ROCKY MOUNTAIN RESOURCES

July 10, 2019

Mid-Continent Limestone Quarry Plan of Operations Modification

Case File: COC-074205

PREPARED FOR:

BUREAU OF LAND MANAGEMENT- COLORADO
RIVER VALLEY FIELD OFFICE

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INTRODUCTION EXHIBIT 1

RMR Industrials, Inc., DBA Rocky Mountain Resources (RMR), through its subsidiary RMR Aggregates, Inc., is the owner and operator of the Mid-Continent Limestone Quarry located approximately 1.4 miles north-northeast of Glenwood Springs, Colorado in the southeast quarter of Section 36 of Township 5 South, Range 88 West. The quarry is located on land owned by the Bureau of Land Management (BLM) between Cascade and Oasis Creek. RMR has operated the quarry since its acquisition in October of 2016 and plans to expand quarry operations within its northern mining claims to quarry out the entirety of the limestone and dolomitic limestone deposit that can be economically extracted. This Plan of Operations modification proposes to add new ground to the quarry and expand operations in terms of both total size and production.

1. History

The Mid-Continent Quarry was first permitted with the BLM, Colorado Division of Reclamation, Mining, and Safety (CO DRMS) (Permit no. M-1982-121), and Garfield County (Resolution No. 82-222) by Mid-Continent Resources, Inc. in 1982 and 1983.

The following provides a history of federal, state, and local permitting at the quarry.

1982-1990

- On August 18, 1982, the BLM approved the Plan of Operations with certain stipulations, including that no quarrying was allowed from December 15 to April 15 each year. The approval also stated that hauling of quarry material could continue year-round but required the construction and maintenance of three roads: the main haul road extension (lower road), the parking access road (middle road), and the initial development road (upper road). The approval stated that the bond required by the CO DRMS would satisfy BLM bonding requirement.
- On August 23, 1982, Garfield County adopted Resolution 82-222, which authorized Mid-Continent, Inc. to extract and process limestone from a 16.30-acre site. The Resolution was incorporated into a County Permit dated May 16, 1983.

- The CO DRMS issued permit M-1982-121 on April 25, 1983, authorizing operations on 10.6 acres. The permit requires the filing of an annual report, employment of procedures to minimize environmental disturbance from operations, reclamation to the "beneficial use of such lands," and the right of the State to enter and reclaim lands under certain circumstances.
- In August 1985, the BLM issued a Right of Way ("ROW") Grant for an access road 35 feet wide, 12,000 feet long, and containing 9.65 acres.
- On August 23, 1989, CO DRMS approved a permit modification effectively increasing the size of the quarry area by 5.1 acres to 15.7 acres. On July 21, 1989, a Plan of Operations modification was submitted to BLM.
- The Quarry temporarily ceased operations in 1990 due to the closure of its coal mining customers in Redstone, Colorado, and the closure of the limestone milling operation in Carbondale, Colorado.

1991-2010

- On June 2, 1992, the CO DRMS approved Technical Revision 1, which added uphill stormwater diversion structure to route water away from Quarry.
- In 1992, the CO DRMS approved Amendment 2 to the permit expanding the permit area from 23 to 34.4 acres. The amendment extended the permit boundary to include an area affected by a crusher fines washout from the lower bench of the quarry. The Reclamation Plan was also amended to describe plan for reclamation of area affected by crusher fines wash-out during fall of 1992.
- On January 10, 1996, BLM issued an Environmental Assessment for the modification of the restriction prohibiting use of motor vehicles except for snowmobiles from December 1 to April 10 beyond an existing gate about two miles up the road.
- In 2008, the CO DRMS issued Technical Revision 2 expanding the weed management plan to apply to Russian Olive and Tamarisk.
- In 2009, the CO DRMS issued Technical Revision 3 adding a rock dust mill to the approved processing operations.

- In 2009, the quarry was acquired by CalX Minerals, LLC ("CalX"). On June 15, 2009, the BLM issued a letter allowing CalX to operate at Mid-Continent Quarry provided that operations would be subject to the stipulations in the 1982 EA and 1982 BLM approval letter.
- On January 4, 2010, Garfield County issued Resolution 2009-97, amending the special use permit.
- In a November 23, 2010 email, the BLM authorized road maintenance activities, including providing 35 feet of total road width within an approximately 150-foot-long segment located between two sharp switchbacks.

2011-2015

- In a March 29, 2011 email, the BLM authorized the temporary removal of the lower gate on Transfer Trail Road for the summer.
- On November 19, 2015, CO DRMS issued a Notice of Surety Increase updating the reclamation cost estimate to $172,376, which was an increase of $49,583.
- On December 18, 2015, the BLM Issued a letter approving CalX's request for exception to the big game winter range timing limitation stipulation to allow for one additional blast during the month of December.

2016-present

- CalX operated the Quarry continuously until October 2016, when it was purchased by RMR Aggregates, Inc. ("RMR"). On October 26, 2016, the BLM issued a letter approving the change of operator at the Quarry from CalX to RMR.
- RMR submitted a letter to the BLM on October 28, 2016 noting that the previous owner operated approximately 50-75 feet outside the current CO DRMS permit boundary. RMR committed to keeping operations out of this area. It also stated that RMR intended to conduct a permit overhaul.
- On December 15, 2016, RMR submitted a request to the BLM for an exception to the winter timing limitation.
- On January 12, 2017, BLM accepted RMR's replacement bond for the Quarry.

- The CO DRMS issued a letter to RMR on January 12, 2017, stating that RMR is now the permitted operator of the Quarry and is responsible for all provisions in the mining permit.
- The CO DRMS issued a letter to RMR on January 17, 2017 stating that RMR shall submit a letter stating that no further disturbance will occur in the area outside approved permit boundaries prior to obtaining BLM and CO DRMS amendments to expand the boundary. RMR issued a letter to the CO DRMS on February 16, 2017, committing to this condition.
- The CO DRMS issued an Inspection Report on November 9, 2017, stating that the mine operations are in full compliance with CO DRMS rules. As the first inspection report since RMR acquired the Quarry, the letter states that RMR is working with the BLM to submit a new plan of operations. The inspection report also states that RMR must delineate and provide updated maps to remedy the fact that markers along the north and east side are inadequate.
- On December 13, 2017, the BLM approved RMR's request for an exception to the big game winter range timing limitation stipulation for the 2017-18 season, allowing quarrying activities, including crushing and screening, between December 15 and April 15.
- On January 5, 2018, the CO DRMS issued a letter accepting RMR's proposed solutions of: 1) recreating the survey points for the 38-acre permit boundary to include the 0.287 acre area that was previously out of bounds; 2) adjusting the recorded area of the AM-2 boundary to 38 acres to include the .287 acre area; and 3) surveying and installing visible boundary markets in the field for the accepted 38-acre permit boundary.
- On March 8, 2018, the CO DRMS issued an approval letter modifying the permit acreage and total lands to 38 acres.
- On March 26, 2018, RMR sought authorization for for mineral material exploration, sampling and testing to gain a better understanding of the dolomite deposit located beneath the limestone deposit at the Mid-Continent Quarry. The request for mineral material exploration identified three drilling areas within existing surface disturbed areas

for up to 15 holes. The BLM published a Categorical Exclusion regarding RMR's request on October 12, 2018 and granted RMR's request on October 15, 2018.

- RMR submitted requests to the CO DRMS on June 8, 2018, June 27, 2018, and August 30, 2018, for exploratory drilling, sampling, and testing. On July 5, 2018, and August 31, 2018, the CO DRMS approved the requests for up to 15 holes to be completed in 2018. The CO DRMS requested additional bonding in the amount of $25,900. The total revised reclamation cost estimate is $222,081.28. The CO DRMS accepted a financial warranty surety increase from RMR to $222,081.28 on August 13, 2018.
- On December 3, 2018, the BLM approved RMR's request for an exception to the big game winter range timing limitation stipulation for the 2018-19 season.

2. Current Operations

The current Mid-Continent Quarry operation produces roughly 40,000-60,000 tons of limestone products per year. The quarry operates on a series of limestone benches within the permit area and uses a sequential process of drilling, blasting, crushing, screening, and milling to prepare the limestone products for market. The quarry utilizes a wide range of equipment in its daily operations, including heavy mobile equipment (bulldozer, front-end loader, excavator, road grader), semi-mobile equipment (crusher, screener, conveyors), and fixed/permanent equipment (mill, bagging line, mill building, product silos, truck scale, office). Products from the quarry are transported from the quarry by truck via Transfer Trail. Typical quarrying operations occur M-F between the hours of 7am – 5pm and product hauling occurs Sun-Sat between the hours of 7am-5pm.

2.1 Permit Items Acquired from Previous Operator

When RMR acquired the Mid-Continent quarry, there were several BLM permit-related items in need of addressing. These items pre-dated RMR's ownership and operation of the quarry and were discussed with the BLM prior to and during the sale of the asset from CalX Minerals to RMR. As a part of RMR's acquisition of the operation, RMR agreed to remedy the items in a modified plan of operations which would also include a request for expansion. The items were formally discussed in conversations between RMR and members of the BLM Colorado River Valley Field Office during plan modification and expansion meetings.

In a letter provided to RMR, the BLM listed 12 specific items to address in a Plan of Operations modification. Some of these items are current compliance matters that need to be addressed; others are guidance for the construction of this modification. The 12 items have been separated into those two categories for clarity.

2.1.1 Compliance Items

1. *Provide consistency with DRMS Permit M-1982-121*
    a. *The content of the following DRMS Permit Amendment has not been approved by BLM:*
        i. *AM-2 (1992): 11.4 acre increase in permit area (total permit area 34.3, include crusher fines washout area*
            1. *BLM-CRVFO has currently authorized a 15.7 acre permit boundary area, per 1982 Plan of Operations and 1989 modification/amendment.*
    b. *The content of the following Technical Revisions have not been approved by BLM:*
        i. *TR-1 (1992)*
            1. *Diversion of upland flow*
        ii. *TR-2 (2008)*
            1. *Revise weed management plan to include Russian Olive and "Tamgrisl"*

RMR Response:

Item 1a: This Plan of Operations modification proposes the expansion of the BLM permit boundary from 15.7 acres to 447 acres. The 447-acre area will fully encompass the existing 38-acre permit boundary approved by the CO DRMS on March 8, 2018. Upon approval of the BLM Plan of Operations modification, RMR will submit an amendment request to the CO DRMS to align the CO DRMS permit area with the new BLM permit area.

Item 1b: TR-01 was approved by the DRMS in 1992, but the associated upland diversion structure was never installed. It is not anticipated to be implemented as originally planned since the operational changes in the proposed modification will replace the upland diversion. Other features will be used to manage stormwater. Those features are detailed in this plan. The CO DRMS permit will be revised via an amendment containing all the components of the approved Plan of Operations modification at the appropriate time. This will ensure that both regulatory documents are in-sync.

Weed management plans for the proposed Plan of Operations modification include Russian Olive and Tamarisk (i.e. "Tamgrisl"). Both weeds are on the Colorado Dept. of Agriculture's List B of noxious species. Details can be found in Exhibit E.

2. *Revise Mine Plan to accurate reflect mining methods*
    a. *Current highwall configuration is not in compliance with 1982 approved Plan of Operations or 1989 Plan of Operations modification.*
        i. *1982 Plan of Operations (Exhibit D, Section 4. Blasting Plan) states: "Limestone is quarried by developing benches in the solid rock with the bench width being at least twice the height of the high wall."*
        ii. *1989 approved Plan Amendment 1: "Only one quarry bench will be worked at a time. Bench widths will not exceed 60 feet and the length of the portion being quarried will be approximately 300 feet."*
    b. *Any highwall increase/expansion proposals must include visual impact mitigations.*

RMR Response:

Item 7a: The 60-foot maximum working bench width mentioned in the 1989 amendment paired with the 1982 plan requirement of the bench width being at least twice the height of the highwall yields a maximum allowable bench/highwall height of 30 feet. RMR discusses highwall height and bench configuration for the proposed expanded operations in Exhibit 5 of this document and lists the use of 25-foot tall operational benches. RMR is requesting the 30-foot maximum bench/highwall height be kept in place for all parts of the operation. RMR plans the continued use of 30-foot benches in the currently disturbed area around its mill facility. The highwalls existing in the currently disturbed area will ultimately be removed and replaced by 25-foot highwalls as the proposed expanded mining operations progress through the area.

RMR requests the stipulation, set forth in the 1989 approved Plan Amendment 1, of one bench being worked at a time with a maximum working area of 60 feet by approximately 300 feet be removed from the Mid-Continent Plan of Operations. As mentioned in Exhibit 5, RMR will typically remove material from one bench at a time but will have the need to quarry multiple benches during transition periods between benches. When multiple benches exist, a catch bench of at least 15 feet in width will be used to create a break between the bench highwalls. The size of the working area in which RMR will conduct its operations will vary in size and location depending upon mining conditions and the natural shape of the formation. Mining operations and

the working area of each bench in the expanded quarry area will be configured and scheduled to minimize visual impact and utilize the cover of the natural visual barrier described in Exhibit 5. The mining operations in the existing quarry area will be designed to utilize the 30-foot highwall limit and will be designed to efficiently employ blasting and extraction resources while continuing to keep disturbance to the surrounding area low.

Item 7b: Visual impact mitigations relating to the proposed expansion of the mining area are discussed in Exhibit 5 and Exhibit 6 of this document. Mining and reclamation plans have been tailored to minimize and mitigate visual impacts.

3. *Reclamation Plan updates*
    a. *RMR must include updated topsoil storage plan.*
        i. *§3809.401 (3) (vi): As noted in multiple inspection reports, the mill bench topsoil storage pile is not graded to the authorized slope.*
            1. *The stipulations included in BLM's approval of Amendment 1, dated July 21, 1989: "The stored topsoil will be graded to a slope of approximately 4:1 to prevent erosion and to facilitate seeding and establishment of grasses."*
            2. *The topsoil stockpile is currently at 2:1 slope.*
    b. *RMR must address visual impacts during reclamation.*
    c. *Include information as to how the eastern highwall, area of MSHA concern, will be mitigated throughout life of mine.*

RMR Response:

Item 9a: RMR has detailed its plans for topsoil handling and storage in Exhibit 5 of this document. The topsoil stockpile currently existing on the mill level, with a slope dimension of 2:1, will either be moved to another location in the expanded operation or to another location on the mill level and regraded to a slope of 4:1. The graded slopes will then be planted with a BLM-approved seed mix to prevent erosion and preserve the integrity of the topsoil.

Item 9b: The reclamation plan in Exhibit 6 has been designed to minimize visual impacts.

Item 9c: The eastern highwall will ultimately be mined out to a slope of 2:1 or shallower as part of the proposed expansion plans in this Plan of Operations modification. Prior to that point, the section of the existing eastern highwall in concern will continue to be visually inspected each day for change and the area under it will be blocked from access using berms or other barriers.

4. *Stormwater Management Plan*
    a. *§3809.401 (b) (2) (iii): Where do I file my plan of operations and what information must I include with it? Water management plans;*
    b. *§3809.401 (b) (4): Monitoring Plan. A proposed plan for monitoring the effect of your operations. You must design monitoring plans to meet the following objectives: To demonstrate compliance with the approved plan of operations and other Federal or State environmental laws and regulations, to provide early detection of potential problems, and to supply information that will assist in directing corrective actions should they become necessary. Where applicable, you must include in monitoring plans details on type and location of monitoring devices, sampling parameters and frequency, analytical methods, reporting procedures, and procedures to respond to adverse monitoring results. Monitoring plans may incorporate existing State or other Federal monitoring requirements to avoid duplication. Examples of monitoring programs which may be necessary include surface- and ground-water quality and quantity, air quality, revegetation, stability, noise levels, and wildlife mortality…*
    c. *§3809.411 (a) (3) (ix): What action will BLM take when it receives my plan of operations? BLM completes consultation with the State to ensure your operations will be consistent with State water quality requirements.*
    d. *§3809.420(b)(5): "all operators shall comply with applicable Federal and state water quality standards, including the Federal Water Pollution Control Act, as amended (30 U.S.C. 1151 et seq.)."*
    e. *The 2015 Colorado River Valley Field Office Resource Management Plan, Appendix K – Best Management Practices (BMPs) and Conservation Measures states: "MIN-17: Before activities take place, every pad, access road, or facility site will have an approved surface drainage plan (storm water management plan) for establishing positive management of surface water drainage, to reduce erosion and sediment transport. The drainage plan will include adaptive BMPs, monitoring, maintenance and reporting. BMPs may include run-on/run-off controls such as surface pocking or revegetation, ditches or berms, basins, and other control methods to reduce erosion. Pre-construction drainage BMPs will be installed as appropriate."*
        i. *BMP MIN-24: "As detailed in the site plan for surface/storm water management, drainage from disturbed areas will be confined or directed to minimize erosion, particularly within 100 feet of all drainages. No runoff, including that from roads, will be allowed to flow into intermittent or perennial waterways without first passing through sediment-trapping mechanisms such as vegetation, anchored bales or catchments."*

RMR Response:

Item 4a-e: The Stormwater Management Plan included in this Plan of Operations modification addresses all the stormwater control systems for the quarry. Stormwater controls and systems for Transfer Trail are described and shown in Appendix 2. All quarry activities will operation in

compliance with Federal and state water quality standards. Details of the surface water monitoring plan can be found in Exhibit 18.

5. *43 CFR 3715 compliance: Use and Occupancy authorization*
    a. *Per 43 CFR 3715.0-1 (a), BLM will "manage the use and occupancy of the public lands for the development of locatable mineral deposits by limiting such use or occupancy to that which is reasonably incident".*
    b. *§3715.3: Before beginning occupancy, you must consult with BLM about the requirements of this subpart.*
        i. *§3715.3, Table 2: "If you are proposing a use that would involve occupancy under a plan of operations or a modification submitted under 43 CFR part 3800, subpart 3802, or subpart 3809", then "you must include in the proposed plan of operations the materials required by §3715.3-2 describing any proposed occupancy for BLM review concurrently with review of the plan of operation."*
    c. *The gate, scale shack, and scales were approved under 43 CFR 3809 on November 20, 1986*
    d. *Gate and sign granted occupancy authorization January 9, 2017*
    e. *Mill facility approved under 43 CFR 3809 on June 15, 2009 does not have 43 CFR 3715 occupancy authorization.*

RMR Response:

Items 10a-e: This Plan of Operations modification addresses occupancy in Exhibit 7. As a part of this plan modification, RMR is requesting occupancy authorization for the mill facility approved under 43 CFR 3809 on June 15, 2009. The mill facility meets all the requirements listed in 43 CFR 3715.2, and 43 CFR 3715.2-1, parts (b) and (c) for occupancy.

2.1.2 Plan of Operations Modification Guidance

6. *Access Route Use and Maintenance Plan*
    a. *§3809.420 (b) (1): When commercial hauling is involved and the use of an existing road is required, the authorized officer may require the operator to make appropriate arrangements for use and maintenance.*
    b. *Improvements to Transfer Trail may include widening, adding retaining walls, and adding drainage improvements.*
    c. *Include Transfer Trail Winter Maintenance Plan.*
        i. *Accommodate existing snowmobile recreation on Transfer Trail*

RMR Response:

Item 2a: RMR has developed an access and use maintenance plan for the proposes commercial hauling on Transfer Trail. This can be found in Exhibit 18 of this document.

Item 2b: RMR is proposing significant improvements to Transfer Trail, including widening, improving sight distances, reducing steep grades, adding drainage improvements, and potentially adding retaining walls. The proposed Transfer Trail improvements are detailed in the writeup and the figures in Appendix 2.

Item 2c: RMR has included a Winter Maintenance Plan in Exhibit 18 of this document. The plan includes the accommodation of winter recreational traffic.

7. *Fugitive Dust Monitoring Plan*
    a. *§3809.401 (b) (4): Monitoring Plan. A proposed plan for monitoring the effect of your operations. You must design monitoring plans to meet the following objectives: To demonstrate compliance with the approved plan of operations and other Federal or State environmental laws and regulations, to provide early detection of potential problems, and to supply information that will assist in directing corrective actions should they become necessary. Where applicable, you must include in monitoring plans details on type and location of monitoring devices, sampling parameters and frequency, analytical methods, reporting procedures, and procedures to respond to adverse monitoring results. Monitoring plans may incorporate existing State or other Federal monitoring requirements to avoid duplication. Examples of monitoring programs which may be necessary include surface- and ground-water quality and quantity, air quality, revegetation, stability, noise levels, and wildlife mortality…*
    b. *Include in the Plan modification a description of when and how often access routes will be treated with dust suppressants. Describe dust suppression activities.*

RMR Response:

Item 3a: Monitoring plans, including fugitive dust monitoring, can be found in Exhibit 16 of this Plan of Operations modification.

Item 3b: Details on dust control for access routes, Transfer Trail, can be found in Exhibit 18.

8. *Seismic and Noise Baseline Data and Monitoring Plan(s)*
    a. *§3809.401 (b) (1): Operational and baseline environmental information for BLM to analyze potential environmental impacts as required by the National Environmental Policy Act and to determine if your plan of operations will prevent unnecessary or undue degradation.*
    b. *§3809.401 (b) (4): Monitoring Plan. A proposed plan for monitoring the effect of your operations. You must design monitoring plans to meet the following objectives: To demonstrate compliance with the approved plan of operations and other Federal or State environmental laws and regulations, to provide early detection of potential problems, and to supply information that will assist in directing corrective actions should they become necessary. Where applicable, you must include in monitoring plans details on type and location of monitoring devices, sampling parameters and frequency, analytical methods, reporting procedures, and procedures to respond to adverse monitoring results. Monitoring plans may incorporate existing State or other Federal monitoring requirements to avoid duplication. Examples of monitoring programs which may be necessary include surface- and ground-water quality and quantity, air quality, revegetation, stability, noise levels, and wildlife mortality…*

RMR Response:

Item 5a: The applicant will provide BLM with all information necessary to analyze potential environmental impacts as required by the National Environmental Policy Act, including seismic and noise baseline data.

RMR Response: Noise and seismic monitoring plans can be found in Exhibit 16 of this Plan of Operations modification.

9. *Address 1982 Plan of Operations winter timing limitations*
    a. *If RMR intends to blast during winter months, request removal of timing limitations.*

RMR Response:

Item 6a: RMR is requesting the removal of the winter timing limitations as a part of its Plan of Operations modification. RMR intends to operate year-round under its plan modification and expansion request. Year-round operations would include blasting, equipment operation, crushing and screening of material, material transport, and equipment maintenance among other activities. Operations in the winter months would be the same as those in the non-winter months.

10. Request any additional utilities, including natural gas line

a. §3809.401 (b) (2) (viii): Plans for all access roads, water supply pipelines, and power or utility services;

RMR Response:

Item 8a: Plans for all access roads, water supply pipelines, and utilities are included in Exhibit 5 and Appendix 2 of this document.

11. Include products/end use of Leadville Limestone in Plan of Operations

a. §3830.12 (d): Limestone of chemical or metallurgical grade, or that is suitable for making cement, is subject to location under the mining laws.

b. §3809.101, Special provisions apply to minerals that may be common variety minerals.

RMR Response:

Items 11a-b: Large portions of the Leadville Limestone formation at the Mid-Continent Quarry site are over 95% calcium carbonate. Limestone of this purity, also known as chemical limestone, is used for high end purposes such as rock dust for coal mines, cement manufacturing, acid-neutralization, household and commercial products manufacturing, glass manufacturing, animal feed, agriculture, and others. Table 1-1 shows a breakdown of the products chemical limestone is used for. This high-quality limestone is found in the upper 30-40% of the Leadville Limestone formation within the current and proposed quarry areas. RMR intends to use the limestone for the purposes listed in Table 1-1 and other uses as they arise and become economically viable.

The lower 60-70% of the Leadville Limestone formation at the quarry site is composed of dolomitic limestone. Dolomitic limestone has both metallurgical and common uses. RMR intends to use the dolomitic limestone for the purposes listed in Table 1-1 and other uses as they arise and become economically viable.

Table 1-1 – Limestone/Dolomite Products of the Mid-Continent Quarry

Chemical Limestone Products	Dolomitic Limestone Products
Rock dust	High-strength crushed aggregate[1]
Acid neutralization	Steel making
Cement component	Agricultural supplement
Industrial filler	Dimension stone
Fly ash replacement	
Dimension stone	
Steel making	
Glass manufacturing	
Water treatment	
Animal feed	
Agricultural supplement	
High-strength crushed aggregate[1]	

[1]For use in all construction materials products including, but not limited to, concrete, asphalt, road base, washed rock, and landscaping stone

12. *In order for BLM to conduct NEPA analysis, any processing or transportation facilities on private land must be summarized. BLM considers these activities connected actions and must be accounted for in EPA analysis. Because BLM will not be authorizing activities on private land, this information does not have to be provided within the Plan of Operations modification.*

RMR Response:

Item 12: Quarrying operations will take place entirely within the BLM claims owned by RMR. These operations include the mining and processing of material to prepare it for sale and transport. Processed material will be transported from the quarry, on trucks, using Transfer Trail and Traver Trail. The majority of the material will be transported to the Union Pacific rail yard in Glenwood Springs where it will be loaded directly into trains via a conveyor-based loading system. Once the trains are loaded, they will transport the material to various customers and unloading facilities within the region depending upon customer need, location, and volume requirements. Product may also be sold directly from the quarry and loaded, at the Glenwood Springs Union Pacific rail yard, onto trains commissioned by customers who also specialize in rail transport. Product not shipped on trains will be trucked from the quarry to customer locations.

3. Proposed Expansion and Modernization

RMR is proposing the Mid-Continent Limestone Quarry be allowed to expand to approximately 320 acres of quarrying activity within a 447-acre permit area on BLM claims north, east, west, and south of the current operation, as depicted on Map C-2. The expansion proposal includes updates to all parts of the operation including mining methods, transportation, reclamation, and monitoring plans.

RMR intends for this Plan of Operations to update and/or replace previous plans and modifications. Upon approval, the DRMS permit for the operation will be amended to match this Plan of Operations modification, thereby making the DRMS and BLM permits consistent with one another.

4. Permitting

In addition to the modified Plan of Operations, the Mid-Continent Limestone Quarry expansion and modernization will require an amendment to the CO DRMS Reclamation Permit, a new Colorado Department of Public Health and Environment (CDPHE) Air Pollution Control Division Fugitive Dust Permit, a new CDPHE Water Quality Control Division Stormwater Discharge Permit, and a Garfield County Land Use Change permit. Each of these additional permits will be pursued in parallel with the BLM Plan of Operations. The commitments and designs in the Plan of Operations will be reflected in all the appropriate permit applications.

The permittee legal entity is RMR Aggregates, Inc., (dba RMR).

PROPOSED SURFACE DISTURBANCE EXHIBIT 2

The majority of the proposed quarrying area is located between one and two miles north of Glenwood Springs, CO (see the General Location Map). Areas of proposed surface disturbance are shown on Map C-2. The proposed BLM permit area is 447 acres in size, while the anticipated disturbance within that area is roughly 320 acres. The quarry and all its associated disturbance are shown on Maps C-2 and F-1.

All quarry activity is located within mining claims controlled by Rocky Mountain Resources. All claims are on public land managed by the Bureau of Land Management. The resources being quarried are chemical limestone and dolomitic limestone.

1. Legal Description

Below is the legal description of the Plan of Operations area.

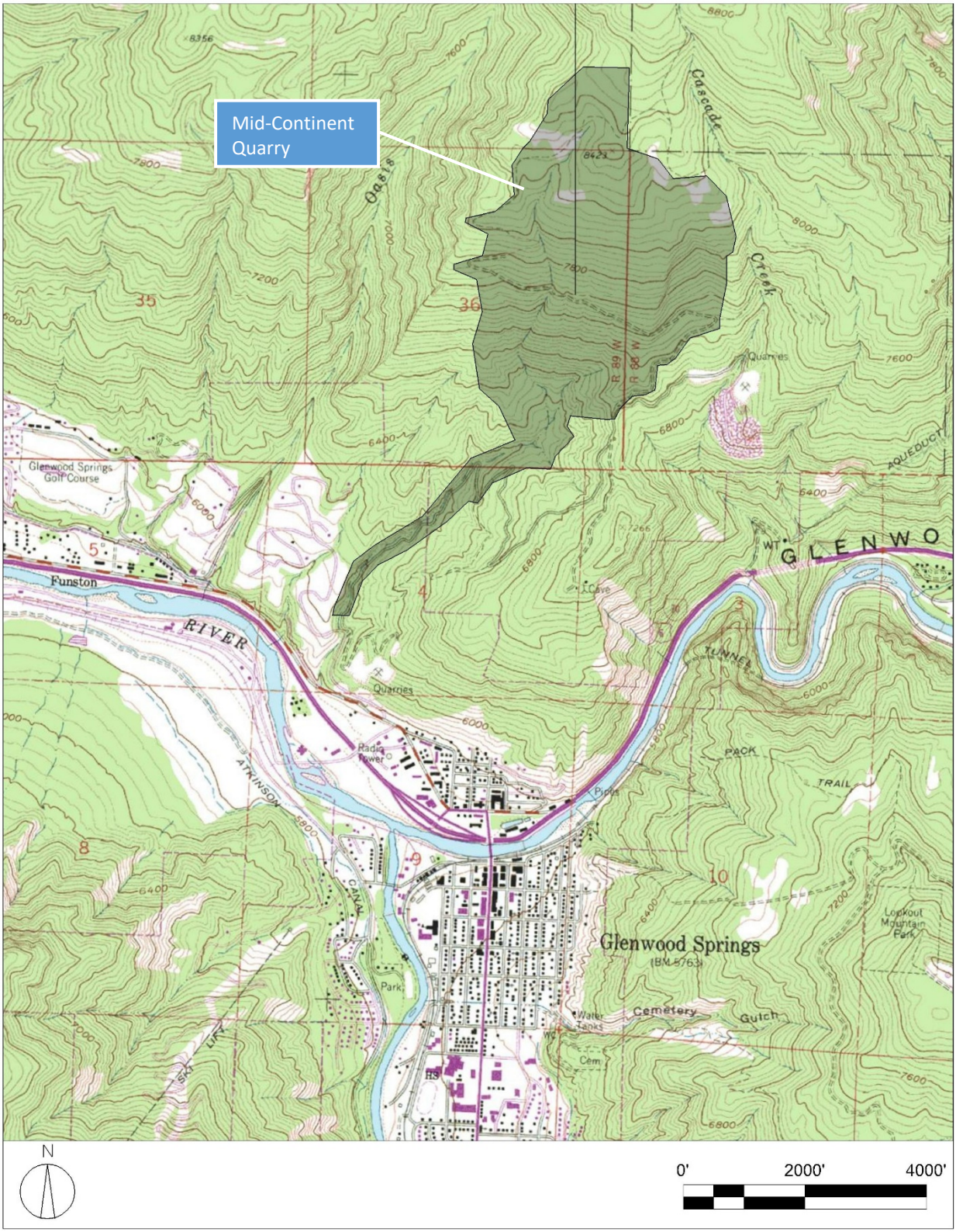
1.1 Quarry

Being located within Section 4, T6S, R89W; Sections 25 and 36, T5S, R89W; Sections 30 and 31, T5S, R88W; with the east section line of Section 36 having a basis of bearing of N 01°57'34" E;
N 86°41'39" W a distance of 1,076.7 ft from the southeast corner of Section 36, T5S, R89W, of the 6th PM;
to the point of beginning;
thence N 87°49'11" W a distance of 391.0 ft;
thence S 43°57'05" W a distance of 1035.7 ft;
thence N 89°52'09" W a distance of 332.0 ft;
thence S 62°02'24" W a distance of 289.1 ft;
thence S 54°40'36" W a distance of 802.7 ft;
thence S 62°53'34" W a distance of 548.4 ft;
thence S 44°20'37" W a distance of 357.8 ft;
thence S 21°05'04" W a distance of 616.4 ft;
thence N 88°27'10" W a distance of 270.0 ft;
thence N 09°40'39" E a distance of 138.4 ft;
thence N 22°49'47" E a distance of 806.6 ft;
thence N 52°48'24" E a distance of 455.5 ft;
thence N 59°05'12" E a distance of 902.7 ft;
thence N 39°46'00" E a distance of 1242.8 ft;
thence N 67°54'15" E a distance of 786.4 ft;
thence N 25°12'27" W a distance of 625.3 ft;
thence N 47°56'41" W a distance of 427.0 ft;
thence N 08°51'20" W a distance of 744.7 ft;
thence N 16°35'31" E a distance of 554.1 ft;
thence N 09°35'22" W a distance of 529.6 ft;
thence N 66°41'28" W a distance of 411.0 ft;
thence N 02°23'17" E a distance of 89.2 ft;
thence N 73°29'34" E a distance of 486.3 ft;
thence N 14°23'45" E a distance of 372.2 ft;
thence N 63°00'20" W a distance of 422.9 ft;
thence N 12°32'13" E a distance of 68.5 ft;
thence N 77°27'10" E a distance of 493.0 ft;
thence N 48°56'17" E a distance of 414.5 ft;
thence N 04°17'17" W a distance of 493.9 ft;
thence N 32°09'19" E a distance of 326.8 ft;
thence N 46°40'45" E a distance of 154.8 ft;
thence N 31°48'27" E a distance of 545.2 ft;
thence N 04°11'42" E a distance of 218.1 ft;
thence N 47°00'04" E a distance of 793.7 ft;

thence S 88°52'12" E a distance of 752.5 ft;
thence S 01°26'26" W a distance of 1314.8 ft;
thence S 70°44'29" E a distance of 538.9 ft;
thence S 37°21'23" E a distance of 410.3 ft;
thence N 85°02'45" E a distance of 550.5 ft;
thence S 45°00'38" E a distance of 456.8 ft;
thence S 13°05'00" E a distance of 688.2 ft;
thence S 11°13'51" W a distance of 266.9 ft;
thence S 56°32'23" W a distance of 118.0 ft;
thence S 00°15'29" W a distance of 440.7 ft;
thence S 11°13'51" W a distance of 582.2 ft;
thence S 06°04'53" E a distance of 276.7 ft;
thence S 72°01'55" W a distance of 520.1 ft;
thence S 49°31'11" W a distance of 361.4 ft;
thence S 53°41'25" W a distance of 157.0 ft;
thence S 84°17'33" W a distance of 149.6 ft;
thence S 07°15'02" W a distance of 413.5 ft;
thence S 62°15'22" W a distance of 159.8 ft;
thence S 83°33'45" W a distance of 232.2 ft;
thence S 45°01'03" W a distance of 278.8 ft;
thence S 26°34'45" W a distance of 191.3 ft;
thence S 86°49'20" W a distance of 134.2 ft;
thence N 84°38'51" W a distance of 598.0 ft;
thence S 17°17'30" W a distance of 175.3 ft;
thence S 33°42'23" E a distance of 201.2 ft;
thence S 43°19'22" W a distance of 444.7 ft;
thence S 20°33'36" W a distance of 223.7 ft;
which is the point of beginning,
having an area of 19,471,320 square feet, 447 acres

A general location map can be found below in this exhibit. This map shows the 447-acre BLM Plan of Operations boundary. The full extents of claims controlled by RMR that the Mid-Continent Quarry is located within can be seen on Map C-1.

Mid-Continent Quarry - General Location Map



2. Existing BLM Land Use Rights-of-Way

The following list of rights-of-way (ROW) are located around the area in which RMR is proposing the expansion of the Mid-Continent Quarry. As a part of its application process, RMR will contact each ROW holder to determine whether RMR's operation will interfere with the existing ROW. In any cases where interference is anticipated, RMR will work with the existing ROW holder to remedy the interference and create a written agreement describing how the ROW holder's access and rights will be maintained and what steps RMR is proposing to ensure that access.

