
J. E. STOVER & ASSOCIATES, INC.

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MINE ENGINEERING
MINE RECLAMATION

CIVIL ENGINEERING
CONST. MANAGEMENT

April 27, 2021

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

Re: Bowie Resources, LLC, Bowie No. 1 Mine
MR-140, New SAEs on outslope of Rail near Loadout pond
Permit C-1981-038

Dear Mr. Zuber:

On behalf of Bowie Resources, LLC, (BRL), attached is a minor revision application to include two new SAEs located on the north-east side of the railroad outslope near the loadout pond.

The SAEs were designed with SEDCAD and utilized a grass filter as the mechanism to demonstrate that after passing through the filter, the peak settleable solids in the runoff have been reduced to less than 0.5 ml/l.

Attached is revised **Map-07** (Volume 7) and **page 2.05-40** and new pages **SAE-31 through SAE-45** which will be inserted into Tab 6 in Volume 7.

Please let me know if you need any additional information.

Sincerely,

Tamme Bishop

Tamme Bishop, P.E.
Project Engineer

Cc: Basil Bear



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 - 038 Date: 04 / 27 / 2021

Permittee: Bowie Resources, LLC
Bowie No. 1 Mine

Street: P.O. Box 1488

City: Paonia

State: CO Zip Code: 81428 -

Brief Description of Revision: Add two new SAEs to the rail outslope near the loadout sediment pond.

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 State (+/-) . Acres

Mineral Federal (+/-) . Acres

given.

The operator has one area at the train loadout area which falls within the guidelines of Rule 4.05.2(3)(a)(b). This area is described as follows:

Mine Silo Area Railroad Outslope

This area consists of approximately 1.5 acres of revegetated disturbance occupying outslopes of the railroad embankment developed at the train loadout facility. This small area exemption is depicted on Map 7. Flow from this area travels through a grass filter established below the site. The grass filter consists of the toe of outslopes of the railroad embankment developed at the train loadout facility. The grass filter consists primarily of Smooth Brome and is established on the perimeter of an irrigated orchard. Cover in the grass filter area is conservatively estimated at 50 percent. No mixing of surface drainage and underground mine drainage occurs within or results from this small area exemption.

SedCad⁷ modeling utilized to describe this site predicts runoff from the site will occur in compliance with the allowable settleable solids concentration. The SedCad⁷ modeling is presented in Exhibit 8 Protection of the Hydrologic Balance, pages SAE-26 through SAE-44.

(iii) Probable Hydrologic Consequences.

The probable hydrologic consequences may be divided into surface water and groundwater systems. The effects will be organized as follows:

Effect to surface water from mine facilities.

Effect to ground water from mine facilities.

BOWIE RESOURCES, LLC
SMALL AREA EXEMPTIONS –
OUTSLOPE OF RAIL SPUR NEAR LOADOUT SEDIMENT POND

Two small area exemptions were examined using SEDCAD 4.0 to show that a grass filter will effectively treat runoff from the SAE so the peak settleable solids concentration in the runoff is less than 0.5 ml/l.

These two small areas are separated by a road from the loadout down to the orchard area. It is assumed the road is a breakpoint, and half of the runoff will flow to the east SAE and half will flow to the west SAE.

Notes for SEDCAD calculation:

1. 10-year 24-hour storm event, 1.8 inches
2. Particle size analysis Loam, clay loam.
3. Roughness coefficient .0161 corresponds to a well-established fescue
4. Hydraulic spacing 0.56 which corresponds to a well-established fescue.
5. A low infiltration rate of 0.05 was used because of the soil type
6. A stiffness factor of 2.00 was used
7. Two different curve numbers were used, 87 for the road above the grass filter which drains into it, and 74 for the grass filter itself.
8. A "K" factor of 0.32 was used for clay loam
9. Results for each SAE will effectively treat the runoff so the peak settleable concentrations are below the limit of 0.5 ml/l.

ENGINEERS CERTIFICATION

The calculations and information presented on pages SAE 32-SAE 45 were prepared by me during the month of April 2021 and the information presented is true and correct to the best of my knowledge and belief.



Tammelin K Stover-Bishop Date
Registered Professional Engineer
State of Colorado No. 43402

4.28.21

Bowie No.1 **Grass Filter (East)**

Outslope of Rail Spur

Jim Stover

J.E. Stover & Associates, Inc.
2352 N. 7th Street, Unit B
Grand Junction, CO 81501

Phone: 970-245-4101
Email: tamme.jestover@bresnan.net

General Information

Storm Information:

Storm Type:	NRCS Type II
Design Storm:	10 yr - 24 hr
Rainfall Depth:	1.800 inches

Particle Size Distribution:

Size (mm)	SiL
2.0000	100.000%
1.0000	100.000%
0.5000	96.000%
0.2500	91.000%
0.1250	87.000%
0.0630	82.000%
0.0160	60.000%
0.0040	33.000%
0.0010	1.000%

