October 25, 2022

Eric Scott
Colorado Division of Reclamation, Mining, and Safety
1313 Sherman St, Rm 215
Denver, CO 80203

Delivered Via Email

RE: Black Obsidian Pit (M-1987-026); Fourth Adequacy Response

Mr. Scott:

On behalf of Colorado Quarries – the operators of the Black Obsidian Pit ("Black Obsidian") – please allow this letter and associated attachments to serve as response to your October 21, 2022 Fourth Adequacy Review addressed to Bill Tezak.

Exhibit D – Mining Plan (Rule 6.4.4):

1. *The mining plan shall supply the following information, correlated with the affected lands, map(s) and timetables: Please review, consolidate, and update as needed the information provided by the initial submittal and all adequacy responses to-date. Items to be addressed:*

    a. *Mining method description (i.e., bench configuration);*
    b. *rangeland slope reclamation (i.e., 3H:1V); and*
    c. *geotechnical stability analysis for slopes steeper than 3H:1V.*

Please see the attached and updated Exhibit D – Mine Plan, updated Map C, and updated Map F. The included and revised Exhibit D differs from the previously submitted Exhibit D as it only includes the requirements listed under Rule 6.4.4 of the 2019 adopted Mineral Rules and Regulations of the Colorado Mined Land and Reclamation Board for the Extraction of Construction Materials. Therefore, extraneous information outside of the Rule included in the July 2022 Mine Plan should still be considered part of the permit file.

Geotechnical Stability Analyses (to-date):

1. *The DRMS acknowledges the unique challenges associated with geotechnical evaluations and analyses for obsidian. However, a demonstration meeting the intent of MLRB Policy 30 must be provided. It should be noted that DRMS is concerned with potential offsite impacts during operation and long-term global stability and local safety/stability at closure/final reclamation.*

Please refer to the revised Exhibit D for the updated mining plan. The site will be mined and reclaimed at a 3H:1V slope with 30-foot-wide benches and 10-foot tall unbackfilled highwalls. As noted by the Division, a geotechnical stability statement is not required for this design. Safety and stability during mining and at the time of closure will be accommodated by the mined and reclaimed 3H:1V slopes and will not provide a negative impact to the surrounding area.

2. *Given the unique circumstances, the DRMS requires a commitment to have a geotechnical inspection performed annually by a qualified, licensed professional assessing the stability of the highwall(s) and submitting their evaluation/assessment in a report along with the permit's annual report. The recent submittal provides a generally adequate executive summary but lacks detailed analyses to support the stated conclusions. Please acknowledge and commit to providing this geotechnical stability inspection by a qualified, licensed professional with the annual report for this site.*

The Applicant commits to having the site inspected for geotechnical stability annually by a qualified, licensed professional. The resultant evaluation will be submitted with the annual report.

3. *The provided exhibit states Bishop's Method of Slices is inapplicable without any rationale. The DRMS acknowledges Bishop's method is generally associated with circular failures, but other methods are applicable for polygonal slip surfaces (e.g., Sarma, Spencer and Morgenstern-Price). Please provide some rationale as to why none of these approaches may be appropriate and propose an alternative method of demonstrating compliance with Policy 30.*

The mining plan has been revised to limit overall slope angle to 3H:1V and to develop benches at 30-feet wide to 10-feet tall. Such a mining plan does not require a slope stability analysis. Please see the revised Exhibit D – Mining Plan. If and when Colorado Quarries wishes to develop steeper permanent highwalls, a complete geotechnical stability exhibit addressing the Division's Policy 30 will be provided as a technical revision.

4. *The DRMS has recently accepted kinematic analyses in conjunction with slope stability evaluations (e.g. M-1997-054/Parkdale AM-2; M-1973-021/Morrison Quarry AM-7 ; M-1974-004/Spec Agg AM-4; and M-1977-141/Lyons Quarry TR-5). These have also included factors of safety analyses addressing global stability and rockfall/bench catchment capacity to demonstrate local slope safety upon closure. Please provide a demonstration of global stability and adequate bench catchment capacity.*

Please refer to the response for Geotechnical Stability question #3 above.