1. COC 36806, right-of-way (which replaces COC 0 122582) issued to the U.S. Forest Service, White River National Forest for the Grand Mesa and Trappers Lake Trails.
2. COC 18884, right-of-way issued to Qwest Corporation for the Transfer Trail Passive Reflector.
3. COC 62757, right-of-way issued to Glenwood Caverns Inc. for the Transfer Trail access to the Fairy Cave.
4. COC 60374, right-of-way issued to CO RSA #3 DBA Verizon Wireless for an access road (Transfer Trail) to the Iron Mountain Communication Site.
5. COC 74438, right-of-way issued to the City of Glenwood Springs for a power transmission line and a buried utility cable.
6. COC 22255, right-of-way issued to Public Service Co of CO for a power transmission line.
7. COC 59505, community pit issued to BLM Colorado River Valley Field Office

OPERATOR INFORMATION EXHIBIT 3

The Mid-Continent Limestone Quarry is owned and operated by RMR Industrials, Inc., DBA Rocky Mountain Resources (RMR), through its subsidiary RMR Aggregates, Inc. BLM Claim numbers are listed in Exhibit 4**.** Contact and tax information for Rocky Mountain Resources is:

RMR Aggregates, Inc.
4601 DTC Blvd, Suite 130,
Denver, CO 80237
(720) 614-5213

Point of Contact: Robert Wagner
Phone: (720) 614-5213

Tax ID: [redacted]

CLAIMS AND RIGHT OF ENTRY EXHIBIT 4

The quarry is located entirely on public land managed by the BLM. The mineral rights are controlled through unpatented mining claims, the extents of which are shown on Map C-1. RMR has legal right to enter through the provisions of the 1872 Mining Law. All claims are listed below, and copies of the claim documentation are presented in Appendix 1.

Table 4-1 Mid-Continent Limestone Quarry Claims

Claim Name	Claim No. (CMC-)	Loc. Date	Township	Range	Sec.	Description
Cascade No. 1	251537	5/10/2001	5 South	88 West	31	E/2NE/4SW/4
Cascade No. 2	251538	5/10/2001	5 South	88 West	31	W/2NE/4SW/4
Cascade No. 3	251539	5/10/2001	5 South	88 West	31	W/2SE/4SW/4
Cascade No. 4	251540	5/10/2001	5 South	88 West	31	E/2SE/4SW/4
Chemin No. 1	251541	5/10/2001	5 South	89 West	36	E/2NE/4SE/4
Chemin No. 2	251542	5/10/2001	5 South	89 West	36	W/2NE/4SE/4
Chemin No. 3	251543	5/10/2001	5 South	89 West	36	E/2NW/4SE/4
Chemin No. 4	251544	5/10/2001	5 South	89 West	36	W/2NW/4SE/4
Chemin No. 5	251545	5/10/2001	5 South	89 West	36	W/2SE/4SE/4
Chemin No. 6	251546	5/10/2001	5 South	89 West	36	E/2SW/4SE/4
Chemin No. 7	251547	5/10/2001	5 South	89 West	36	W/2SW/4SE/4
Storm Queen No. 1	276917	12/15/2008	5 South	89 West	36	W/2NW/4NE/4
Storm Queen No. 2	276918	12/15/2008	5 South	89 West	36	E/2NW/4NE/4
Storm Queen No. 3	276919	12/15/2008	5 South	89 West	36	W/2NE/4NE/4
Storm Queen No. 4	276920	12/15/2008	5 South	89 West	36	E/2NE/4NE/4
Storm Queen No. 5	276921	12/15/2008	5 South	88 West	31	W/2NW/4NW/4
Storm Queen No. 6	276922	12/15/2008	5 South	88 West	31	E/2NW/4NW/4
Storm Queen No. 7	276923	12/15/2008	5 South	88 West	31	W/2NE/4NW/4
Storm Queen No. 8	276924	12/15/2008	5 South	89 West	36	E/2SE/4NW/4
Storm Queen No. 9	276925	12/15/2008	5 South	89 West	36	W/2SW/4NE/4
Storm Queen No. 10	276926	12/15/2008	5 South	89 West	36	E/2SW/4NE/4
Storm Queen No. 11	276927	12/15/2008	5 South	89 West	36	W/2SE/4NE/4
Storm Queen No. 12	276928	12/15/2008	5 South	89 West	36	E/2SE/4NE/4

Claim Name	Claim No. (CMC-)	Loc. Date	Township	Range	Sec.	Description
Storm Queen No. 13	276929	12/15/2008	5 South	88 West	31	W/2SW/4NW/4
Storm Queen No. 14	276930	12/15/2008	5 South	88 West	31	E/2SW/4NW/4
Storm Queen No. 15	276931	12/15/2008	5 South	88 West	31	W/2SE/4NW/4
Storm Queen No. 16	276932	12/15/2008	5 South	89 West	36	W/2NE/4SW/4
Storm Queen No. 17	276933	12/15/2008	5 South	89 West	36	E/2NE/4SW/4
Storm Queen No. 18	276934	12/15/2008	5 South	88 West	31	W/2NW/4SW/4
Storm Queen No. 19	276935	12/15/2008	5 South	88 West	31	E/2NW/4SW/4
Storm Queen No. 20	276936	12/15/2008	5 South	89 West	36	W/2SE/4SW/4
Storm Queen No. 21	276937	12/15/2008	5 South	89 West	36	E/2SE/4SW/4
Storm Queen No. 22	276938	12/15/2008	5 South	89 West	36	E/2ES/4SE/4
Storm Queen No. 23	276939	12/15/2008	5 South	88 West	31	W/2SW/4SW/4
Storm Queen No. 24	276940	12/15/2008	5 South	88 West	31	E/2SW/4SW/4
Storm Queen No. 25	276941	12/15/2008	5 South	89 West	4	W/2NW/4NE/4 (AKA W/2 Lot2 (31.34ac))
Storm Queen No. 26	276942	12/15/2008	5 South	89 West	4	E/2NW/4NE/4 (AKA E/2 Lot 2 (31.34ac))
Storm Queen No. 27	276943	12/15/2008	5 South	89 West	4	W/2NE/4NE/4 (AKA W/2 Lot 1 (31.84ac))
Storm Queen No. 28	276944	12/15/2008	5 South	89 West	4	E/2NE/4NE/4 (AKA E/2 Lot 1 (31.84ac))
Storm Queen No. 29	276945	12/15/2008	5 South	89 West	3	W/2NW/4NW/4 (AKA W/2 Lot 1 (32.08ac))
Storm Queen No. 30	276946	12/15/2008	5 South	89 West	3	E/2NW/4NW/4 (AKA E/2 Lot 1 (32.08ac))
Oasis No. 1	290391	4/5/2018	5 South	89 West	24	S/2NE/4NW/4
Oasis No. 2	290392	4/5/2018	5 South	89 West	24	W/2NW/4NW/4
Oasis No. 3	290393	4/5/2018	5 South	89 West	24	E/2NW/4NW/4

DESCRIPTION OF OPERATIONS EXHIBIT 5

1. Background Information

The mining plan described in this Plan of Operations modification is intended to supersede all previous mining plans, including those described in the 1982 and 1989 Plans.

The limestone deposit is located within the Leadville Limestone formation. The proposed Plan of Operations pursues limestone and dolomitic limestone within only the Leadville Limestone formation, which sits in a large tabular deposit. The deposit outcrops to the west and east of the project area in varying amounts. Figure 5-1 shows a general geologic cross section for the quarry. For a full discussion of area geology, refer to Exhibit 13.

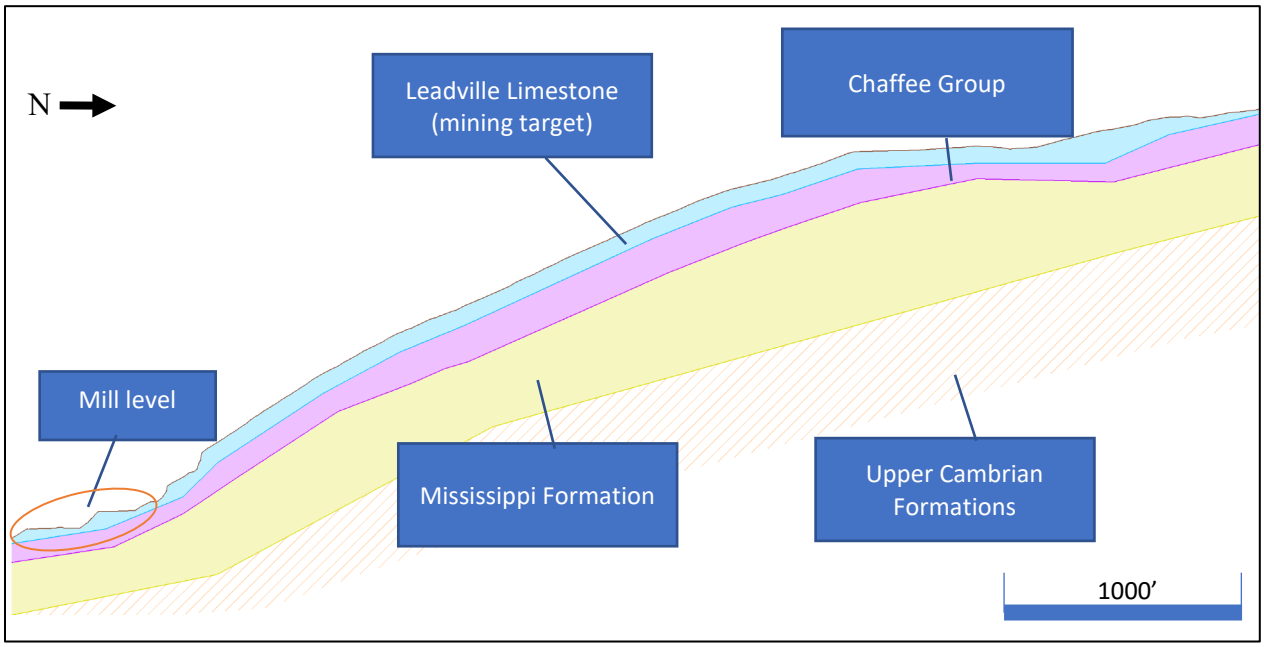


Figure 5-1 General Geologic Cross Section

2. Quarry Operations

RMR currently operates the Mid-Continent Limestone Quarry and produces limestone products for regional sale and distribution. The operation will be expanded to disturb roughly 320 acres of the 447-acre permit area to produce limestone and dolomitic limestone. Both products will be sold to offsite customers. The primary method of proposed product distribution will utilize the nearby Union Pacific Railroad property, approximately 2.6 miles from the quarry.

RMR evaluated the potential safety, environmental, and production impacts of various quarrying alternatives during the development of its 20-year proposed quarry plan. This evaluation indicated the potential impacts to soil, vegetation, water, and other natural resources could be minimized by quarrying the deposit from top to bottom, north-to-south, down the hill slope. Available geological data suggest the bottom of the Leadville Limestone deposit should mimic the surface topography in slope and shape. Quarrying using the top-down approach will allow RMR to concurrently reclaim the post-quarrying slope as each 25-foot bench is removed.

2.1 Natural Visual Barrier

RMR will be utilizing a natural wall technique to create a physical barrier (Natural Visual Barrier) along the south edge of each bench. The Natural Visual Barrier is achieved by leaving one to three 25-foot tall quarry benches in place during the removal of the remainder of the bench. The result is a 25-75-foot-high barrier which will contain most quarry operations. The presence of the Natural Visual Barrier will prevent active quarrying operations on the active mining level from being visible from any vantage point at or below the level of the active mining level.

Figure 5-2 shows a typical cross section of the proposed quarry bench configuration. Map C-6 shows an example of a typical active mining level where this Natural Visual Barrier can be seen on the south side. The dimensions of the excavated side of the Natural Visual Barrier were determined using the Geotechnical Stability Analysis found in Appendix 4.

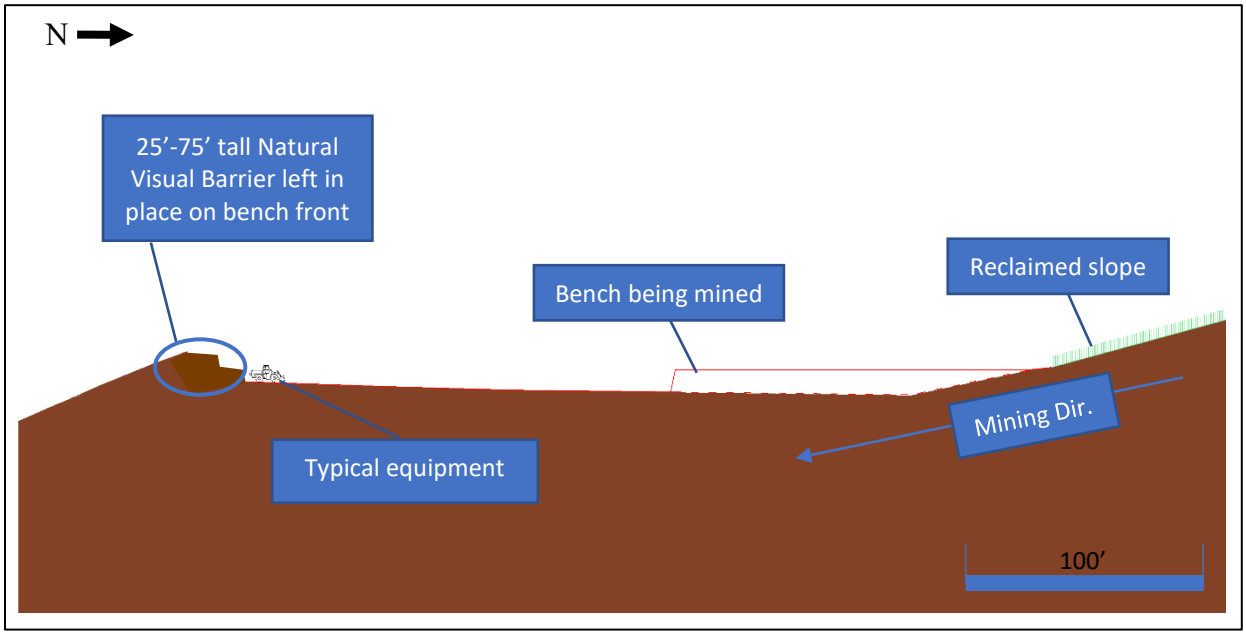


Figure 5-2 Typical Active Mining Level Cross Section

The top-down methodology and corresponding Natural Visual Barrier are effective in hiding the most obvious portions of the operation from the surrounding view, while also containing noise, dust, and water impacts within the active mining level. The mill level will continue to operate in the same manner as it has during the recent life of the quarry, with the exception of increased truck traffic due to higher production and sales and the addition of structures and material stockpiles pertaining to the proposed expansion.

2.2 Hours of Operation

The Mid-Continent Quarry will have activity on-site 24-hours a day, seven days a week. Crushing, screening, loading, and hauling will only take place on day shifts between 6am-6pm. Blasting will only take place on day shifts between 9am-4pm. All other site activities including, but not limited to, surveying, product testing, equipment maintenance, road and site maintenance, and product sales will also occur during the day shift hours of 6am-6pm. Activities during night shift hours between 6pm-6am will be limited to equipment maintenance, equipment fueling and lubricating, pulverized limestone milling inside of the mill building, administrative

tasks, and other similar operations tasks. When weather conditions dictate, limited snow removal and sanding/salting may also be performed at night to endure the safe travel of employees on Transfer Trail and quarry access roads. Work performed during night shift will be done so with the intent of minimizing the impact and perception of operations within the permitted boundary. Lighting at the quarry will be kept to a minimum during non-daylight hours. Lighting use during night shifts will typically be limited to equipment headlights, work lights mounted on mechanics' trucks, lighting around buildings and walkways for safe access, flashlights, and the occasional use of one or two downcast light plants (portable) fitted with shielding.

The quarry will operate two shifts per day. Currently, 4 employees work for the quarry. This number will increase to approximately 50-80 employees per day, plus contractors. The projected quarry life is approximately 20 years, based on an annual production rate of 5 million tons of sellable material. This quarry life is notional, as product sales will principally determine production rates.

The quarry will operate year-round and is requesting the removal of the winter timing restriction which currently occurs from December 15 – April 15 each year.

2.3 Quarry Design

Exploration data has shown the deposit of limestone and dolomitic limestone to be essentially tabular along the face of the current hillside above the current milling operations. The deposit ranges between 125 to 175 feet in depth, depending on the specific location. For the purpose of quarry planning, the maximum depth is 175 feet.

All proposed quarrying activities will follow the footprint outlined on Map C-2, in Appendix 6. The sequence of mining stages, which consist of several benches, can be seen on Maps C-2B to C-2F in Appendix 6. Figure 5-3 shows a conceptual cross section of pre and post mining topography. A more detailed cross sections can be seen on Map C-3.

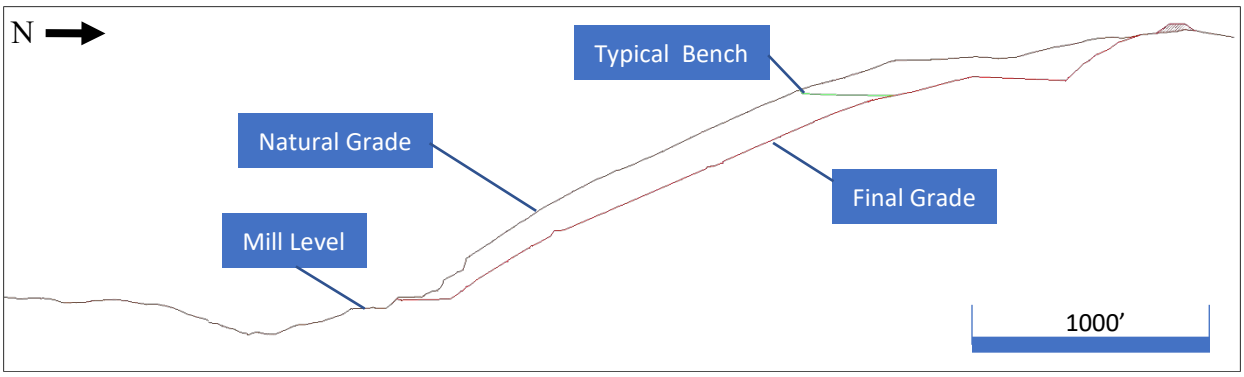


Figure 5-3 Quarrying Conceptual Cross Section

2.4 Mining Plan

Mining at the Mid-Continent Quarry will take place in two places: the active mining level and the mill level. The mining process is the same both places, but the mill level mining is smaller in production than the active mining level. The mill level mining will consist of mining a small section of limestone north of the existing mill and facilities in order to supply material to the local market. Mining at both levels will involve drilling and blasting, crushing, hauling, and conveying.

2.4.1 Mining Process

Native limestone will be drilled with a rock drill in preparation for blasting. An explosives crew will then load the drill holes with explosives and blast the drilled area. This is known as a "shot". Blasting in this manner produces chunks of limestone that are small enough for excavation

equipment to handle, but big enough that further crushing is needed to produce the final sized product. The shot rock will be excavated from its blasted location and loaded into the crushing and screening circuit using either haul trucks or direct loading from an excavator or front-end loader. The crushing and screening circuit consists of a combination of jaw and cone crushers along with vibrating screens. Jaw crushers break large pieces of rock (4 feet in diameter or smaller) down to a specified size by crushing them in between two steel plates using a motion similar to a mouth chewing. Once material has passed through the jaw crusher, it is fed to a cone crusher. Cone crushers use a heavy cone, typically steel, that rotates around within a steel rim. The gap between the cone and the rim is set to the desired size of the finished rock product, so rock remains in the cone crusher until it is small enough to slip through the gap. Cone crushers operate in a similar manner to a mortar and pestle by pressing the rock between two hard surfaces with sufficient force to break the rock. After rock passes through the crushers it is sent to the vibrating screens. Screens act as large sieves that separate the crushed rock into separate product types based on their size. After exiting the screens, the different product types are either sent on as final products or are sent back to the crushers if the rock size is larger than the desired product specifications.

2.4.2 Material Transport

Finished rock products produced on the mill level will be conveyed away from the crushing and screening circuit and placed in small stockpiles on the mill level. Stockpiled material will be loaded into trucks using either a front-end loader or an excavator.

Both finished rock products and waste products produced on the active mining level will be transported from the crushing and screening circuit using conveyors. Waste products (sand size and smaller) will be conveyed from the vibrating screens to a radial stacking conveyor and then placed directly on the quarry backslope for reclamation contouring. The waste material will then be pushed into its final location on the contoured slope by a dozer. Finished products (approx. 1/8” to 1-1/2” rocks) will be conveyed from the vibrating screens, using a series of linked mobile conveyors, to the loading point for the pipe conveyor.

The pipe conveyor used at the Mid-Continent Quarry will be similar to pipe conveyors used across the world for material transport in steep or challenging terrain or where a curved

conveyance path is required. Pipe conveyors function much like a standard conveyor with a loading point on one end and a discharge on the other end. The methods for loading and unloading a pipe conveyor are identical to those of a standard conveyor. Loading of the pipe conveyor is accomplished by positioning a feed hopper or chute directly over the loading point of the moving conveyor belt. Rock is dumped into the hopper, or chute, by way of the discharge point on the last mobile bench conveyor and then comes to rest on the moving conveyor belt. From there, the rock is transported down the hill to the discharge point where the rock flows freely off the end of the conveyor.

Where pipe conveyors differ from a standard conveyor is in the configuration of the conveyor belt between the loading and discharge points. The section of conveyor belt beginning at approximately 50 feet after the loading point and extending to approximately 50 feet before the discharge point is transformed from an open configuration to a completely closed, pipe-like configuration. This is accomplished by a gradual changing of angle of the rollers supporting the conveyor belt. The rollers guide the edges of the conveyor belt upwards and then towards each other at the 12 o'clock position. The belt eventually overlaps itself and creates a completely sealed conveyor belt pipe. The opposite process occurs just before the discharge point to reopen the belt into an open configuration. The closed configuration of the pipe conveyor completely prevents spillage and fugitive dust along the entire conveyor route. The pipe configuration also allows the conveyor to run down steeper slopes and to make turns without the need of transfer points for the material.

The Mid-Continent pipe conveyor will be located on the eastern side of the quarry permit boundary, just outside of the mining footprint. The entire conveyor will be constructed from the mill level to the upper active mining level at the onset of the expanded operation. As the active mining level progresses down the face of the deposit, upper sections of the pipe conveyor will be removed to maintain proximity between the loading point of the conveyor and the active mining level.

As rock is discharged from the pipe conveyor at the mill level, it will be placed into a stockpile. This stockpile will then be used to fill storage bins located along a loading loop on the mill level.

This loading loop will allow trucks to enter the mine, load directly from the bins, and then drive back out in an efficient, continuous, and uninterrupted manner.

2.4.3 Mining Sequence on the Active Mining Level

Mining activity on the active mining level will involve drilling and blasting, crushing, screening, and hauling/conveying as described above. The process of drilling and blasting out the limestone deposit will slowly remove portions of the active mining level floor. Therefore, the crushing and screening circuit and associated conveyors and support equipment will have to be moved within the active mining floor every 4-6 months to accommodate mining around them. Map C-6B shows a sequence of mining on the active mining level and the locations of the equipment that will facilitate mining. From an existing floor, mining will excavate a new floor 25' lower than the existing floor. Once enough room has been made on this new, lower floor, the crusher and associated equipment will move to the new lower floor. This will allow the existing floor to be mined (see Map C-6B, Step 1). When the existing floor is mined out, mining can then proceed another 25' deeper (see Map C-6B, Step 2). Once sufficient new floor is mined out, the crusher will move again into this new area, so that the floor that had been beneath the crusher can be mined (see Map C-6B, Step 3). While this is going on, vegetation and topsoil will be stripped from the outside of the top 25' of the natural visual berm and immediately hauled and placed in reclamation areas that are prepared for it. Once the stripping of this top 25' of the natural visual berm is complete, the limestone beneath the soil and overburden will be mined out. The combination of all the components of the mining and reclamation sequence herein described produce the net effect of the active mining level "moving" down the hillside. Undisturbed area that is below the active mining level is preserved until right before it is time to mine, mining is contained within a limited area behind a natural visual berm, and reclamation takes place promptly in the back of mining to return the natural form and color of the landscape.

The benches being mined will range in width and depth throughout the life of the quarry based on the width of the proposed disturbed boundary, the slope of the deposit, and the thickness of the deposit. Width will typically range between 1300-3500 feet and depth will typically range from 300-700 feet. Bench height on the active mining level will remain consistent throughout the life of the quarry at 25 feet or less.

RMR will begin quarry operations at or near the highest point in the proposed expansion area; approximately 8425' elevation. Typically, one 25-foot bench will be removed at a time, with the exception being during the transition from one bench to the next lower bench. When more than one operating bench exists at the same time, a 15-foot catch bench will separate the bench levels to prevent a straight highwall of more than 25 feet in height. The dimensions of these benches are based on the geotechnical evaluation conducted by Brierley and Associates which is found in Appendix 4. Over the course of the operation, approximately 72 individual benches will be removed.

Material will be removed from each bench by blasting and removing individual rectangular blocks from the 25-foot mining bench. Most backslopes between benches will be blasted and quarried in a manner that will leave an overall 2H:1V or 3H:1V backslope surface, depending upon hillside location. This backslope matches the slope of much of the existing topography. To aid in the holding and stabilization of reclamation recontouring material, sections of the backslope rock will be left in a benched configuration immediately after removal of the limestone and dolomitic limestone. This methodology will create firm underlying foundations in areas where additional slope stability is determined to be necessary. Recontouring material in these benched backslope areas will be placed and graded to an overall 2:1 slope or shallower. In areas where the surface underlying the dolomitic limestone undulates up into the deposit, a steeper cliff-type surface may be left. These cliffs may be vertical, with its permanent slope determined by a geotechnical analysis of the rock mass of any cliff at the time that it is excavated. In all cases, protruding rock or cliff features will be left with as natural an appearance and height as possible.

Material removed from each 25-foot quarry bench will be crushed and initially screened on the bench level and then transported down to the mill level. Primary crushing and screening on the active mining level, prior to transport, reduces haul costs and allows the operation to use unsellable fines for reclamation backfill. Once the material reaches the mill level, it may be minimally screened to separate product flows prior to being loaded onto trucks using a truck loadout. As previously mentioned, the southern edge of each quarry bench will be bounded by a Natural Visual Barrier with a height of 25-75 feet (1-3 bench heights). This barrier will be

created by leaving the southern edge of 1-3 benches untouched while the remaining limestone and dolomitic limestone behind it are removed. Maps C-3 & C-6 shows details of these barriers. This barrier conceals the majority of quarrying activity from the surrounding area and reduces impacts from light, dust, and noise.

The Natural Visual Barrier will retain its vegetation cover until the time it is scheduled to be lowered. Topsoil and vegetation will be stripped from the top 25 (vertical) feet of the outside of the Natural Visual Barrier from within the active mining level by an excavator. The removal of the topsoil will require significantly less time than the mining of the limestone on the active mining level, thus limiting the timeframe in which stripping activity will be necessary to support the ongoing mining. After the removal of the top 25 (vertical) feet of vegetation and topsoil, the underlying limestone will be removed using controlled blasting and a tracked excavator or similar type of equipment.

As quarrying operations progress down the slope, the finished portions of the quarry backslope will be recontoured with limestone and dolomitic limestone fines, top-soiled, and revegetated according to the reclamation plan represented in Exhibit 6. In designated areas, small portions of the limestone and/or dolomitic limestone will be placed to create rock sections that aid in soil stabilization, animal habitat, and a naturally reclaimed appearance.

2.4.4 Mining Sequence on the Mill Level

Mining on the mill level will involve drilling and blasting, crushing, screening, and hauling/conveying similar to the active mining level. Benches will be mined from the current highwalls into the limestone deposit, going north and west. These benches will be no more than 30’ tall and catch benches of at least 15’ will be used between 30’ highwalls. The material will be drilled and blasted and then loaded into a crusher and screen plant located at the mill level. The screened rock will be conveyed a short distance away from the screen plant and stored in product stockpiles on the mill level. These stockpiles will typically range between 500-2000 tons in size. From these stockpiles, a loader will either transport rock to the mill feed bin, to make rock dust, or it will load products into trucks for the local market. Trucks hauling material from the mill level will exit the site via the same truck loop as all other highway haul trucks. Milled rock dust product will be loaded into trucks utilizing the existing silos and truck scale.

Dimensional stone for the local market will also be produced and sold from the mill level. Dimensional stone blocks will be mined from the same areas on the mill level, to the north of the current mill building, as the crushed products. Dimensional stone extraction will utilize smaller blasting techniques and large stone cutting saws to extract rectangular blocks of stone. Dimensional stone blocks will be loaded onto trucks near the northern highwall on the mill level. Those trucks will use the same haul truck access roads and scales as the trucks hauling other quarry products.

2.5 Material Transport Details

2.5.1 Active Mining Level Hauling

Blasted material on the active mining level will be loaded into haul trucks using large hydraulic excavators. The haul trucks will transport the material across the active mining level and dump it into the feeder on the primary crusher. After dumping into the primary crusher, the empty haul trucks will return to the hydraulic excavators to be loaded again. RMR anticipates using between 6-12 haul trucks at a time on the active mining level depending upon the length of the haul from the production face to the primary crusher.

2.5.2 Pipe Conveyor

A conveyor system composed of a standard rubberized conveyor belt formed into a tubular conveyor will transport material from the active mining level down the east side of the site to the mill level. The route of this pipe conveyor can be seen on the C-2 maps. Locating the conveyor on the east side of the operation will shield it from most viewpoints.

By design a pipe conveyor is a self-contained system. Once the conveyor belt pipe is formed there is no contact of the material with the outside environment. The system is designed to operate independent of whether it is carrying material or not, i.e. the pipe conforms and closes independent of any weight inside of the belt. The pipe is formed on both the carry and return side, thereby avoiding any fugitive dust release at any stage.

The belt is open for loading and discharging for the first and last 30 to 50 feet of the path. These are the only two areas along the pipe conveyor path where dust can occur. For this reason, the

loading and discharge stations may be enclosed and can be equipped with dust suppression sprays or dust collectors if necessary.

The following figures show the operation and design of a typical pipe conveyor, including one specifically showing how the 6 idlers mounted to a panel keep the belt closed. As stated before, the conveyor does not have to be transporting material to function properly, the belt is engineered to form a pipe regardless of whether it is loaded or not. Additionally, while the overlap must be at the 12 o'clock position when opening at the head and tail stations, it can be sideways or upside-down during part of the path without causing any material spillage.

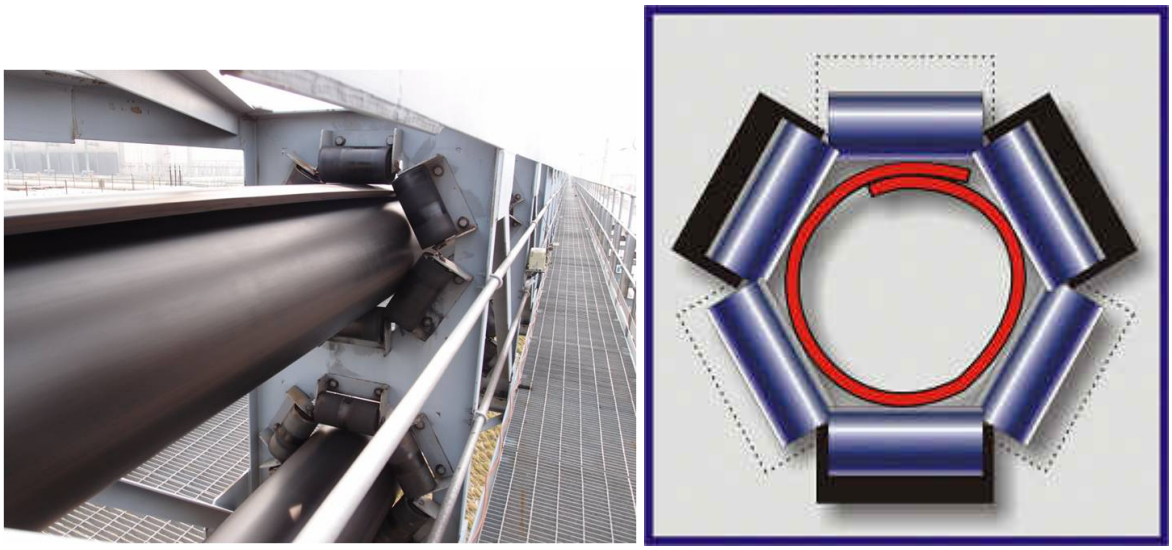


Figure 5-4 – Typical Pipe Conveyor and Cross-Section

Construction of the pipe conveyor would occur at the start of the quarry expansion. Temporary roads would be constructed along the conveyor route to facilitate the installation of concrete foundations or the creation of anchor points in the native rock. The temporary roads would also be used to transport sections of the conveyor to their installation location.

The entire conveyor system, including accompanying utilities, will fit into a corridor roughly 20 feet wide. During construction, and for the life of the conveyor, the 20-foot path will be used to contain the pipe conveyor and the adjacent maintenance and access road. Of that 20 feet, the pipe conveyor will occupy approximately 10 feet with the remaining 10 feet used for maintenance

access. During construction, additional temporary 20’ x 20’ pads will be placed along the conveyor route to use as laydown and turnaround pads. These pads will typically occur every 200 feet along the path. In some areas, due to steep slopes, equipment may have to move about a wider area during construction. These areas are identified on Map C-2. Segments of the conveyor will be elevated 6-15’ above the ground to allow for wildlife to cross underneath and to keep snow from building up around it. The tubular conveyor belt will be 12-36” in diameter depending upon design requirements. The total system capacity will be at least 1400 tons per hour. The conveyor system will be painted to a background matching color approved by the BLM. Maintenance will be conducted using either a track car that is attached to the conveyor system itself and/or a walkway mounted to one, or both, sides of the conveyor structure.

The pipe conveyor used at the Mid-Continent Quarry would be enclosed with paneling on all sides to prevent negative effects from weather and to prevent wildlife from accessing any moving parts. The enclosure would also reduce any noise generated by the conveyor system. Noise levels from pipe conveyors generally range from 70-75 decibels. Figure 5-5 shows an example of a pipe conveyor system.

Figure 5-5 – Pipe Conveyor in Environment Similar to Mid-Continent Quarry

2.5.2.1. *Conveyor Power Generation*

When conveyors are used for downhill transport, they provide the added benefit of electrical generation. This pipe conveyor, with its proposed route, would create an ideal power generating scenario, and would generate between 1-2 megawatts of power during operating hours. This power would be used at the quarry, reducing the power draw requirements of the operation.

An E-house, located in a container-type building, will house Variable Frequency Drives (VFDs). The VFDs control the pipe conveyor motors and can either input power to the motors or use the motors as generators and input the energy back to the site to be used by other equipment. Excess electricity generated by the motors can be put back into the local electric grid. Mid-Continent

plans to consume all power generated by the conveying system during normal operating conditions. Occasionally, there may be excess power placed back on the electric grid.

The drive motor for our conveyor will be located in a mid-conveyor position approximately one-quarter of the way up the conveyor path from the discharge point. The E-house will be placed near the pipe conveyor drive motor. The motor will operate in regenerating mode when the pipe conveyor is loaded. The E-house will likely include a regenerative 18 or 24 pulse VFD connected to an MCC/buss bar which is connected to a circuit breaker and switch gear and then to an outdoor transformer which feeds either the operation or the local grid.

The E-house and drive motor will be located on a prepared pad with approximate dimensions of 40’x40’. The pad will relatively flat, covered in crushed rock, and will drain towards the path of the pipe conveyor. The pad will be accessed via a small access road from Transfer Trail. The access road will be used during the installation of the pipe conveyor drive motor and E-house and will be used for maintenance access throughout the duration of the quarry life. The location of the pad is noted on the mining maps. Figure 5-6 shows a typical E-house.

Figure 5-6 – Typical Conveyor E-House

2.5.2.2. *Material Surge Piles*

Surge piles of product will be maintained at the mill level as well as the quantities of product stored in silos for truck loading. Roughly 20,000 tons of material can be stored in the stockpile at the bottom of the pipe conveyor on the mill level. The exact size of the pile will vary on a daily basis with production and truck loading volumes. The stockpile will be located in the northeast corner of the mill level and will leave plenty of room for truck loading operation in the truck loading loop. Another 800-1000 tons of material can be stored in the truck loading bins on the mill level. This total volume is adequate for up to 1.5 days of hauling from the site without additional production from the active mining level. There will be no alternative hauling or conveyance of material during any time the pipe conveyor is offline.

