Trapper Mining Inc.
Permit No C-1981-010
Steep-Slope Mining Variance from Approximate Original Contour

May 8, 2020

Submitted By Trapper Mining Inc.

Originally Submitted in Support of PR-09

Revised in May 2022 in Support of PR-11

Revised in July 2024 in Support of PR-12

Revision: PR-12
Submitted: 10-10-2024

1.0 Introduction

1.1 Purpose of the letter – Steep-Slope Mining Variance Request L Pit and Ash Pit

The Regulations of the Colorado Mine Land Reclamation Board for Coal Mining (Effective August 30, 1990 as modified through September 14, 2005) (Regulations) allow for a variance from the requirements to restore reclaimed mine areas at surface coal mines to approximate original contour (AOC). A variance may be granted for areas of steep slope coal mining if the requirements of Section 2.06.5 are met along with the performance standards of Rule 4 including specifically Rules 4.14, 4.16 and 4.27.4. Steep slope mining is defined as any slope more than 20° or such lesser slope as may be designated by the Board or Division after consideration of soil, climate, and other characteristics of the region.

The following discussions are designed to provide information to the Division of Reclamation, Mining and Safety (Division) that operations at the Trapper Mine in the L Pit and the Ash Pit meet the requirements for steep slope mining under Rule 2.06.5 and allow the Division to find that a variance from approximate original contours for these areas is appropriate to promote a long-term stable postmining land surface and that the post-mining topography improves the overall watershed and meets the postmining land use.

The proposed post-mining topography is shown in plan view on Map M12 Sheets 2 and 3 and in cross section on Map M14A Sheets 1 and 3 included with this submittal. The variance request does not change the methods being used at the Trapper Mine for backfilling and grading, topsoil replacement or revegetation as described in Sections 3.2, 3.5, and 3.6 of Permit C-1981-010. Nor does the variance affect the post-mining land use as discussed in Section 3.0 below.

Along with the following summary discussion, more detailed information is provided in the attachments and revised pages for Permit C-1981-010, new Section 3.5.3.1. This document is intended to be inserted in Appendix B of the Permit C-1981-010 document and is referenced as such in the Section 3.5.3.1 pages.

1.2 Regulatory Background for Steep-Slope Variance and Required Information

A variance from the requirements of AOC for steep slope mining areas is allowed by the Regulations as long as certain demonstrations can be made relative to the mining and the reclaimed surface. These demonstrations include information on the nature of the steep slope mining, reclaimed slopes and overall stability of reclaimed surfaces, and information to demonstrate that a reclamation variance will still allow the reclaimed area to meet certain conditions. The sections of the Regulations where needed information is identified are Rule 2.06.4, Rule 2.06.5, Rule 4.14, Rule 4.16, Rule 4.27.4. **Table 1** provides a summary of the requirements and a cross reference to where these are discussed in the proposed changes to the Trapper Mine Permit C-1981-010.

Table 1 Regulatory Requirements Checklist

Rule	Requirements	Location in Document
Rule 2.06.4(2)	Sufficient information to establish that the operations will be conducted in accordance with the steep slope performance standards of Rule 4.27.3.	Not applicable under variance of Rule 2.06.5
Rule 2.06.5(2)(a)	The applicant has demonstrated that the purpose of the variance is to make the lands to be affected within the permit areas suitable for an industrial, commercial, agricultural, residential or public use post-mining land use	Post-mining land use is discussed in sections 2.5, 3.6.3 and 4.2 and has not changed from the approved postmining land use.
Rule 2.06.5(2)(b)	The proposed use, after consultation with any appropriate land-use planning agencies, if any, constitutes an equal or better economic or public use.	No alternative postmining land use is proposed.
Rule 2.06.5(2)(c)	The applicant has demonstrated compliance with the requirements for acceptable alternative postmining land uses of 4.16.	No alternative postmining land use is proposed.
Rule 2.06.5(2)(d)	The applicant has demonstrated that the watershed of lands within the proposed permit area and adjacent areas will be improved by the operations. The watershed will only be deemed improved if: (i) There will be a reduction in the amount of total suspended solids or other pollutants discharged to ground or surface waters from the permit area as compared to such discharges prior to mining, so as to improve public or private uses or the ecology of such waters; or, there will be reduced flood hazards within the watershed containing the permit area by reduction of the peak flow discharges from precipitation events or thaws; (ii) The total volume of flows from the proposed permit area, during every season of the year, will not vary in a way that adversely affects the ecology of any surface water or any existing or planned use of surface or ground water; and (iii) The appropriate State environmental agencies approve the plan.	See App. B; **Attachment 2** of this report for analysis of surface hydrology impacts within the AOC variance area.
Rule 2.06.5(2)(e)	The applicant has demonstrated that the owner of the surface of the lands within the permit area has knowingly requested, in writing, as part of the application, that a variance be granted. The request shall be made separately from any surface owner consent given for operations under 2.03.6, and shall show an understanding that the variance could not be granted without the surface owner's request.	See App. B; **Attachment 3** of this report for applicable documents.