5. *Backbreaks and nodule stability. Sections 3 and 4 of the provided analysis assume a worst case 8-foot nodule is encountered in the highwall, stating that when 3 feet is exposed/protruding from the highwall, it should be removed. The DRMS is concerned a 5 or six foot nodule, which is likely just as hazardous, would fail by the time three feet of the nodule is exposed. Please revise this approach to the more generic 40 percent exposed nodule, for those as small as say one foot.*

Please refer to the response for Geotechnical Stability question #3 above.

6. *Please provide rationale, sources for any published or tested strength parameters, and limitations to any selected methods and analyses.*

Please refer to the response for Geotechnical Stability question #3 above.

Please do not hesitate to contact me with questions and we look forward to receiving the Division's review of this submittal.

Cheers,

Katie Todt
Geologist and Senior Consultant
Lewicki & Associates, PLLC
(303) 346-5196
katie@lewicki.biz

CC:
Bill Tezak, Colorado Quarries, Inc.
Nicole Tezak, Colorado Quarries, Inc.
Ben Langenfeld, Lewicki and Associates, PLLC

Attached:
Black Obsidian Pit 221024-Exhibit C – Mining Plan Map.pdf
Black Obsidian Pit 221024-Exhibit F – Reclamation Map.pdf
Black Obsidian Exhibit D Mine Plan 221025.pdf

Black Obsidian Pit (M-1987-026)
112c Conversion Application (rev. October 24, 2022)

Rule 6.4.4.
Exhibit D – Mining Plan

Introduction

Current operations consist of a small surface quarry contained within a 9.0-acre permitted (110) area; the surface quarry area itself occupies approximately 3.0 acres. Following conversion and approval to a 112(c) operation, the permit area and affected area will be 45.3 acres. All maps detailing representations of mining areas and locations are found in Exhibit C.

The operator wishes to expand the permitted acreage to extend the life of the mine, to increase the annual production of the mine, and investigate additional markets for this unique material. The expanded area will allow an increased rate of production, yet still extend the life of the mine several more decades.

The Lucky VI Quarry (M-2016-015), operated by Ed Lyons, is a 9.5-acre 110 permit adjoining and partially overlapping the proposed 112c expansion of the Black Obsidian Pit. Approximately 3.16 acres of the Lucky VI Quarry permit lies within the proposed Black Obsidian expansion area, along the southeastern boundary. Please refer to the maps in Exhibit C showing the boundary locations. Colorado Quarries wishes to include this 3.16-acre overlap area in its 112c expansion to include the shallow obsidian deposit which is not a desired commodity for the present operator of the Lucky VI Quarry permit. Colorado Quarries has been in discussion with Mr. Lyons, with the intention of including the 3.16-acre area in the 112c permit through a release request of the Sharp Lode portion. This partial release request will be filed separately in the near future so that it can be approved and effective upon the approval of the 112c expansion.

This 112c permit conversion application is preceded by an approval given by the BLM Royal Gorge Field Office, for the expansion of the obsidian quarry operation onto the specific areas included in this conversion. That approval by BLM includes the legal right-of-entry given to Colorado Quarries for those lands and minerals.

6.4.4 (a)

The operator has mined this site intermittently since the issuance of the DRMS permit in 1987. The operation includes a surface extraction area, a below-grade quarry floor, a level staging area and product stockpile pad, topsoil stockpile areas, stormwater controls, and an access road. The current mined area within the existing permit boundary is small and has room to grow by several more acres.

The site is kept secure by a locked and gated entrance. The areas above the highwall will contain signage and/or physical barriers to deter accidental falls, conforming to MSHA requirements.

Under the 112c permit, nearly the entire affected area will be disturbed by various mining activities. Some areas will be disturbed during initial years of the mining stage (such as topsoil and overburden stockpiling), and other areas will be disturbed later through active obsidian mining.

After all stripping and shaping of the overburden slopes above the planned new highwall margin has occurred, and the expanded staging and stockpile areas are built, development of the expanded quarry itself will begin. The site will be mined in benches. Benches will be mined at a 3H:1V overall slope (30-feet wide; 10-feet tall highwall) such that the highwall at any given time and in any location does not exceed 10-feet in height. The resultant bench will be 30-feet wide and capable of accommodating any rockfall from the highwall. This will be the permanent bench configuration. Rockfall will be mitigated by proper blasting techniques, extensive scaling, and the development and implementation of active area safety zones. Each bench will be mined via drill and blast and in accordance with the attached blast plan.