2.5.2.3. *Reclamation of Pipe Conveyor Route*

As the quarry benches progress down the slope, the loading point for the pipe conveyor will need to be adjusted periodically to maintain an elevation similar to that of the active mining level. This process will be accomplished by removing sections of the conveyor structure, associated foundations, and components located above the current quarry bench level. Once removed, any disturbance created by the conveyor or the removal of the conveyor structure and foundations will be reclaimed in accordance with the reclamation guidelines discussed in Exhibit 6.

2.5.3 Truck Haulage from Mill Level

RMR anticipates using a fleet of 20-30 trucks, each up to 68.5-ft long (1400-2100 feet of trucks), to haul material from the site. Between the loading loop on the mill level (~900 ft long) and the quarry access road (~1500 ft long) from Transfer Trail, there is enough room for the trucks to line-up without extending onto the public portions of Transfer Trail. RMR can also have all trucks queue on the southeast portion of the mill level if preferred.

RMR specifically designed the improved Transfer Trail alignment to handle trucks with a length of 68.5 feet or shorter. Computer design software was used to develop the turn radii of the improved Transfer Trail configuration to ensure the turns could handle trucks of this size.

Each RMR truck will make between 15 and 20 round trips per day from the mill level down Transfer Trail. In case of delay at the mill level, trucks can queue in one of three places: the

loading loop on the mill level, on the quarry road between the quarry gate and the mill level, or in the truck parking area on the southeast portion of the mill level.

Additional equipment operations on the mill level will be minimal and will consist primarily of employee vehicle traffic at the beginning and end of shift, sporadic maintenance vehicle traffic to and from the building, deliveries to the building from outside vendors, and small volumes of truck traffic related to local product sales. These equipment operations will be much lower volume than the truck traffic column and will occur predominantly in the areas away from the truck loading loop.

2.6 Quarry Blasting Operations

RMR intends to employ modern blasting techniques in the development and operation of its Mid-Continent Quarry. Blasting operations will be conducted in accordance with Mine Safety and Health Administration (MSHA) Regulations (30 CFR Parts 56 and 57). Blast holes will be loaded with a blasting cap, chemical booster, and a mixture of ammonium nitrate and fuel oil (ANFO) granules (or a similar blasting agent). The blasts will be initiated using either a non-electric or electronic system, with the hole pattern, firing sequence, and delays designed to produce optimum rock breakage along with minimum seismic and noise impact. Explosives and detonators will be stored in powder magazines located on or near the mill level, in accordance with MSHA and Bureau of Alcohol, Tobacco, Firearms, and Explosives (BATFE) Regulations, or brought onsite by the blasting contractor. Explosives will be transported from the magazines to the active mining level in accordance with MSHA regulations (30 CFR Part 56 and 27 CFR Part 55). Blasting will be conducted by a licensed operator, who is either an RMR employee or contractor. Blasting is anticipated to occur one to two times per week. Blasting operations are planned to occur during all months of the year. A blasting schedule will be posted outside the quarry entrance gate. A blasting notification system will also be setup to notify neighbors and local authorities about upcoming blasting operations. Blasting operations will take place only between the hours of 9am – 4pm, Monday through Friday.

During blasting operations, on-site personnel will be warned and notified of blasting through radio communications and audible warnings. Clearing of blasting areas and roadblocks will be used to prevent individuals from being in or travelling into active blasting zones. Prior to blasting

on the eastern edge of the quarry, catch ditches and berms will be constructed to prevent blasted rock from travelling out of the blasting area. If needed, sections of Transfer Trail, above the saddle parking lot, may be temporarily blocked during blasting operations on the eastern edge of the quarry. These safety blocking periods will typically range from 10-20 minutes in length. During safety blocking periods, RMR employees will block both ends of a section of Transfer Trail near the blast. Each employee blocking the road will have a sign explaining the nature of the roadblock and will be wearing a high visibility safety vest. Blocking employees will also have radios to communicate with the RMR blasting crew. Transfer Trail safety blocking is expected on a maximum of 15% of the shots performed by the quarry. After a shot has been completed, and the blaster has given the "all clear" signal, all activities at and around the quarry will be allowed to return to normal, including those on Transfer Trail.

2.7 Exploration and Development Drilling Activity

Exploration drilling has occurred within most of the mining claims in the proposed expansion area. This drilling occurred within two separate timeframes. First, between 1958 – 1978, and more recently, between 2016 – 2018. The exploration drilling between 1958 – 1978 was performed by Colorado Fuels and Iron Corp. (CF&I). Their extensive drilling covered much of the upper portions of the expansion area and was focused specifically on limestone and dolomitic limestone. RMR has data from 57 CF&I drill holes. The exploration drilling between 2016 – 2018 was performed by RMR and focused on both limestone and dolomitic limestone. This drilling occurred in and around the immediate area of the current quarry operation. RMR drilled 21 holes during this time frame. The 78 exploration drill holes show extensive reserves of both chemical grade limestone and dolomitic limestone within the proposed expansion boundary.

The data from the exploration drilling is good enough to show the existence and extents of both chemical grade limestone and dolomitic limestone within the formation, but it does not contain the level of accuracy needed for today's mining engineering requirements. As a part of initial quarry development, and then as a part of ongoing operations, RMR will conduct additional development drilling to supplement its existing drilling information and more precisely detail deposit extents, quality, boundaries, and composition. The data gathered in the development drilling will be used to model the geologic characteristics of the formation and create engineered

plans for bench and backslope development along with reclamation surfaces. All drilling will be conducted in areas where quarry activities will occur shortly after the development drilling is completed.

Development drilling as well as hole abandonment and plugging will follow all BLM and other applicable regulatory standards. Holes are anticipated to be between two and four inches in diameter and between 150-250 feet in depth, typically. They will be located on the southern end of the active mine level before it is excavated. Drilling will be accomplished using either air or fresh water to flush tailings from the drill hole. All development holes will be filled with cuttings and a 3' thick concrete cap upon completion. Holes will be fully mined out during the course of normal mining operations. In a 5 million ton per year operating scenario, the holes will typically be mined through within 2-3 years of their drilling.

3. Quality Assurance Plans

RMR will provide site inspection of the operations as well as facility and road construction. These inspections will include on-site inspections of the operation as well as contact with construction crews to determine if problems are encountered. Quality control (QC) includes functions and procedures that are performed by the party building any facility. Quality assurance (QA) is a process to independently verify and test that the builder performs the construction activities to meet the intent of the design and conform to facility specifications. QA/QC activities include coordination, documentation, quality control and inspection, and records/reports.

3.1 Coordination

Close coordination between the engineer, mine manager, and designated QA monitor are needed. Regularly scheduled meetings and ongoing contact are required. Meetings include pre-construction meetings, weekly progress meetings, and ad-hoc special meetings.

3.2 Documentation

Daily record keeping will consist of field notes, earthwork observations, testing data sheets, summary of meetings, and report problems and resolutions. This information will be submitted daily to the mine manager for review in a form provided or pre-approved by RMR. One complete set of reports will be kept on-site by QA personnel at all times.

Clarifications of designs or specifications may be needed during construction. The designated QA monitor will notify the mine manager and engineer when this occurs. Modifications and changes to designs and specifications will only be made with written approval of the engineer and mine manager. Any and all changes of this type will be well-documented.

Photo-documentation of all phases of construction will be collected. These photographs will be identifiable by location, time, data, and initials of the person taking the photograph.

During construction, the QA monitor will prepare weekly progress reports summarizing the construction and QA activities that transpired at the quarry. This report will be submitted to the mine manager.

Upon completion of construction, the engineer will submit to the mine manager an as-built, a survey, or a certification report. This report will certify that the construction work completed is in compliance with designs and specifications, with approved deviations noted. This report will also certify that the intent of the design has been achieved. Documentation of construction for the support of as-builts will be conducted by the builder, under the supervision of the QA monitor.

3.3 Quality Control Inspections

Quality control inspections will be conducted to ensure that the specified quality and quantity of work is completed by the builder. Quality assurance is the mine manager and engineer's responsibility.

Builder's QC representative must enforce drawings, designs, and specifications and where conflicts arise resolve them to the mine manager and engineer's satisfaction. It is the QC representative's responsibility to ensure that the builder has a proper understanding of the requirements but also that the builder proceeds accordingly. The QC representative must ensure compliance with both the minimum specified material and equipment requirements as well as general professional construction standards.

Builders will supervise and control those portions of the work that they are to perform. The mine manager or engineer will perform overall supervision and necessary field engineering. Construction will be performed in strict compliance with plans and specifications approved by

RMR. When construction is conducted by a contractor, they will implement an approved quality plan specific to their contracted project. The mine manager will enforce those quality plans. Such plans will be formally approved by the engineer, mine manager, and will clearly indicate type and frequency of QC measures. A copy of the contractors' approved quality plans will be provided to the mine manager and engineer.

The mine manager and engineer will be given reasonable notification time as to scheduled inspections. They may exercise their right to be present at any scheduled inspection.

3.4 Records and Reporting

Field reports will contain accurate descriptions of what was found during any inspection. All documentation will be clearly written, dated, and clearly identify the equipment and materials inspected. All documentation should be signed and dated. Copies are to be provided to the engineer and the mine manager. Test results will cite any contract requirements (when conducted by a contractor), the analytical procedure used, the actual results, and include a statement of whether the result conforms or fails to conform with designs or specification requirements. Upon work completion, reports are to be incorporated into permanent records. Permanent records are to be kept well organized. Builders will keep separate logs for each type of inspection form and each type of test, and each log will contain a copy of the appropriate specification.

Builders will keep a master set of records, with a duplicate set with the project manager, and a triplicate set for the engineer. The mine manager and engineer will maintain files for each construction drawing and each specification. All files will indicate their date of revision, revision number, and who approved of the revision. Changes to QA/QC requirements will be incorporated into drawings and specification changes. All revisions to drawings and specifications will be tracked. No proposed changes will be carried out without the prior written approval of the mine manager and engineer.

The engineer or mine manager will supply design drawings to contractors. Contractors will be responsible for the updating of records showing installed conditions. These will be made available to the mine manager at any time during construction and will become the property of RMR at the completion of construction.

The QC representative will ensure that requirements for as-built records are met. The QC representative or special assigned personnel will initial each as-built to certify its accuracy prior to submission.

3.5 Facility Specific QA/QC

Table 5-1 shows a breakdown of the quality assurance/quality control plans for all facilities at the Mid-Continent Quarry. The majority of facilities will only need review immediately following construction. Others, such as stormwater structures, will be inspected on a regular basis.

Designs for all facilities/structures will be provided to the BLM at least 60 days before construction and the BLM will be notified at least 10 working days before construction so that they may inspect as desired.

All portable and mobile equipment will be maintained in-line with manufacturer recommended guidelines.

Table 5-1 Quality Assurance/Quality Control for Facilities

Facility	Builder	Initial QA/QC Provider	Initial QA/QC	Initial QA/QC Requirements	Ongoing QA/QC (Y/N)	Ongoing QA/QC Schedule	Ongoing QA/QC Requirements	Ongoing QA/QC Records	Ongoing QA/QC Provider
Overburden and topsoil stockpiles	RMR	RMR	SURVEY	Check that stockpiles are located in the designated area; Confirm slopes are within permit limits; Confirm temp veg	Y	Annual	Visual survey of the extents and slope of each stockpile.	Photographs and written description of stockpile conditions.	RMR
Fuel and oil storage areas	RMR	RMR	AS-BUILT	Check that all tanks are without defect; Confirm presence of secondary containment & SPCC Plan compliance	Y	Monthly; Every 5th year (tank integrity)	Visual check of integrity of all tanks and secondary containment. Every five years, tank integrity testing must be conducted in accordance with the SPCC Plan.	Monthly inspection form in SPCC Plan. Tank integrity testing will be reported every five years.	RMR
Office	CONTRACTOR	CONTRACTOR	AS-BUILT	Contractor must supply an as-built report indicating that the office was built according to construction specs and explain any deviations from original plan.	N				
Truck loading bins	CONTRACTOR	CONTRACTOR	AS-BUILT	Contractor must supply an as-built report indicating that the truck loading bins were installed according to construction specs and explain and deviations from said specs.	N				
Truck scale	CONTRACTOR	CONTRACTOR	AS-BUILT	Contractor must supply an as-built report indicating that the truck scale was built according to construction specs and explain any deviations from original plan.	N				
Designated parking areas	RMR	RMR	SURVEY	Extents and size of the parking area will be confirmed	N				
Quarry access roads and pads	RMR	ENG. CONSULTANT & CONTRACTOR	SURVEY, AS-BUILT	Contractor will provide a survey of the final road showing grades, ditches, berms, cut and fill slopes, retaining walls, water handling structures, road route, and revegetation status; Engineering consultant will review contractor data and certify an as-built of the road.	Y	Daily	Visual inspection of roads and pads for signs of erosion, surface damage, and integrity of safety components. Plowing and blading of roads to maintain clear and quality paths for public and private use.	Any repairs or maintenance noted in annual reports to regulators.	RMR
Utilities	CONTRACTOR	CONTRACTOR	SURVEY, AS-BUILT	Contractor will provide a survey/as-built of the final utility routes, depth/height of installation, and type of utilities installed (ex: water line diameter).	N				
Solid waste storage (trash, scrap metal, etc.) (any hazardous material will be disposed of by an appropriate contractor)	CONTRACTOR	CONTRACTOR	CONTRACTOR CERT.	Solid waste contractor will provide a certification that storage containers installed on site meet all required state and federal regulations.	Y	Daily	Visual check that all solid waste is appropriately being stored in designated containers.	N/A	RMR
Wastewater storage	CONTRACTOR	CONTRACTOR	CONTRACTOR CERT.	Contractor will provide documentation that on-site wastewater storage facilities were installed with sufficient capacity to serve the operation and that the storage facility has been installed according to industry standards.	Y	Annually	Visual check of tank integrity.	Any problems noted in annual reports to regulators.	RMR

Non-potable water tank for dust suppression	RMR	RMR	AS-BUILT	RMR will produce an as-built for water tanks showing they have sufficient size to meet operational needs and that they are in good working condition upon construction.	N				
Power drops and associated pad areas including pipe conveyor e-house	CONTRACTOR	CONTRACTOR	CONTRACTOR CERT.	Contractor will provide documentation that all power drops have been installed to industry standards and utility company requirements. If needed, the contractor will acquire local utility certification of all power drops.	N				
Ditches and sumps	RMR	RMR	OPERATOR CERT.	RMR will certify all ditches and sumps, including temporary ones; Ex: active mining level sumps will be certified to be excavated entirely in the Leadville Limestone, runoff intercept ditches are installed according to designs	Y	Bi-annually	Visual inspection of general conditions. If visual inspection notes a structure might be not be meeting performative standards in SWMP, measure structure to ensure capacity and integrity.	Summary of stormwater structure integrity in annual reports to regulators.	RMR
Sediment pond	RMR	ENG. CONSULTANT	AS-BUILT	A third-party engineer will produce as-builts for each sediment pond and certify that the ponds meet or exceed design requirements; Depth, slopes, and total capacity will be among the information documented in an as-built.	Y	Bi-annually	Visual inspection of general conditions. If visual inspection notes a structure might be not be meeting performative standards in SWMP, measure structure to ensure capacity and integrity.	Summary of stormwater structure integrity in annual reports to regulators.	RMR
Conveyors	CONTRACTOR	CONTRACTOR	CONTRACTOR CERT.	Conveyor installation certified to be within design norms.	Y	Weekly	RMR will document the regular maintenance of all conveyors onsite, in accordance with manufacturer recommendations.		
Containment berms	RMR	ENG. CONSULTANT	AS-BUILT	A third-party engineer will produce as-builts for each containment berm and certify that they meet or exceed design requirements; Berm height, slopes, and compaction will be among the information documented in an as-built.	Y	Bi-annually	Visual inspection of general conditions. If visual inspection notes a structure might be not be meeting performative standards in SWMP, measure structure to ensure capacity and integrity.	Summary of stormwater structure integrity in annual reports to regulators.	RMR
Explosive magazine	CONTRACTOR	CONTRACTOR	CONTRACTOR CERT.	Contractor will provide documentation that the explosive magazine is installed in accordance with ATF rules and regulations.	N				
Mill building	CONTRACTOR	CONTRACTOR	CONTRACTOR CERT.	Contractor will certify that the mill building has been constructed in accordance with all specifications; Contractor will specifically certify sufficient size and strength of foundation to hold the structure and all equipment to be stored within	N				
Maintenance shop	CONTRACTOR	CONTRACTOR	CONTRACTOR CERT.	Contractor will certify that the maintenance shop has been constructed in accordance with all specifications; Contractor will specifically certify sufficient size and strength of foundation to hold the structure and all equipment to be stored within	N				

4. Surface Facilities

The proposed surface facilities are shown on Maps C-2B through C-2F and C-4. The C-2 maps shows the location of bench facilities at each stage along with the mill level. Map C-4 shows the mill level facilities in detail.

The surface facilities at the Mid-Continent Limestone Quarry will include the following.

- Overburden and topsoil stockpiles
- Fuel and oil storage areas
- Office
- Truck loading bins, structure, and equipment
- Truck scale
- Designated parking areas
- Quarry access roads and pads
- Utilities
- Solid waste storage (trash, scrap metal, etc.) (any hazardous material will be disposed of by an appropriate contractor)
- Wastewater storage (on-site tank to be emptied by contractor; see Exhibit 13, section 9)
- Non-potable water tank for dust suppression
- Power drops and associated pad areas
- Ditches and sumps
- Sediment pond
- Aggregate crusher(s)
- Screening plant(s)
- Stacker(s)
- Conveyors
- Containment berms
- Explosive magazine
- Mill building
- Maintenance shop

4.1 Surface Disturbance

Roughly 13% of the disturbance planned for the expanded Mid-Continent Limestone Quarry will be within the quarry area currently in place as of 2019.

Table 5-1 below shows a breakdown of proposed surface disturbance at the Mid-Continent Limestone Quarry.

Table 5-2 Proposed Surface Disturbance

Surface Disturbance	Area (acres)
Quarrying benches	281.1
Mill level	23.0
Roads[1]	5.7
Initial Stockpile Areas	9.6
Pipe Conveyor Route	1.5
Total	320.9

[1] Road disturbance is approximated for this application based on preliminary road designs.

5. Surface Quarry Equipment

The following or similar equipment may be used at the quarry operation.

Table 5-3 Preliminary Quarry Equipment List

Surface Equipment	Quantity
Excavator (CAT 312 or equivalent)	3
Front-end loader (CAT 960 or equivalent)	2-3
Bulldozer (CAT D9 or equivalent)	2-3
Excavator (CAT 374 or equivalent)	2
Rock Truck (CAT 740 or equivalent)	10-12
Water Truck	2
Road Grader (CAT 16M or equivalent)	2
Pickup truck	6-7
700 ton per hour jaw crusher	2
500 ton per hour cone crusher	4
Triple deck screen plant	5-6
400 ton per hour impact crusher	1
Portable conveyors	20-30
Stacker conveyors	2-4
Drill rigs (for blasting and development)	2-3
Fuel and lube truck	1-2
Mechanic's service truck	2-3
50-ton crane	1
Off-site haul trucks	30-40

Notes:

a) Miscellaneous rental and contract equipment will be brought to the quarry site as needed. These could include fuel trucks, propane trucks, maintenance vehicles including welders, pipe equipment, electrical man lifts for working on power lines, contract drilling equipment, development drilling equipment, material delivery trucks, concrete trucks, gravel trucks, and others necessary for operations.

b) Except for the off-site haul trucks, all equipment maintenance and washing will take place either on the active mining level or mill level.

6. Product Stockpile Area

Quarried material will be crushed and screened at the active mining level and then transported to the mill level. Some products may be stored in stockpiles on the mining level and on the mill level. The stockpiles' typical locations have been delineated on Maps C-2 and C-4.

Since the material being produced is chemically inert, for the purpose of environmental protection (i.e., does not produce acid or toxic chemicals), no special storage controls are needed beyond general runoff control. All material will be located within active areas, and runoff will not be allowed to drain freely offsite. Internal drainage to sumps and sediment ponds will prevent the discharge of fines or other sediment offsite. The general locations of sumps and sediment ponds are shown on Maps C-2, C-2B through C-2F, and C-4, with conceptual details shown on Map C-5.

7. Topsoil and Overburden Handling

7.1 Topsoil and Overburden Stripping

Topsoil thickness varies onsite, as shown in the NRCS soil survey contained in Exhibit 10. Overburden varies between 30 and 41 inches, depending on location.

Topsoil will be stripped from all areas prior to conducting quarrying or construction activities. This includes both previously reclaimed areas and previously undisturbed areas. Oakbrush/aspen soils will be kept separate from pinyon-juniper soils. Pinyon pine, juniper, scrub oak, and any other trees and shrubs will be dealt with prior to topsoil removal. These trees and other woody material will be chipped in place, on the native surface, and added into the organic topsoil mixture; or the woody material will be used in reclamation (erosion control or microhabitats). The mix of topsoil and chipped organic material will be removed from the native surface and then placed directly on the prepared backslope. Using direct placement of the topsoil will allow for the immediate transplanting of a portion of the vegetation from the native slope to the reclaimed slope. In cases where the topsoil cannot be directly placed on the prepared backslope, it will be placed in topsoil stockpiles with 4H:1V slopes and seeded to prevent erosion.

Subsoil, also known as overburden, will be stripped from mining areas and either directly placed in areas being reclaimed, or stored in stockpiles until it can be used in reclamation. During the initial development of the expansion area, overburden will be stored in the stockpile location shown on Map C-2, on the north end of the mining area. Overburden may also be stored on the active mining level away from active mining, when being stored for short periods prior to reclamation.

Removal of trees and shrubs will not be performed within raptor nesting season, as determined by the local BLM office (typically February 15 – July 15). Vegetation clearing will not take place during the core breeding period for most migratory songbirds in the area (May 15-July 15), based on BLM guidance.

7.2 Topsoil and Overburden Storage

It is estimated that 400,000 CY of topsoil will be stripped and replaced during quarrying operations at the Mid-Continent Limestone Quarry. Most of this material will be directly placed on areas undergoing reclamation. An initial quantity of roughly 57,000 CY will be stripped from the starting quarry bench and stored north of the initial quarry cut, as seen on Map C-2. All topsoil and overburden stockpiles will be labelled with their contents to ensure they are not mixed.

Roughly 1.4 million CY of overburden are anticipated to be stripped over the course of the quarry's life, based on the subsoil thickness data from the NRCS soil survey. In most areas this overburden consists of weathered limestone. This material will be directly placed onto slopes being reclaimed as much as possible. Small amounts may be stored on the active mining level for short terms (<90 days) prior to final placement. Roughly 163,000 CY will be stripped from the starting quarry bench and stored north of the initial quarry cut as seen on Map C-2. This stockpile will be labeled "Overburden".

Both stockpiles will be constructed with a maximum slope of 4H:1V and be seeded promptly. The ground below the stockpiles will be stripped of its soil and vegetation for reclamation of that area. The seed mix used will be the same as that used in reclamation. These piles will be constructed using the standard earthmoving equipment available onsite. Stormwater controls will

be installed around all stockpiles upon construction to prevent erosion. These controls are described in the Stormwater Management Plan found in Appendix 3. Full reclamation of the site will use all topsoil and overburden stripped, so the stockpiles will not remain after mining and reclamation are finished. These piles will be used in both ongoing and final reclamation, depending on the needs of the operation at the time. Whenever these piles are not going to be added to or drawn from in a 90 -day period, they will be revegetated.

The topsoil stockpile currently located on the Mill level (west side) will either be relocated to another topsoil stockpile or it will be relocated on the mill level, regraded to 4H:1V or shallower and reseeded.

8. Fuel and Oil Storage Areas

Diesel fuel and various oils for use in mobile and stationary equipment will be stored and used on site. Secondary containment will be provided for all petroleum products. Any tanks or containers for secondary containment will either be constructed to exclude wildlife or have escape ramps to facilitate wildlife escape.

The local utility company will supply electrical power to the site. however, small generators may be used initially to supply power to the main facilities and to power portable plants. All generators will either be attached directly to power equipment or located in secondary containment. Fuel tanks will be located in the base of the generator or as separate tanks contained within larger livestock tanks for spill containment purposes. If the livestock tanks fill with stormwater or snowmelt, the water in them will be checked for sheen, and then pumped to the sediment pond. If sheen is discovered, the stormwater will be removed offsite for proper disposal and all fuels tanks within the livestock tank will be reviewed according to the Spill Prevention, Control, and Countermeasure (SPCC) Plan.

Since the planned total aboveground storage of fuel and oil in containers, of 55 gallons or more, will exceed 1,320 gallons, a SPCC Plan for storing and using petroleum products will be prepared and implemented for the site in accordance with federal and state regulations. A preliminary plan has been included in Appendix 3. This plan will be updated and maintained

throughout the life of the quarry to reflect the conditions on site. A summary of the anticipated fuel and oil storage at the site follows.

1) A pair of 10,000-gallon tanks for off-highway diesel will be located at the mill level. Each tank will be double-walled. A fuel truck will take diesel from these tanks to supply equipment on the active mining level.
2) A single, 2,000-gallon off-highway diesel tank will be located on the active mining level. This tank will be double-walled and mounted on a mobile flat trailer for easy transportation. This tank will provide fuel for active mining level equipment in the event of a disruption of the fuel truck from the mill level. Used oil in drums will be kept in a containment area at the mill level. Used oil will be transferred to the drums by hand or pump.
3) Small containers of oil and lubricants will be stored in the containment area with the used oil drums.

All tanks on site will have secondary containment with a volume of at least 110% the volume of the largest tank within said containment. Any open containment will also include extra capacity for large rain events. Containment details are covered in the SPCC plan in Appendix 3.

9. Quarry Office

A small office is currently located next to the mill on the mill level. RMR will build a more permanent office facility next to the mill building on either the east or west side. The office would house management and administrative staff, a training room, safety and first aid equipment, and other office equipment. It will be a steel structure on a reinforced concrete foundation. See Map C-4 for the approximate location, size, and shape of the structure. Precise dimensions will be provided to the BLM once the design is complete.

10. Designated Parking Areas

A gravel-lined parking area will be provided for employees and visitors immediately south of the quarry office. The parking lot will be sloped and graded to match the drainage plan for the rest of the mill level.

11. Quarry Access Roads

Access to the Mid-Continent Limestone Quarry is achieved via Transfer Trail (8149(F)). No additional access roads are proposed at this time. However, RMR is proposing improvements for two sections of Transfer Trail. Improvements include straightening, widening, placing of berms, concrete block barriers, rock barriers, or guardrails, and the installation of drainage structures such as sumps and culverts. Retaining walls are not currently planned for the road improvements but may be added if the final road design requires them. Designs for improvements to Transfer Trail can be seen in Appendix 2. Existing roads along the front slope of the hill will be used to access the active mining level, until they are mined out. The front slope road (the old drilling road that exists within the proposed disturbance boundary) will also be improved during the expansion, but to a lesser extent than Transfer Trail. Improvements to the slope road will include widening, placing of safety berms, and some drainage control structures. Access points from Transfer Trail to the quarry is shown on Map C-2.

Internal quarry roads will be built during mining to allow access up and down the final quarry slope for reclamation and monitoring activities. Examples of these roads can be seen on Map C-2. The exact route of the roads will be determined during mining based on the shape of the final bottom of the Leadville Limestone deposit. All roads will be built within either the Leadville Limestone formation or the underlying formation. These roads will be left following reclamation.

Exhibit 18 addresses access use and maintenance at the quarry.

12. Utilities

As part of the improvement of Transfer Trail, RMR Aggregates is requesting the ability to install additional utilities in the form of buried power, gas, potable water, and communication lines within the improved road. RMR will conduct or supervise the construction and maintenance of the utilities in the Transfer Trail utility corridor. Upon completion of the quarry life, RMR will empty all utility lines and conduit, cap them, and leave them in-place within the Transfer Trail utility corridor.

The local power utility (Glenwood Springs Electric) will be used to supply electricity to the site. the existing mill level has current power service provided by Glenwood Springs Electric. New

power connections will be installed in the improved Transfer Trail between Traver Trail and the mill level. This entire installation will be covered in this Plan of Operations, and RMR will maintain responsibility for these utilities throughout the life of the operation. Power for the active mining level will be supplied via electrical lines installed from the mill level up the pipe conveyor path. All power lines are shown on the C-2 maps.

Water, communications, and gas will also be connected to the quarry from available utility connections at the intersection of Transfer Trail and Traver Trail. The new utility lines from this point to the mill level will be buried in the improved Transfer Trail utility corridor.

The quarry will be supplied with potable water via a water line buried in the improved Transfer Trail route. Non-potable water will be pumped from the mill level to the active mining level via the conveyor route for use on bench as a dust suppressant or for other needs. Should pumping not be possible for a period along the conveyor route, water will be transported to the active mining level using a water truck and the front side mine access road. Non-potable water will come from offsite sources, such as a well, river draw point, or a major utility. Non-potable water will be hauled onsite as needed by a water truck. A shower house with toilets will be built on the mill level. Sewer for this facility will be via a large-scale containment tank on the mill level that would be regularly serviced by a contractor. The structures shown on Map C-4 will be serviced by the utilities brought to the bench. Approximate size and location of said structures can also be seen on this map.

13. Solid Waste Storage

A roll off container for disposal of trash will be located next to the quarry office and mill. The trash will be routinely picked up by a contracted service company and disposed of at an approved landfill. No landfills will be constructed on site. Scrap metal will be stored in a bin and/or on pallets near the shop until it can be picked up for recycling. Used batteries and tires will be stored in the same area and will be picked up and recycled by vendors.

14. Maps and Conceptual Design

General Location Map (located in Exhibit 2)

The following Maps and Figures are included in Appendix 6 of this application:

- Map C-1 Baseline Conditions
- Map C-2 Mining Plan
- Map C-2B Stage 1
- Map C-2C Stage 2
- Map C-2D Stage 3
- Map C-2E Stage 4
- Map C-2F Stage 5
- Map C-3 Cross Sections
- Map C-4 Mill Facilities
- Map C-5 Sump and Pond Detail
- Map C-6 Typical Bench
- Map F-1 Reclamation Plan
- Conceptual Design - Transfer Trail Improvements

15. Water Management

15.1 Quarry Surface Water Control

All drainage area runoff immediately around the quarry disturbed area will drain into the quarry itself. During all quarrying operations, the active mining level will have a sump to collect runoff during storm events. This will be done using a combination of natural and constructed berms and barriers, grading of the bench into the hillside at an approximately 1% grade, and sump excavation into the quarry bench below the active mining level. Map C-2 shows the typical location of some of these storm water controls. Stormwater controls for the improved Transfer Trail are shown in Appendix 2.

All sediment ponds and sumps will have at least one internal side slope of 2H:1V or shallower to facilitate wildlife egress. Maintenance of the sumps will be conducted on a monthly basis. Active mining level sumps will not require regular clean out as they will be excavated and rebuilt as mining progresses.

15.1.1 Surface Water

The systems described in this section will replace the current stormwater control systems found at the quarry. Table 5-4 shows a breakdown of the existing stormwater systems and identifies which ones will remain, which ones will be reclaimed, and the new ones coming online. All designs and plans found in this Plan of Operations apply to the remaining and new stormwater control systems. See the Stormwater Management Plan and associated maps for details of said control structures.

Table 5-4 Stormwater Structures

Stormwater Structure	Remain/Replace/ Remove/New	Comments
Existing mill level sediment pond and rock-lined discharge	Replaced	A new mill level sediment pond and discharge will be installed once the mill level is expanded.
Sediment catchment and rock-lined discharge along lower quarry access road between quarry gate and mill level	Reclaimed	The new mill level grading will all drain to the sediment pond. The catchment and rock-lined discharge will be removed and the area where they were located will be incorporated into a widened lower quarry access road.
Sediment catchment and rock-lined discharge at lower switchback on Transfer Trail	Replaced	During the construction of the improved Transfer Trail, a new sediment pond and discharge will be installed near this location.
Active Mining Level Sump	New	Constructed and maintained on the active mining level during the expansion's life
Diversion Channel	New	Installed upon expansion approval
Stormwater Control Berms	New	Berms will be installed on the mill level and at daylighting portions of the active mining level to prevent offsite sediment discharge.
Discharge points	New/Retained	One at the diversion channel outlet, one at the mill level sediment pond outlet, and one at the lowest point of Transfer Trail

Stormwater collected on the active mine level will either evaporate or be used for dust suppression. If the water is used for immediate dust suppression, a pump will be placed within the sump, and the stormwater will be pumped to a water truck that will proceed to water the needed areas on the active mining level. By using a broad area for a sump, the resulting pool of water will always be shallow, encouraging evaporation if it is not used for dust suppression on the bench. All stormwater containment structures will be inspected and maintained monthly. All

quarry-based structures will be removed upon reclamation. Only stormwater structures associated with Transfer Trail will remain. Further information on the inspection and maintenance of these stormwater structures can be found in the Stormwater Management Plan (SWMP) in Appendix 3. Along the daylighting stretches of the benches (east side; see Map C-2) a five-foot-tall berm will be maintained to trap stormwater.

The quarry slope roads will drain to the lowest active mining level during mining. The access roads will drain to their respective portions of Transfer Trail and use the stormwater control structures on those roads (ditches, sumps, etc.). No area of the site will drain to undisturbed ground without first passing through a stormwater control structure and sediment trap.

15.1.2 Worst Case Runoff Containment

This section describes the overall runoff containment plan for the site. See the SWMP in Appendix 3 for details of stormwater management, controls, and BMPs.

The 100-YR 24-HR storm event for this site is 2.82 inches.[2] The worst-case stormwater runoff scenario is when most of the quarrying and reclamation is complete, and the active mining level must hold all the stormwater for the entire slope area above it. At this time, approximately fifteen acres of active mining level will be disturbed. Since the deposit bottom is dolomitic, a runoff curve number of ninety-five is assumed for the bench disturbance. A curve number of 95 or greater is typical for disturbed ground. An area of 14.5 acres of worst-case disturbance area represents the mill level and an active mining level located immediately above the mill level.

The reclaimed ground is considered to have the same hydrologic conditions as the pre-quarry soils. Therefore, the curve numbers are based on the vegetation typical of the area and the soil hydrologic group identified in the NRCS Soil Report in Exhibit 10. Using curve numbers listed in the NRCS Technical Release 55, and the lateral extents of the soils, a composite curve number is obtained. The total drainage area is greater than the quarry disturbance area as it includes portions of the natural topography that will drain to the quarry operations.

[2] NOAA's National Weather Service, Hydrometeorological Design Studies Center, Precipitation Frequency Data Server (PFDS). https://hdsc.nws.noaa.gov/hdsc/pfds/index.html

Based on these inputs, the runoff total for the 100-YR 24-HR storm event can be calculated for the worst-case scenario.

Runoff Curve Number and Runoff **Wed May 30 16:44:31 2018**
Project: Glenwood Springs Quarry

Project: Baseline Runoff Conditions **By: B Langenfeld** **Date: 05/30/18**
Location: Mid-Continent Quarry **Checked:** **Date:**
Present

1. Runoff Curve Number (CN)

Cover description	CN	Soil Group	Area (Acre)
Pinyon-Juniper (Fair)	73	C	207.064
Pinyon-Juniper (Fair)	58	B	169.772

CN (weighted): **66.2**
Total Area: **376.836 Acre**

2. Runoff

Return Period:	100	YEAR
Rainfall, P:	2.82	in
Runoff, Q:	0.4702	in
Runoff Volume:	14.7651	Acre-Ft

The baseline runoff for the entire quarry area is approximately14.8 acre-feet. The total drainage area is 376.84 acres, which is greater than the disturbance area of the quarry. This is due to the drainage area extending further uphill than the quarry does. Map C-2 shows the extents of the drainage area.