Rule	Requirements	Location in Document
Rule 2.06.5(2)(f)	The applicant has demonstrated that the proposed operations will be conducted in compliance with the requirements of 4.27.4.	See following references for Rule 4.27.4.
Rule 2.06.5(2)(g)	All other requirements of the Act, these Rules, and the regulatory program will be met by the proposed operations.	General permit compliance.
Rule 4.16.1	All areas affected by surface coal mining operations shall be restored in a timely manner: (1) To conditions that are capable of supporting the uses which they were capable of supporting before any mining; or (2) To higher or better uses achievable under criteria and procedures of 4.16.	General permit compliance.
Rule 4.16.2	The postmining land use shall be determined after consideration for the use(s) before any mining and the appropriateness of such use(s) based on the land's capability.	Postmining land use is discussed in sections 2.5, 3.6.3 and 4.2 and has not changed from the approved postmining land use.
Rule 4.16.2	(1) The postmining land use for land that has been previously mined and not reclaimed shall be determined on the basis of the uses which the land was capable of supporting prior to any mining or of the higher and better uses that can be achieved and are compatible with surrounding areas.	Postmining land use is discussed in sections 2.5, 3.6.3 and 4.2 and has not changed from the approved postmining land use.
	(2) The postmining land use for land that has received improper management shall be judged on the basis of the premining use of surrounding lands that have received proper management. If such lands are not available for comparison, the standard by which postmining land use will be set will be determined by the Division.	Postmining land use is discussed in sections 2.5, 3.6.3 and 4.2 and has not changed from the approved postmining land use.
4.27.4(1)	Unless retention of a highwall remnant is specifically authorized pursuant to 4.14.1(2)(f) or 4.14.1(2)(g), the highwall shall be completely backfilled with spoil material, in a manner which results in a static factor of safety of at least 1.3 using standard geotechnical analyses.	See App. B **Attachment 1** and permit section 3.5.5

Rule	Requirements	Location in Document
4.27.4(2)	The watershed control of the area within which mining occurs shall be improved, in accordance with the approval by the appropriate State agency, by reducing the peak flow from precipitation or thaw and by reducing the total suspended solids or other pollutants in the surface water discharge during precipitation or thaw. The total volume of flow during every season of the year shall not be altered in such a way that adversely affects the ecology of any surface water or any existing or planned public or private use of surface or ground water. The watershed control may be demonstrated by maps and exhibits reflecting the watershed conditions before and after mining.	See App. B **Attachment 2** of this report for analysis of surface hydrology impacts within the AOC variance area and permit Section 2.7.4 for analysis of watershed yield characteristics.
4.27.4(3)	Land above the highwall may be disturbed only to the extent that the Board or the Division deems appropriate and approves as necessary to facilitate compliance with the provisions of 4.27 and if the Board or Division find that the disturbance is necessary to: (a) Blend the solid highwall and the backfilled material; (b) Control surface runoff; (c) Provide access to the area above the highwall; or (d) Temporarily store overburden.	Mining operations detailed on Maps M10A and M10B along with Post Mining Contours on Map M12 detail the reclamation plan for the affected area.
4.27.4(4)	The landowner of the permit area has requested, in writing, as part of the permit application under 2.06.5 that the variance be granted.	See App. B; **Attachment 3** of this report for applicable documents.
4.27.4(5)	The operations are conducted in full compliance with a permit issued with 2.06.5.	Operations will be conducted in compliance with 2.06.5 as described above.
4.27.4(6)	Only the amount of spoil as is necessary to achieve the postmining land use, ensure the stability of spoil retained on the bench, and meet all other requirements of the Act and these Rules shall be placed off the mine bench. All spoil not retained in the bench shall be placed in accordance with 4.09, 4.14.1, and 4.14.2.	Not applicable