Drilling and blasting will break the obsidian to allow extraction of the upper highwall deposit while creating the upper bench. Mined materials will be pushed off the bench down to the pit floor or carried via loader to the processing area. Upon reaching the areal limits of the topmost bench and highwall level of extraction, the operator will begin the next level. Bench levels will be approximately 10 feet apart in elevation. Production will proceed with the blasting and removal of the obsidian back to the next highwall limit, leaving a bench approximately 30 feet wide (sufficient for small-medium equipment to safely operate). Broken rock will again be pushed down to the pit floor for processing.

Due to the ultimate size of the expanded pit floor and the need to backfill a significant depth in the pit for reclamation, the operator intends to develop the quarry in three segments, or approximate "thirds", as indicated by the three "direction of mining" arrows shown on the Exhibit C mining map. This means that, for example, the benches and walls in the southeast third may be fully developed, and the southeast pit floor will receive its full depth of backfilled overburden, before the mining in the center third of the new quarry begins. As each one-third segment is completed, the operator will move to the next segment, and begin developing the next new segment. This will facilitate easier backfilling, reducing mining disturbance, yet allow full use of the operations pad at the mouth of the pit.

6.4.4 (b)

Earth moving activities consist of stripping and stockpiling topsoil for later use in reclamation, stripping the overburden for reclamation stockpiling down to the top of the obsidian deposit, drilling and blasting the obsidian, and moving and stockpiling the product for offsite sale and use. Initial topsoil and overburden stripping will expose the underlying obsidian and the margins of each stripped area will be maintained at a 3H:1V or shallower slope.

The paired nature of the obsidian rock with efficient mining practices results in minimal waste or reject material produced during the mining and handling of the obsidian. Overburden is stockpiled for use in reclamation and to maintain sitewide stormwater controls in the northeast extent of the site. Topsoil stockpiles will be located in the northwestern most extent of the site. When overburden and topsoil are separately stockpiled for longer than 180 days, each stockpile is shaped, topsoiled, and seeded to minimize erosion. Where possible, reclamation occurs concurrently with mining to utilize recently stripped overburden and topsoil efficiently and with minimal handling.

Equipment used on the site includes the following: bulldozer, wheeled loader, tracked drill, haul truck, portable crusher, and portable conveyor/stacker. All explosives, fuel, lubricants, and other materials used onsite are either delivered for use that day or stored properly in clearly identified areas segregated from other site activities, secured, and with sufficient secondary containment as needed.

The pit will be reclaimed to drain freely by backfilling the stockpiled overburden into the final pit up to an elevation of ~7880 feet. If the operations pad is higher than the backfilled pit floor, a drainage channel will be cut into the operations pad so that there is no long-term impoundment of water. Please refer to Exhibit E – Reclamation Plans for additional final reclamation details.

6.4.4 (c)

The operator will install and maintain adequate stormwater controls for all affected areas of the site, including the quarry and operations pad areas, roadways, above-quarry slopes, topsoil stockpiles, and overburden cell. These controls may include earthen dams, culverts, ditches or diversions, and wattles or silt fence, as appropriate.

Stormwater from outside the site will not be allowed to enter via sitewide perimeter stormwater controls (e.g., ditches and small berms). Stormwater that falls within the permit boundary will be directed via stormwater control structures and the pit will be pumped and dewatered, as needed, to the sediment pond near the site entrance. No sediment laden water will be allowed to discharge from the site. Discharge from the sediment pond will be via an approved discharge permit.

Dewatering will typically be carried out only prior to and during normal scheduled operations, which presently is seasonal and depending on demand. At most, pumping may only be necessary once a month, and would involve removing up to 50,000 gallons each time. Pumps move approximately 100 gallons per minute, which takes one day to empty the sump in the pit. Water is discharged into the stormwater pond downslope (southwest) from the pit near the site entrance. At this rate and volume, there is no sediment transport and the pond is not likely to be overtopped.