Runoff Curve Number and Runoff **Wed May 30 17:05:25 2018**
Project: Glenwood Springs Quarry

Project: Worst Case Runoff Conditions **By: B Langenfeld** **Date: 05/30/18**
Location: Mid-Continent Quarry **Checked:** **Date:**
Developed

1. Runoff Curve Number (CN)

Cover description	CN	Soil Group	Area (Acre)
Pinyon-Juniper (Fair)	73	C	192.564
Pinyon-Juniper (Fair)	58	B	169.772
Quarry Floor	95	C	14.500

CN (weighted): **67.1**
Total Area: **376.836 Acre**

2. Runoff

Return Period:	100	YEAR
Rainfall, P:	2.82	in
Runoff, Q:	0.5014	in
Runoff Volume:	15.7443	Acre-Ft

Total stormwater runoff during the worst-case scenario is 15.7 acre-feet. This worst-case bench level (14.5 acres) is near the end of the quarry life, when the largest portion of the site drains into the active mining level. It will be a bench similar to that shown on Map C-2F. Since the entirety of the area above the active mining level drains to it during operations, the volume of the active mining level must be greater than the amount of runoff. There will be larger active mining level areas, but they will be near the top of the proposed expansion area and have significantly smaller overall areas draining to them.

The active mining level will be bound by a natural barrier of at least twenty-five feet in height or a stormwater berm that it is at least five feet tall. Over 14.5 acres, this provides in excess of 72.5 acre-feet of stormwater storage (14.5 acres x 5 foot minimum). This is enough volume to store the stormwater runoff of 15.7 acre-feet in this scenario.

Runoff Curve Number and Runoff
Project: Glenwood Springs Quarry

Project: Mill Level Runoff Conditions By: B Langenfeld Date: 03/01/19
Location: Mid-Continent Quarry Checked: Date:
Developed

1. Runoff Curve Number (CN)

Cover description	CN	Soil Group	Area (Acre)
Quarry Floor	95	C	12.127

CN (weighted): 95.0
Total Area: 12.13 Acre

2. Runoff

Return Period:	100	YEAR
Rainfall, P:	2.83	in
Runoff, Q:	2.27	in
Runoff Volume:	2.298	Acre-Ft

Stormwater runoff at the mill level will be collected within a sediment pond located at the southwest portion of the mill level, as shown on Maps C-2 and C-4. The sediment pond has a capacity of 3.0 acre-feet. This is enough to hold the entire 100-Year event runoff from the mill level, which is 2.3 acre-feet. The discharge from this sediment pond will drain to the NPDES discharge point for this site. All surrounding disturbed areas on the mill level drain to this sediment pond.

15.1.3 Groundwater

Quarrying of the Leadville Limestone is not anticipated to interact with any regional groundwater aquifers. Deposits of this type can contain perched aquifers with limited extents. Any of these that are encountered within the Leadville Limestone during quarrying activities will be mined through. Water generated in such a situation will join with surface water on the active mining level and be handled with surface water control systems. Quarrying operations at the Mid-Continent Quarry are exclusively mechanical in nature; this means that there are no chemical treatments taking place. Therefore, the only environmental risk to any interaction with perched aquifer water is one of sediment discharge. The surface water controls prevent the discharge of sediment from the active mining level.

Further discussion of the hydrology of the site and surrounding region can be found in Exhibit 13.

16. Quarrying Schedule

Quarry life is estimated at approximately twenty years. The Leadville Limestone deposit is estimated to be a minimum of 100 million tons in size.

Table 5-3 shows the approximate schedule of quarrying operations at the Mid-Continent Limestone Quarry. The quarry life is based on a projected five million tons per year of quarrying throughout the life of the proposed operation. This production rate will fluctuate depending on market dynamics. Therefore, this timetable should be treated as a general estimate.

Table 5-5 Quarrying Timetable

Task	Description	Time (Years)
1	Improvement of Transfer Trail	0.3
2	Construction of pipe conveyor on surface	1.0
3	Topsoil stripping from top of the expansion area	0.2
4	Development of first quarrying bench	0.3
5	Excavation of Leadville Limestone. Individual bench life will vary due to horizontal extents and production level.	20
6	Final reclamation of mill level	3.0
	Total	**24.8**

RECLAMATION PLAN EXHIBIT 6

1. Reclamation Plan Goals

The goals of the reclamation plan for the Mid-Continent Quarry area as follows:

- Preservation of year-round access to and year-round recreational parking for the White River National Forest;
- Creation of a post-mining landscape that provides suitable wildlife habitat;
- Protection and preservation of visual aesthetics (Visual Resource Manual [VRM] Class II); and
- Accommodation of existing rights-of-way.

Highlights of the mining and reclamation plan that accomplish these goals are described in the following paragraphs. Detailed descriptions of mining, reclamation and natural resource management activities are provided categorically below in the permit application.

Following resource removal, the mining benches will be backfilled and graded to final topography. The reclamation plan will create a diverse mosaic of native grasses and forbs, intermingled with patches of shrubs, that creates wildlife habitat similar in character to pre-existing conditions. Topsoil will be preferentially live handled with plant propagules contained in the soil accelerating the establishment and growth of the reclaimed plant community. Shrub patches will be enhanced by the planting of a woody species seed mixture on about 10% of the area that is reclaimed each year. Additionally, 50 one-gallon containerized transplants will be planted within areas reclaimed each year to enhance wildlife habitat. The woody plant enhancement seed mixture and transplants will be placed selectively in locations that are expected to optimize establishment and growth.

First and foremost, the reclamation plan has been formulated to reconstruct the texture and colors that existed in the pre-mining landscape. Texture and color reconstruction processes are addressed in a variety of ways throughout the reclamation process. Reclamation activities and their contributions to producing textures and colors within reclaimed lands that resemble the pre-mining landscape and preserve visual aesthetics are detailed below.

Backfilling and grading will reconfigure the land to approximate original contours and blend the disturbed area into the surrounding undisturbed area. During this process larger boulders may be encountered that can be configured horizontally to form rock outcrops. Boulders may be placed from 1 to several layers deep and will be of a length that mimics adjacent landforms. Topsoil will be placed around the perimeter of such outcrops after they are placed.

A plant growth medium will be reconstructed on graded lands using soils salvaged from the site; it will not be imported from off-site. From a visual aesthetics standpoint, the color and texture of these soil materials will not be affected by the soil salvage and redistribution process. The soils on site are rocky and this content will not be altered.

Live-handling soil will transfer viable native plant propagules and seed directly onto reclaimed land. Plant reproduction from these transferred sources will create vegetation that has the same texture and color as was existing in the pre-mining vegetation communities. This process will accelerate the growth of vegetation that will in turn significantly reduce linear features that might disrupt visual aesthetics. Accelerated growth of woody plants will occur. Due to these benefits, direct transfer of soil will be performed whenever possible.

Selective-live-handling of soil will be performed when RMR identifies woody plant stands of aspen, serviceberry, chokecherry and Gambel oak in the pre-stripping area that are a suitable size for transplanting (4 feet or less in height). These species will be excavated to maximum soil depths of 3 feet, selectively handled and carefully placed in clumps within the reclaimed area. The goal will be to recreate the semi-random nature of vegetation clumps that exists in the pre-mining vegetation communities in terms of their visual color and texture. Selective-live-handling will be performed on an opportunistic basis as the presence of these species varies within the vegetation community being disturbed.

Transplanting of containerized stock will be performed to further enhance reclaimed plant community texture and color. Transplants will be grouped in clumps to augment selectively handled woody species (described above). Transplants will grow more rapidly than woody plants established by seed and, in concert with volunteer woody plants regenerating from live-handled

topdressing, will serve to more rapidly create textures and colors in the reclaimed plant community and diffuse the visual linearity of features created during the reclamation process.

Broadcast seeding uses plant species native to the region that will further enhance the texture and color of the reclaimed vegetation communities. Broadcasting seed optimizes the interstitial distance between seedlings and increases their ability to germinate and successfully establish. It prevents the seed from being planted in rows which in turn increases randomness of plant distribution and improves visual aesthetics.

Water harvesting and erosion control measures will be used to harvest moisture and control erosion while vegetation establishes. The primary measures include soil gouging and intermittent contour furrowing. Slope steepness will dictate placement of these features. Care will be taken to avoid the creation of visible horizontal lines when they are constructed to the extent this is physically possible. The contour furrows will be interrupted at intervals between 50 and 75 feet. Interruptions will be about 3 to 5 feet wide and staggered to avoid creating vertical “lines”. During the construction process it is expected that larger rocks will be unearthed. These rocks will be left on the surface and will serve to disrupt the linear nature of these control measures. These physical features are temporary and will “melt” into a rough planar surface over time with soil movement. All these steps will be taken with the goal of recreating the color and texture of the pre-mine site in mind.

The concurrent reclamation onsite will lead to active mining levels being reclaimed in roughly 50-100 tall sections down the face of the south facing hill that houses the deposit. Figure 6-1 shows the approximate extents of each reclaimed bench on the hillside. Figure 6-2 shows a conceptual cross section of the concurrent reclamation process. Figure 6-3 shows the typical sequence of this reclamation following mining. This will be repeated down the quarry slope, covering all the areas that will be mined out at Mid-Continent.

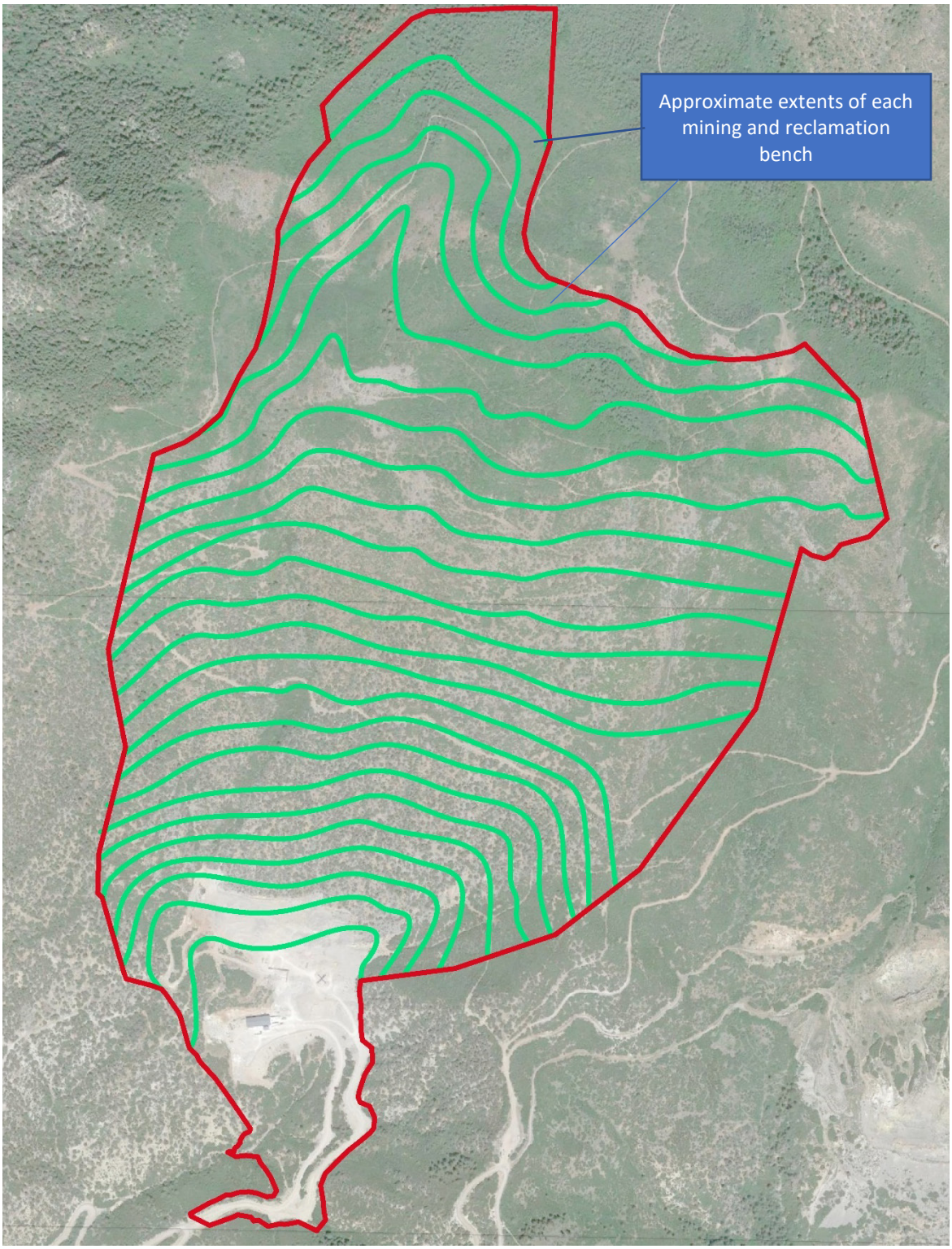


Figure 6-1 Approximate Extents of Each Reclaimed Section

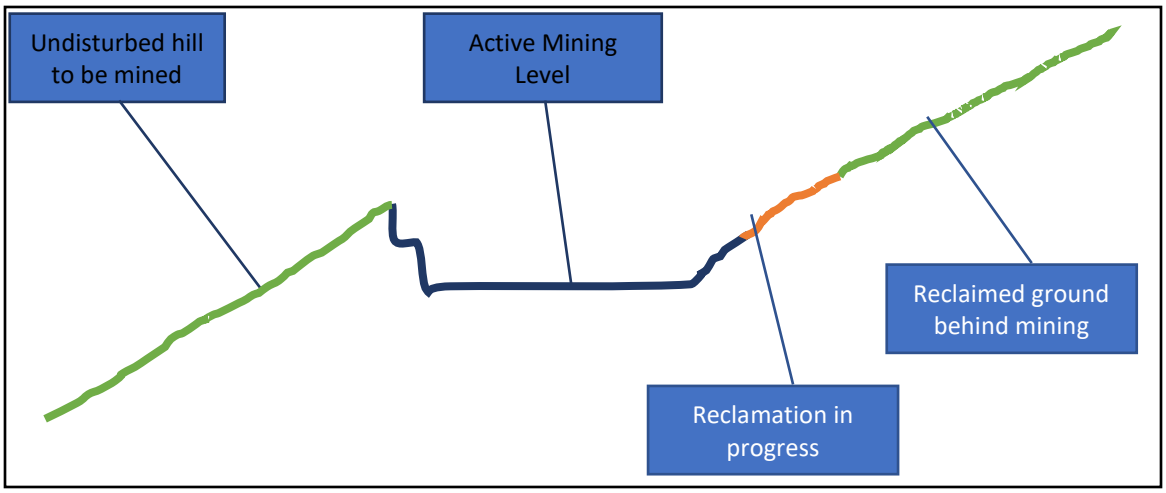


Figure 6-2 Conceptual Concurrent Reclamation Cross Section

Figure 6-3 Typical Bench Reclamation process

2. Reclamation Plan & Visual Aesthetics

The reclamation plan assembled in this exhibit will accomplish the visual goals by protecting and preserving the visual aesthetics of the area according to BLM VRM Class II. The following elements are key to the creation of the visually aesthetic reclaimed landscape:

- The topographic nature of the quarry area will be preserved. The final reclaimed topography will be set back into the slope, but it will be at the same slope gradients that existed prior to disturbance. The perimeter of the quarry disturbance will be blended into the undisturbed area so there will be no topographic boundary visible between them.
- Following removal of the resource the quarry benches will be backfilled to final topography.
- Some rock outcrops will be left that simulate these features in adjacent undisturbed areas.
- Topsoil will be salvaged and direct hauled to reconstruct a suitable plant growth medium. The soils in the reclaimed area will be of the same color and texture as existing prior to mining.
- Vegetation propagules and viable seed in the soil seed bank transferred by the direct haulage of topsoil will generate and germinate and establish and grow vegetation that existed on site prior to disturbance. This vegetation will be enhanced with the seeding of native plant species local to the mine site and seeding portions of the site with woody plant enhancement seed mixtures to create the shrub clusters depicted in the simulation. This will also preserve the color, texture and form inherent in the vegetation within and adjacent to the reclaimed land.
- The development of one or two benches when mining begins at the top of the reserve will be visible. However, mining of the reserve will be hidden by the Natural Visual Barrier for the remainder of the mining period. As mining progresses young reclamation will be visible above the Natural Visual Barrier. These young reclamation areas will experience rapid vegetation growth and will quickly blend in with adjacent undisturbed vegetation.

- Reclamation operations will avoid to the extent reasonable creating linear structures or features in the landscape that would appear unnatural. Some short-term linear features will be constructed on some reclaimed slopes to control erosion and harvest precipitation immediately following topsoil reconstruction. The rockiness of much of the topsoil will break up the linear nature of these features, as well as the growth of grasses, forbs and shrubs will serve to segment them in the viewshed. Given the relatively steep reclaimed slopes and soil textures and their small vertical dimensions, it is expected that these features will fill with sediment over a relatively short period of time. During the first years of reclamation they will essentially be invisible to the casual observer in Glenwood Springs.
- The limits of disturbance are not linear, but rather will be polymorphic making the area more aesthetically acceptable.
- As reclamation matures disturbance boundaries will become less pronounced as adjacent undisturbed lands create seed rain and wildlife uses the area that transports seed into the reclaimed area that produces additional vegetation native to the area.

Mining and reclamation activities will proceed downhill. Achievement of the visual simulation will occur in phases as the quarry is mined and reclaimed. In the longer term the reclamation plan will create an aesthetically pleasing landscape that blends with the surrounding area and provides valuable wildlife habitat.

Following mining, backfilling and grading operations will create a slope topography that is rough and blends in with the surrounding undisturbed area. Some non-mineable rock exists within the reserve and this will be left as outcrops that mimic those found in undisturbed areas adjacent to the quarry area. The topsoil that is in place will be salvaged and placed back on the surface, so the texture and form of the mined area will be similar to the pre-disturbance conditions. The reclamation process will recreate the existing character of the landscape as much as possible. Only native plant species found within the area prior to mining will be used in the reclamation process. Propagules in live handled soils, the permanent reclamation seed mixtures and transplants used to establish wildlife habitat following mining will create a vegetation community capable of providing cover, nesting habitat, browse and forage for the wildlife

species known to use this area. The final topography will be set back into the hillside as much as 150 feet. This change in surface location will become unnoticeable as the vegetation community establishes and grows. The materials used for reclamation will repeat the basic elements of form, line, color and texture found in the predominate natural features of the characteristic landscape. Detailed descriptions of the mining and reclamation process are provided categorically below in this permit application.

RMR Mid-Continent Quarry reclamation will involve backfilling and grading mined out areas to achieve planned post-mining topography, reconstructing soil profiles to provide a suitable plant growth medium, reconstructing drainages to safely convey storm water runoff through and off of the quarry site and establishing vegetation communities capable of supporting the designated post-mining land uses. Reclamation will be conducted contemporaneously with mining. The Reclamation Plan is based on the following assumptions:

- Disturbed areas will be reclaimed;
- Newly excavated materials will be placed into previously excavated, un-reclaimed areas wherever feasible. Otherwise, materials will be placed in temporary stockpiles and stabilized;
- No stockpiles will remain at the conclusion of mining and reclamation operations;
- Reclaimed topdressing materials include topsoil (assumed to average approximately 6 inches in thickness), plant growth medium (assumed to average approximately 42 inches in thickness), and unconsolidated backfilled fines material below the soil horizon (variable thickness);
- Reseeding will follow completion of materials placement; and
- Revegetation efforts will be monitored and adaptively managed to achieve the desired vegetation community.

The final reclamation land use of the Mid-Continent Quarry is wildlife habitat. The reclamation plan will establish a vegetation community that over time will have the same characteristics as the pre-mine wildlife habitat.

3. Final Closure

Final closure will involve work at three distinct operation areas: the active mining level, the material transport system, and the mill level. Final closure of the mining benches will be performed contemporaneously throughout the mining operation. Final closure of the mill level will be performed when processing of mining products is no longer needed. The material transport system will be reclaimed in stages as quarry operations proceed downhill. Description of the final closure and reclamation process is provided for each area below.

3.1 Active Mining Level

Since reclamation of the active mining level is contemporaneous with mining, final closure of the active mining level technically begins with the initial bench and continues until the final bench is mined out. Reclamation of each active mining level will be conducted sequentially as follows:

a) Prior to all other mining activities, the mining area to be disturbed each year will be surveyed and any noxious weeds found growing within the disturbance area will be treated or removed and properly disposed of.

b) Woody material that would interfere with topsoil salvage will be grubbed from the bench outslope. This will be performed as mining operations proceed downhill in a manner that minimizes disturbance, avoids contamination of in place topsoil and minimizes viewshed impacts. Woody material will only be removed during the period from July 15 to February 15 to avoid impacting nesting birds. Woody material will be chipped and spread across the topsoil removal area.

c) Overburden and/or processing fines from ongoing stripping will be placed in the bench where resource extraction has been completed above the active mining level. Backfilled areas will be graded to final topography, leaving room for topdressing (subsoil and topsoil reconstruction).

d) Topsoil (the A horizon or 6 inches in depth whichever is greater) and subsoil (18 inches or to bedrock whichever occurs first) will be sequentially salvaged. Soils may be

salvaged from pre-stripping areas any time during the year when soil moisture contents are suitable for handling. Topsoil will be live-handled and reconstructed to the target depth. Topdressing will be live-handled whenever possible to promote generation of vegetation from seed and propagules that it contains. The only significant time period when topsoil may need to be stockpiled is when the first two benches are disturbed at the top of the quarry area. Topsoil and subsoil that can't be live-handled will be placed in designated stockpiles and protected from wind and water erosion. When these stockpiles remain inactive for more than one growing season, they will be seeded with the temporary cover seed mixture. This seed mixture is comprised of native species that are faster growing and rhizomatous.

A field moisture capacity hand test will be used to determine when soils are too wet for salvage. This test is easily performed in the field. A sample of topsoil is obtained and squeezed by hand. If soil moisture is released, then the soil is too wet for salvage. The topsoil is too dry for salvage when a handful disintegrates and turns to dust when handled. Dry soils can be "watered" to enable salvage when ongoing mining operations require their removal. Equipment used for dust control at the mine will be used for this purpose if the need arises.

For the first mining benches, topsoil and subsoils required for plant growth medium reconstruction (topdressing for a final graded bench) will be stripped and segregated into separate soil stockpiles and stored for use on the final bench(es) at the bottom of the quarry area. A greater area of topsoil removal will be required to make room for live-handling as bench reclamation proceeds. This is required to allow room for backfilling and grading, and subsoil reconstruction prior to live-handling placement of topsoil. The stockpile areas can be seen on Map C-2.

e) Topdressing will be analyzed, and appropriate amendments will be obtained, spread, and incorporated into the soil profile to recommended depths. It is anticipated that this will be accomplished using one of the following methods:

a. On regraded slopes that are 3h:1v or flatter, ripping along the contour with a bulldozer equipped with a 3 or 5-gang ripper will be performed. After the soil is replaced required amendments will be broadcast at targeted rates across the surface. After amendment application a bulldozer will be used to rip and cross-rip the amendments into the soil. This will result in adequate incorporation of the amendments, alleviate compaction, optimize the potential for stormwater infiltration, and create a roughened surface that will minimize the potential for topsoil slippage on the reclaimed slope. The final soil ripping pass will be performed along the contour. Topsoil will then be live-handled over the area and required amendments applied to its surface. Contour ripping will then be performed to a target depth of 6 inches, with a maximum spacing of 24 inches between the furrows. This sequence of operations will leave a rough surface that is an ideal seedbed for native plant species. Micro-niches are created where seed can lodge, germinate and establish. The roughness causes surface winds to "tumble" along the ground surface which reduces their velocity and potential for soil particle saltation and generation of wind - borne dust.; or

b. Using loaders or track hoes to mix topsoil and soil materials with amendments at a mixing area prior to topdressing reconstruction on the backfilled and graded bench. This method will be used on slopes between 2h:1v and 3h:1v where ripping along the contour is not physically possible. Following placement of amended soil materials, the surface of the reclaimed slope will be gouged with a track hoe or equivalent equipment or tracked with a bulldozer (depending upon slope steepness and machine capabilities) after topdressing reconstruction to create soil roughness for water harvesting, water and wind erosion control, and create micro-niches for seed lodging, germination, establishment and growth.

f) The permanent reclamation seed mixture will be broadcast seeded at the target PLS density rate of 60 PLS per square foot into the reclaimed slope seedbed. On about 10% of

each seeding area the woody plant enhancement seed mixture will be broadcast at one or more locations where development of woody plant clusters is desired. These seeding enhancement sub-areas will be mapped to determine the effectiveness of planting this seed mixture.

g) Each year within the reclamation area, 50 1-gallon containerized woody plants will be transplanted. This transplanting will be performed following broadcast seeding operations.

h) Immediately following seeding, an English tine harrow (or an equivalent harrow) will be used to lightly back drag the seedbed and set the seed.

i) One of the approved mulches (WoodStraw, hydromulch with tackifier, hay mulch, or cereal grain straw mulch that is crimped) will be applied at their appropriate target rate. Selection of the type of mulch will be determined by slope angles; WoodStraw mulch will be used preferentially over the other mulch types.

j) Reclamation monitoring will commence on the reclaimed area during the second full growing season. Monitoring will include revegetation success and inventory for noxious weeds (List A and B). The area will also be monitored for adequate soil stability (excessive topdressing erosion).

k) If monitoring demonstrates that further management is needed, specific plans will be formulated, submitted to BLM for approval and implemented following receipt of BLM approval. Monitoring is described in Exhibit 16.

3.2 Material Transport System

Final closure of the pipe conveyor will be conducted as follows:

a) Remove last segment of pipe conveyor.
b) Revegetate remaining disturbance of pipe conveyor corridor.
c) Begin post-reclamation monitoring.

3.3 Mill Level

Final closure of the mill level will be conducted as follows:

a) Remove all structures and facilities on the mill level, including mill, office, shower house, storage containers, truck washouts, etc.
b) Backfill and grade the mill level to the final required topography.
c) Place Topsoil and revegetate the mill level to the permanent ecological condition.
d) Remove all fences, gates, and other access controls.
e) Remove stormwater control structures once erosion control is achieved by revegetation and the final drainage patterns are in place.
f) Begin post-reclamation monitoring.

Almost all the quarry areas will require at least two years of monitoring after the completion of closure and reclamation activities.

3.4 Reclamation Equipment

Reclamation at the Mid-Continent Quarry will, at a minimum, use the same earth moving equipment as the mining process. A list of this equipment can be found in Exhibit 5, section 5. Additionally, revegetation equipment such as tractors, seeders, ATV's, and others will be used.

3.5 Reclamation Areas

Of the roughly 447 acres project area, approximately 320 acres will be disturbed and reclaimed during mining.

Table 6-1 Reclamation Areas

Surface Disturbance	Area (acres)
Quarrying benches	281.1
Mill level	23.0
Roads[3]	5.7
Initial Stockpile Areas	9.6
Pipe Conveyor Route	1.5
Total	320.9

Various roads will be left in place following reclamation.

[3] Road disturbance is approximated for this application based on preliminary road designs.

3.6 Transfer Trail Reclamation

Transfer Trail, the local public access, will be modified which will result in construction of new sections, modification to some and abandonment of others. Reclamation plans for the quarry will also be used as appropriate to reclaim disturbances associated with the new Transfer Trail and any abandoned sections of the old Transfer Trail. All utilities buried in the new Transfer Trail south of the quarry access will be capped/terminated and left in place. All improvements made to Transfer Trail including widening, grade improvement, sediment and drainage control features, and safety berms will be left in place following the closure of the quarry. There is no plan to reclaim those items as they will continue to be used by the public and maintain their beneficial qualities.

4. Reclamation Timetable

The reclamation timetable below (Table 6-2) is based on the projections for the quarry and the amount of reclamation that is needed after quarry shutdown. Once the quarry is permanently shut down, the remaining reclamation is expected to take approximately thirty-six months. This includes the time to complete the reclamation activities and the minimum monitoring time to ensure reclamation success.

Table 6-2 Reclamation Timetable

Task	Description	Time (Years)
	Improvement of Transfer Trail	0.3
	Pipe conveyor on surface	1.0
	Topsoil stripping from top of the expansion area	0.2
	Development of first quarrying bench	0.3
	Excavation of Leadville Limestone. Individual bench life will vary due to horizontal extents and production level.	20
	Final reclamation of mill level	3.0
	Total	**24.8**

5. Dismantle Buildings and Structures

Reclamation will include the removal of all buildings and other structures. The following structures will be removed at the Mid-Continent Limestone Quarry:

5.1 Quarry

- Mill structure (steel structure on twelve-inch concrete foundation)
- Fuel storage area
- Conveyors
- Truck loading facilities and truck scales

All of these structures can be found on Maps C-2 and C-4.

5.2 Utilities

All utility infrastructure north of the mill level will be removed as part of reclamation. Conduit and pipes installed in Transfer Trail will be left in place after mining operations are complete. Lines and cables within the conduit and any water or natural gas within the pipes will be removed. Pipes and conduit will be capped at both ends. Should the BLM wish to maintain the access to utilities at the mill level, RMR could leave the lines and connections in place. This option would require assigning these utilities to the BLM or another third party with a right-of-way.

5.3 Pipe Conveyor

The pipe conveyor system will be reclaimed in the same manner as other disturbed areas at Mid-Continent. Little to no earthwork is anticipated for this reclamation due to its minimal required disturbance.

6. Backfill Mill Level Sediment Pond and Remove Stormwater Structures

The sediment pond on the mill level must be backfilled. The estimated fill volume is 2,500 cubic yards (CY). Fines from quarrying of the last remaining benches and topsoil from the mill area stormwater berm will be used to backfill. Roughly 3,000 CY is expected to be available from these berms. Stormwater sumps on each bench will be removed by the quarrying process through the life of quarry. Stormwater berms shown on Maps C-2, C-4, and C-6 will be removed as

revegetation is adequately established behind them. Topsoil from all berms will be used to reclaim nearby areas.

7. Quarry Slope Roads

Some slope roads will remain in the quarry following mining activities and reclamation. These roads are shown on Map F-1. They will be installed during the concurrent mining and reclamation of the quarry to facilitate long term access to the reclaimed slopes for monitoring. These roads will be cut to drain into the hillside, and then downhill. As they are replacing portions of 8149F, they will be built to meet BLM requirements. Check dams will be installed every 500 feet on the interior ditch. All other quarry roads will either be mined out during the life of the quarry or reclaimed in the same manner as the surrounding slopes. This includes placement of overburden and topsoil, and then revegetation. See Map C-2 for the road design cross section.

7.1 Reclaimed Roads

All roads to be reclaimed at the Mid-Continent Quarry will be reclaimed according to the Bureau of Land Management Solid Materials Handbook. Specifically, all road reclamation will be conducted in the following manner:

- Remove all surfacing present
- Mulch and seed any exposed cut and fill slopes
- Remove culverts and restore drainage to its pre-disturbance configuration
- Outslope the road surface
- Rip, scarify, and revegetate according to the revegetation plans for other quarry areas

8. Overburden Replacement

Overburden onsite is expected to vary and consist mostly of weathered limestone either just below the topsoil or exposed as part of rock outcrops. This material will be placed on the quarried slopes to a depth of one to two feet. Processing fines from the active mining level will be used to augment this depth. Processing fines will likely be 15% of the mined material and based on the anticipated production at the Mid-Continent Quarry (5 million tons per year),

Roughly 375,000 CY of fines will be produced annually. The minimum necessary overburden needed to replace what is stripped in a year is 70,000 CY. No import of material will be necessary.

Overburden storage for concurrent reclamation will be within the active mining level. See Map C-6.

9. Post-Reclamation Site Drainage

The final drainage patterns for the entire operation will be very similar or identical to the pre-quarry drainage patterns. The drainage directions created in post-reclamation conditions can be seen on Map F-1. In general, runoff from stormwater will flow downhill to the south, as it does now, eventually entering the natural drainages that exist at the toe of the current quarry disturbance. The new presence of cliffs and the slope road will lead to small local changes in drainage, but the overall pattern will remain the same. The new cliffs will mimic natural topographic features as much as possible. Water quality will be protected during reclamation revegetation periods using short term sediment controls such as hay bales and silt fences as well as the presence of the sumps on the active mining level and the mill level. Both benches contain stormwater from their upland drainage areas. Stormwater control during ongoing operations is outlined in detail in the Stormwater Management Plan (SWMP) in Appendix 3.

Until final reclamation release has been achieved, all stormwater that enters the disturbed area will either be contained onsite for evaporation and recycling or pass through approved NPDES discharge points. These points will be monitored regularly according to their governing Colorado Department of Public Health and Environment discharge permit.

10. Backfilling, Grading & Post-mining Topography

Mining and reclamation activity will take place concurrently over the course of the life of the Mid-Continent Quarry. This prevents any scenario where reclamation earthwork is needed for the entire site at once. Annual estimates are included based on the quarry production rate. Roughly 400,000 CY of topsoil is estimated to be stripped and replaced, with an anticipated 1.4 million CY of overburden being stripped and replaced over the life of mine. Roughly 20,000 CY of topsoil and 70,000 CY of overburden will be handled annually, assuming a 20-year quarry life. It is anticipated that the overburden and topsoil onsite will be enough to achieve reclamation. No topsoil will be exported from the site. Processing fines generated by the crusher on the active mining level will be used as overburden in backfilling to ensure that final stable slopes are installed.

The entirety of the site will be reclaimed to slopes no steeper than 2H:1V. Map F-1 shows reclamation slopes. These will be built during mining. Fine material, from the processing circuit on the quarry bench, will be placed on the backslope and used as recontouring material. This will be accomplished with front-end loaders, bulldozers, haul trucks, and other mining equipment present on the site.

The mining plan creates a horizontal bench containing all mining activity within a roughly 15-20-acre area that progresses down the quarry face from the top (north end) to the bottom (south end). This active mining level is bound by the slope of the hill to the north, the slope of the hill to the west and east, and the Natural Visual Barrier to the south. A configuration of this type traps all stormwater runoff from the disturbed and reclaimed areas nearby on the active mining level. During most of the quarry life, no stormwater ditches or other controls will be necessary as all disturbed area associated with the active mining level drains to the bench itself. Similarly, at the mill level, all disturbed areas for this part of the site drains internally to the mill level sediment pond. This is due to the topography of the surrounding ground draining toward the mill level. The C-2 maps show this configuration, including identifying the drainage direction in and around the quarry disturbance.

11. Topsoil & Subsoil Handling

In this document the following terminology is used:

- Topsoil: The A and E horizons and subsoil B horizon that will be salvaged for topdressing reconstruction.
- Plant growth medium: Fines created from resource processing, a portion of which will be amended and used in topdressing reconstruction.
- Topdressing: A combination of topsoil and plant growth medium placed on backfilled mined out areas.

Suitable topsoil materials for topdressing reconstruction on reclaimed areas will either be salvaged, stockpiled or direct hauled, and redistributed. Quantities of topsoil and subsoil identified for salvage are estimated from baseline soil samples taken from the NRCS map units obtained from the USDA Web Soil Survey (Soil Survey Staff, NRCS, USDA-2018). Baseline soils information is contained in Exhibit 10: Soils Information.

Baseline topsoil and subsoil samples were collected from each of the soil map units projected to be disturbed within the quarry's affected area boundary. Additional samples were collected from the existing topsoil stockpile immediately adjacent to the loadout facility and the screened fines stockpiles near the crusher that represent typical plant growth medium produced by screening operations. Soil sample locations are shown in Exhibit 10-1. Soil sample analyses were conducted by Energy Laboratories and results are in Table 10-2. Analytical parameters for soil analyses were selected to evaluate the suitability of the baseline topsoil resources and the fines produced by limestone screening operations. Screened fines will be produced every year and a portion will be conditioned as plant growth medium. Topsoil and plant growth medium analytical results were evaluated to determine the soil amendments necessary to support successful revegetation.

Topdressing reconstruction activities will be scheduled to allow completion of soil amendment incorporation, construction of water harvesting features, and revegetation operations when ground conditions are favorable. Proper scheduling will minimize adverse impacts to topsoil resources and optimize seedling germination and establishment. Topdressing operations may be

conducted with a variety of suitable equipment (i.e., scraper, excavator, haul truck, backhoe, dozer, etc.). Topsoil will be either direct-hauled from on-going salvage operations or removed from stockpiles and placed over backfilled and graded plant growth medium. Mined-out bench areas will be reclaimed contemporaneously by:

1. Backfilling with processing fines to about 2 feet below the final post-mining surface elevation;
2. Placing plant growth medium (amended soil or suitable processing fines) at a target depth of 18 inches over the backfilled fines; and
3. Distributing topsoil at a target depth of six inches on the surface of the conditioned plant growth medium.

