectively.

The production data presented for the vegetation types studied for the proposed portal site is higher than the mixed shrub reference area production data (45.5 lbs. per acre) but lower than the previously established success standard of 400 lbs. per acre. Herbaceous production in the oakbrush and mixed shrub vegetation types was 387 and 247 lbs. per acre, respectively.

The density data presented for the vegetation types studied greatly exceeds the previously accepted success standard, however the standard

Concurrence Statement:

I understand that Bowie Resources, LLC is proposing to change the vegetation standard as it relates to the Phase III bond release criteria at the East Mine location. I have reviewed the information supplied by JE Stover & Associates, Inc and Cedar Creek and Associates and accept the proposed changes. The reduction in shrub establishment and woody plant density requirements are compatible with the management plans of Pavlisick Mining.

Marvin D Pavlisick 4/2/18

Pavlisick Mining Date