2.0 Steep Slope Analysis

For the purposes of the AOC variance, Trapper contracted with Agapito Associates, Inc. (AAI) to evaluate the existing conditions and stability of the L Pit and Ash Pit based on pre-mining topography and post-mining stability under both AOC conditions and lesser slopes proposed by the variance request. AAI's report "Geotechnical Evaluation of L-Pit and Ash-Pit in Support of Trapper's Steep-Slope Mining Variance Application" is attached as **Attachment 1** and will be included with this document inserted into Permit C-1981-010 as part of Appendix B. AAI identified that, based on the unique combination of steepness of the pit floor, spoil thickness, spoil saturation and the presence of a weak shale/clay in the floor of the mined pits, steep slopes for the final cut of the L Pit and Ash Pit at the Trapper Mine should be identified as any slope over 16°. These conditions make any reclaimed slopes at a steepness of 16° or steeper unstable as described in the following sections.

2.1 Pre-Mining Topography and Evidence of Historic Slides

The pre-mining topography for the Trapper Mine and surrounding areas is shown on Map M3 of the Trapper Mine Permit M- 1981-010.

Overlaying the pre-mining topography with the limits of the final cut of L Pit shows there are small areas throughout the pit and in particular in the southern portion of the pit with slopes that exceeded 20° and almost all of the pre-mining topography of the pit had slopes that exceeded 16° (see Figure 1a of the AAI report). The pre-mining topography of the Ash Pit showed slopes shallower than 16° for most of the pit area with steeper areas within the northern portion of the pit (See Figure 1.b of the AAI report).

AAI studied Google Earth Imagery to evaluate historical slumping within the surrounding areas on ground not impacted by mining operations and, based on similar conditions, likely to be encountered at the Trapper Mine (oversteepened slopes, similar geology likely in combination with a weak base layer such as a clay or shale and saturated conditions). There is evidence of historical instability resulting in slumps in an area south of the G Pit; three areas to the southeast and southwest of the L Pit, and an area southeast of the Trapper Mine Office (see AAI report Figures 2a, 2b, and 2c). Based on the similarities between pre-mining slopes in these historical slumps, the similar conditions likely to be encountered at the Trapper Mine in the L Pit and Ash Pit (oversteepened slopes, similar geology likely in combination with a weak base layer such as a clay or shale and saturated conditions), and the fact that the historical slumps occurred in competent rock significantly stronger than the mined spoil material, AAI concluded that an AOC post-mining topography could result in unstable slopes in both pits.

2.2 Proposed Post-Mining Topography and Stability

2.2.1 L Pit

Post-Mining Topography

A proposed postmining topography was developed for the L Pit that takes into consideration the need for shallower reclaimed slopes. The post-mining topography is shown on Map M12 Sheet 3. The proposed post-mining topography would have slopes of 4 to 14°, shallower than the overall pre-mining topography of 4-26° and would have the same general aspect with slopes facing north/northeast. The L Pit would be backfilled in the same manner as described in the Permit C-1981-010 Section 3.5. The backfill would eliminate all highwalls, and spoil/refuse piles. Once backfilled, the spoil would be graded to blend with the surrounding topography, and drainage controls would be established as described in Section 4.0 below.

Attachment 2 to this document is titled "An Evaluation of Pre-Mine and Post-Mine Hydrology Characteristics Associated with the Trapper Mine Approximate Original Contour Variance Application" completed by JMattern Mining, LLC. (Mattern) and includes an overview of the proposed post-mining

topography and the surrounding area for approximately 25 square miles as Figure 8, Permit Area Post-Mine topography. This overview figure shows that the proposed post-mining topography blends well with other areas surrounding the Trapper Mine and would not appear unnatural or of a different general slope or aspect. Once revegetation is established, the post-mining topography would appear similar to surrounding areas. Map M14A Sheet 1 shows several cross sections through the L Pit with the pre-mining and proposed post-mining topography. The cross sections highlight the differences in backfill height and slope between pre- and post-mining topography.