Topdressing operations will create a plant rooting zone that averages 24 inches in depth. Plant growth medium used for the 18-inch fill will be tested and fertilizer and amendments added as needed to create suitable soil fertility levels. Mixing fertilizer and other soil amendments into the topsoil and plant growth medium will ensure that non-mobile plant nutrients are distributed throughout the topdressing profile. Amendment mixing will be performed at the processed fines stockpile locations prior to their haulage for topdressing reconstruction.

The steep slopes and shallow rocky nature of the topsoil and subsoil resources (Exhibit 10), combined with the clearing and grubbing of existing vegetation will result in the mixing of A and B horizon materials. Suitable topsoil available for salvage is anticipated to result in an average replacement depth of six inches. Varying topsoil depth and quality in association with topographic features will help minimize erosion and deposition processes, optimize soil resource productivity and aid in development of vegetation communities. Topsoil thickness may be increased on stable landforms (i.e., lower slope gradient areas) to foster increased vegetation productivity. Decreased topsoil depths may be constructed on slopes and other landforms where soil erosion potentials are higher. Soil reconstruction materials with higher rock content may be preferentially placed on steeper slopes to increase their stability and promote the growth of sub-shrubs and shrub species. Different topsoil depths associated with topographic position will encourage plant species diversity based upon variances in slope, aspect and available soil moisture.

11.1 Direct Haul Topsoil Handling

Direct-haulage (also referred to as "live-handling" in this document) of topsoil reconstruction materials after clearing and grubbing of existing vegetation, will optimize the transfer of nutrients, organic matter, microbial populations, perennial plant propagules and the native seed bank. Live-handling of topsoil will be preferentially performed. When direct-haulage is performed outside of the active growing season, increased volunteer growth of underground plant propagules is supported. Topsoil will be direct hauled to permanent reclamation areas whenever operationally feasible and placed at an average six-inch depth on final graded and ripped plant growth medium.

11.2 Stockpiled Soil Handling

When final graded backfill is not available for direct topsoil handling the plan detailed below will be followed:

- The storage area will be prepped with sediment control constructed and topsoil in the storage area stripped
- Topsoil to be salvaged for growth medium reconstruction will be removed and stockpiled.
- Stockpiles will be shaped and sloped to control excessive erosion and unnecessary loss of soil materials.
- A berm or ditch will be constructed immediately downhill from the stockpile to retain soil that is moved from it.
- Topsoil stockpiles will be clearly marked with appropriate signage.
- Soil stockpiles that will remain undisturbed for one or more growing seasons will be seeded with the temporary cover seed mixture.
- Topsoil will be hauled from designated topsoil stockpiles and placed to an average six-inch depth on final graded and ripped growth medium materials.

Topsoil materials will be removed from the stockpiles when soil moisture conditions are suitable so that impacts to soil structure are minimized, and excessive compaction and pumping

associated with machine traffic are avoided. Stockpile locations are shown on Maps C-2, C-4, and C-6.

11.3 Soil Amendments

Processing fines will be produced each year that can be amended and used as a suitable plant growth medium. Laboratory analyses indicate that it will be necessary to amend the plant growth medium with nitrogen, phosphorous, potassium and organic matter (Table 6-3). Topsoil resources are limited within the disturbed area, so the amended plant growth medium will provide an important rooting zone that supports the establishment of the post-mining vegetation community.

Representative topsoil, stockpiled topsoil and plant growth medium amendment rates were calculated to estimate potential types and amounts of amendments necessary for topdressing reconstruction on reclaimed areas (Table 6-3). Representative baseline samples of processing fines (Table 10-1) determined that this material has a suitable sandy loam texture and coarse fragment content, but low inherent fertility and organic matter. Therefore, amendments of nitrogen, phosphorous, potassium, and organic matter will be added to processing fines to create a suitable plant growth medium. Fertilizer and organic matter amendments rates and types will be re-evaluated after final soil testing is performed prior to growth medium reconstruction.

Table 6-3 Topdressing Amendments

RMR Mid-Continent Quarry Site Amendments								
	Amendment							
	Biosol (7-2-1)		Phosphous (0-45-0)		Potassium (0-0-62)		PermaMatrix	
Soil Sample	Lb/Acre 6"	Lbs/Ton Fines	Lb/Acre 6"	Lbs/Ton Fines	Lb/Acre 6"	Lbs/Ton Fines	Lb/Acre 6"	Lbs/Ton Fines
Fines West	477	0.48	358.8	0.16	468	0.28	4000	4.0
Fines East	443	0.44	360.3	0.16	468	0.31	4000	4.0
Farlow #26	237	0.24	349.5	0.16	0	0	0	0
Cochepeta #17	229	0.23	349.8	0.16	0	0	0	0
Jerry #39	257	0.26	268.6	0.12	0	0	0	0
Dateman #22	257	0.26	368.6	0.17	0	0	0	0
Topsoil Stockpile	374	0.37	263.4	0.12	0	0	0	0

For each reclamation unit collated topsoil, soil and processing fines (when used within the 18-inch reconstructed soil lift) samples will be collected and analyzed to evaluate their fertility levels and organic content. Each collated sample will consist of a minimum of three, thoroughly mixed, soil cores/samples. The collated sample will be sent to a laboratory for analysis for organic matter and the major plant nutrients of nitrogen, phosphorous, and potassium. The laboratory results will be used to determine the type and quantity of topsoil amendments needed to establish minimum fertility levels typical of a typical mountain shrub community. Baseline soil amendment calculations suggest that nitrogen and phosphorous amendments will be required for the native topsoil after placement. Nitrogen and phosphorous nutrient amendments will be applied as needed to the topsoil as described previously (see 1.1(e). Due to the inherent fertility and organic matter content of properly segregated and live-handled topsoil, supplemental organic matter usually will not be required.

11.4 Water Harvesting & Erosion Control Measures

A variety of water harvesting, conservation, and erosion control methods will be used to harvest and conserve precipitation and treat stormwater runoff. Primary water harvesting, water

conservation, and erosion control methods and practices include contour furrowing, land imprinting, mulching (cereal grain straw, native hay, Woodstraw or hydromulch), and installation of erosion control blankets. Descriptions of these methods and practices that will be used for harvesting and conserving water and controlling soil erosion are described below.

11.5 Surface Roughening

Surface roughening is the most important water harvesting and retention method that can be used in reclaiming land disturbed by mining. Surface roughening that will be used at Mid-Continent Quarry includes contour furrowing, land imprinting, contour drill seeding, cleat tracking, and soil gouging. Surface roughening activities will be performed on the contour whenever physically and operationally feasible. Construction along the contour is particularly critical for surface roughening measures that need to be placed parallel to the slope. Surface roughening operations will be timed appropriately during the soil reconstruction and vegetation planting process to optimize their long-term effectiveness to support vegetation establishment. Soil gouging will be the preferred surface roughening measure on slopes whose gradients are between 33% and 50%. On slopes with gradients equal to 33% or flatter either soil gouging or contour furrowing will be used preferentially. Surface roughening will also take place between the layers of contouring material (crusher fines) and topsoil. This will be performed by either the rippers on the back of a dozer or by an implement pulled behind a tractor, dozer, or other suitable equipment. The intent of the roughening of the contouring material will be to improve the bond between the contouring material and the topsoil and to promote the penetration of moisture through the topsoil and into the upper layer of contouring material.

11.5.1 Contour Furrowing

Contour furrowing will be established using a plow, disc, or gang ripper. Contour furrows will be used on slope gradients that are equal to or flatter than 33%. Other soil roughening methods described in this document will be used on slopes with gradients steeper than 3H:1V. The furrows will be constructed approximately on the contour. Typically, furrows will be placed 2 to 4 feet apart from one another. Contour furrow length will not exceed 100 feet. Shorter lengths may be used on steeper slopes (i.e., steeper than 5H:1V). A gap or earthen plug in the furrow will be created periodically by lifting the furrowing implement for a short interval of several feet and

then setting it back into the ground again. Furrow depth will depend upon soil moisture conditions and texture; a plowing, disking, or ripping depth of a minimum of 6 inches will be preferred. A plow or disc will normally be used on lower slope areas; a gang ripper may be needed on steeper slopes. Contour furrowing will be constructed prior to or concurrent with seeding operations, being dependent upon equipment use and capability.

11.5.2 Land Imprinting

A land imprinter may be pulled behind a tractor or bulldozer of suitable size and configuration. Land imprinting typically creates small pyramid-shaped depressions in the soil surface. The land imprinter is omni-directional in terms of use and may be pulled over the reclamation area in any direction, but operations will be conducted along the contour when this is physically possible. Care will be taken to evaluate soil moisture in order to ensure that it is adequate to hold depression shapes, but not so wet as to cause excessive damage to soil structure during imprinting. Land imprinting will normally be performed after seeding and mulching (when applied) have been completed.

11.5.3 Cleat Tracking

Cleat tracking can be used to establish surface roughness when soil moisture is adequate and heavy equipment travel perpendicular to the slope is limited by its steepness. A bulldozer or other heavy tracked equipment is walked up and down parallel to the slope to create small soil depressions with the track's cleats.

11.5.4 Soil Gouging

Soil gouging is accomplished by creating small depressions in the reclaimed surface. These depressions collect surface water runoff and provide soil zones with soil moisture contents that are elevated over soils in the interstitial areas between them. These small depressions can provide suitable habitat for establishing woody and other plant species that require higher soil moistures. Soil gouging may be performed on those slopes that are too steep for contour furrowing and those portions of the Mid-Continent Quarry where establishing woody plants is a goal for permanently reclaimed vegetation communities.

Soil gouging may be established using a track hoe bucket, Hodder gouger, bulldozer, motor grader or other suitable equipment. They will be constructed perpendicular to the slope in irregularly spaced, irregularly aligned configurations. Soil gouges will be the width of the equipment used to build them (between 2 and 10 feet wide) and will be about 6 inches deep (below final grade level). Material removed from the gouge will be placed downhill from the depressions and above grade in a configuration that increases the features moisture harvesting capacity. Soil gouges will be placed randomly on the hillside to avoid creating linear features that might impact the viewshed.

11.5.5 Swale Stability Enhancement

If a reclamation block has the topography to form a natural swale, RMR will install check dams or straw bales, wattles or other suitable stabilization measures across the swale at a reasonable slope interval to prevent erosion losses.

12. Mulching

Various types of mulches will be used to facilitate the establishment of permanent vegetation communities. One of four types of mulch will be used to protect soils from excessive erosion, reduce soil moisture evaporation, and facilitate germination and establishing suitable vegetation covers. They include, in order of preference, Woodstraw, native hay, cereal grain straw, and hydromulch.

12.1 Woodstraw, Native Hay or Cereal Grain Straw Mulch

When one of these mulches is used, the type in order of preference will be Woodstraw, native hay, or cereal grain straw. Woodstraw will be applied at the percent cover rates specified by the manufacturer for the steepness of the slope on which it is applied (i.e., typically 50% to 70%). Woodstraw usually will not require tackifying or anchoring. Native hay or cereal grain straw mulch will be applied at a targeted rate of 2 tons per acre and will either be crimped or tackified or both.

Mulch materials will be spread uniformly over the treatment site to the extent this is physically possible. Mulch may be spread either by hand or mulching equipment. Mulch materials will be certified weed-free. Mulch materials will be free of mold and fungus. At least 50% of the native

hay and cereal grain straw mulch material by weight will be equal to or greater than 10 inches in length. After application native hay or cereal grain mulch will be crimped or adequately tacked (normally at least 80 pounds of R-tack per acre). Mulch will be applied as soon as is practicable following completion of seeding activities, back dragging with a tine harrow and transplanting of containerized stock. Care will be taken to avoid or distribute mulching machinery traffic across the planted surface and avoid multiple trip passes along a single travel route to minimize damage to soil structure and water harvesting features.

12.2 Hydromulching

Hydromulching will be used when Woodstraw, native hay or cereal grain straw is not available in the marketplace or on slopes where high velocity winds render other types of mulch ineffective. Hydromulch used in these areas will be made of high durability fibers (e.g., cocoflex or equivalent product) and will be tacked at the rate specified by the manufacturer. Hydromulch will be applied at the manufacturer's specified rate appropriate for the terrain on which it is applied and tackified with a non-petroleum based tackifier. A hydromulcher that is capable of safely accessing the terrain to be treated will be used. Many of the reclaimed quarry slopes will be between 2H:1V and 3H:1V and could be difficult to reach with hydromulching equipment. On these steeper slopes, Woodstraw mulch will be applied at a target cover of 70%.

12.3 Erosion Blankets

A variety of erosion blankets and geotextiles are available in the marketplace that can be used to reduce soil erosion during the establishment of vegetation or provide subsurface soil stability to reinforce rooting zones for vegetation liners required in surface water runoff structure designs. Geotextile blankets and turf reinforcement products will be selected and applied per manufacturer's recommendations and instructions for the areas in which they are used.

13. Revegetation Plan

The revegetation plan addresses establishment of vegetation for three distinct purposes including temporary cover, stabilization cover and permanent reclamation. The seed mixtures formulated for these purposes use native plant species that are known to grow in the mine quarry area. Plant

species in the seed mixtures have been selected based on their ability to accomplish their seed mixtures specific purpose. The purposes of these three seed mixtures are as follows:

- **Temporary Cover**: Used to establish quick growing covers on areas disturbed by mining and reclamation activities that will be subsequently re-disturbed to support ongoing activities. An example is a topsoil stockpile.

- **Stabilization**: Used on areas that are prone or more susceptible to erosion that will benefit from the increased stability provided by vegetation cover. Examples include diversions, channel bottoms, and sediment pond spillways.

- **Permanent Reclamation**: Used on permanently reclaimed lands to establish a diverse, permanent, native plant community capable of supporting the designated post-mining land use of wildlife habitat. It is also important in providing ground cover that promotes soil stability and reduces soil erosion during initial establishment and early growth of the permanent reclaimed plant community.

Plant species will be used in a variety of combinations in the three seed mixtures to establish the vegetation cover type best suited for the purpose/needs of given site. Seed mixtures and plant species that will be considered for use in them are below.

Seed tags and test results from a registered seed lab for all seed lots to be included in any seed mixture will be provided to BLM for approval before any seed is mixed. This information will be provided to the BLM at least 30 days in advance of needing the seed mixture. BLM will review and approve seed lot certification information within 10 working days of receipt. If BLM approval is not received by RMR within 15 working days of BLM receipt, then RMR will proceed with ordering the seed mixture with the documented seed lots.

Additionally, transplanting containerized species will be undertaken for aesthetic and wildlife habitat enhancement purposes. Each year 50, 1-gallon transplants will be strategically placed to optimize their effectiveness. Native plant materials will be used for transplants and may be herbaceous and/or woody plant species. Appropriate soil amendments and fertilizers will be added during transplanting. Transplants will be watered during planting to promote growth and

reduce transplanting shock. Transplant species and size will be selected based on the purpose of the planting. Where needed, transplants will be protected from grazing and browsing during their establishment period (i.e., minimum first two growing seasons). Transplanting may be used to enhance reclaimed plant communities when they are substandard in their development as determined by vegetation monitoring or to enhance revegetation communities for wildlife use. Transplanting plans will be submitted to the BLM for review and approval prior to their implementation.

13.1 Seed Mixture Species Selection

Plant species to be used in the seed mixtures at the mine are presented in this section. Please note that a given plant species inclusion and relative composition in a seed mixture may vary from year to year based on commercial availability and acceptance of seed lots by the BLM. Plant species in the seed mixtures have been selected based on reclamation experience, plant species characteristics, and site-specific environmental conditions documented in the following:

- The site's baseline vegetation survey;
- Baseline soil and reconstructed plant growth medium chemical and physical composition;
- NRCS Range Site descriptions for the site and adjacent undisturbed areas;
- Professional experience gained reclaiming drastically disturbed lands;
- Plant materials suppliers; and
- Mined land reclamation literature.

Additional plant species may be considered for the seed mixtures as they become commercially available in the future.

Native plant species will be used in the formulation of all seed mixtures. Seed mixtures will be formulated to address the specific site and use for which they are intended as described categorically below. Also, seed mixtures will be composed to reduce visual contrast with vegetation communities on adjoining undisturbed lands to maintain viewshed properties and aesthetics.

13.2 Temporary Cover Seed Mixture

This seed mixture will be used to establish a temporary vegetation cover on lands that have been disturbed and will be re-disturbed by ongoing mining and reclamation activities in the future. It will normally be used on lands whose interim periods between physical disturbance are projected to last one or more growing season(s). This seed mixture will be used to establish a quick growing, permanent vegetation cover that will serve to:

1) Reduce storm water runoff;

2) Reduce water and wind erosion of soils;

3) Minimize habitat available for the establishment of noxious weeds; and

4) Establish temporary mitigative habitat for wildlife.

Typical uses for this seed mixture include areas around facilities, inactive topsoil and subsoil stockpiles, and other lands requiring quick, short-term, stabilization.

Typically, cool-season, rhizomatous grasses will be the primary plant species in this mixture. The temporary cover seed mixture is provided in Table 6-4. This seed mixture will be applied at the pure live seeds per square foot target rate indicated in Table 6-4. The seed mixture can be planted using either drill or broadcast planting methods during the time periods indicated in Table 6-5.

The cool-season grasses contained in this seed mixture are adapted to growing conditions that occur during the spring, early summer, and fall. Therefore, this seed mixture will normally be planted during the period from late fall through early spring. Summer plantings will be avoided unless necessary. Summer plantings may require supplemental watering to ensure germination.

Table 6-4 Temporary Cover Seed Mixture

Pure Live Seeds per Square Foot=	100.0				
Scientific Name	**Common Name**	**Desired Species Composition (%)**	**Average No. Seeds/ Pound**	**Pounds PLS/Acre**	**PLS/Square Foot**
Graminoids					
Bromus marginatus	mountain brome	25%	64,000	17.02	25.0
Elymus lanceolatus	thickspike wheatgrass	25%	155,000	7.03	25.0
Elymus trachycaulus	slender wheatgrass	25%	159,000	6.85	25.0
Pascopyrum smithii	western wheatgrass	25%	110,000	9.90	25.0
Graminoid Totals		***100%***		***40.79***	***100.0***

13.3 Stabilization

The stabilization seed mixture will be used in limited areas where the potential for water erosion is greater and ensuring soil stability is a primary concern. Special areas carrying or exposed to concentrated surface water runoff that are prone or more susceptible to erosion include, but are not limited to, diversions, ditches, drainage channels, sediment pond spillways, and culvert inlets and outlets. The stabilization seed mixture will always be used to enhance soil stability in these types of features when vegetation lining is a part of water control structure design. Grass species adapted to mesic and hydric soil conditions will be included in this seed mixture. Cool-season aggressive sod forming grasses will typically comprise most of the plant species in this seed mixture. A portion of the plant species used in this mixture will be capable of withstanding short periodic inundation by surface water runoff. The stabilization seed mixture is provided in Table 6-6. This seed mixture will be applied at the pure live seeds per square foot target rate indicated in Table 6-6. The stabilization seed mixture will be planted using drill or broadcast methods as described under Table 6-6 .

Table 6-5 Optimum Planting Schedule

Seed Mixture	Optimum Planting Period	Optional Planting Period & Limitations
Temporary	Late Fall through Early Spring	Winter-favorable soil conditions, snow pack
		Summer-favorable precipitation patterns/amounts
Stabilization	Late Fall through Early Spring	Winter-favorable soil conditions, snow pack
		Summer-favorable precipitation pattern & amounts
Permanent	Late Fall through Early Spring	Winter-favorable soil conditions, snow pack
Shrub/Subshrub	Late Fall through Early Spring	None

The cool-season grasses contained in this seed mixture are adapted to growing conditions that occur during the spring, early summer, and fall. Therefore, this seed mixture will be planted during the period from late fall through early spring. However, when necessary and without regard to season, the stabilization seed mixture may be planted immediately following completion of earthwork associated with a hydrologic control/treatment structure. Additional care will be taken to monitor the germination and establishment of this seed mixture, since stability of hydrologic control/treatment structures is critical to their proper performance.

Supplemental watering of stabilization seedings may be necessary to achieve adequate establishment. When this is necessary, seedings will be watered using water tanks with sprinklers and/or hose reels and with sprinkler heads that distribute the water and minimize the potential for soil erosion and dislodging of seedlings. Tanks will be carried on vehicles capable of accessing the areas that require supplemental watering (e.g., ATV, UTV, pickup truck, water truck, etc.). Watering will be at intervals of 3 to 5 days and continue until:

- seedlings are adequately established
- natural precipitation occurs that provides adequate soil moisture for plant growth
- the end of the growing season.

Table 6-6 Stabilization Seed Mixture

Pure Live Seeds per Square Foot=	**50.0**				
Scientific Name	**Common Name**	**Desired Species Composition (%)**	**Average No. Seeds/ Pound**	**Pounds PLS/Acre**	**PLS/Square Foot**
Graminoids					
Calamagrostis canadensis	bluejoint	15%	2,270,000	0.14	7.5
Elymus lanceolatus	thickspike wheatgrass	20%	155,000	2.81	10.0
Pascopyrum smithii	western wheatgrass	20%	110,000	3.96	10.0
Phalaris arundinacea	reed canarygrass	15%	533,000	0.61	7.5
Poa compressa	Canada bluegrass	15%	2,500,000	0.13	7.5
Thinopyrum intermedium	intermediate wheatgrass	15%	88,000	3.71	7.5
Graminoid Totals		***100%***		***11.37***	***50.0***

13.4 Permanent Reclamation

Two seed mixtures will be used to establish a reclaimed vegetation community capable of supporting the post-mining land use of wildlife habitat. These include the Permanent Reclamation seed mixture and the Woody Plant Enhancement seed mixture. The composition and uses of these seed mixtures are presented in the following paragraphs.

The permanent reclamation seed mixture will be used to establish a permanent diverse vegetation community and quality wildlife habitat on reclaimed areas. This seed mixture will be broadcast at the rate of 50 PLS per square foot. This seeding density is more than adequate to achieve the

germination, establishment and growth of the permanent reclamation community. Live-handling of topsoil has been used to establish reclaimed wildlife habitat on mined land in Colorado since the 1980s without planting seed mixtures. Habitat Management has established diverse permanent reclamation plant communities in the Rocky Mountain region using broadcast seeding rates as low as 5 PLS per square foot, and commonly has used 25 to 30 PLS per square foot rates to establish reclaimed plant communities capable of creating wildlife habitat on top-dressed and substitute plant growth mediums at mine sites with similar climatic conditions. Our professional experience indicates that broadcasting at the 50 PLS rate per square foot is excessive given the predominate use of live-handled topsoil.

The permanent reclamation seed mixture is presented in Table 6-8**.** The reclamation seed mixture contains a variety of cool and warm season grasses, forbs, sub-shrubs and shrubs, with graminoid plant species being emphasized. These life form compositional percentages are generally initial targets based on baseline vegetation information and will be adaptively managed as permanent vegetation communities are established and their growth and development are monitored.

Table 6-7 Permanent Reclamation Seed Mixture

Pure Live Seeds per Square Foot=	50.0				
Scientific Name	Common Name	Desired Species Composition (%)	Average No. Seeds/ Pound	Pounds PLS/Acre	PLS/Square Foot
Graminoids					
Achnatherum hymenoides	Indian ricegrass	5%	141,000	0.77	2.5
Bouteloua gracilis	blue grama	10%	825,000	0.26	5.0
Bromus marginatus	mountain brome	10%	64,000	3.40	5.0
Elymus lanceolatus	thickspike wheatgrass	10%	155,000	1.41	5.0
Elymus trachycaulus	slender wheatgrass	10%	159,000	1.37	5.0
Hesperostipa comata	needle and thread	5%	137,000	0.79	2.5
Pascopyrum smithii	western wheatgrass	10%	110,000	1.98	5.0
Poa fendleriana	muttongrass	5%	890,000	0.12	2.5
Pseudoroegneria spicata	bluebunch wheatgrass	10%	135,000	1.61	5.0
Graminoid Totals		***75%***		***11.73***	***37.5***
Forbs					
Achillea millefolium	common yarrow	3%	2,700,000	0.02	1.5
Artemisia frigida	prairie sagewort	3%	4,500,000	0.01	1.5
Linum lewisii	Lewis flax	3%	170,000	0.38	1.5
Penstemon strictus	Rocky Mountain penstemon	3%	592,000	0.11	1.5
Vicia americana	American vetch	3%	33,000	1.98	1.5
Forb Totals		***15%***		***2.51***	***7.5***
Woody (Subshrubs, Shrubs, Trees)					
Cercocarpus montanus	alderleaf mountain mahogany	2.5%	48,000	1.13	1.3
Ericameria nauseosa	rubber rabbitbrush	2.5%	400,000	0.14	1.3
Symphoricarpos occidentalis	western snowberry	2.5%	75,033	0.73	1.3
Ribes aureum	golden currant	2.5%	356,000	0.15	1.3
Woody Totals		***10%***		***2.15***	***5.0***
Seed Mixture Total		**100%**		**16.39**	**50.00**

The Woody Plant Enhancement seed mixture will be planted on approximately 10% of the reclamation unit constructed each year. It will be broadcast in areas that have higher potential to support woody plant species. For example, steeper slopes (>5H:1V) with northerly and easterly aspects and rockier soils are best suited for shrub and subshrub establishment and growth. Slopes with these aspects generally have reduced herbaceous vegetation, increased infiltration, lower evapotranspiration and higher soil moisture availability, all which serve to promote woody plant species growth. The Woody Plant Enhancement seed mixture is provided in Table 6-8**.** This seed mixture will be broadcast at the target rate of 10 PLS per square foot.

Table 6-8 Woody Plant Enhancement Seed Mixture

Pure Live Seeds per Square Foot=	10.0				
Scientific Name	**Common Name**	**Desired Species Composition (%)**	**Average No. Seeds/ Pound**	**Pounds PLS/Acre**	**PLS/Square Foot**
Woody (Subshrubs, Shrubs)					
Amelanchier utahensis	Utah serviceberry	12.0%	25,800	2.03	1.2
Cercocarpus montanus	alderleaf mountain mahogany	11.0%	48,000	1.00	1.1
Krascheninnikovia lanata	winterfat	11.0%	123,000	0.39	1.1
Rhus trilobata	skunkbush sumac	11.0%	20,000	2.40	1.1
Ribes aureum	golden currant	11.0%	356,000	0.13	1.1
Ribes cereum	wax currant	11.0%	350,000	0.14	1.1
Ribes leptanthum	trumpet gooseberry	11.0%	350,000	0.14	1.1
Rosa woodsii	Woods' rose	11.0%	45,300	1.06	1.1
Symphoricarpos oreophilus	mountain snowberry	11.0%	54,700	0.88	1.1
Shrub/Subshrub Mixture Totals		***100%***		***8.15***	***10.0***

13.5 Timing of Seeding Operations

The generally accepted period for planting operations in western Colorado is late summer through early spring (September 1st through March 31st). When possible, seeding operations will be conducted during this time of the year. Seeding in the late summer/fall should be scheduled after late summer/early fall rains increase soil moisture content and prior to permanent snow cover in late summer/early winter. Spring seeding should be conducted as ground conditions allow the type of seeding to be performed. Care will be taken to avoid or minimize adverse impacts to soil from seeding equipment. Dry and dusty, or excessively wet soils, do not make good seedbeds and are more susceptible to structural damage by seeding equipment. Site conditions will be monitored with seeding and planting operations scheduled accordingly.

Successful seeding and planting can be performed throughout the year but often require careful selection of methods and close attention to prevailing climatic conditions. In some situations, timing of seeding may vary from the preferred late fall-early spring planting period. Exceptions to the customary planting period may be required to obtain desired vegetation cover results. Revegetation goals, the ability to irrigate, flexibility in revegetation operations and operational limitations may support/require conducting revegetation operations at other times of the year.

For these reasons specific calendar dates for seeding and planting operations are not specified. Planting operations should be conducted based on site-specific needs, moisture regimes, and revegetation goals. Generally accepted and optional planting periods for the seed mixtures that can be used at the Mid-Continent mine are provided in Table 6-5.

Plantings undertaken outside of these generally accepted time periods may not be successfully completed, particularly in the winter when inclement weather can interrupt or prevent seeding operations. Success of seeding undertaken during the summer months can be highly variable, depending upon the length of time between precipitation events, precipitation levels and plant available moisture in the soil. Summer hailstorms may also influence survival of seedlings. under certain circumstances some areas may require seeding immediately following disturbance or construction activities. In these situations, exceptions may be made to the standard planting periods. Should planting efforts fail, reseeding will be performed during the next appropriate planting period.

13.6 Seeding Methods

Seed mixtures may be planted using either broadcast or drill seeding methods. Key to the success of broadcast planting operations is proper preparation of the seedbed. The seedbed will be evaluated for proper levels of fertility prior to beginning planting operations. Water harvesting features will be in place and adequate soil protection measures will be used to ensure stability of the seedbed during the anticipated seed mixture germination and establishment period. If soil crusting is present, with the potential to seriously impact seedling germination and establishment, it will be alleviated using appropriate methods. Sterile or benign extenders will be used as necessary to ensure even distribution of seed across the planting site. Rice hulls will typically be used as extenders. Soil fertility, water harvesting features, and seedbed preparations will be sequenced and performed to optimize seedling establishment and development.

13.6.1 Broadcast Seeding

Seed will be broadcast into properly prepared seedbeds. Seed will be broadcast at the targeted pure live seed per square foot rate specified for the seed mixture being planted; broadcasting application rates will not be increased over drilling rates. Care will be taken to ensure that soil crusting will not prevent seed from lodging and to ensure soil-seed contact will be adequate.

Broadcasting will be performed immediately following seedbed preparations. Broadcasting may be performed by hand or with handheld or vehicle mounted equipment. Broadcasting equipment will be calibrated and maintained to ensure that seeds are properly distributed during planting operations.

Broadcasting will be the preferred method of seeding temporary cover, stabilization, and reclamation seed mixtures. Broadcast seeding maximizes interstitial spacing between seeds and optimizes germination and establishment of plant species within the seed mixture. Temporary soil stabilization measures will be used to promote soil stability during vegetation germination and establishment periods. Broadcast seeding of permanent reclamation seed mixtures will target an application density of 50 pure live seeds per square foot. Using a predicted seed/seedling loss of 75%, this will result in an average seedling germination density of 12.5 plants per square foot. Seed application rates greater than 50 pure live seeds per square foot can be expected to adversely impact the expression of plant species diversity included in the permanent reclamation seed mixture. It is expected that broadcast seeding density rates will be lowered over time to account for volunteer growth from propagules and seed transferred in the soil bank by the direct haul topsoiling process. Vegetation observations and formal monitoring will be used to adaptively manage seeding rates as reclamation progresses.

Broadcast seeding achieves maximum interstitial spacing between seeds. This optimizes expression of the diversity of plant species included in the seed mixture since competition for soil moisture is reduced between seedlings. Each seedling is given a better environment for germination, establishment and growth. It also produces the most visually aesthetically pleasing plant community because the seed isn't planted in rows like a crop.

13.6.2 Drill Seeding

Seed mixtures will be drill seeded into properly prepared seedbeds. Soil fertility and amendments, water harvesting features, and soil preparations will be sequenced and performed to optimize seedling establishment and development, while maintaining the integrity of sediment control and water harvesting structures. Drill seeding will be performed using equipment designed for rangeland plantings. Till or no till drills may be used. No till drills will be the preferred equipment when inter-seeding is performed to enhance or augment reclamation

plantings. To the extent possible, drill seeding will be performed along the contour to minimize potential soil erosion and promote water harvesting. Drill seeding when performed will be limited to slope gradients of 33% or less.

Drill seeding along the contour will support development of the vegetation look submitted in the visual simulations. Seed drills typically contain multiple seed boxes that allow for planting seed in a variety of ways including: 1) drilling and planting seed a short depth beneath the soil surface, 2) dribbling seed through tubes that end a short distance above the ground surface, and 3) broadcasting boxes located several feet above the ground that release seed across their width. Subdividing seed by physical characteristics and planting requirements into sub-mixtures planted using these drill capabilities will fill interstitial areas between drill rows. This seeding strategy will more effectively distribute seeds throughout the surface area and result in establishment of a plant community that is more natural in distribution and visually appealing. When viewed closeup, seeds planted in the ground will initially appear linear, however, this portion of the reclaimed plant community will be visible to the casual observer from the vantage point used in the simulations and will not appear linear in nature due to the growth of seeds from sub-mixtures distributed through dribble tubes and the broadcast seed boxes. Over a short period of time the seeded rows will disappear as rhizomatous species spread out and seedlings germinate and establish from natural reproduction within the reclaimed area.

13.6.3 Selection of Seeding Methods

Broadcast seeding can be used to plant any of the seed mixtures. It is the preferred planting method for the permanent reclamation seed mixture and the Woody Plant Enhancement seed mixture. Either broadcasting or drill seeding will be used for the temporary cover seed mixture and the stabilization seed mixture.

Drill and broadcast seeding methods may be used in combination to plant temporary cover, stabilization, and permanent reclamation seed mixtures. Drill seeding may be used in combination with broadcast seeding to enhance the effectiveness of the stabilization seed mixture. In areas where concentrated surface water runoff flows may be experienced, drilling seed perpendicular to the direction of flow serves to promote the integrity of grass linings in channels, promote their stability and improve water filtration characteristics. Additionally, drill

and broadcast seeding may be used in combination to simultaneously plant seeds with different planting depth requirements. When drilling and broadcasting are used in combination, the seed mixture must be divided into sub-mixtures with similar planting requirements.

13.7 Supplemental Watering

The use of suitable soil materials for backfill, plant growth medium reconstruction, the placement of water harvesting features throughout reclamation areas, and the preferential use of native plant species adapted to the Mid-Continent Mine site are expected to promote the germination and establishment of adequate vegetation covers on lands disturbed by proposed mining operations. However, applying supplemental water on seeded areas may be performed in certain situations including non-prime planting periods, transplanting, specialized seeding, and prolonged drought. Supplemental watering will use methods to promote even distribution of water while minimizing the diminution of water control and harvesting features. Supplemental watering will be judiciously applied to avoid overgrowth and subsequent die back of young plants.

When soils are too dry outside preferred planting periods, supplemental water may be used to elevate soil moisture content prior to seeding operations. This watering may be performed prior to and after seeding to promote seed germination and growth.

When containerized plant materials are transplanted, they will be watered at least once at the time of planting. Water conservation amendments such as polyacrylimide will be added to the soils to enhance plant soil water availability. This watering is intended to immediately stimulate root growth and reduce shock associated with transplanting. Watering transplants during planting will be accomplished using freshwater tanks mounted on vehicles capable of accessing the work site (e.g., ATV, UTV, pickup Truck, Water Truck, etc.). Tanks will be equipped with hoses to allow for direct watering of transplants. At sites that can't be reached with hoses, 5-gallon buckets will be used to carry water to the transplants.

It may be necessary to provide supplemental water to stabilization seedings. This may be done prior to and several times after seeding operations to ensure adequate germination, establishment

and growth. Adequate vegetation growth is often critical to support proper functioning of surface water treatment structures. Stabilization plantings will be monitored and watered accordingly.

Prolonged drought can adversely impact temporary, specialized, transplant and permanent reclamation vegetation growth and development. When long-term or severe drought occur, supplemental watering will be performed when feasible.

13.8 Reclaimed Area Stability

Providing a stable seedbed is critical for germination and establishment of a permanent diverse reclaimed vegetation plant community. The soil handling methods and stabilization measures, water harvesting features and mulch materials described under Section 9 Topsoil & Subsoil Handling will be used in various combinations to provide a stable seedbed. These seedbed stabilization practices are discussed in detail in Section 9 Topsoil & Subsoil Handling. Typically, they will be used to create a stable seedbed in the following order:

1. Inventory noxious weeds and treat as needed prior to other disturbance activities.
2. Remove woody material, chip and incorporate into topsoil;
3. Salvage topsoil and live-handle or stockpile when live-handling isn't possible, performing these operations when soil moisture content is suited for handling (to avoid structural impacts to the extent possible).
4. Salvage subsoil and live-handle or stockpile.
5. Protect soil materials from excessive erosion and loss.
6. Sample soils prior to reconstruction, formulate amendments based on laboratory results, mix amendments into topdressing and place soil and topsoil on regraded slope at targeted depths.
7. Following topdressing reconstruction create surface roughening (contour furrows, land imprinting, cleat tracking, soil gouging).
8. Plant the permanent reclamation seed mixtures.
9. Harrow area to set the seed in the seedbed and promote germination and establishment.
10. Transplant containerized woody species as detailed in the revegetation plan.
11. Apply mulch (WoodStraw, native hay, cereal grain straw or CocoFlex) at specified rates or geotextiles based on site specific conditions.