In the event that discharge is necessary, stormwater will leave the site in accordance with the approved CDPHE discharge permit. Please refer to Exhibit G – Water Information for additional water related topics.

Following the completion of all mining activities, the pit will be reclaimed to be free-draining. The operations pad at the mouth of the pit will be higher than the pit floor, so a drainage trench will be excavated to allow the pit to drain. Please refer to details in Exhibit E and F.

6.4.4 (d)

The maximum area to be disturbed at any given time is detailed in Exhibit L – Reclamation Costs. It is anticipated that at any given time the processing and operations areas, stockpiling locations, active mining segment, stripping of advance segment, and reclamation of the previous segment may occur simultaneously. Therefore, the full 45.3 acres of the site may be considered as affected area during any given time.

6.4.4 (e) (i)

Year 1

- Strip topsoil from all areas of activity, windrow or place into stockpiles, and seed it.
- Strip overburden from area above pit expansion, place in stockpiles or use to construct SWMP structures, pad areas, roadways, as needed.

- Concurrent reclamation where possible: seed disturbed areas that will not be redisturbed.

Year 2-20

- Active mining, including processing, stockpiling, and export of material. Pit highwalls and benches will be mined, pit floor will be backfilled at proper times of mining stages.

Year 21-25

- Reclamation. Removal of stockpiled product, removal of equipment, cleanup of site, pit backfill, replacement of overburden, pad and roadway grading/ripping, replacement of topsoil, revegetation seeding.

6.4.4 (e) (ii)

The site is not mined in phases.

6.4.4 (e) (iii)

The site not mined in phases.

6.4.4 (f) (i)

The obsidian deposit has a known extent much larger than the currently operated 110 permit and extends to a depth >100-feet below the undisturbed ground surface.

Overburden thickness ranges from zero feet (i.e., obsidian visible in surface outcrops) to approximately 40 feet deep (as determined through mining and exploratory drilling) with an average thickness of 18 feet deep. An estimated total of ~360,000 CY of overburden will be stripped and reused over the mine's life.

Topsoil thickness ranges from 3-6 inches and will be reapplied during reclamation at the same 3-6 inch depth.

6.4.4 (f) (ii)

In many places the known vertical thickness of the obsidian deposit is greater than 100 feet.

6.4.4 (g)

Obsidian – whether processed or in boulder form – is the only product that is mined and exported from the site.

6.4.4 (h)

N/A

6.4.4 (i)

Explosives will be used on site. Please refer to the Blast Plan for further details on blasting.

A storage or transfer area for fuel and lube will be designated either on the operations pad or the processing pad area. It is expected that most fluids will be delivered to the site on the day that it is needed, without the need for a storage area. Regardless, this designated area will include berms, liners and secondary containment structures.

6.4.4 (j)

Stripped overburden will be used to construct the initial expanded processing area and onsite roadways, as needed. Overburden will also be used to maintain stormwater controls in the form of earthen berms along roadways and surrounding the affected area.

LEGEND

GENERAL

- DRMS Permit Boundary
- Property Lines
- Mine Road/Existing Road
- Sediment Control Structures
- Ephemeral Drainages
- Ephemeral Pond
- Drainage Direction

BASELINE CONTOURS

- Index — Approximate of indefinite — 5280'
- Intermediate — Approximate of indefinite — 5281'
- Supplementary — 5281'

PERMIT AND AFFECTED AREA:
45.3 ACRES

HIGHWALL CREST
FROM CURRENT BOTTOM
AT 3H:1V OVERALL SLOPE
SEE DETAIL 1 FOR BENCH CONFIGURATION

OVERBURDEN
STOCKPILE ZONE

TOPSOIL
STOCKPILE AREA

PROCESSING
PAD

SEGMENT 3

MINING DIRECTION

PIT BOTTOM
~7880-7900'

MINING DIRECTION

SEGMENT 1

OPS PAD

SEGMENT 2

SEDIMENT POND
(DISCHARGE VIA APPROVED
POINT)