Post-Mining Stability Analysis

AAI performed an evaluation of the geologic and geohydrologic conditions present in the L Pit and used that information to develop a stability analysis of the backfilled L Pit under both the proposed post-mining topography and the AOC topography. The analysis is contained in the AAI report, **Attachment 1**, also to be included as part of Appendix B of Permit C-1981-010 and briefly described below.

The stability analysis considered the factors that critically affect stability of backfill at the Trapper Mine including:

- Pit floor gradients – At Trapper the pit floor varies between 6° and 13° which results in both an overall reduction in backfill stability, especially with thicker volumes of spoil placed upslope under the AOC backfill scenario. The proposed backfill under the AOC variance generally places spoil at lesser thickness upslope and buttresses the upslope backfill with thicker backfill downslope.
- Backfill Saturation – Pre-mining the groundwater at the Trapper Mine occurs in alternating aquifers of more permeable rock layers confined by less permeable rock. In the pits backfilled with spoil, the groundwater percolates downward through the backfill materials and trends along the sloping floor of the pit to pool at the endwall at the toe of the slope where it meets the less permeable native bedrock. The development of a phreatic surface above the pit floor and collection of groundwater at the toe of the slope has an overall negative impact on the long-term stability of the backfilled material, particularly in thicker spoil placement upslope that would occur under AOC.
- Pit Floor Geology – The coal mined at Trapper is typically underlain by a seam of weak clays and shales. These materials will deteriorate over time, creating instability in the presence of groundwater. This will be exacerbated by a deeper depth of spoil placed under AOC.
- Spoil Depth Variations – Research indicates that spoil shear strength decreases with depth of spoil and the overall strength of deeper spoil is controlled by clay-sized particles. Placement of deeper spoils in areas under an AOC post-mining topography is likely to result in weakened areas under the peaks and ridges with a potential for differential settlement and deformation presenting as surface cracks.

These factors along with the evidence that unmined competent rock shows some instability in the surrounding area, create a potential for instability that was studied by AAI. A detailed discussion of the AAI approach to stability is contained in **Attachment 1**. AAI evaluated 3 sections through the L Pit under both AOC and the proposed post-mining topography. These vertical analysis sections were taken along the true dip direction. The results indicate that for the L Pit, the Safety Factors for AOC configurations are consistently lower than the proposed post-mining topography and at or below AAI's minimum threshold for long-term stability of 1.5. **Table 2** below presents the results.

Table 2 L Pit Safety Factors

Section	AOC Safety Factor	AOC Variance Safety Factor
LA-LA'	1.5	1.58
LB-LB'	1.3	1.55
LC-LC'	1.49	2.14

The proposed post-mining topography under the AOC variance yields an overall more stable, long-term backfill than the AOC.

2.2.2 ASH Pit AOC Variance

Post-Mining Topography

A postmining topography was developed for the Ash Pit that takes into consideration the proposed post-mining topography which includes shallower reclaimed slopes. The post-mining topography is shown on Map M12 Sheet 2. The proposed post-mining topography would have an overall slope of 4 to 14° and would have the same general aspect with slopes facing north/northwest. As with the L Pit, the Ash Pit would be backfilled in the same manner as described in the Trapper Mine Permit Section 3.5, except that the Ash Pit has additional requirements related to coal ash placement. Those requirements include a minimum cover of five feet of spoil and a foot of topsoil over the ash body. In addition, construction of post-mining drainages must be at least 50 feet from the edge of the ash placement. The backfill would eliminate all highwalls, and spoil/refuse piles. Once backfilled, the spoil would be graded to blend with the surrounding topography, and drainage controls would be established as described in Section 4.0 below. It should be noted that post-mining drainages must be located to avoid placement over the top of historical ash disposal. Figure 7 of the Mattern report (**Attachment 2**) shows the proposed pre- and post-mining drainage patterns for the Ash Pit.

Figure 8 of the Mattern report shows a view of the proposed post-mining topography and the surrounding area for approximately 25 square miles to show that the proposed post-mining topography blends well with other areas surrounding the Trapper Mine and would not appear unnatural or of a different general slope or aspect. Map M14A Sheet 3 shows two cross sections through the Ash Pit with the pre-mining and proposed post-mining topography.