12. Monitor the reclaimed land for stability, germination, and establishment of desirable vegetation.
13. Based on monitoring as needed, develop correctional plans for BLM approval.
14. Implement correctional plans after BLM approval is received in writing.

Following this typical procedure will ensure that reclaimed lands are stable and capable of supporting the growth of permanent diverse reclaimed plant communities.

14. Reclamation Schedule

Reclamation activities will be scheduled to optimize the quality of reclaimed land. Reclamation activities, limitations on them and scheduling are provided in Table 6-9.

Table 6-9 Reclamation Activities, Limitations and Scheduling

Reclamation Activity	Limitations	Scheduling
Noxious weed inventory & control	Plants need to be growing	Inventory: Formal inventories beginning and middle of growing season. Opportunistic inventory during mining and reclamation operations. Control: Prior to disturbance and as needed during growing season
Remove & incorporate woody vegetation into soil	Snow cover >6 inches,	
too wet or too dry soil	Any time after snow melt and before accumulation of permanent snow cover with suitable soil moisture content	
Salvage & stockpile soils	Snow cover >6 inches,	
too wet or too dry soil	Any time after snow melt and before accumulation of permanent snow cover with suitable soil moisture content and after woody material has been incorporated	
Live handle soil	Snow cover >6 inches,	
too wet or too dry soil,		
adequate backfilled and graded area for final reclamation placement	Any time after snow melt and before accumulation of permanent snow cover with suitable soil moisture content and after woody material has been incorporated and adequate area for topdressing reconstruction	
Soil fertility analyses and amendment formulation	Adequate lead time to sample, get lab results, and formulate and purchase amendments	Allow 60 days before anticipated handling date
Obtaining permanent reclamation seed mixture	Adequate lead time to get BLM approval of seed lots to be included in seed mixture	Allow 90 days prior to anticipated seeding date
Mixing topdressing with amendments	Too late in fall to allow time for soil preparation and seeding and mulching	Completed no later than mid-September
Create surface roughening	Soil too wet or too dry	After soil is reconstructed on reclamation unit

15. Weed Management Plan

Mid-Continent Mine will implement an Integrated Weed Management Plan (IWMP) to address the long-term management of noxious and nuisance weeds in compliance with county, state, and federal regulations. This plan incorporates adaptive management principles utilizing cultural, mechanical, chemical, and biologic weed control methods to effectively control weed populations within disturbed areas, reclaimed land, and the mining and reclamation permit boundary.

15.1 Summary

ERO (ERO Resource Corp.) completed a pedestrian survey of the project area in 2017 and developed a list of noxious weed species growing on lands within the project boundary. The survey area included approximately 448 acres of woodlands, shrublands, reclamation, and disturbed areas. No wetlands were observed in the project area. Several State of Colorado listed noxious weed species were identified in these areas and are prevalent along access road corridors and within the old limestone quarry southeast of the project area.

15.2 Objectives

Weed management is an important part of the reclamation process required to achieve the designated post-mining land uses at the Mid-Continent Quarry. Undesirable vegetation can have an impact on the success of the reclamation process, therefore, an IWMP is an integral part of the reclamation process and is required to help achieve the designated post-mining land uses.

The goals of a successful IWMP are:

- Survey and map noxious and nuisance weed infestations within the project boundary while observing infestations adjacent to the property boundary;
- Develop and understand growth habits and characteristics for each weed species;
- Characterize weed infestations;
- Prioritize and properly schedule appropriate treatment(s) of weed infestations; and
- Use available methods, either singly or in combination, to control, prevent, and minimize or eradicate weed species to the extent necessary to ensure the viability of the post-mining

land uses.

15.3 County, State, and Federal Weed Lists and Management Requirements

There are several noxious weeds species present at the Mid-Continent Mine that are listed in the Colorado Department of Agriculture's (CDOA) list of noxious weeds. State listed noxious weeds require eradication, control, or monitoring depending on their classification. The species identified in the State of Colorado lists may not currently be present or have limited distribution, may be limited to portions, or may be wide-spread in the state.

The CDOA weed list categorizes noxious weeds into three different classifications (List A, List B, and List C Species) that have the following control requirements:

- List A Species - Prevent new infestations of these species and eradicate existing infestations.

- List B Species - Management plans should be designed to contain the infestation and stop the continued spread of these species.

- List C Species – Management plans will be designed to support the efforts of local governing bodies to facilitate more effective integrated weed management strategies. "The goal of such plans will not be to stop the continued spread of these species but to provide additional education, research, and biological control resources to jurisdictions that choose to require management of List C species". (CDOA 2018).

In addition to the absence of state listed noxious weeds, the Bureau of Land Management (BLM) lists specific nuisance weeds for control including Kochia (*Bassia scoparia*), Russian thistle (*Salsola tragus*), and cheatgrass (*Bromus tectorum*). These weeds must be absent from reclaimed lands, except for cheatgrass. BLM control requirements for cheatgrass state: "If cheat grass is present adjacent to disturbed areas in overall concentrations of less than 50 percent vegetative cover, the percentage vegetative cover of cheatgrass on the reclaimed site will not exceed five percent. In areas where adjacent lands have greater than 50 percent cheatgrass cover, the percentage cover on reclaimed lands will not exceed 20 percent." (BLM 2007).

Several weed species have been identified at Mid-Continent Mine in 2017 and are listed on the Garfield County Vegetation Management Noxious Weed List. These weeds and others weed species, in addition to state listed noxious weeds, must be monitored, and controlled in accordance with county requirements for the management of noxious weeds (GCVM 2017). State of Colorado listed noxious weeds that have been identified at the Mid-Continent Mine are listed in Table 6-10.

Table 6-10 Noxious Weed Species Currently Present at Mid-Continent Quarry

Common Name	Scientific Name	State List
Chinese clematis	*Cleamtis orientalis*	B
diffuse knapweed	*Centaurea diffusa*	B
houndstongue	*Cynoglossum officinale*	B
plumeless thistle	*Carduus acanthoides*	B
common mullein	*Verbascum thaspus*	C
field bindweed	*Convolvulus arvensis*	C
redstem filaree	*Erodium cicutarium*	C

15.4 Written Records

The CDOA regulations require Commercial Applicators to maintain accurate application records for all herbicides applied. Application records must be retained by the Commercial Applicator for a minimum period of two years. Records must include eight requirements set forth by the CDOA Pesticide Rules and Regulations for Commercial Applicators. Application records will include:

- The customer's name;
- Date, time, and location of the application;
- Name and EPA registration number of the pesticide or pesticides used;
- Herbicide concentration or rate applied;
- Target pest(s) and site (s) (name of crop or specific site);
- Wind direction, wind speed, and the temperature at the time of the application;
- The total volume of mixed pesticide (use-dilution preparation) applied, whenever the pest control category is agricultural, forest, ornamental, aquatic, right-of-way, public health, or wood destroying pest control; and
- The name and license number of the individual who applied the pesticide(s).

The BLM requires that a Pesticide Use Proposal (PUP) must be submitted to the Colorado River Valley Field Office prior to commencing herbicide applications on BLM lands in Garfield County.

RMR will submit the PUP on or before March 1 for BLM review and approval for initial authorization or when renewal is required. BLM will review and timely approve this PUP so that RMR can proceed with noxious weed treatments in an efficient manner.

Pesticide Application Records (PARs) must be filled out within 24 hours following herbicide application. Annual noxious weed treatment reports (including PARs) will be submitted to the BLM by December 1each year.

15.5 Weed Management Priorities

Four basic factors will determine Mid-Continent Quarry weed management priorities:

1) CDOA, BLM and County listed weed species classification;
2) Infestation levels;
3) Potential to spread; and
4) Elevation of the noxious weed infestation.

CDOA listed weed species should be targeted by their designated treatment priorities assigned by the State's treatment program with List A and B classifications being first and second, respectively. List C species should be monitored, and treatments implemented if undesirable infestations are interfering with the establishment of desirable vegetation and potentially impacting the designated post-mining land use. Priority of treatment should also focus on each plant species' growth habit, characteristics, and potential to establish widespread, uncontrollable populations within a short period of time. The BLM and Garfield County requirements should also be considered when prioritizing the management of different weed species.

Infestation levels will be measured and characterized by evaluating their population extent and density. Single plants and lower density infestations will receive first treatment priority for eradication; it is critical to treat these infestations before they become established, extensive, and produce large quantities of seed. Widespread and densely populated infestations will be a second

treatment priority. They should typically be treated from the perimeter inwards to confine infestations and prevent further colonization. Higher density and larger infestations will typically need repeated treatments over three or more years to control germination of seed produced and deposited to the soil seed bank during previous years.

The potential to spread will be assessed by evaluating each infestation's site-specific environmental conditions, taking into consideration the targeted weed species growth characteristics and preferred habitat. Infestations in areas with a high potential to spread by means of water, erosion, wind, equipment, or disturbance will be given higher treatment priority. Infestations in areas with a low potential to spread will have a lower treatment priority unless the targeted weed species are listed for mandatory eradication by the BLM and Garfield County.

In the spring weed treatment will be prioritized at lower elevations of the mine and work up in elevation to the highest points of the mine. This treatment strategy will optimize the time periods when treatments may be successfully implemented during the spring growing season. Conversely, fall weed treatments will start at the highest elevations and proceed to the lowest.

As mining expands into undisturbed ground the area will be surveyed for noxious weed infestations. If noxious weeds are observed growing within the area to be disturbed, they will be treated prior to commencing any other mining activities. This will minimize the potential to spread weed seed and propagules to other areas of the permit area.

15.6 Weed Management Methods & Practices

There are four management methods for controlling, containing, and eradicating noxious weed species including:

- Physical;
- Cultural;
- Chemical; and
- Biological

Physical control involves the use of machines and other physical methods to disrupt pests or adjust their environment. Mechanical control of noxious weeds can be an effective tool to physically disrupt noxious weed growth and seed development. Mechanical removal of rosettes, seed heads, and plant material can be an effective way of controlling noxious weeds prior to seed set. Cultivation through disking or covering plants will disrupt their growth and make conditions less suitable for plant survival. Physical removal is typically more effective on annual and biennial weeds and less effective on perennial weed species.

Cultural controls consist of preventive measures and practices that minimize the risk for pests to be introduced to a controlled environment. Project materials such as weed-free hay, mulch, and seed should be certified as weed-free and equipment used for the project should be clear from debris capable of transporting noxious weed seed or roots. Cultural control also includes prevention through the establishment and maintenance of a healthy reclaimed plant community. This practice incudes preventing bare spots by overgrazing and poor desirable seed germination and establishment.

Chemical controls are pesticides that are applied to the plants, soil, or water to regulate or interrupt plant growth patterns and subsequently cause death. Herbicide treatment applications are the most common form of pesticide control for noxious and nuisance vegetation. Chemical treatments are often chosen as having the greatest potential for effective control and eradication when infestations are widely distributed.

Biological control methods include using insects, other animals, or plant pathogens (fungi, bacteria or viruses) to disrupt the growth and/or kill noxious weeds. Parasitic methods are the most effective biologic control.

15.7 Mid-Continent Quarry Weed Characteristics

The noxious weed species identified at Mid-Continent Mine vary in their characteristics and preferred methods for their control. Noxious and nuisance weed species present, or potentially present, inside the project boundary have been identified prior to treatment and the following management methods will be considered and evaluated for effective control. There are several different factors that should be examined prior to implementation of treatment method(s). Appropriate treatment method(s) for each species identified in the project area, and the optimum timing of application for the chosen method of control are presented in Table 6-11.

Table 6-11 Mid-Continent Quarry Weed Characteristics and Control Methods

Noxious Weed Common Name	A (annual) P (perennial B (biannual)	Control Methods	Growing Season							
			April	May	June	July	August	September	October	November
Chinese clematis	P	Physical	X	X	X	X				
		Chemical	X	X	X	X	X	X		
diffuse knapweed	B	Physical				X	X			
		Cultural	X	X	X	X	X	X	X	X
		Chemical	X	X	X			X	X	
		Biological			X	X				
houndstongue	P/B	Physical	X	X						
		Cultural	X	X	X	X	X	X	X	X
		Chemical	X	X	X		X	X	X	
plumeless thistle	B	Physical	X	X	X					
		Cultural	X	X	X	X	X	X	X	X
		Chemical	X	X	X			X	X	
		Biological	X	X	X					
field bindweed	P	Cultural	X	X	X	X	X	X	X	X
		Chemical			X	X	X	X	X	X
		Biological		X	X			X	X	
common mullein	B	Physical	X	X	X					
		Cultural	X	X	X	X	X	X	X	X
		Chemical	X	X				X	X	
redstem filaree	A/B	Physical	X	X	X					
		Cultural	X	X	X	X	X	X	X	X
		Chemical	X	X	X					

15.8 Timing

Timing of implementation is critical to optimize effectiveness when choosing the best method for treatment. Critical timing factors include plant growth stage, growth characteristics, and responses to seasonal moisture.

15.9 Physical Control

Mechanical control, including the use of disking, should be performed when plants are young and less established. Mowing and removal of seed heads for biennial plants should be performed when plants are in the bolting stages of growth and just prior to seed development. Repeated treatments maybe required until biennial plant reserves have been exhausted and the plant can no longer produce seed. If mechanical removal is performed after the development of seed, then removed seed heads should be bagged and disposed. Some species retain the ability to mature and become viable after the plant has been cut down making additional cutting necessary.

15.10 Cultural Control

Reclamation plantings may fail to adequately germinate and establish for a variety of reasons (i.e., weather, insects, overgrazing, wildlife, soil fertility levels, the presence of 'Potentially acid and toxic forming materials', etc.). When this occurs, inter-seeding and re-seeding are cultural controls that can be implemented. Inter-seeding operations should be performed either early in the spring or late in the growing season to avoid late germination during the hot summer months. The seed bed should be free of noxious weeds to avoid competition during the germination process. Annual vegetation monitoring should include observations for inadequate establishment and be reported timely for scheduling of seeding operations.

15.11 Chemical Control

Herbicide products should be carefully selected based on the designated treatment area, species intended for treatment, and timing of application. Herbicide applications should be scheduled to treat annual and biennial noxious weeds prior to flowering/setting seed, thus maximizing herbicide efficiency and preventing/minimizing seed production. Perennial noxious weeds should be treated when actively growing to ensure that herbicides are readily translocated throughout the plants vascular and root system, and prior to setting seed. Perennial noxious

weeds can also be treated in the fall when plants are actively translocating carbohydrates back to their roots. Herbicide mixtures will be applied using either:

- A utility terrain vehicle (UTV) mounted with an 80-gallon capacity, low-profile spray tank, and two 120-foot hoses equipped with low volume spray guns. The application rate of herbicide mixtures will be at a target rate of 40 gallons per acre (GPA), with herbicide concentrations being adjusted to manufacturer's recommended levels for the targeted weed species. Spot or boom applications will be performed using this equipment.
- Backpack sprayer units equipped with 4-gallon tanks and spray wands. The application of spray solution with the use of backpack sprayers will be at a target rate of 40 GPA, with herbicide concentrations being adjusted to manufacturer's recommended levels for the targeted weed species. Spot applications will be performed using this equipment.

Mobile equipment used for herbicide applications will be equipped with a fire extinguisher, backup alarm, first aid kit, spill kit, and suitable toolbox. Equipment will be inspected daily prior to use to check for leakage or spillage and repaired as needed.

15.12 Biological Control

There are limited biological controls for the weed species identified within the project area. Often, biological control methods are only effective on large, densely populated infestations. Furthermore, biological controls can have an impact on desirable vegetation, and in some instances, may not be approved for the use in Colorado. As effective biological controls become available, they should be evaluated and used for treatment appropriately.

15.13 Data Collection

GPS technology will be used to record where weed treatment applications have been performed. Treatment information will include location, date, time, and the specific weed species treated or targeted for treatment. Daily records will be kept that document date, time, general area, applicators, weather conditions, and species treated. Observations will be recorded in the field during each treatment day and timely entered into the mine's weed management database. This information will be used to plan future treatments and evaluate the effectiveness of weed treatments over time.

Prior to implementation of each year's weed control activities, previous treatment reports should be used to:

1. Characterize and evaluate the effectiveness of methods and practices that were used during previous years' weed management; and

2. Determine if selected methods and practices are still considered an appropriate, effective means of controlling noxious weed species in the upcoming treatment sessions

15.14 Noxious Weed Surveys

Surveys for weeds will be performed formally and informally throughout the year. Formal surveys will be performed twice per year, the first at the beginning of the growing season (April-May depending upon climatic conditions) and the second during the height of the growing season (between mid-July and mid-August). These surveys will cover the entire permit area and document the presence of weed species and their locations using GPS equipment. Results of these surveys will be provided to the BLM in the annual weed treatment report.

Informal surveys will be performed during the reclamation process. This includes reconnaissance of soil stripping areas and treatment prior to soil salvage operations, and opportunistic observations of infestations during mining and reclamation activities. Infestation treatments will be recorded using GPS equipment and include noxious weeds treated by species. Infestation treatments will be provided to the BLM in the annual weed treatment report.

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OCCUPANCY EXHIBIT 7

RMR will maintain staff onsite 24 hours a day, seven days a week, due to the continuous nature of operations in one form or another. The area topography discourages trespassing on foot. Gates across each road that enters the quarry will prevent vehicle access. BLM approved fencing may be used to prevent access to active quarry areas or other sensitive locations on site.

The gates and personnel presence are permitted under Section 3715.2-1 of Title 43 of the Code of Federal Regulations (CFR). Specifically, this occupancy involves (a) protecting exposed, concentrated, or otherwise accessible minerals from theft or loss; and, (b) protecting from theft or loss appropriate, operable equipment which is regularly used, is not readily portable, and cannot be protected by means other than occupancy.

A detailed map that identifies the site and the placement of the items specified in paragraphs (c), (d), and (e) below is provided in this plan of operations as Map C-2. In conformance with Section 3715.3-2, the following written description of the proposed occupancy is provided.

a) How the proposed occupancy is reasonably incident:

Operations at the Mid-Continent Quarry, in one form or another, will take place continuously throughout the day and night, requiring continuous presence of personnel.

b) How the proposed occupancy meets the conditions specified in Section 3715.2 and Section 3715.2-1:

The presence of personnel on site is solely for the purpose of allowing RMR to extract minerals without loss of valuable equipment or product.

c) Where you will place temporary or permanent structures for occupancy:

The quarry site's proximity to the City of Glenwood Springs means that onsite residence structures are not necessary and will not be present. The facilities listed in Exhibit 5, Section 4.0 and shown on Map C-4 are all that will be present onsite.

d) The location of and reason you need enclosures, fences, gates, and signs intended to exclude the general public.

Gates will be located at the entrance to the mill level and at the takeoff road along Transfer Trail on the east side of the quarry, as shown on Map C-2. Signs with the name of the quarry will be posted near the access points warning the general public that quarry operations are in progress and that all visitors should check in at the quarry office. The gates and signs are designed to exclude the general public from accessing the quarry area where heavy equipment is in use. The entire quarry will be fenced to prevent vandalism and to keep the public from active mining activities for their safety.

e) The location of reasonable public passage or access routes through or around the area to adjacent public lands:

Transfer Trail, which runs along the south and east sides of the quarry area, will continue to be available for public passage.

f) The estimated period of use of the structures, enclosures, fences, gates, and signs, as well as the schedule for removal and reclamation when operations end.

The quarry life is estimated to be 20 years. After mining is completed, the project will be reclaimed including removal of all structures, fences, and signage. A detailed reclamation schedule is provided in Exhibit 6, Reclamation Plan.

INTERIM MANAGEMENT PLAN EXHIBIT 8

This Interim Management Plan was developed in accordance with Section 3809.401 of Title 43 of the Code of Federal Regulations (CFR). It addresses the management of the Mid-Continent Limestone Quarry area during periods of temporary closure (including periods of seasonal closure) for the purpose of preventing unnecessary or undue degradation.

1. Reasons and Causes of Temporary Closure

The Mid-Continent Limestone Quarry has an estimated quarry life of twenty years; however, this may be extended or contracted depending on market conditions and deposit extents. Throughout the quarry life there may be periods when the project must be temporarily closed for various reasons. Such reasons include, but are not limited to, the following:

a. Decreases in sales that lead to a slow in production.
b. Insufficient manpower required to operate the quarry efficiently.
c. Road closures due to weather or other causes.
d. Loss of contracts for selling material.
e. Poor ground conditions, flooding, or other physical changes in the quarry that requires reevaluation and modification of the quarrying method.

Temporary closures are classified by duration of time. A short-term closure includes any closure of less than 12 months. A Long-term closure includes any closure of 12 months of greater

2. Measures to Stabilize Excavations and Workings

All excavations and workings will be stabilized in accordance with Mine Safety and Health Administration (MSHA) regulations and periodically inspected during temporary closure. Equipment will be removed from active production areas and placed in storage separate from all stormwater sumps. All equipment will be locked to prevent unwanted access of vandalism.

The surface area will be maintained in accordance with the project's Storm Water Management Plan (SWMP). Areas exhibiting erosion will be repaired and runoff will be monitored periodically in accordance with the approved Plan of Operations and SWMP. Ditches, culverts

and other surface drainage features will be inspected periodically and cleaned out as needed.
Measures to Isolate or Control Toxic or Deleterious Materials

The interaction of stormwater runoff with sediment, fuel, or oil is the only potential source of polluting materials. Sediment pollution in waterways could occur when the stormwater runoff that interacts with disturbed areas is not controlled and is allowed to discharge offsite to the nearest natural drainage. Several Measures for isolating or controlling each of these polluting materials during temporary closure will be implemented.

Rocky Mountain Resources will begin reclamation activities within 180 days of mining being completed in an area. All sumps and sediment ponds will remain in place Until vegetation of sufficient quality to control sediment has been re-established.

During a short-term (<12 months) closure, all fuel tanks, oils and other petroleum products will be locked in secure areas and any solvents will be picked up and recycled by the licensed vendor. Secondary containment features will be periodically inspected and maintained according to the SPCC Plan. If quarry operations are suspended over a longer period (>12 months), all petroleum products will be removed from the site.

During any temporary closure, all sumps and sediment ponds will continue to be monitored according to the plans found in Exhibit 16 – Monitoring Plans under Surface Water. Active mining level water that needs to be removed from the bench sump will be discharged via the onsite natural drainage.

3. Provisions for the Storage or Removal of Equipment, Supplies and Structures

Equipment and supplies will be maintained on site in secure areas during a short-term closure period. Quarrying equipment will be parked and locked. Structures, such as the mill, will also be locked.

If the temporary closure period extends beyond six months, some or all equipment, supplies, and mobile or modular structures may be gradually removed from the site in order to minimize the potential for theft and vandalism.

4. Measures to Maintain the Project Area in a Safe and Clean Condition

All areas of the site will be regularly maintained and kept free of litter and debris. Trash, used tires, used parts and equipment, empty barrels, and other miscellaneous materials will be removed from the site and either recycled or disposed of properly.

Site safety will be maintained with clear signage to discourage unauthorized access. All buildings and equipment will be securely locked when not in use.

5. Plans for Monitoring Site Conditions During Periods of Non-Operation

The following monitoring plans will remain in place during periods of non-operation:

- Vegetation monitoring
- Surface water monitoring (the Stormwater Management Plan will still be put into full practice during periods of non-operation)
- Ground water monitoring
- Air quality monitoring
- Stability monitoring

The following monitoring plans will be suspended during periods of non-operation due to the absence of all associated activities:

- Wildlife monitoring
- Seismic monitoring
- Noise monitoring

6. Closure Schedule and Reporting

No seasonal or maintenance shutdowns of the project are anticipated at this time. If market conditions or other circumstances require a temporary closure, RMR will provide notice to the BLM.

WILDLIFE INFORMATION EXHIBIT 9

Wildlife presence in the area and on the site of the proposed quarry expansion and modernization were evaluated by ERO Resources Corporation (ERO) of Denver, CO. This evaluation includes two site surveys conducted in October 2017 and June 2018. A report detailing their evaluation of the wildlife habitat at the Mid-Continent Limestone Quarry can be found in Appendix 5.

1. Wildlife Mortality Reporting

RMR will report to the BLM any observed deaths of raptors, elk, deer, and bighorn sheep within the active area within 72 hours of their discovery.

2. Raptors

topsoil stripping will be seasonally suspended from February 15 to July 15 of each year in order to protect bird nesting activities. Prior to the removal of topsoil and native vegetation, a visual survey will be performed on the area to be disturbed, to check for the presence of raptors and raptor nesting locations. A qualified biologist will conduct all surveys for raptors. Should any active nests be found, the BLM will be consulted to determine the best course of action for properly handling the situation.

SOILS INFORMATION EXHIBIT 10

Detailed baseline soils information can be found in the attached document from Habitat Management in this exhibit.

Procedures for topsoil replacement are detailed in the Reclamation Plan portion of this document. See Section 8 of Exhibit 6 for the complete Reclamation Plan.

1. Erosion Control and Soil Loss Mitigation

Soil loss due to erosion at the Mid-Continent Quarry occurs in three locations: the active mining level including concurrently reclaimed areas, the mill level, and the improved Transfer Trail. Measures to control erosion in the three areas identified include the following:

- All stormwater runoff will drain to sediment capture structures prior to discharge
- All topsoil stripped will be stored in a manner that minimizes erosion
- All sediment recovered from sumps, ponds and other structures will be retained within the quarry and utilized in reclamation activities
- Revegetation will occur promptly across all disturbed areas following the completion of all construction and mining activities
- All mining areas will drain to the active mining level during mining and concurrent reclamation to prevent any loss of soil due to storm erosion
- Sediment in runoff on the disturbed areas of the mill level area will be trapped in one of the following manners:
    - Drained into sediment ponds
    - Contained behind retention berms and local topography
    - Contained by temporary sediment control structures at the edges of disturbance (i.e. silt fences at the toe of fill slopes as they are revegetated).
- Transfer Trail will use period sumps and check dams within the road ditch to keep sediment from runoff from discharging and to prevent unnecessary soil loss

Some amount of soil loss will occur despite the implementation of all viable measures to control erosion. As such, best practices will be utilized in order to minimize as much soil loss due to erosion as possible.

SOILS INFORMATION

SOIL RESOURCES

The permit and adjacent lease areas are very rugged and are a portion of the south face of the Flat Tops massive mountain range. The south facing ridges are extremely steep and consist primarily of bare limestone outcrops of a dolomitic limestone member from the Leadville formation. Most of the area has shallow, rocky topsoil and subsoils vegetated with a mountain shrub community and subalpine aspen and conifers at the upper elevations and east-facing slopes. All south-facing formations in the area are quite arid and little runoff occurs even in the spring. Very infrequent summer thunderstorms can cause flash flooding in the adjacent ephemeral channels of Oasis Creek to the west and Cascade Creek to the east.

These soils present within the permit areas have formed on mountain slopes in residuum and colluvium weathered from limestone, calcareous sandstone, basalt, rhyolitic tuffs and are classified as Haplocryolls and Argicryolls. Suitable soil materials for plant growth medium reconstruction on reclaimed areas will be salvaged, stockpiled and redistributed or salvaged, direct hauled and redistributed. Quantities of topsoil and subsoil identified for salvage are estimated from baseline soil samples taken from the NRCS map units obtained from the USDA Web Soil Survey (USDA-NRCS-2018). Map 10-1 illustrates the soil resources that may be disturbed by mining operations and their associated acres within the 302-acre quarry boundary. Four major NRCS soil map units are identified within the 302-acre affected area quarry boundary including the Farlow-Rock Outcrop (47%), Cochetopa loam (23%), Dateman gravelly loam (22%), Jerry loam (1%), Torriorthents-Rock Outcrop (1%), and previously disturbed (7%) by roads and previous mining activity. Table 10-1: Soil Properties, lists the soil map unit series, properties, and classifications. Attachment 10-1 contains the NRCS soil series descriptions.

Table 10-1: Soil Properties

Map Unit Symbol - NRCS Soil Map Unit	Class	Percent of Area	Sample Depth to Cobble	Depth to Bedrock	Hydrologic Soil Group
26 - Farlow-Rock outcrop association, 25 to 50% slopes	Haplocryolls	47%	12"	40-60"	B
39 - Jerry loam, 12 to 50 percent slopes	Argicryolls	1%	13"	>80"	C
17 - Cochetopa loam, 9 to 50 percent slopes	Argicryolls	23%	12"	>80"	C
67 - Torriorthents-Rock outcrop complex, steep, 15 to 70 percent slopes		1%		0-30"	D
22 - Dateman gravelly loam, 30 to 50 percent slopes	Argicryolls	22%	19"	20-40"	C

FARLOW-ROCK OUTCROP ASSOCIATION, 25-50% SLOPES

This association is made up of about 65 percent Farlow channery loam. The balance is comprised of 25 percent Rock Outcrop and 10 percent Dateman gravelly loam. The Farlow is a shallow, channery, well-drained soil located on mountain flanks and formed in residuum weathered from limestone. Permeability ranges from moderately low to moderately high, and the available water capacity is low. Runoff is high, maximum calcium carbonate is 10 percent and the salinity ranges from nonsaline to very slightly saline. This soil has moderate water and wind erosion hazards. The native vegetation is mainly subalpine mountain shrub. The Farlow channery loam, has been assigned to land capability class 7e (non-irrigated), indicating severe limitations that make it generally unsuited to cultivation and restrict its use largely to range, woodland, or wildlife habitat. The “e” sub-class indicates that the main limitation of this soil is risk of erosion. The rock outcrop portion of this Association is generally unweathered limestone bedrock with no surface soil.

COCHETOPA LOAM, 9-50% SLOPES

This map unit is made up of about 85 percent Cochetopa stony loam and 10 percent Jerry stony loam. The Cochetopa is a shallow, stony, well-drained soil located on mountain flanks and formed in colluvium weathered from volcanic and sedimentary rocks. Permeability ranges from moderately low to moderately high, and the available water capacity is moderate. Runoff is high, nonsaline and has moderate water and wind erosion hazards. The native vegetation is mainly subalpine trees and shrubs. The Farlow channery loam, has been assigned to land capability class 7e (non-irrigated), indicating severe limitations that make it generally unsuited to cultivation and restrict its use largely to range, woodland, or wildlife habitat. The "e" sub-class indicates that the main limitation of this soil is risk of erosion. The Jerry loam portion of this map unit is generally formed in alluvium from basalt, sandstones and shales and are deep and well drained.

DATEMAN GRAVELLY LOAM, 30-50% SLOPES

This map unit is made up of about 85 percent Dateman gravelly loam and similar soils. The Dateman loam is a shallow, gravelly, well-drained soil located on mountainsides and formed in residuum weathered from limestone and sandstone. Permeability ranges from moderately low to moderately high, and the available water capacity is very low. Runoff is high, nonsaline with calcium carbonate at 2 percent and has moderate water and wind erosion hazards. The native vegetation is mainly subalpine coniferous trees. The Dateman gravelly loam, has been assigned to land capability class 7e (non-irrigated), indicating severe limitations that make it generally unsuited to cultivation and restrict its use largely to range, woodland, or wildlife habitat. The "e" sub-class indicates that the main limitation of this soil is risk of erosion.

JERRY LOAM, 30-50% SLOPES

This map unit is made up of about 90 percent Jerry loam and similar soils. The Jerry loam is a deep, cobbly, well-drained soil located on mountainsides and formed in alluvium weathered from basalt, sandstone and shale. Permeability ranges from moderately low to moderately high, and the available water capacity is very low. Runoff is very high, nonsaline with calcium carbonate at 5 percent and has moderate water and wind erosion hazards. The native vegetation is mainly pastureland. The Jerry loam, has been assigned to land capability class 7e (non-irrigated), indicating severe limitations that make it generally unsuited to cultivation and restrict its use largely to range, woodland, or wildlife habitat. The "e" sub-class indicates that the main limitation of this soil is risk of erosion.

SOIL SAMPLING, ANALYSIS AND SUITABILITY

Baseline topsoil and subsoil samples were collected from each of the four major soil map units projected to be disturbed within the quarry's affected area boundary. Soil samples were collected with a bucket auger to the depth of refusal when large rock cobble was encountered. Three subsamples were collected from each map unit and collated for laboratory analysis. The particle size and compacted lithology of the channery, gravelly and cobbly rock material encountered at these shallow sampling depths (9-19") suggests topsoil and subsoil salvage after clearing and grubbing of the standing vegetation will be difficult and result in the salvage of no more than six inches of topsoil/subsoil material.

The suitability of the native topsoil, subsoil and screened fine materials to sustain several native plant communities will be determined by using WDEQ/LQD Table I: Criteria to Establish Topsoil and Overburden Suitability (Wyoming DEQ, 1994). Appendix 10-2 contains the topsoil and overburden suitability guidelines and criteria. Suitability criteria will be met for pH, electrical conductivity, saturation percentage, texture, selenium, and percent by volume of coarse fragments. If the topsoil and subsoil materials comply with WDEQ/LQD's criteria as "suitable" or "marginal" these materials will be acceptable for use as a plant topdressing substrate over the final graded backfill material.

Additional samples were collected from the existing topsoil stockpile immediately adjacent to the loadout facility and the screened fines (growth medium) stockpiles near the crusher. Soil sample locations are shown on Map 10-1: Baseline Soils. Soil sample analyses were conducted by Energy Laboratories and results are contained in Table 10-2: Soil Data. Analytical parameters for the soil analysis were selected to evaluate the suitability of the baseline topsoil resources and the growth medium and fines materials that will result from the limestone mining screened material fines (approximately 885,000 tons of growth medium per year or 15 percent of the screened quarried dolomite materials).

A review of the topsoil and screened material fines laboratory analyses indicated that all parameters tested were suitable as plant growth medium. However, selected major nutrients (nitrogen, phosphorous, potassium) and organic matter in the salvaged topsoil and screened material fines are below standard agronomic concentrations and will require additional amendments to support the post mining vegetation. These soil and growth medium analytical results were evaluated to calculate the soil amendments necessary to support successful revegetation and the post-mining land use of wildlife habitat. Exhibit 6: Reclamation Plan contains the additional soil amendments necessary to support revegetation success.

