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

1313 Sherman Street, Room 215
Denver, CO 80203

To: Rob Zuber

From: Binns, Janet

CC:

Date: 5/24/2021

Re: Bowie No. 1 , C1981038, SL7 Vegetation Review

I have reviewed the Bowie Resources Inc. SL7 application for Phase III bond release at the Run of Mine (R-O-M) area for compliance with the vegetation success standards at the Bowie No. 1 Mine. The operator has applied for Phase III bond release on a 12 acre portion of the reclaimed mine. The R-O-M area was reclaimed in 2008, and the sediment pond was reclaimed in 2017, after approval of SL6.

The operator collected vegetation data on the reclaimed area in two consecutive years 2019 and 2020, in accordance with Rule 4.15.7(5). The 2019 vegetation sampling reflects 11 years from the initial seeding of the R-O-M area and 2020 was 12 years. The R-O-M area meets the minimum of 10 years liability (Rule 4.15.7(5)).

The permanent seed mix found on Permit page 70, Section 2.05.4(2)(e)(iii), and is composed of; Grasses Thickspike wheatgrass, Slender wheatgrass, Streambank wheatgrass, Western wheatgrass, Indian ricegrass, and Arizona fescue. Forbs,: Cicer milkvetch, Small burnett, Smooth aster, Lewis flax. Shrubs: Rubber rabbitbrush, Wood's rose, Antelope bitterbrush, Winterfat, and Western snowberry.

Revegetation Success standards are defined on Permit Section 2.05.4(2)(e)(vi) page 74a (revised TR63 01/2018).

The R-O-M reclaimed area and reclaimed sediment pond met all of the vegetation success criteria for both 2019 and 2020 vegetation sampling events.

I have written the following sections to allow you to copy directing into the Findings document. Please let me know if you have any questions:

II. CRITERIA AND SCHEDULE FOR BOND RELEASE

PHASE III

Vegetation success standards are found in Permit section 2.05.4 (2)(e)(vi)

- Total plant cover ≥ 90 0f 40% total plant cover at Run of Mine reclaimed area.
- Herbaceous production ≥ 90% of 400 lbs/acre at the Run of Mine area.
- Woody plant density ≥ 90% of 100 shrub, sub-shrub, or trees per acre.
- Species diversity ≥ native or introduced perennial herbaceous species with between 0.5% and 60% relative cover.
- Species diversity of ≥ 3 native perennial cool season grass species with between 0.5% and 60% relative cover.
- Species diversity ≥ native or introduced perennial forb species comprising between 0.5% and 60% relative cover.
- Diversity of ≥ 2 native shrub, sub-shrub, or tree species, not exceeding a relative cover value ≥ 80%

The approved post-mining land use is the same as the pre-mine land use of rangeland with wildlife habitat.

The PAP indicates that no topsoil was available for salvage at the R-O-M area, but plant growth media was used during reclamation of the area. The PAP does not define the thickness of the plant growth media placement for the R-O-M area. The Reclamation cost estimate on Permit page MR65 (Section 2.05.4 p. 66) provides an estimated redistribution task for 5200 cubic yards. This volume results in approximately 3" thickness of plant growth media. The operator employed pitting and surface roughness to manage erosion on the slope. This method proved quite effective in minimizing water erosion, and creating microsites for water trapping, which benefitted vegetation establishment.

III. OBSERVATIONS AND FINDINGS

PHASE III

Data collected on the reclaimed R-O-M area in 2019 and 2020 demonstrate that the reclaimed vegetation community met the reclamation success standards for both years. The required total plant cover is 40% cover. Achieving 90% of the standard is considered acceptable. The total plant cover sample data achieved sample adequacy for both 2019 and 2020. Total plant cover measured in 2019 was 68.8%. Total plant cover in 2020 measured 51.6%. Total plant cover exceeded the standard both years of sampling.