Post Mining Stability Analysis

AAI performed an evaluation of the geologic and hydrologic conditions present in the Ash Pit and used that information to develop a stability analysis of the backfilled pit under both the proposed post-mining topography and the AOC topography. The analysis is contained in the AAI report, **Attachment 1**, also to be part of Appendix B of the Trapper Mine Permit C-1981-010 and briefly described below.

The stability analysis considered the same factors as described above for the L Pt including pit floor gradients, backfill saturation, pit floor geology, and spoil depth variations. As discussed above, a detailed discussion of the AAI approach to stability is contained in **Attachment 1**. AAI evaluated one section through the Ash Pit under both AOC and the proposed post-mining topography. The vertical analysis section was taken along the true dip direction. The results indicate that for the Ash Pit, the Safety Factor for the AOC configuration is 1.36, below AAI's minimum threshold for long-term stability of 1.5. The Safety Factor for the AOC variance post-mining topography is 1.75 indicating long-term stability.

3.0 Post-Mining Land Use

For Trapper Mine there are three different types of post mining land uses that occur within the permit area: 1) cropland, 2) rangeland dominated by mountain shrubs before mining, and 3) rangeland

dominated by sagebrush and grass before mining. All areas designated for cropland have been previously reclaimed. Areas of the L Pit and Ash Pit would be reclaimed to approved postmining land use of rangeland open to grazing by both domestic species and wildlife. The AOC variance request does not request an alternate land use post mining or changes to the approved revegetation for rangeland areas.

The AOC variance would have positive impacts on the post-mining land use. It is well known that steepness of slope affects cattle distribution during grazing (Mueller 1965) and that the steeper the slope, the more the cattle will congregate at the toe of the slope or on shallower areas of the slope. The AOC variance will reclaim the L Pit to overall slopes of 4 to 14° and the Ash Pit to overall slopes of 4 to 14°. These gentler slopes would promote more even cattle distribution and result in a healthier overall vegetative cover in the long term.

4.0 Watershed Improvements

The Regulations require that variances from AOC demonstrate that the watersheds of the area and adjacent areas are improved by the post-mining topography variance including showing a reduction in total suspended solids or other pollutants from pre-mining discharges or reduced peak flows and flood potential and the total volume of flows during every season of the year will not vary to the extent it has an effect on the ecology or existing or planned use of the surface water or groundwater.

Trapper contracted with Mattern to review the watershed improvements for the proposed AOC variance post-mining topography. The Mattern report is contained as **Attachment 2** to this document and also will become part of Appendix B of the Trapper Mine Permit Application Package. The following discussions provide information on pre- and post- mining watersheds for the L Pit and Ash Pit. The Division has indicated that in order to make these demonstrations, a comparison of the changes in watershed areas pre- and post-mining based on the proposed post-mining topography is required and that is included in the discussion.

4.1 L Pit Watershed Improvements

The L Pit area of interest lies within four post-mine drainages; Flume Gulch (540.3 acres), Deal Gulch (60.0 acres), and the Deacon and Jeffway Gulches (a combined 4.4 acres). The hydrologic evaluation focuses on the Flume Gulch drainage since most of the L Pit lies within this drainage. Within Trapper's permit boundary there are multiple Flume Gulch sub-drainages referred to as Grouse, Sage, Oak, West Flume, Middle Flume, East Middle Flume and East Flume. The L Pit includes East Middle Flume Gulch and Middle Flume Gulch. Areas of the Flume Gulch watershed outside of the L Pit have been affected by mining operations at the Trapper Mine over the last 30 years. **Table 3** shows the changes in watershed area for Flume Gulch within the Trapper Mine permit boundary. Figure 4 of the accompanying Mattern report (**Attachment 2**) shows the similarities between pre- and post-mining drainage patterns.