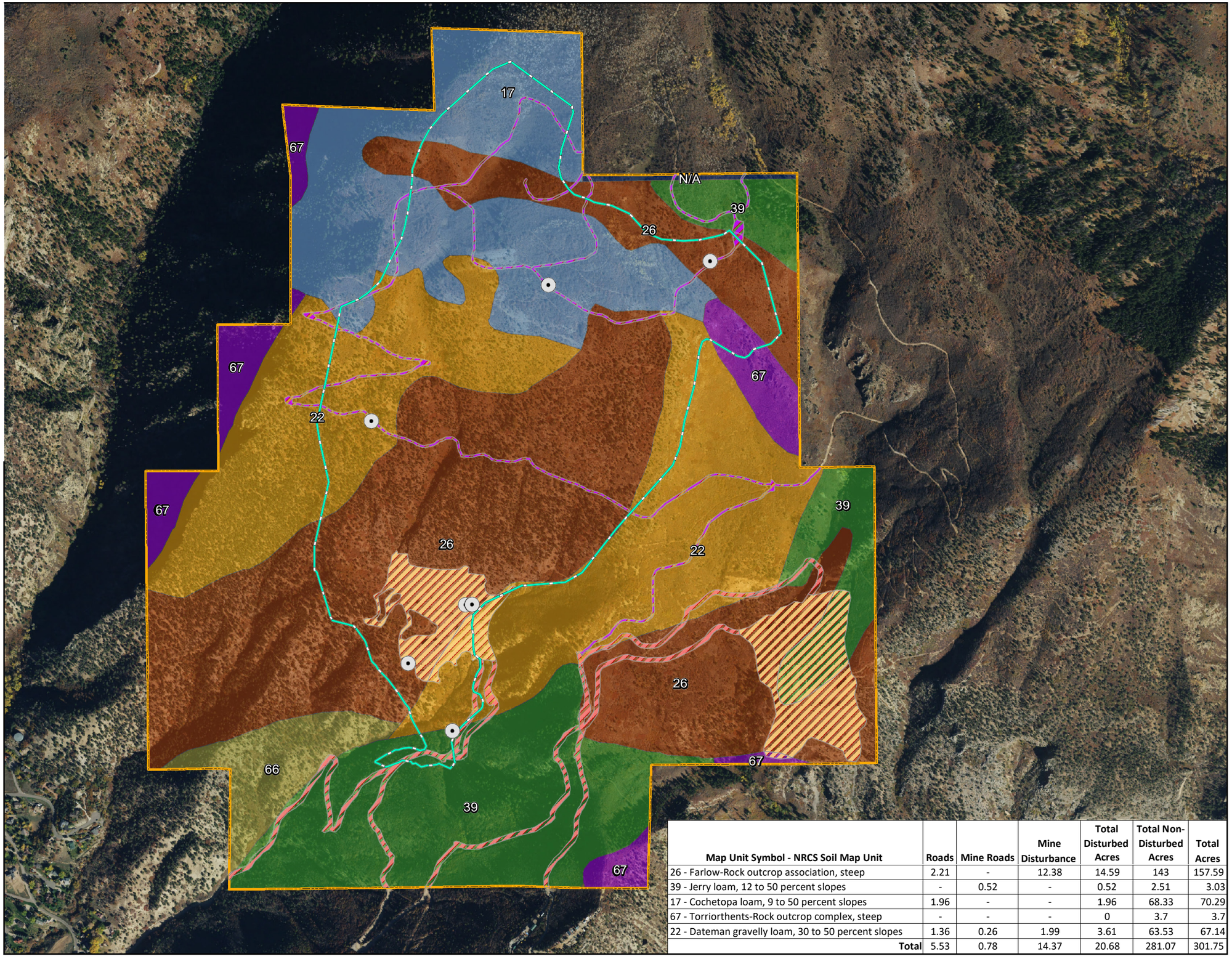
Table 10-2: Soil Data

SampleID	ClientSampID	Depth	Matrix	CollectionDate	Very Fine Sand, wt% (Note #1)	Coarse Fragments, % (Note #2)	Sand, %	Silt, %	Clay, %	Texture	Percent Sat, %	pH-SatPst, s_u_	Cond-SatPst, mmhos/cm	K, available-NH4OAC, mg/kg	CEC, meq/100g	OM-WB, %	OC, %	Lime, %	P, Olsen-Olsen, mg/kg	NO3, mg/kg-dry	B-CACL2, mg/kg	Se-CACL2, mg/kg
H18070509-001	Fines West	0-12	Soil	7/20/2018	11	25	66	22	12	SL	20.5	7.6	2.2	33	3.74	<0.2	<0.1	73.2	<1	3.3	0.1	<0.1
H18070509-002	Fines East	0-12	Soil	7/20/2018	9	19	72	18	10	SL	18.6	7.9	1.7	19	2.49	<0.2	<0.1	77.3	<1	4.5	<0.1	<0.1
H18070509-003	Farlow #26	0-9	Soil	7/20/2018	53	<2	32	42	26	L	41.0	6.4	0.4	424	26.0	3.5	2.0	0.92	2	1.7	0.2	<0.1
H18070509-004	Cochepeta #17	0-12	Soil	7/20/2018	68	5	18	44	38	SiCL	58.3	7.1	0.6	617	53.6	5.3	3.1	3.35	2	2.0	0.2	<0.1
H18070509-005	Jerry #39	0-13	Soil	7/20/2018	83	<2	26	34	40	C	54.0	6.9	1.0	501	30.7	4.3	2.5	3.18	6	<1	0.3	<0.1
H18070509-006	Dateman #22	0-19	Soil	7/20/2018	43	8	18	38	44	C	59.6	7.4	0.5	390	36.8	3.3	1.9	6.57	<1	<1	0.2	<0.1
H18070509-007	Topsoil Stockpile	0-12	Soil	7/20/2018	65	4	16	50	34	SiCL	49.0	7.7	0.4	249	34.0	1.7	1.0	12.1	6	1.9	0.4	<0.1

Note #1: Very Fine Sand is reported as a percentage of the entire sand fraction. It represents the size fraction from 0.05 - 0.10 mm. As an example in Fines West Stockpile, 66% Sand is composed of 11% very fine sand.

Note #2: Coarse Fragments represents particle sizes greater than 2.0 mm and are the percent of the total soil volume.

Map 10-1:
Rocky Mountain Resources Mid-Continent Quarry Baseline Soils



Legend

- Soil Sample Locations
- GLA Designed Quarry Boundary
- DisturbanceSoils
- Claims Border

Disturbance Type

- Mine Road
- Mining Disturbance
- Road

Soils

- Cochetopa loam, 9 to 50 percent slopes
- Dateman gravelly loam, 30 to 50 percent slopes
- Farlow-Rock outcrop association, steep
- Jerry loam, 12 to 50 percent slopes
- No Digital Data Available
- Torriorthents-Camborthids-Rock outcrop complex, steep
- Torriorthents-Rock outcrop complex, steep

N

Feet

0 500 1,000 2,000

1:10,000

Map Unit Symbol - NRCS Soil Map Unit	Roads	Mine Roads	Mine Disturbance	Total Disturbed Acres	Total Non-Disturbed Acres	Total Acres
26 - Farlow-Rock outcrop association, steep	2.21	-	12.38	14.59	143	157.59
39 - Jerry loam, 12 to 50 percent slopes	-	0.52	-	0.52	2.51	3.03
17 - Cochetopa loam, 9 to 50 percent slopes	1.96	-	-	1.96	68.33	70.29
67 - Torriorthents-Rock outcrop complex, steep	-	-	-	0	3.7	3.7
22 - Dateman gravelly loam, 30 to 50 percent slopes	1.36	0.26	1.99	3.61	63.53	67.14
Total	5.53	0.78	14.37	20.68	281.07	301.75

REV. No.	DATE	DRAFT BY	REVISION DESCRIPTION	ENG.	EQD.	PE.
				APPROVALS		

ROCKY MOUNTAIN™ RESOURCES

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(Sheet 1 of 1)

PREPARED BY: HMI	DRAWN BY: CG	PAPER SIZE: 11"x17"
APPROVED BY: DI	DATE: 7/27/2018	

ATTACHMENT 10-1: SOIL MAP UNIT DESCRIPTIONS

LOCATION FARLOW WY

Established
Rev.
02/1999

Series
PSD/MCS

FARLOW SERIES

The Farlow series consists of deep, well drained soils formed in residuum and colluvium weathered from limestone and calcareous sandstone. Farlow soils are on hillslopes, mountain slopes, alluvial fans, and terraces. Slopes are 5 to 65 percent. The mean annual precipitation is about 15 inches and the mean annual temperature is about 35 degrees F.

TAXONOMIC CLASS: Loamy-skeletal, mixed, superactive Calcic Haplocryolls

TYPICAL PEDON: Farlow channery loam - on a southwest facing 40 percent slope utilized as rangeland. (Colors are for dry soil unless otherwise stated.)

A--0 to 9 inches; dark grayish brown (10YR 4/2) channery loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft; very friable, slightly sticky and nonplastic; slightly effervescent, calcium carbonate disseminated; 20 percent channers; moderately alkaline (pH 8.2); abrupt smooth boundary. (6 to 12 inches thick)

Bw--9 to 17 inches; brown (10YR 5/3) very channery loam, brown (10YR 4/3) moist; moderate coarse prismatic structure; soft, very friable, slightly sticky and slightly plastic; strongly effervescent, calcium carbonate disseminated and as few fine and medium soft masses; 50 percent channers; strongly alkaline (pH 8.6); clear wavy boundary. (0 to 12 inches thick)

Bk1--17 to 30 inches; very pale brown (10YR 8/3) extremely channery loam, pale brown (10YR 6/3) moist; massive; soft, very friable, slightly sticky and slightly plastic; violently effervescent, calcium carbonate disseminated throughout the matrix and as many distinct soft masses, threads, filaments, and coatings on rock fragments; 60 percent channers; strongly alkaline (pH 8.6); gradual wavy boundary.

Bk2--30 to 46 inches; very pale brown (10YR 7/3) extremely channery loam, pale brown (10YR 6/3) moist; massive; soft, very friable, slightly sticky and nonplastic; violently effervescent, calcium carbonate as many prominent soft masses, threads, and coatings on all rock fragments; 65 percent channers; strongly alkaline (pH 8.6); abrupt wavy boundary.

R--46 to 60 inches; limestone with fractures more than 10 inches apart and no apparent displacements.

TYPE LOCATION: Fremont County, Wyoming; approximately 1,800 feet north and 240 feet east of the SW corner of sec. 18, T. 30 N., R. 99 W. Miners Delight Quadrangle. 42 degrees 34 minutes 16 seconds north latitude and 108 degrees 43 minutes 2 seconds west longitude.

RANGE IN CHARACTERISTICS: Depth to hard limestone and lithic contact ranges from 40 to 80 inches. Depth to continuous horizons of carbonate accumulation ranges from 6 to 20 inches. The mean annual soil temperature ranges from about 35 to 45 degrees F., and the mean summer soil temperature ranges from about 53 to 58 degrees F. The particle size control section has matrix texture of loam, clay loam, or sandy clay loam with 18 to 35 percent clay. Rock fragments average from 35 to 80 percent and consist of channers, cobbles, or angular gravel with 0 to 15 percent flagstones near the lithic contact.

The A horizon has hue of 2.5Y or 10YR, value of 3 through 5 dry, 2 or 3 moist, and chroma of 2 or 3. Reaction is neutral through moderately alkaline.

The Bw or BA horizon has hue of 2.5Y or 10YR, value of 4 through 7 dry, 3 through 6 moist, and chroma of 2 through 4. Reaction is slightly alkaline through strongly alkaline.

The Bk horizon has hue of 2.5Y or 10YR, value of 5 through 8 dry, 4 through 7 moist, and chroma of 2 through 4. Calcium carbonate equivalent ranges from 15 to 40 percent. This is a diagnostic calcic horizon. Reaction is moderately alkaline or strongly alkaline. A C horizon is present in some pedons above the lithic contact.

COMPETING SERIES: These are the Antrobus, Basinpeak (T), Broad Canyon, Decram, Fairydell, Foxmount, Gaia (T) Grafen, Greyback, Handran, Kamack, Klug (T), Krackle (T), Lag (T), Maurice, McCort (T), Middlehill, Midelight, Midfork, Parachute, Rockabin, Sebud, Silvercliff, Sup, Supervisor, Teemat (T), Thornburgh, Tiban, Timmercrek (T), Tineman and Wareagle series. The Antrobus, Basinpeak, Broad Canyon, Gaia, Greyback, Handran, Klug, Lag, Maurice, McCort, Midfork, Sebud, Silvercliff, Sup, Teemat, Thornburgh, Tiban, Timmercrek, and Wareagle soils are very deep. Decram, Foxmount, Grafen, Krackle, Middlehill, Parachute, Rockabin, and Supervisor soils are moderately deep. Fairydell soils have accumulations of silica in the Bk horizon. Kamack and Tineman soils are non-calcareous throughout. Midlight soils lack a diagnostic calcic horizon.

GEOGRAPHIC SETTING: Farlow soils are on mountain and hill footslopes, backslopes, and upper toeslopes. It is also on terraces and upper fan aprons. These soils formed in residuum and colluvium weathered primarily from limestone and calcareous sandstone. Slopes are 5 to 65 percent. Elevations are 6,000 to 9,000 feet. In Colorado elevations are as high as 10,250 feet The mean annual precipitation is about 15 inches but ranges from 13 to 25 inches. The mean annual temperature is about 35 degrees but ranges from 33 to 44 degrees F. The estimated frost-free season is 60 days or less depending upon elevation, aspect, and air drainage.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the Cloud Peak and Duncom soils. Cloud Peak soils have an argillic horizon. Duncom soils have bedrock at 10 to 20 inches.

DRAINAGE AND PERMEABILITY: Well drained; rapid or medium runoff depending upon slope; moderate permeability.

USE AND VEGETATION: Rangeland and wildlife habitat. Native vegetation is Idaho fescue, big sagebrush, Columbia needlegrass, western wheatgrass, and mountain brome.

DISTRIBUTION AND EXTENT: Mountains of Wyoming and Colorado. The series is of moderate extent.

MLRA SOIL SURVEY REGIONAL OFFICE (MO) RESPONSIBLE: Bozeman, Montana

SERIES ESTABLISHED: Fremont County, Lander Area, Wyoming; 1975.

REMARKS: Diagnostic horizons and features recognized in this pedon are:

mollic epipedon - 0 to 9 inches (A)

cambic horizon - 9 to 17 inches (Bw)

calcic horizon - 9 to 46 inches (Bk1, Bk2)

lithic contact - 46 inches (R)

MLRR- E

SIR- WY0245, WY0611, WY0656, WY0834, WY1181

National Cooperative Soil Survey
U.S.A.

LOCATION COCHETOPA CO

Established Series
Rev. RHM/DAD/TWH
11/98

COCHETOPA SERIES

The Cochetopa series consists of very deep, well drained soils that formed in colluvium and alluvium derived mainly from basalt and rhyolitic tuff. Cochetopa soils are on mountain slopes, hills, and valley sides. Slopes range from 5 to 50 percent. Mean annual precipitation is about 18 inches and the mean annual air temperature is about 39 degrees F.

TAXONOMIC CLASS: Fine, smectitic Pachic Argicryolls

TYPICAL PEDON: Cochetopa stony loam - grassland. (Colors are for dry soil unless otherwise noted.)

A--0 to 8 inches; dark gray (10YR 4/1) stony loam, black (10YR 2/1) moist; strong fine granular structure; soft, very friable, slightly sticky and slightly plastic; 15 percent stones; neutral (pH 6.8); clear smooth boundary. (4 to 14 inches thick)

BAt--8 to 12 inches; dark gray (10YR 4/1) clay loam, black (10YR 2/1) moist; moderate medium subangular blocky structure parting to fine granular; slightly hard, friable, slightly sticky and slightly plastic; few thin patchy clay films on faces of peds and in root channels and pores; many dark colored mineral grains and fragments of basalt, of sand and silt size; 10 percent stones; neutral (pH 6.8); clear smooth boundary. (4 to 10 inches thick)

Bt1--12 to 20 inches; dark grayish brown (10YR 4/2) stony clay, very dark brown (10YR 2/2) moist; moderate medium subangular blocky structure; slightly hard, very friable, sticky and plastic; thin continuous clay films on faces of peds in root channels and pores; many dark colored mineral grains and fragments of basalt, of sand and silt size; 20 percent stones; neutral (6.8); clear smooth boundary.

Bt2--20 to 32 inches; brown (7.5YR 5/4) stony clay, brown (7.5YR 4/4) moist; moderate medium subangular blocky structure; slightly hard, friable, sticky and plastic; thin continuous clay films on faces of peds and in root channels and pores; many dark colored mineral grains and fragments of basalt, of sand and silt size; 20 percent stones; neutral (pH 7.2); gradual smooth boundary. (The combined thickness of the Bt horizon ranges from 12 to 36 inches)

BCt--32 to 40 inches; brown (7.5YR 5/4) stony sandy clay, brown (7.5YR 4/4) moist; weak medium subangular blocky structure; very hard, friable, sticky and plastic; thin patchy clay films on faces of peds and in root channels and pores; many dark colored mineral grains and fragments of basalt, of sand and silt size; 20 percent stones; slightly alkaline (pH 7.6); gradual smooth boundary. (4 to 12 inches thick)

C--40 to 60 inches; light brown (7.5YR 6/4) stony clay loam, brown (7.5YR 5/4) moist; massive; hard, friable, slightly sticky and slightly plastic; many dark colored mineral grains and fragments of basalt, of sand and silt size; 30 percent stones; slightly alkaline (pH 7.6). (several feet thick)

TYPE LOCATION: Gunnison County, Colorado; East half of Sec. 22, T. 15 S., R. 86 W.

RANGE IN CHARACTERISTICS:
Soil moisture regime: ustic; the moisture control section is dry more than half the time when the soil temperature is above 41 degrees F.
Mean annual soil temperature: 36 to 42 degrees F.
Mean summer soil temperature: 47 to 56 degrees F.

Thickness of the mollic epipedon: 16 to 30 inches
Depth to the base of the argillic horizon: 20 to 60 inches or more
Base saturation: ranges from 60 to 100 percent, but usually is more than 80 percent in most subhorizons
Linear extensibility (estimated): 2.0 to 4.0 cm

Particle size control section (weighted averages):
Clay content: 35 to 55 percent
Rock fragment content: 5 to 35 percent, dominantly stones

A horizon:
Hue: 7.5YR to 2.5Y
Value: 2 to 5 dry, 2 or 3 moist
Chroma: 1 to 3 dry or moist
Texture: L, ST-L
Rock fragments: 0 to 20 percent
Reaction: slightly acid or neutral

Bt horizon:
Hue: 7.5YR to 2.5Y
Value: 3 to 7 dry, 2 to 6 moist
Chroma: 1 to 4, dry or moist
Texture: ST-C, ST-CL
Clay content: 35 to 55 percent
Rock fragments: 5 to 35 percent, dominantly stones
Content of fine and coarser sand: 15 to 35 percent
Reaction: slightly acid or neutral

C horizon (not in all pedons):
Hue: 7.5YR to 2.5Y
Value: 5 or 6 dry, 4 or 5 moist
Chroma: 2 to 4, dry or moist
Texture: ST-L, ST-SCL, ST-CL, ST-C
Clay content: 20 to 50 percent

Rock fragments: 5 to 35 percent, dominantly stones
Reaction: neutral or slightly alkaline

COMPETING SERIES: These are the Bischoff, Burnette, Faim, Friana, Fulcher, Grouseville, Guero, Leemorris, Luna, Mancos, Mayflower, Paulson, Perinos, Richens, Runlett, Skutum, Slights, Sudpeak, Teedown, and Toponce series.

Bischoff: have silty clay loam and silty clay textures in the argillic horizon and have a presumed xeric moisture regime

Burnette, Fulcher, Grouseville, and Paulson: have horizons of secondary calcium carbonate accumulation.

Faim: have a xeric moisture regime.

Friana: have a lithologic discontinuity with cindery materials

Guero: have rock fragments that are dominantly gravel or cobbles in the control section and are dry less than half the time when the soil temperature is above 41 degrees F.

Luna: overlie beds of ash and tuff at depths of less than 40 inches and have significant amount of ash throughout the soil.

Leemorris, Mancos, Mayflower, and Runlett: have a lithic contact at depths of 20 to 40 inches.

Perinos and Richens: have hue redder than 7.5YR in the Bt horizon.

Skutum: have sandy loam textures in the C horizon.

Slights: is an old series last updated in 2/46 and cannot be accurately competed with data available.

Sudpeak: have endosaturation at depths of 3 to 6 feet.

Teedown: are dry less than half the time when the soil temperature is greater than 41 degrees F.

Toponce: have less than 5 percent rock fragments in the argillic horizon and have a presumed xeric moisture regime.

GEOGRAPHIC SETTING:
Parent material: colluvium and slope alluvium derived principally from basalt and rhyolitic tuff
Landform: mountain slopes, hills, and valley sides
Slopes: 5 to 50 percent
Elevation: 7,000 to 10,000 feet
Mean annual temperature: 34 to 42 degrees F.
Mean annual precipitation: 16 to 22 inches, relatively evenly distributed throughout the year.
Frost-free period: 30 to 75 days

GEOGRAPHICALLY ASSOCIATED SOILS: These are the Youman and Passar soils. Youman soils have hue of 5YR or redder and have mollic epipedons less than 16 inches thick. Passar soils have more than 35 percent rock fragments and have mollic epipedons less than 16 inches thick.

DRAINAGE AND PERMEABILITY: Well drained; negligible to very high runoff; slow permeability.

USE AND VEGETATION: These soils are used as livestock grazing, wood products, and for recreational purposes. Native vegetation is mainly big sagebrush, snowberry, Thurber fescue, nodding brome, and mountain bluegrass.

DISTRIBUTION AND EXTENT: Mountainous areas of central Colorado. LRR E, MLRA 48A. The series is of moderate extent.

MLRA SOIL SURVEY REGIONAL OFFICE (MO) RESPONSIBLE: Bozeman, Montana

SERIES ESTABLISHED: Gunnison County, Colorado, 1974.

REMARKS: Diagnostic features recognized in this pedon are:
Mollic epipedon: from 0 to 20 inches (A, BAt, and Bt1 horizons)
Argillic horizon: The zone from 12 to 40 inches (Bt1, Bt2, and BCt horizons)
Particle-size control section; The zone from 12 to 32 inches (Bt1 and Bt2 horizons)

This revision (10/98) limits the range in characteristics to more closely match the original concept of this series. Soils without rock fragments or without stones as the dominant fraction are now excluded. Sandstone and shale are excluded from the parent material. This series was determined to be mainly in the ustic moisture regime; the upper limit of average annual precipitation was reduced from 30 to 22 inches. Soils that border a udic regime (and are typically forested) are now excluded from the series concept.

Keys to Soil Taxonomy: classified according to the 8th edition, 1998.

ADDITIONAL DATA:

National Cooperative Soil Survey
U.S.A.

LOCATION DATEMAN UT+ID

Established Series
Rev.11/98 DTH/TER/MJD

DATEMAN SERIES

The Dateman series consists of moderately deep, well drained, moderately permeable soils. Dateman soils formed in residuum and colluvium derived dominantly from sedimentary rock on mountain slopes. Slopes range from 3 to 80 percent. Average annual precipitation is about 27 inches and mean annual temperature is about 40 degrees F.

TAXONOMIC CLASS: Loamy-skeletal, mixed, active Pachic Argicryolls

TYPICAL PEDON: Dateman cobbly silt loam-coniferous forest. (Colors are for air-dry soil unless otherwise stated.) A discontinuous litter of leaves and twigs is from 0 to 2 inches thick.

A1--0 to 14 inches; brown (10YR 5/3) cobbly silt loam, very dark brown (7.5YR 2/2) moist; weak fine granular structure; soft, very friable, nonsticky and slightly plastic; many fine and common medium and few coarse roots; 20 percent cobbles; neutral (pH 7.2); gradual wavy boundary. (11 to 18 inches thick)

A2--14 to 24 inches; brown (10YR 5/3) very cobbly silt loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure parting to weak fine granular; slightly hard, very friable, slightly sticky and slightly plastic; many fine, few medium and coarse roots; 40 to 50 percent cobbles; neutral (pH 7.0); gradual irregular boundary. (6 to 12 inches thick)

Bt--24 to 34 inches; brown (7.5YR 4/4) extremely cobbly silty clay loam, dark brown (7.5YR 3/4) moist; weak medium and coarse subangular blocky structure; hard, friable, slightly sticky and plastic; few fine, medium and large roots; many very fine interstitial pores; few thin clay films in pores and on ped surfaces; 70 percent cobbles; mildly alkaline (pH 7.4); abrupt irregular boundary. (8 to 18 inches thick)

R--34 inches; fractured weathering limestone.

TYPE LOCATION: Cache County, Utah; Paradise Dry Canyon; 1,700 feet east of the west 1/4 corner, sec. 5, T. 9 N., R. 2 E.

RANGE IN CHARACTERISTICS: The average annual soil temperature is 34 to 45 degrees F, with average summer soil temperature at a 20 inch depth of 50 to 54 degrees F. The soil moisture regime is udic.

The mollic epipedon is 16 to 32 inches thick. Depth to fractured bedrock is 20 to 40 inches. The particle size control section has 35 to 80 percent rock fragments and 18 to 35 percent clay.

The A horizon has hue of 10YR or 7.5YR, value of 3 to 5 dry, 2 or 3 moist and chroma of 2 or 3. Texture is silt loam or loam with 10 to 60 percent rock fragments. Consistence is soft to slightly

hard. Reaction is slightly acid to neutral.

The Bt or Bw horizon has hue of 7.5YR or 10YR, value is 4 or 5 dry, 3 or 4 moist and chroma of 3 or 4. Textures are silty clay loam or loam, with 35 to 80 percent rock fragments, mainly cobbles and gravels. Rock fragment content is 35 to 80 percent. It has weak to moderate, fine to coarse subangular blocky structure. Reaction is neutral to moderately alkaline.

COMPETING SERIES: There are no competing series.

GEOGRAPHIC SETTING: Dateman soils occur on moderately sloping to very steep, north and east facing mountain slopes and mountain tops at elevations of 5,200 to 11,500 feet. Slopes are 3 to 80 percent. These soils formed in residuum and colluvium from sedimentary rocks. The climate is humid and the average annual precipitation is 22 to 35 inches. The mean annual temperature is 34 to 47 degrees F. and the average summer air temperature is 50 to 59 degrees F. The freeze-free period is 50 to 90 days.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the Agassiz, Flygare, Onaqui, Podmor and Elwood soils. All these soils except Flygare have mean summer temperatures that are more than 59 degrees F. Agassiz and Onaqui are 10 to 20 inches deep over bedrock. Podmor is 20 to 40 inches deep over quartzite. Flygare is more than 60 inches deep and has a mean summer temperature of less than 59 degrees F.

DRAINAGE AND PERMEABILITY: Well drained; slow to rapid runoff; moderate permeability.

USE AND VEGETATION: Used for timber, limited grazing and for watershed. Native vegetation is Douglas-fir, alpine fir, white fir, mountain brome, snowberry and quaking aspen.

DISTRIBUTION AND EXTENT: These soils are on very steep mountain slopes in north-central Utah, southeast Idaho and western Colorado. This series is of moderate extent. MLRA 13, 28A, 28B, 48A

MLRA SOIL SURVEY REGIONAL OFFICE (MO) RESPONSIBLE: Phoenix, Arizona

SERIES ESTABLISHED: Cache Area, Utah, 1969.

REMARKS: Diagnostic horizons and features recognized in this pedon are:

Mollic epipedon - the zone of dark colored soil material from the soil surface to a depth of 24 inches. (A1 and A2 horizons)

Argillic horizon - the zone from 24 to 34 inches. (Bt horizon)

The classification is based on the "Keys to Soil Taxonomy, Eighth Edition, 1998".

National Cooperative Soil Survey
U.S.A.

LOCATION JERRY CO

Established Series
Rev. RHM/GB
02/1999

JERRY SERIES

The Jerry series consists of deep and very deep, well drained soils that formed in alluvial and colluvial sediments or residuum derived mainly from sandstone, shale, breccia, and tuff. These soils are on upland hills, mountain slopes, ridges, benches, and mesa tops. Slopes are 1 to 65 percent. The mean annual precipitation is about 20 inches and the mean annual air temperature is about 37 degrees F.

TAXONOMIC CLASS: Fine, smectitic Ustic Argicryolls

TYPICAL PEDON: Jerry loam, rangeland. (Colors are for dry soil unless otherwise noted.)

A--0 to 6 inches, dark gray (10YR 4/1) loam, black (10YR 2/1) moist; moderate fine granular structure; soft, very friable; slightly sticky and slightly plastic; neutral; gradual smooth boundary. (4 to 10 inches thick)

BA--6 to 11 inches, dark grayish brown (10YR 4.2) loam, very dark brown (10YR 2/2) moist; moderate fine subangular blocky structure parting to moderate fine granular; slightly hard, very friable; slightly sticky and slightly plastic; few thin patchy clay films on some peds; 10 percent pebbles; neutral; clear wavy boundary. (3 to 6 inches thick)

Bt1--11 to 24 inches, brown (7.5YR 5/3) gravelly clay loam, dark brown (7.5YR 4/3) moist; moderate medium prismatic structure parting to medium subangular blocks; very hard, friable; sticky and plastic; faint clay films on faces of peds; 20 percent pebbles; neutral; gradual smooth boundary. (9 to 15 inches thick)

Bt2--24 to 32 inches, light brown (7.5YR 6/4) gravelly heavy clay loam, brown (7.5YR 4/4) moist; moderate medium prismatic structure parting to moderate medium subangular blocks; very hard, friable; very sticky and very plastic; many faint clay films on faces of peds; 25 percent pebbles; slightly alkaline; clear wavy boundary. (0 to 11 inches thick)

Bk1--32 to 40 inches, pale brown (10YR 6/3) gravelly clay loam, brown (10YR 4/3) moist; weak medium subangular blocky structure; very hard, friable; sticky and plastic; few faint patchy clay films on horizontal and vertical faces of peds; 30 percent pebbles; some visible secondary calcium carbonate occurring as concretions, and as coatings on pebbles; moderately alkaline; gradual wavy boundary. (4 to 10 inches thick)

Bk2--40 to 60 inches, pale brown (10YR 6/3) gravelly loam, brown (10YR 4/3) moist; massive; hard very friable; slightly sticky and slightly plastic; 30 percent pebbles; visible secondary calcium carbonate occurring as concretions, and in thin seams and streaks; moderately alkaline.

TYPE LOCATION: Gunnison County, Colorado; Center of Sec. 26, T. 15 S., R. 85 W.

RANGE IN CHARACTERISTICS: Mean annual soil temperature ranges 35 to 44 degrees F. Thickness of the mollic epipedon ranges from 7 to 15 inches, depth to secondary lime ranges from 15 to 40 inches, and thickness of the solum ranges from 20 to 50 inches. Organic carbon in the mollic epipedon ranges from .8 to 2 percent and decreases uniformly with increasing depth. The soil is 90 to 100 percent base saturated. Cation exchange capacity ranges from approximately 60 to 90 milliequivalents per 100 grams of clay. Rock fragments range from 0 to 35 percent in a majority of the particle-size control section and are mainly of pebble size, but includes channers up to 6 inches in length and some angular cobble. Some pedons have polygenetic horizons in the lower parts and soft bedrock may occur at depths of 40 to 60 inches.

The A horizon has hue of 2.5Y through 7.5YR, value of 4 or 5 dry, 2 or 3 moist, and chroma of 1 through 3. It ranges from soft to slightly hard.

The Bt horizon has hue of 2.5Y through 7.5YR, value of 5 or 6 dry, 3 through 5 moist, and chroma of 2 through 4. It usually has prismatic to subangular blocky structure but has angular blocky structure in some pedons. The Bt horizon may be modified with gravel or channers. Textures are clay loam, silty clay, silty clay loam, or clay and has 35 to 55 percent clay. It is neutral or slightly alkaline.

The Bk horizon has hue of 2.5Y through 7.5YR, value of 6 or 7 dry, 4 through 6 moist, and chroma of 1 through 4. It ranges from pH 8.0 to 8.6, and the calcium carbonate equivalent ranges from approximately 4 to 13 percent. Textures are silty clay loam, silty clay, clay or clay loam, and loam is common below 40 inches.

COMPETING SERIES: These are the Beaverdam (ID), Blackhorse (ID), Brinkert (CO), Buckskin (ID), Florissant (CO), Gothic (CO), Heath (CO), Heathcoat (ID), Helmet (CO), Judy (CO), Little Horn (MT), Mayoworth (WY), Owen Creek (WY), Piltz (CO), Sessions (UT), Sneffels (WY), Trout Creek (CO), and Youman (CO) series. Beaverdam, Brinkert, Gothic, Helmet, Sessions, and Youman soils lack lime carbonate above a depth of 40 inches and do not have k horizons. Judy, Little Horn, and Sneffels soils have a lithic contact at depths of 20 to 40 inches. Buckskin and Sessions soils have sola more than 50 inches thick. Florissant, Mayoworth, Owen Creek, Piltz, and Trout Creek have a paralithic contact at depths of less than 40 inches. Heath and Heathcoat soils have calcic horizons. Blackhorse soils have more than 45 percent silt in the Bt horizon and have lime carbonate above 15 inches.

GEOGRAPHIC SETTING: The Jerry soils are on upland hills, ridges, mountain slopes, benches and mesa tops. Slope gradients range from approximately 1 to 65 percent. The soils formed in locally transported alluvial and colluvial sediments or residuum derived principally from sandstone and shale Breccia and/or Tuff, but having a mixture of other crystalline rocks in places. The average annual precipitation is 16 to 30 inches with peak periods of precipitation occurring during

the spring and late summer. The mean annual temperature is 36 to 42 degrees F., and the mean summer temperature is 54 to 59 degrees F. Elevation is 7,000 to 10,000 feet in the state from north to south. The frost-free period ranges from 50 to 75 days.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the Cochetopa soils which have a mollic epipedon more than 16 inches thick and the competing Heath and Youman soils.

DRAINAGE AND PERMEABILITY: Well drained; rapid or medium runoff; slow to very slow permeability.

USE AND VEGETATION: These soils are used principally as native pastureland and for recreation. Native vegetation is mainly mountain big sage, snowberry, Thurber fescue, nodding brome, and native bluegrass and western wheatgrass.

DISTRIBUTION AND EXTENT: Mountainous areas of Colorado. The series is of moderate extent.

MLRA SOIL SURVEY REGIONAL OFFICE (MO) RESPONSIBLE: Bozeman, Montana

SERIES ESTABLISHED: Gunnison County, Colorado, 1975.

REMARKS: Diagnostic features are a mollic epipedon from 0 to 11 inches and an argillic horizon from 11 to 32 inches. Last updated by the state 6/93.

National Cooperative Soil Survey
U.S.A.