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Grass Filter	#1	==>	End	0.000	0.000	

#1 Grass Filter

Particle Size Distribution(s) at Each Structure

Structure #1:

Size (mm)	In	Out
2.0000	100.000%	100.000%
1.0000	100.000%	100.000%
0.5000	96.000%	100.000%
0.2500	91.000%	100.000%
0.1250	87.000%	100.000%
0.0630	82.000%	100.000%
0.0160	60.000%	100.000%
0.0040	33.000%	100.000%
0.0010	1.000%	59.886%

Structure Summary:

		Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc. (ml/l)	24VW (ml/l)
#1	In	0.500	0.500	0.31	0.02	0.5	66,013	25.76	9.66
	Out			0.27	0.01	0.0	1,545	0.00	0.00

Structure Detail:

Structure #1 (Grass Filter)

Grass Filter Inputs:

Roughness Coefficient	Grass Height (in)	Hydraulic Spacing (in)	Infiltration Rate (iph)	Stiffness Factor (N-sq m)	Filter Length (ft)	Filter Width (ft)	Filter Slope (%)
0.0161	10.0	0.56	0.05	2.000	50.0	290.0	0.5

Grass Filter Results:

Total Infiltration Volume:	0.0071 ac-ft
Filter Infiltration Rate:	0.0168 cfs
Peak Flow Depth:	0.070 in
Critical Prone Velocity:	0.8122 fps
Wedge Location:	0.09 ft
Sediment Depth in Zone D:	0.0081 in
Trap Efficiency:	98.7 %

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	0.200	0.100	0.000	0.000	74.000	TR55	0.06	0.002
	2	0.300	0.100	0.000	0.000	87.000	TR55	0.25	0.014
	Σ	0.500						0.31	0.016

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	30.00	20.00	1.0000	1.0000	1	0.5	295,560	115.35	84.80
	2	0.320	20.00	0.10	1.0000	1.0000	1	0.0	3,110	1.21	0.77
	Σ							0.5	66,013	25.76	9.66

Bowie No.1

Grass Filter (West)

Outslope of Rail Spur

Jim Stover

J.E. Stover & Associates, Inc.
2352 N. 7th Street, Unit B
Grand Junction, CO 81501

Phone: 970-245-4101
Email: tamme.jestover@bresnan.net

General Information

Storm Information:

Storm Type:	NRCS Type II
Design Storm:	10 yr - 24 hr
Rainfall Depth:	1.800 inches

Particle Size Distribution:

Size (mm)	SiL
2.0000	100.000%
1.0000	100.000%
0.5000	96.000%
0.2500	91.000%
0.1250	87.000%
0.0630	82.000%
0.0160	60.000%
0.0040	33.000%
0.0010	1.000%

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Grass Filter	#1	==>	End	0.000	0.000	

#1

Grass Filter

Particle Size Distribution(s) at Each Structure***Structure #1:***

Size (mm)	In	Out
2.0000	100.000%	100.000%
1.0000	100.000%	100.000%
0.5000	96.000%	100.000%
0.2500	91.000%	100.000%
0.1250	87.000%	100.000%
0.0630	82.000%	100.000%
0.0160	60.000%	100.000%
0.0040	33.000%	100.000%
0.0010	1.000%	100.000%

Structure Summary:

		Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc. (ml/l)	24VW (ml/l)
#1	In	0.630	0.630	0.36	0.02	0.7	62,528	24.40	9.74
	Out			0.26	0.01	0.0	594	0.00	0.00

Structure Detail:

Structure #1 (Grass Filter)

Grass Filter Inputs:

Roughness Coefficient	Grass Height (in)	Hydraulic Spacing (in)	Infiltration Rate (iph)	Stiffness Factor (N-sq m)	Filter Length (ft)	Filter Width (ft)	Filter Slope (%)
0.0161	10.0	0.56	0.05	2.000	56.0	540.0	0.5

Grass Filter Results:

Total Infiltration Volume:	0.0135 ac-ft
Filter Infiltration Rate:	0.0350 cfs
Peak Flow Depth:	0.052 in
Critical Prone Velocity:	0.8122 fps
Wedge Location:	0.06 ft
Sediment Depth in Zone D:	0.0034 in
Trap Efficiency:	99.7 %

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	0.300	0.100	0.000	0.000	74.000	TR55	0.09	0.003
	2	0.330	0.100	0.000	0.000	87.000	TR55	0.27	0.016
Σ		0.630						0.36	0.019

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.320	20.00	20.00	1.0000	1.0000	1	0.6	225,077	87.84	58.41
	2	0.320	36.00	0.10	1.0000	1.0000	1	0.1	3,683	1.44	0.88
Σ								0.7	62,528	24.40	9.74