Table 3 Flume Gulch Sub-Drainage Areas Within the Trapper Mine Permit Boundary

Sub-Drainage	Pre-Mining Area (acres)	Post-Mining Area (acres)
Grouse	207.6	252.3
Sage	188.7	109.5
Oak	378.1	439.1
West Flume	234.5	206.2
Middle Flume	621.7	614.9
East Middle Flume	143.3	419.0
East Flume	103.6	73.3
Total	**1877.5**	**2114.3**

The total acreage of the pre-mining Flume Gulch watershed is approximately 5,800 acres. The pre-mine Flume Gulch total watershed acreage within the Trapper Mine permit area is 1,878 acres and increases by approximately 236.8 acres post-mining to an acreage of 2,114.3, an increase of approximately 12.6%. In order to understand the changes in the drainage flows and sediment generation as a result of the increased acreages, Mattern also reviewed the pre- and post-mining drainage densities and sediment generation. **Table 4** shows the drainage densities pre- and post- mining and **Table 5** shows the predicted USLE and SEDCAD outputs.

Table 4 Flume Gulch Pre-Mine and Post-Mine Comparative Hydrology Characteristics

Sub-Drainage	Pre-Mining Drainage Density (mi/m^2)	Post-Mining Drainage Density (mi/m^2)	Pre-Mining Average Gradient (%)	Post-Mining Average Gradient (%)
Grouse	4.8	4.0	8.3	8.2
Sage	3.4	6.5	9.1	10.0
Oak	3.8	3.1	11.4	11.9
West Flume	4.5	4.1	13.5	14.5
Middle Flume	2.8	3.4	10.4	9.8
East Middle Flume	4.4	3.1	10.8	8.8
East Flume	5.6	4.5	9.4	8.3
Overall Average	**3.8**	**3.6**	**10.6**	**10.3**

Table 5 Flume Gulch Pre-Mine and Post Mine Sediment Yield Projections for the L-Pit AOC Variance

	USLE Results (annual tons/acre)	SEDCAD Total Area (acres)	Overall Sediment Yield (tons)	Sediment Yield Per Acre (tons
Pre-Mining	2.44	771	872.8	1.13
Post-Mining	0.70	1,038	765.9	0.74

Based on the Mattern evaluation, the sub-drainage watersheds would be slightly larger overall. The watershed characteristics would be very similar with the same overall drainage densities and similar drainage gradients. The post-mining AOC variance topography shows an overall decrease in sediment yield per acre based on the SEDCAD evaluation.

Drainage patterns would be designed to blend with surrounding drainage patterns and would not represent a change from the surrounding drainage patterns. Figure 3 shows the proposed drainage patterns for the AOC variance post-mining topography for the L-Pit area, the drainage patterns within other reclaimed areas of the Flume Gulch drainage and the surrounding areas. As shown on the figure the proposed post-mining drainage pattern blends with the surrounding drainage patterns.

There would not be any significant changes in the post-mining watershed areas that would impact seasonal or flood flows from the post-mining reclaimed areas or adversely affect surrounding ecology or any existing or planned use of surface water or groundwater.

4.2 Ash Pit Drainage Improvements

The 103.5-acre Ash Pit lies primarily within the Johnson Gulch watershed (65 acres) with the remaining acres within the Pyeatt watershed. The Ash Pit represents only 1.5% of the 7,053-acre Pyeatt/Johnson Gulch watersheds. The evaluation of post-mining drainage conditions completed by Mattern focused on the Johnson Gulch watershed since it represents the majority of that drainage. **Table 6** shows the changes in the Ash Pit portion of the Johnson Gulch watershed pre- and post-mining. Figure 7 of the accompanying Mattern report (**Attachment 2**) shows the pre- and post-mining drainage patterns for the Ash Pit and surrounding areas.

Table 6 Johnson Gulch Drainage Characteristics within the Ash Pit Pre- and Post-Mining

Condition	Acreage	Drainage Density (mi/mi^2)	Gradient (%)	Sediment Yield Per Acre (tons)
Pre-Mining	1,432	3.1	9.3	1.03
Post-Mining	1,435	3.2	7.8	0.56

Based on the Mattern evaluation, the Johnson Gulch watershed would be slightly larger. The watershed characteristics would be very similar with similar drainage densities and less steep drainage gradients and about half of the sediment yield based on the SEDCAD evaluation.

Drainage patterns would be designed to blend with surrounding drainage patterns and would not represent a change from the surrounding drainage patterns. Figure 6 shows the proposed drainage patterns for the AOC variance post-mining topography for the Ash Pit area and the drainage patterns within the surrounding areas. As shown on the figure the proposed post-mining drainage pattern blends with the surrounding drainage patterns.