Annual herbaceous production is considered successful if sampling records greater than or equal to 400 pounds of herbaceous biomass (herbaceous production must meet 90% of the standard). Herbaceous productivity sampling for both 2019 and 2020 sampling events achieved sample adequacy. Herbaceous production measured 1,141 pounds per acre in 2019, and 951 pounds per acre in 2020. Herbaceous productivity for both years of sampling exceeded the required standard and is considered successful.

Woody plant density for the reclaimed R-O-M area includes live tress, shrub species, and sub shrub species. The woody plant density shall be considered successful on the reclaimed area if 100 stems or more per acre are established. The standard must be met at a 90% level, so a minimum of 90 stems per acre is considered successful. Due to typical non-normal distribution of the woody stems throughout the reclaimed area, the operator was unable to meet sample adequacy or sample a minimum of 75 sample transects for woody plant sampling in 2019. As permitted by Rule 4.15.11(3) the operator used the sample median to determine woody plant density success. The operator measured 131 stems per acre on the reclaimed area in 2019 using the reverse null calculation and determining the median "ranked L test". This calculation is acceptable and the woody plant density requirement has been met for 2019. The 2020 sampling for woody plant density exceeded 75 transects (the operator collected 80 woody plant density transects). The 2020 sampling measured 331 woody stems per acres on the reclaimed R-O-M. The R-O-M exceeded the woody plant standard for 2020, and is considered successful.

Four criteria need to be met to be considered successful for species diversity. First, the reclaimed vegetative community requires greater than or equal to five (5) perennial non-noxious plant species to be established. The five spies must comprise at least 0.5% relative cover, yet no more than 60% relative cover each. They may be composed of either native or introduces species. Bothe 2019 and 2020 sampling demonstrated that the reclaimed community met this criterion. Six (6) species met this standard in 2019, and 8 species. met his standard in 2020. The second criterion requires that a minimum of three (3) native cool-season perennial grasses be established within the reclaimed community. Of these three species, each must contribute a minimum of 0.5% relative cover, yet no greater than 60% relative cover. Four grass species met this requirement in 2019, and five grass species met the standard in 2020. The reclaimed community must also contain a minimum of two (2) native or introduced forb species for the third criterion. Once again, each of these species must contribute a minimum of 0.5% relative cover, but no greater than 60% relative cover. In 2019 two (2) forb species met this requirement, and three (3) form species met the requirement in 2020. The final diversity standard requires a minimum of two(2) native tree, shrub, or sub-shrub (woody) species be established in the reclaimed community. No one woody species may exceed greater than 80% relative cover. In 2019 seven (7) woody species achieved this standard. In 2020 four (4) woody species met this requirement.

The R-O-M site was seeded to permanent seed mix as shown on Permit page 2.05.4(2)(e)(ii) in 2008. The sediment pond was reclaimed, and seeded with the permanent seed mix, in 2017, after the approval of SL6. The Division confident, based upon the sample data presented, that the reclaimed R-O-M area has met all the required vegetation standards required on this site.

The approved post-mining land use is rangeland with wildlife habitat as a secondary use. The seed mix used was developed to be an effective self-sustaining rangeland mix suitable for cattle grazing. The nearby landowner has allowed a few head of cattle to graze on the reclaimed area over the years. Grazing has not been conducted in a planned or documented manner. However, cattle have been observed grazing on the unfenced reclaimed area over the years. Wildlife, elk and deer, have been free to browse the reclaimed area as well. The seed mix and the resulting reclaimed vegetation community are adapted to the environment and location, and have demonstrated that they are able to support the post-mining land use of rangeland and wildlife habitat.

Summary and Conclusions

Based upon a review of the mine permit, the applicant's bond release application, and site inspections, the Division finds that Elk Ridge Mining and Reclamation, LLC has successfully completed all surface coal mining reclamation operations in accordance with the approved reclamation plan and met all requirements of the Act and the Rules.