MINING DIRECTION

EXPLOSIVES
STORAGE

DETAIL 1 - PERMANENT BENCH CONFIGURATION

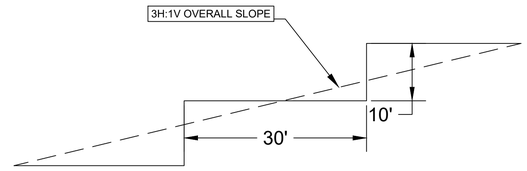

Exhibit C - Mining Plan Map

Black Obsidian Pit

DRMS Permit Number: M-1987-026 — **Colorado Quarries**

Mine Entry Location:	Latitude: 38.14394	Longitude: -105.445134	
State: CO	County: Custer	Nearest Town: Westcliffe	
Section: 16	Township: 22S	Range: 72W	PM: 6th
Major Watershed:	Grape Creek	MSHA ID: N/A	

Map Scale: 1": 100

0 — 100 — 200

N

Map Georeferencing Information: **Datum: NAD83** **Projection: CO SOUTH**

Survey Source: Drone	**Drawn by:** BEL	Date: 10/11/22
Imagery Source: Drone & Google	**Checked by:** MKT	Date: 10/25/22
Survey Date: 09/25/22	**Approved by:** BEL	Date: 10/25/22
Imagery Date: 2022 & 2019		

File Name: Black Obsidian Pit 221024

Lewicki & Associates

3375 West Powers Circle
Littleton, CO USA 80123
(303)-346-5196
info@lewicki.biz

COLORADO LICENSED
BENJAMIN E. LAWSON
47151
10/25/22
PROFESSIONAL ENGINEER

LEGEND

GENERAL

- DRMS Permit Boundary
- Property Lines
- Drainage Direction
- Existing Road
- Ephemeral Drainages
- Reclaimed Vegetation

BASELINE CONTOURS

- Index — 5280'
- Approximate of indefinite
- Intermediate — 5281'
- Approximate of indefinite
- Supplementary — 5281'

PERMIT AND AFFECTED AREA:
45.3 ACRES

HIGHWALL CREST
FROM CURRENT BOTTOM
AT 3H:1V OVERALL SLOPE
SEE DETAIL 1 FOR BENCH CONFIGURATION

RECLAIMED SLOPE DRAINS FREELY TO THE SOUTH

ALL DISTURBED AREAS
RECLAIMED TO RANGELAND

QUARRY BOTTOM
BACKFILLED TO DRAIN TO SOUTH
WITH OVERBURDEN FROM STOCKPILE

DRAINAGE SWALE CUT TO ENSURE POSITIVE DRAINAGE
13-FT DEEP 3H:1V SIDESLOPES.

DETAIL 1 - PERMANENT BENCH CONFIGURATION

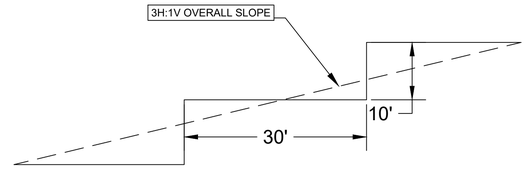

Exhibit F - Reclamation Map

Black Obsidian Pit

DRMS Permit Number: M-1987-026 — **Colorado Quarries**

Mine Entry Location:	Latitude: 38.14394	Longitude: -105.445134
State: CO	County: Custer	Nearest Town: Westcliffe
Section: 16	Township: 22S	Range: 72W PM: 6th
Major Watershed:	Grape Creek	MSHA ID: N/A

Map Scale: 1": 100

0 — 100 — 200

Map Georeferencing Information: **Datum: NAD83** **Projection: CO SOUTH**

Survey Source: Drone
Imagery Source: Drone & Google
Survey Date: 09/25/22
Imagery Date: 2022 & 2019

Drawn by: BEL — Date: 10/11/22
Checked by: MKT — Date: 10/25/22
Approved by: BEL — Date: 10/25/22

File Name: Black Obsidian Pit 221024

COLORADO LICENSED — MATTHEW T. LEWICKI — 47151 — 10/25/22 — PROFESSIONAL ENGINEER

Lewicki & Associates
3375 West Powers Circle
Littleton, CO USA 80123
(303)-346-5196
info@lewicki.biz