There would not be any significant changes in the post-mining watershed areas that would impact seasonal or flood flows from the post-mining reclaimed areas or adversely affect surrounding ecology or any existing or planned use of surface water or groundwater.

5.0 Landowner Agreements

Attachment 3 contains a letter of concurrence with the AOC variance from Trapper Mining Inc, the owner of the land associated with the L Pit. **Attachment 3** also contains a letter of variance for concurrence of the AOC variance from the Colorado State Land Board owner of the land associated with the Ash Pit.

6.0 Conclusions

As discussed in the text above and accompanying attachments, a variance from AOC for the final cut of the L Pit and for the Ash Pit would result in a more stable long-term post-mining configuration and in improvements in the overall watershed for the two pit areas. The variance would not impact approved methods for backfilling, grading, topsoil replacement or revegetation.

The L Pit shows overall pre-mining topography with slopes of 16° or steeper and steeper slopes that exceeded 20° in the southern portion of the L Pit area. Post-mining the slopes would range from 4 to 14° and would blend with the surrounding topography.

The post-mining backfill configuration for the L Pit would decrease the depth of spoil placed at the head of the slope and increase the depth of spoil placed at the toe of the slope to act as a buttress to any movement. Shallower overall surface topography also would increase the stability of the backfilled spoil. The stability analysis showed that the post-mining stability for the AOC variance has improved Safety Factors when compared to restoring the L Pit to AOC.

In addition, post-mining drainages have been designed to mimic pre-mining drainages as part of the AOC variance drainage design and would result in overall watershed improvements. For the L Pit, the overall drainage area for Flume Gulch, which is the major drainage associated with the L Pit, would increase by approximately 181.2 acres or 9.7%. The pre- and post-mining drainage densities would remain the same and the overall drainage gradient would increase by 0.2%. Sediment yield would decrease from 1.13 tons/acre to 0.81 tons/acre under the proposed post-mining configuration.

Table 7 summarizes the pre- and post-mining characteristics for the L Pit.

Table 7 Pre- and Post-Mining Characteristics for the L Pit

Condition	Acreage	Slopes (°)	Safety Factors	Drainage Density (mi/mi^2)	Gradient (%)	Sediment Yield Per Acre (tons)
Pre-Mining	1,877.5	4-26	1.3 to 1.5	3.8	10.6	1.13
Post-Mining	2,114.3	4-14	1.58 to 2.14	3.6	10.3	0.74

The Ash Pit shows overall pre-mining topography with shallower slopes but does include the steeper slopes of over 23° in the northern portion of the pit. Post-mining the slopes would range from 4 to 14° and would blend with the surrounding topography.

The post-mining stability analysis for the Ash Pit showed that the AOC variance would significantly improve Safety Factors when compared to restoring the Ash Pit to AOC.

In addition, post-mining drainages would result in overall watershed improvements. For the Ash Pit, the drainage area for Johnson Gulch, which is the major drainage associated with the Ash Pit, would increase by approximately 3 acres. The pre- and post-mining drainage densities would change slightly, and the overall drainage gradient would decrease 1.5%. Sediment yield would decrease from 1.03 tons/acre to 0.56 tons/acre under the proposed post-mining configuration.

Table 8 summarizes the pre- and post-mining characteristics for the Ash Pit.

Table 8 Pre- and Post-Mining Characteristics for the Ash Pit

Condition	Acreage	Slopes (°)	Safety Factors	Drainage Density (mi/mi^2)	Gradient (%)	Sediment Yield Per Acre (tons)
Pre-Mining	1,432	4-23	1.36	3.1	9.3	1.03
Post-Mining	1,435	4-14	1.75	3.2	7.8	0.56

Approval of the post-mining topography AOC variance also would improve the post-mining land use of rangeland by allowing for cattle to graze on shallower slopes. In steeper areas cattle would tend to congregate on shallower slopes and that could result in over-grazing in these areas. The shallower slopes would provide for more dispersed grazing.

Finally, the landowners have approved the proposed changes in post-mining topography.

All of the information provided shows clear evidence that the proposed AOC variance can be conducted in accordance with the performance standards of Rule 4.27.3 and would result in overall beneficial changes to post-mining topography while providing a long-term stable and natural land surface that blends with the surrounding topography.