United States Department of Agriculture

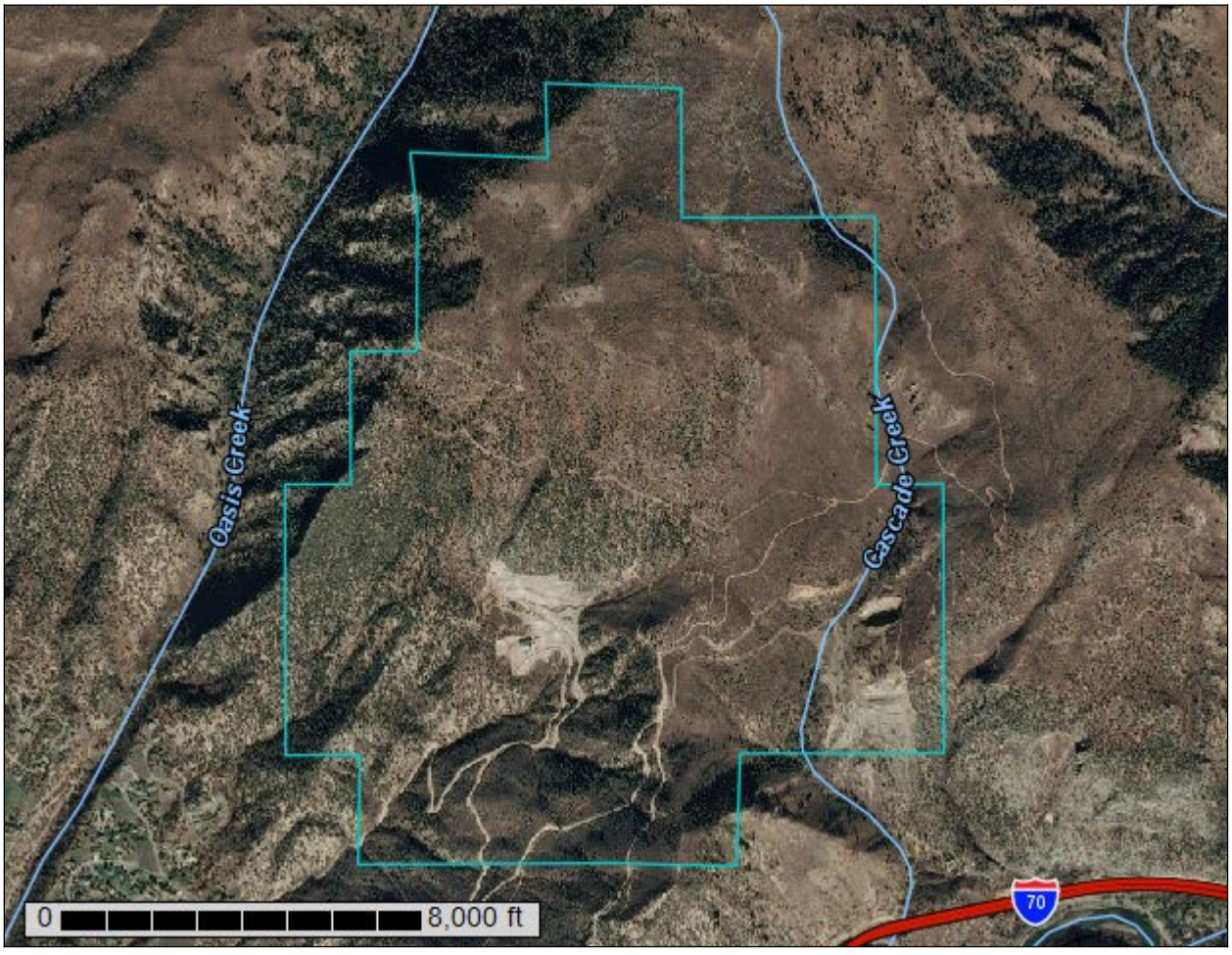
NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Flat Tops Area, Colorado, Parts of Eagle, Garfield, Moffat, Rio Blanco, and Routt Counties; and Rifle Area, Colorado, Parts of Garfield and Mesa Counties

Mine Claims Border



July 17, 2018

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

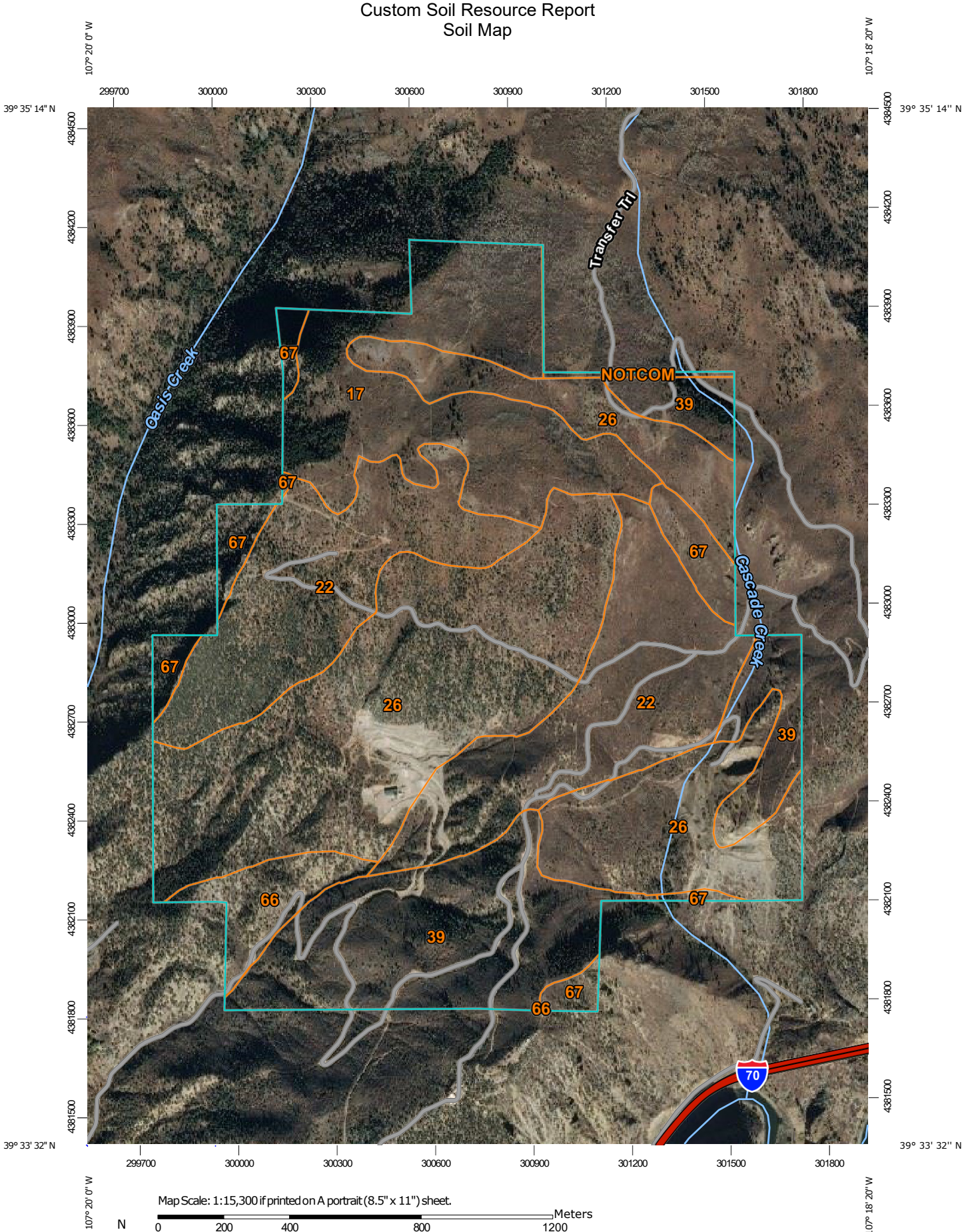
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Flat Tops Area, Colorado, Parts of Eagle, Garfield, Moffat, Rio Blanco, and Routt Counties
Survey Area Data: Version 2, Dec 23, 2013

Soil Survey Area: Rifle Area, Colorado, Parts of Garfield and Mesa Counties
Survey Area Data: Version 10, Oct 12, 2017

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Sep 24, 2015—Nov 2, 2015

MAP LEGEND

MAP INFORMATION

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
NOTCOM	No Digital Data Available	2.5	0.3%
Subtotals for Soil Survey Area		**2.5**	**0.3%**
Totals for Area of Interest		**838.8**	**100.0%**

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
17	Cochetopa loam, 9 to 50 percent slopes	122.1	14.6%
22	Dateman gravelly loam, 30 to 50 percent slopes	204.2	24.3%
26	Farlow-Rock outcrop association, steep	307.6	36.7%
39	Jerry loam, 12 to 50 percent slopes	143.7	17.1%
66	Torriorthents-Camborthids-Rock outcrop complex, steep	23.0	2.7%
67	Torriorthents-Rock outcrop complex, steep	35.6	4.2%
Subtotals for Soil Survey Area		**836.2**	**99.7%**
Totals for Area of Interest		**838.8**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties

and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Flat Tops Area, Colorado, Parts of Eagle, Garfield, Moffat, Rio Blanco, and Routt Counties

NOTCOM—No Digital Data Available

Map Unit Composition

Notcom: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Notcom

Properties and qualities

Rifle Area, Colorado, Parts of Garfield and Mesa Counties

17—Cochetopa loam, 9 to 50 percent slopes

Map Unit Setting

National map unit symbol: 2w4zr
Elevation: 7,000 to 9,500 feet
Mean annual precipitation: 18 to 22 inches
Mean annual air temperature: 37 to 39 degrees F
Frost-free period: 45 to 75 days
Farmland classification: Not prime farmland

Map Unit Composition

Cochetopa and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Cochetopa

Setting

Landform: Mountain slopes
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Colluvium derived from volcanic and sedimentary rock

Typical profile

A - 0 to 19 inches: loam
Bt - 19 to 44 inches: stony clay
BCt - 44 to 60 inches: very stony clay

Properties and qualities

Slope: 9 to 50 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.07 to 0.21 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline (0.0 to 1.0 mmhos/cm)
Available water storage in profile: Moderate (about 8.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: C
Ecological site: Brushy Loam (R048AY238CO)
Hydric soil rating: No

Minor Components

Jerry, stony

Percent of map unit: 10 percent
Landform: Mountain slopes
Down-slope shape: Convex
Across-slope shape: Linear

Ecological site: Subalpine Loam (R048AY250CO)
Hydric soil rating: No

Lamphier

Percent of map unit: 5 percent
Landform: Mountain slopes
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: Aspen Woodland (F048AY449CO)
Hydric soil rating: No

22—Dateman gravelly loam, 30 to 50 percent slopes

Map Unit Setting

National map unit symbol: jnxl
Elevation: 7,000 to 9,500 feet
Farmland classification: Not prime farmland

Map Unit Composition

Dateman and similar soils: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Dateman

Setting

Landform: Mountainsides
Landform position (three-dimensional): Mountainflank
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from limestone and sandstone

Typical profile

H1 - 0 to 3 inches: gravelly loam
H2 - 3 to 16 inches: gravelly sandy loam
H3 - 16 to 22 inches: very gravelly sandy clay loam
H4 - 22 to 34 inches: very gravelly sandy loam
H5 - 34 to 38 inches: unweathered bedrock

Properties and qualities

Slope: 30 to 50 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 2 percent
Available water storage in profile: Very low (about 2.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: C
Ecological site: Brushy Loam (R048AY238CO)
Hydric soil rating: No

26—Farlow-Rock outcrop association, steep

Map Unit Setting

National map unit symbol: jnxq
Elevation: 8,000 to 10,500 feet
Farmland classification: Not prime farmland

Map Unit Composition

Farlow and similar soils: 65 percent
Rock outcrop: 25 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Farlow

Setting

Landform: Mountainsides
Landform position (three-dimensional): Mountainflank
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Residuum weathered from limestone

Typical profile

H1 - 0 to 10 inches: channery loam
H2 - 10 to 35 inches: very channery loam
H3 - 35 to 42 inches: extremely flaggy loam
H4 - 42 to 46 inches: unweathered bedrock

Properties and qualities

Slope: 25 to 50 percent
Depth to restrictive feature: 40 to 60 inches to lithic bedrock
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 10 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Low (about 3.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: B
Ecological site: Shallow Subalpine (R048AY251CO)
Hydric soil rating: No

Description of Rock Outcrop

Setting
Landform: Mountainsides
Landform position (three-dimensional): Free face
Down-slope shape: Convex
Across-slope shape: Convex

Typical profile
H1 - 0 to 60 inches: unweathered bedrock

Properties and qualities
Slope: 25 to 50 percent
Depth to restrictive feature: 0 inches to paralithic bedrock
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)
Available water storage in profile: Very low (about 0.0 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8s
Hydric soil rating: No

Minor Components

Dateman
Percent of map unit: 10 percent
Landform: Mountainsides
Landform position (three-dimensional): Mountainflank
Hydric soil rating: No

39—Jerry loam, 12 to 50 percent slopes

Map Unit Setting
National map unit symbol: jny5
Elevation: 7,000 to 9,500 feet
Farmland classification: Not prime farmland

Map Unit Composition
Jerry and similar soils: 90 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Jerry

Setting

Landform: Mountainsides
Landform position (three-dimensional): Mountainflank
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Alluvium derived from basalt and/or alluvium derived from sandstone and shale

Typical profile

H1 - 0 to 3 inches: loam
H2 - 3 to 10 inches: clay loam
H3 - 10 to 40 inches: cobbly clay loam
H4 - 40 to 60 inches: cobbly clay

Properties and qualities

Slope: 12 to 50 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 5 percent
Available water storage in profile: Moderate (about 8.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: C
Ecological site: Brushy Loam (R048AY238CO)
Hydric soil rating: No

66—Torriorthents-Camborthids-Rock outcrop complex, steep

Map Unit Setting

National map unit symbol: jnz4
Elevation: 5,000 to 8,500 feet
Mean annual precipitation: 10 to 15 inches
Mean annual air temperature: 39 to 46 degrees F
Frost-free period: 80 to 105 days
Farmland classification: Not prime farmland

Map Unit Composition

Torriorthents, steep, and similar soils: 45 percent
Camborthids, steep, and similar soils: 20 percent
Rock outcrop, steep: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Torriorthents, Steep

Setting

Landform: Mountainsides
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Mountainflank, base slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Stony, basaltic alluvium derived from sandstone and shale

Typical profile

H1 - 0 to 4 inches: variable
H2 - 4 to 30 inches: fine sandy loam
H3 - 30 to 34 inches: unweathered bedrock

Properties and qualities

Slope: 15 to 70 percent
Depth to restrictive feature: 4 to 30 inches to lithic bedrock
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 5 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Very low (about 2.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D
Hydric soil rating: No

Description of Camborthids, Steep

Setting

Landform: Mountainsides
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Mountainflank, base slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Stony, basaltic alluvium derived from sandstone and shale

Typical profile

H1 - 0 to 4 inches: variable
H2 - 4 to 30 inches: clay loam
H3 - 30 to 34 inches: unweathered bedrock

Properties and qualities

Slope: 15 to 65 percent
Depth to restrictive feature: 15 to 60 inches to lithic bedrock
Natural drainage class: Well drained
Runoff class: High

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 10 percent
Gypsum, maximum in profile: 2 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Low (about 4.0 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: C
Hydric soil rating: No

Description of Rock Outcrop, Steep

Setting
Landform: Mountainsides
Landform position (three-dimensional): Free face
Down-slope shape: Convex
Across-slope shape: Convex

Typical profile
H1 - 0 to 60 inches: unweathered bedrock

Properties and qualities
Slope: 15 to 70 percent
Depth to restrictive feature: 0 inches to paralithic bedrock
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)
Available water storage in profile: Very low (about 0.0 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8s
Hydric soil rating: No

67—Torriorthents-Rock outcrop complex, steep

Map Unit Setting
National map unit symbol: jnz5
Elevation: 5,800 to 8,500 feet
Mean annual precipitation: 10 to 15 inches
Mean annual air temperature: 39 to 46 degrees F
Frost-free period: 80 to 105 days
Farmland classification: Not prime farmland

Map Unit Composition

Torriorthents, steep, and similar soils: 60 percent
Rock outcrop, steep: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Torriorthents, Steep

Setting

Landform: Mountainsides
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Mountainflank, base slope
Down-slope shape: Concave, convex
Across-slope shape: Concave, convex
Parent material: Stony, basaltic alluvium derived from sandstone and shale

Typical profile

H1 - 0 to 4 inches: variable
H2 - 4 to 30 inches: fine sandy loam
H3 - 30 to 34 inches: unweathered bedrock

Properties and qualities

Slope: 15 to 70 percent
Depth to restrictive feature: 4 to 30 inches to lithic bedrock
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 5 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Very low (about 2.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D
Hydric soil rating: No

Description of Rock Outcrop, Steep

Setting

Landform: Mountainsides
Landform position (three-dimensional): Free face
Down-slope shape: Convex
Across-slope shape: Convex

Typical profile

H1 - 0 to 60 inches: unweathered bedrock

Properties and qualities

Slope: 15 to 70 percent
Depth to restrictive feature: 0 inches to paralithic bedrock
Runoff class: Very high

Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)
Available water storage in profile: Very low (about 0.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8s
Hydric soil rating: No

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APPENDIX 10-2: SOIL LABORATORY & SUITABILITY CRITERIA

APPENDIX I - SECTION 1

Parameters, Analytical Procedures and Suitability Criteria for Topsoil and Overburden Analyses and Evaluation.

Table I-1: Recommended procedures for analyzing soils and overburden/interburden quality for coal, uranium and bentonite mines.

Parameter			Recommended Procedure		
Topsoil		Overburden/ Interburden	Reported As	Extractant	Analytical
1.	pH	pH	Hydrogen ion activity	USDA Handbook 60, method (2), pg. 84 (saturated paste).	USDA Handbook 60, method (21a), pg. 102
2.	Conductivity	Conductivity	mmhos/cm @ 25 c	USDA Handbook 60, method (3a), pg. 84.	USDA Handbook 60, method (3a), pg. 84 and method (4b), pg. 89-90
3.	Saturation	Saturation	Percent		USDA Handbook 60, method (27a) or (27b), pg. 107.
4.	Particle size Analysis	Particle size Analysis	% clay, silt, sand, and very fine sand (vfs=0.05 - 0.1 mm)		ASA Mono. No. 9, Pt. 1 method 43-5, pgs. 562-566. Sieve analysis for very fine sand.
5.	Texture	Texture	USDA textural class		USDA Handbook 18, pgs. 205-223.
6.	Soluble Ca, Mg, and Na	Soluble Ca, Mg, and Na	meg/l	USDA Handbook 60, method (3a), pg. 84.	USDA Handbook 60, method (3a) pg. 84. Analysis by AA or ICP.
7.	Sodium-absorption ratio	Sodium-absorption ratio	SAR Calculated from soluble Ca, Mg, and Na concentrations		Calculated: USDA Handbook 60, pg. 26.
8.	Carbonates		Percent		USDA Handbook 60, method (23c) pg. 105.

9.	Selenium 1/	Selenium	ppm to a lower detection limit of 0.01	ASA Mono. No. 9, Pt. 2 (1st Ed.), method 80-3.2 pg. 1122 or ASA Mono. No. 9, Pt. 2, method 3-5.2.3, pg. 55.	For hydride generation, pretreat extract according to ASA Mono. No. 9, Pt. 2, method 3-5.5.4, pg. 61. Hydride generation for AA (U.S. EPA, 1979) or ICP by ASA Mono. No. 9, Pt. 2 method 3-5.5.3. pg. 60.
10.	Boron 2/	Boron	ppm	ASA Mono. No. 9, Pt. 2 method 25-9.1, pg. 443.	ICP or ASA Mono. No. 9, Pt. 2, Method 25-5. pg. 435.
11.		Nitrate-Nitrogen	ppm	ASA Mono. No. 9, Pt. 2, method 33-3.2, pg. 649.	ASA Mono. No. 9, Pt. 2, method 33-8.2, pg. 679.
12.	Organic Matter		Percent		ASA Mono. No. 9, Pt. 2 method 29-3.5.2, pg. 570.
13.		Organic Carbon 3/	Percent		Dean (1974)
14.		Molybdenum	ppm to a lower detection limit of 0.1	(NH4) 2CO3 (Vlek, 1975) or ASA Mono. No. 9, Pt. 2, method 3-5.2.3, pg. 55 or ASA Mono. No. 9, Pt. 2 (1st Ed) method 74-2.3., pp. 1056-1057.	Furnace AA, ICP or ASA. Mono. No. 9, Pt. 2, (1st Ed) method 74-2, pp. 1054-1057
15.		Acid potential (AP)	meg H/100g or % sulfur		Sulfur furnace (Smith et al, 1974) or ASA Mono. No. 9, Pt. 2, methods 28-2.2.3, pg. 512-514.
16.		Neutralization potential (NP)	%CaCO3 or tons CaCO3/1000 tons material		USDA Handbook 60, method (23c), pg. 105.
17.		Acid-base potential (ABP)	tons CaCO3/1000 tons material		Calculated: ABP = NP - AP
18.		Arsenic 4/	ppm	ASA Mono. No. 9, Pt. 2, method 3-5.2.3, pg. 55. or method 24-5.4, pg. 421.	Pretreat extract according to ASA Mono. No. 9., Pt. 2, method 3-5.5.5, pg. 61. Hydride generation for AA (U.S. EPA, 1979) or ICP by ASA Mono. No. 9, Pt. 2, method 3-5.5.3, pg. 60. Furnace AA also acceptable (U.S. EPA, 1979).
19.	Coarse Fragment		Percent		USDA Handbook 436, App. I, Pg. 472. SCS (1972) pgs. 9 & 12-13.

/ Analysis for selenium recommended on soils where primary selenium indicator plants are present.

/ Analysis recommended for mining operations in Sweetwater County, Wyoming and all bentonite operations.

/ Analysis recommended for regraded coal mine spoils.

/ Analysis recommended for uranium operations.

Table I-2: Criteria to establish suitability of topsoil (or topsoil substitutes).

Parameter	Suitable	Marginal 1/	Unsuitable
pH	5.5-8.5	5.0-5.5 8.5-9.0	<5.0 >9.0
EC (Conductivity) mmhos/cm	0-8	8-12	>12
Saturation Percentage	25-80	<25 >80	
Texture		c,sic,s	
SAR 2/	0-10	10-12 3/ 10-15	>12 3/ >15
Selenium	<0.1 ppm	>0.1 ppm	
Boron	<5.0 ppm		>5.0 ppm
Coarse Frag (% vol)	<25%	25-35	>35%

1/ Evaluated on an individual basis for suitability.

2/ As an alternative to SAR calculations, ESP (exchangeable sodium percentage) can be determined. ESP should be determined if suitable SAR value is exceeded.

3/ For fine textured soils (clay >40%)

VEGETATION INFORMATION EXHIBIT 11

An analysis of the vegetation communities present within the proposed expansion and modernization area at the Mid-Continent Limestone Quarry was conducted and is detailed in the report provided by ERO. See Appendix 5 for the full report.

1. Existing Plant Communities

The majority of the project area consists of three vegetation communities: Colorado Plateau pinyon-juniper woodland, Rocky Mountain Gambel oak-mixed montane shrubland, and Southern Rocky Mountain Dry-Mesic montane mixed conifer forest and woodland. The pinyon-juniper and Gambel oak communities occur at overlapping elevation ranges, with the pinyon-juniper being at 5,000 to 8,000 feet and the Gambel oak being at 6,500 to 9,500 feet. These two communities are codominant across the quarry area. The dry-mesic community is principally found on areas if the site where the pinyon-juniper/Gambel oak is transitioning into the true mixed conifer communities that are commonly located outside of the project area.

The picture below shows the vegetation in the areas of the current quarry as well as the proposed expansion.

Figure 11-1 – Current Quarrying Area from Transfer Trail Looking Northwest

The ERO report in Appendix 5 contains several photos of the vegetation communities found on site.

2. Sensitive, Threatened, and Endangered Species

No sensitive, threatened, or endangered species have been found in the project area. See the ERO Report in Appendix 5 for additional information.

CLIMATE INFORMATION EXHIBIT 12

The climate of the Mid-Continent Limestone Quarry is estimated using climate data collected at the nearest Western Regional Climate Center weather station. The weather station is located in Glenwood Springs, CO, at an elevation of 5,750 feet and the Mid-Continent Quarry is located at elevations ranging from 6,500 to 8,500 feet.

The nearest weather station west of the continental divide at an elevation comparable to the quarry expansion is located in Vail, CO. The climate data collected at the Vail station exhibits the lower temperatures and greater snowfall amounts that are characteristic of higher elevations. While it is not possible to directly extrapolate the quarry's climate from this data, it is reasonable to estimate that the quarry is most comparable to Vail in terms of climate due to their similar elevations.

Glenwood Springs #2 (Station 053359), Elevation = 5,750 feet

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	36.9	42.5	51.5	61.5	72.0	82.3	88.5	86.1	78.4	66.2	49.9	38.1	62.8
Average Min. Temperature (F)	11.7	16.7	24.5	31.3	38.4	44.2	50.9	49.7	42.0	32.1	22.4	13.6	31.5
Average Total Precipitation (in.)	1.46	1.25	1.41	1.59	1.41	1.10	1.23	1.48	1.59	1.46	1.14	1.29	16.40
Average Total Snowfall (in.)	17.9	11.2	6.6	1.8	0.3	0.0	0.0	0.0	0.0	1.1	5.3	14.9	59.3
Average Snow Depth (in.)	6	5	0	0	0	0	0	0	0	0	0	2	1

Vail (Station 058575), Elevation = 8230’

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	29.1	33.0	42.3	49.9	60.8	72.2	77.7	75.3	67.1	54.1	37.6	28.2	52.3
Average Min. Temperature (F)	5.7	8.5	16.5	23.7	30.8	35.2	41.2	40.4	33.0	24.8	14.6	6.4	23.4
Average Total Precipitation (in.)	1.87	2.08	1.80	2.22	1.83	1.49	1.95	1.86	2.07	1.72	1.91	1.61	22.40
Average Total Snowfall (in.)	33.8	33.2	24.4	22.2	4.8	0.3	0.0	0.0	1.1	7.7	27.6	28.3	183.4
Average Snow Depth (in.)	25	31	25	11	1	0	0	0	0	0	6	15	1

GEOLOGY/HYDROLOGY EXHIBIT 13

1. Introduction

The proposed quarry will mine the Mississippian age Leadville Limestone. The deposit to be mined consists of two products, a high calcite metallurgical limestone ideally suited for a variety of industrial uses and a dolomite intended as an aggregate product. The following section will include a discussion of the general area, regional geology, local/site geology, mineralogy of the deposit, and the hydrogeologic conditions of the quarry.

2. General Area Discussion

The area where the quarrying will take place sits between Oasis Creek and Cascade Creek along Transfer Trail. This region is dominated by the mesa of the White River National Forest along with the drainages and canyons carved by the Colorado, Roaring Fork, and Eagle Rivers. To the local north lies the Quartzite Ridge, Glenwood Canyon extends to the east, Glenwood Springs to the south, and the Grand Hogback to the west. The Roaring Fork joins the Colorado River in Glenwood Springs.

Elevations within the claim group range from 6,500 feet in the south to 8,500 feet at the top of the mesa. The site area and its surrounding ground is dominated by Oak brush and pinion-juniper vegetation communities.

Oasis Creek and Cascade Creek run from the top of the mesa that sits above the quarry area and extend south to the Colorado River. Oasis Creek and Cascade Creek are both defined as intermittent drainages with Oasis Creek typically flowing more often than Cascade Creek. The hillside being quarried is contained between these two creeks, with the boundaries established by the quarry forming a buffer between the creek drainages and areas of active mining. The entire quarrying area drains to a small local drainage at its toe which flows directly to the Colorado River. The base of this drainage lies along the area where flows enter the Colorado River at an elevation of 5,725 feet.

3. Regional Geology

The Mid-Continent Limestone Quarry lies in the south-central portion of the White River Plateau in Colorado and is part of a large, high-elevation topographical area that extends from New Mexico through Colorado. The regional geology is complex and includes periods of uplift, compressional and tensional tectonics, and volcanism. These periods of tectonic activity are interspersed with long periods of quiescence, typified by deposition of many thousands of feet of sedimentary rocks.

Beginning about 1790 Ma (million years ago), continental crust was formed as a series of arcs and interarc basins were accreted to an Archean craton. Volcanism associated with the accretion, and the deposition of sediments eroded from topographical highs into interarc basins resulted in the accumulation of thousands of feet of continental crust. These rocks are grouped into two general categories, gneiss consisting of quartz-feldspars and amphibolite and interlayered migmatite, gneiss, and biotite schist. These were later metamorphosed to upper-amphibole facies, and complexly deformed by multiple sets of overprinting folds. These two rock types are intimately mingled in the region, both structurally and stratigraphically. It is thought that the felsic gneiss and amphibole are of a meta volcanic origin, while the biotitic rocks are originally of a sedimentary origin. Plutons consisting of granodiorite and quartz monzonite intruded and cut the crustal rocks during a period of 1780 – 1650 Ma. Emplacement of these plutons resulted in high- temperature, low -pressure metamorphism in the adjacent country rocks. Approximately 1400 Ma, crustal reheating resulted in the intrusion of dikes, stocks, and discordant plutons of a non-foliated two mica granite, assigned as part of the Berthoud Plutonic Suite. A final pulse of Proterozoic igneous rocks occurred at 1092- 1074 Ma, resulting in the emplacement of the Pikes Peak batholith at a depth of approximately 2 miles. The Pikes Peak batholith is composed of a biotite and hornblende-biotite potassic granite, with minor plutons of syenite, quartz monzonite, and alkali diorite. These crustal rocks were subsequently deformed by a series of anastomosing ductile shear zones and wrench faults.

A period of tectonic quiescence resulted in the deposition of large packages of shelf sedimentary rocks during the early Paleozoic. These clastic sedimentary rocks included shales, mudstones, and sandstones that were eroded from topographical highs composed of the igneous and

metamorphic rocks emplaced during the Proterozoic. In addition to the clastic sedimentary rocks deposited as the result of mechanical weathering of igneous and metamorphic highlands, chemical sedimentary rocks such as limestone, chert, and dolomite were formed in low-energy, typically near shore environments. This includes the Mississippian age Leadville Limestone mined at the Mid-Continent Quarry.

In Early Pennsylvanian time, approximately 320 Ma, uplift of the northwest to north –northwest trending Ancestral Rockies resulted in the erosion of much of the shelf sedimentary rocks deposited during the early Paleozoic. Accumulations of these sediments in flanking basins resulted in the deposition of up to 20,000 feet of clastic sedimentary rocks. These include the Belden Formation which was deposited above the Leadville Limestone and which acts as a confining layer in areas where the Leadville Limestone is an aquifer. Also formed during this time were locally thick evaporite deposits, including the Eagle Valley Formation, in structurally controlled sub-basins. Uplift and erosion of the Ancestral Rockies continued through the middle Mesozoic, depositing fluvial, eolian, and shoreline deposits above the late Paleozoic clastic deposits. Several cycles of marine transgression and regression during the Cretaceous deposited interbedded sequences of marine and continental rocks sourced from the west. The abrupt transition from these fine-grained distally sourced rocks to orogenic, locally sourced rocks marks the beginning of the Laramide Orogeny.

The Laramide Orogeny occurred from 70 – 40 Ma and was a period of crustal contraction, uplift, faulting, and igneous activity that initiated the formation of the modern Rocky Mountains. North America at the time was overriding a gently dipping subduction zone and heterogeneities in the crust caused a synchronous, anisotropic strain field to develop in the North American plate. The strain regime was for the most part compressive, which resulted in reverse faults, thrust faults, asymmetrical folding, synclines, anticlines, and the formation of uplifts of large areal extent, including the White River Plateau located north of the quarry area. Neogene intrusive centers and volcanism formed, depositing igneous rocks such as basalts overlying the inclined sedimentary bedding of the Grand Hogback monocline. Geomorphic formation of canyons, for example the Glenwood Canyon, resulted in the exposure of Proterozoic basement rocks as rivers incised through areas of regional uplift. Circulation of groundwater undersaturated in calcite led

to the formation of large collapse features as evaporite deposits were dissolved and transported via saline solutions. Finally, Quaternary deposits of alluvium, landslides, and glacial deposits were emplaced upon the previous deposited lithologies

4. Site Geology

The major Laramide age fold structures in the region include the Glenwood Springs Syncline, Cattle Creek Anticline, and Grand Hogback Monocline. All of these are located to the south of the Colorado River. The Spring Valley, located approximately 4 miles to the southeast of Glenwood Springs, is a late Cenozoic collapse feature caused by dissolution and removal of the Eagle River Evaporite by groundwater. Flowage and diapirism of the Eagle River Evaporite caused local uplift and extensional faulting in overlaying Neogene basalts emplaced on the top of the Laramide age Grand Hogback monocline to the southwest and west of Glenwood Springs. This faulting of the Grand Hogback monocline is important as it provides fluid pathways for the recharge of groundwater in the Leadville Limestone aquifer. Faults on the south side of the river strike predominantly southwest to northeast, with occasional faults perpendicular to that main trend. North of the Colorado River, fault structures strike nearly uniformly west-northwest to east-southeast, with the exception of the West Glenwood Fault located near the quarry (it strikes southwest to northeast). The faulting north of the Colorado River may provide conduits for groundwater and an understanding of the extent and connectivity of these fault systems would be important for understanding the hydrological regime in the area of the proposed quarry. A monocline runs immediately north of the quarry area, roughly trending east-west. The White River Plateau, an area of uplift formed during the Laramide Orogeny, is also located to the north of the quarry area. Portions of the upper surface of the White River Plateau show a karst topography due to dissolution of the upper portions of the relatively flat lying Leadville Limestone.

The quarry area is located upon Leadville Limestone with underlying layers bound by a fault to the north and the West Glenwood Fault to the south. The limestone outcrops to the east creating a natural boundary for the eastern edge of the quarry. The deposit is roughly tabular in nature, with a west-northwest to east-southeast strike and 10-30° dip to the south-southwest and is

approximately 200 feet thick in the study area. Quarrying is intentionally limited on the west side to protect Oasis Creek, despite the continued presence of the Leadville Limestone to the west.

4.1 Lithology

The general lithology of the quarry consists of the Manitou Formation overlain by the Chaffee Group, overlain by the Leadville Limestone. The Leadville Limestone exposed to the surface as weathered rock or overlain by topsoil.

Leadville Limestone (Mississippian)

Gray to bluish-gray, coarse to finely crystalline limestone and dolomitic limestone. Abundant chert nodules in lower part of formation. Deposited in a low energy environment. Very fossiliferous and is resistant to weathering in the climate of Glenwood Springs, thus forming prominent cliff bands in the area.

Chaffee Group (Upper Devonian)

Includes in ascending order: Parting formation-white to buff orthoquartzite, green shale, and gray dolomitic limestone; Dyer Dolomitic limestone – Limestone and dolomitic limestone; and Gilman Sandstone – tan to yellow, fine-grained dolomitic sandstone.

Manitou Formation (Lower Ordovician)

Flat-pebble limestone conglomerate, brown and tan crystalline dolomitic limestone, and greenish-gray calcareous shale.

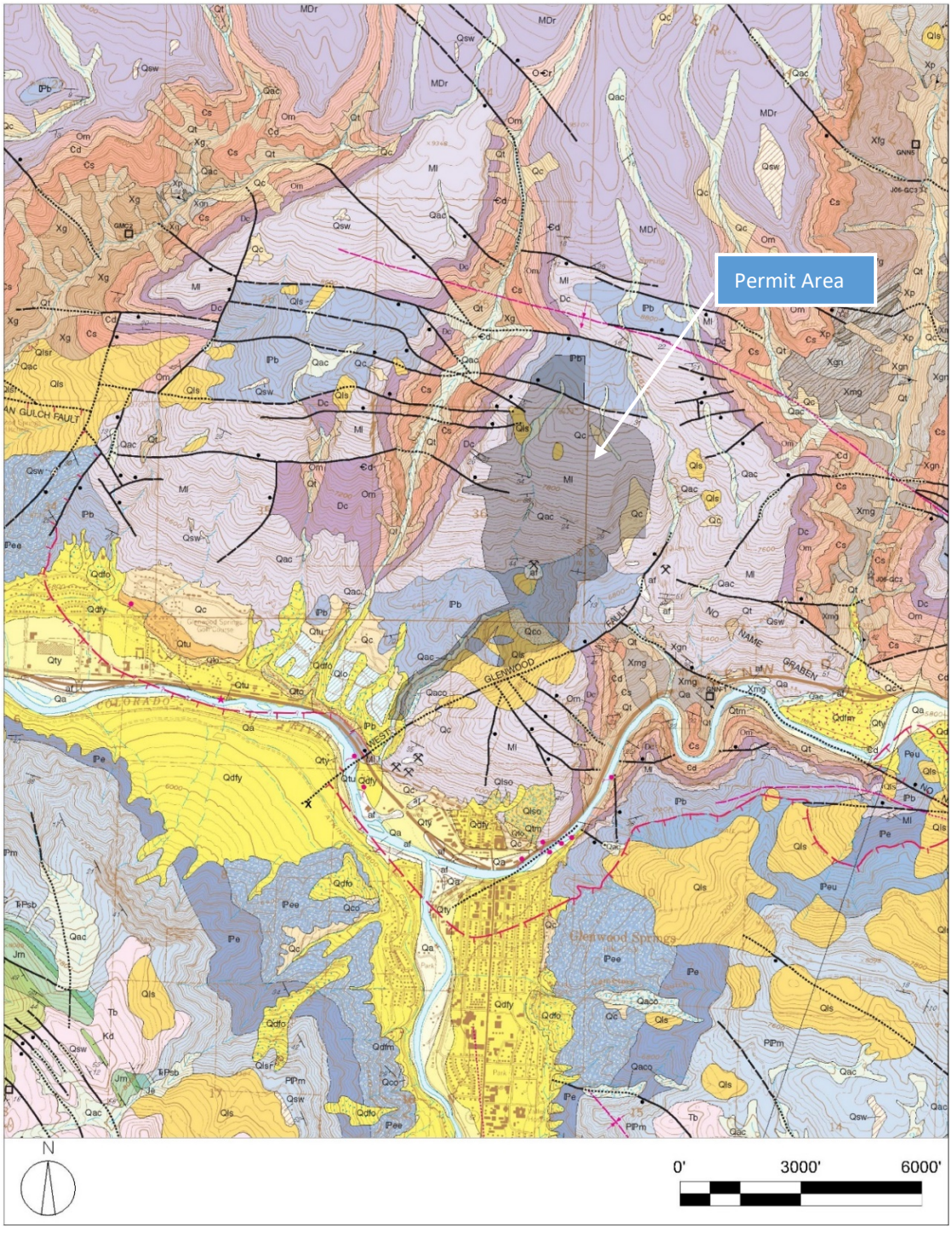


Figure 13-1 – Geologic Map of the Quarry Area and Surrounding Region[4]

[4] Taken from *Geologic Map of the Glenwood Springs Quadrangle, Garfield County, CO.*

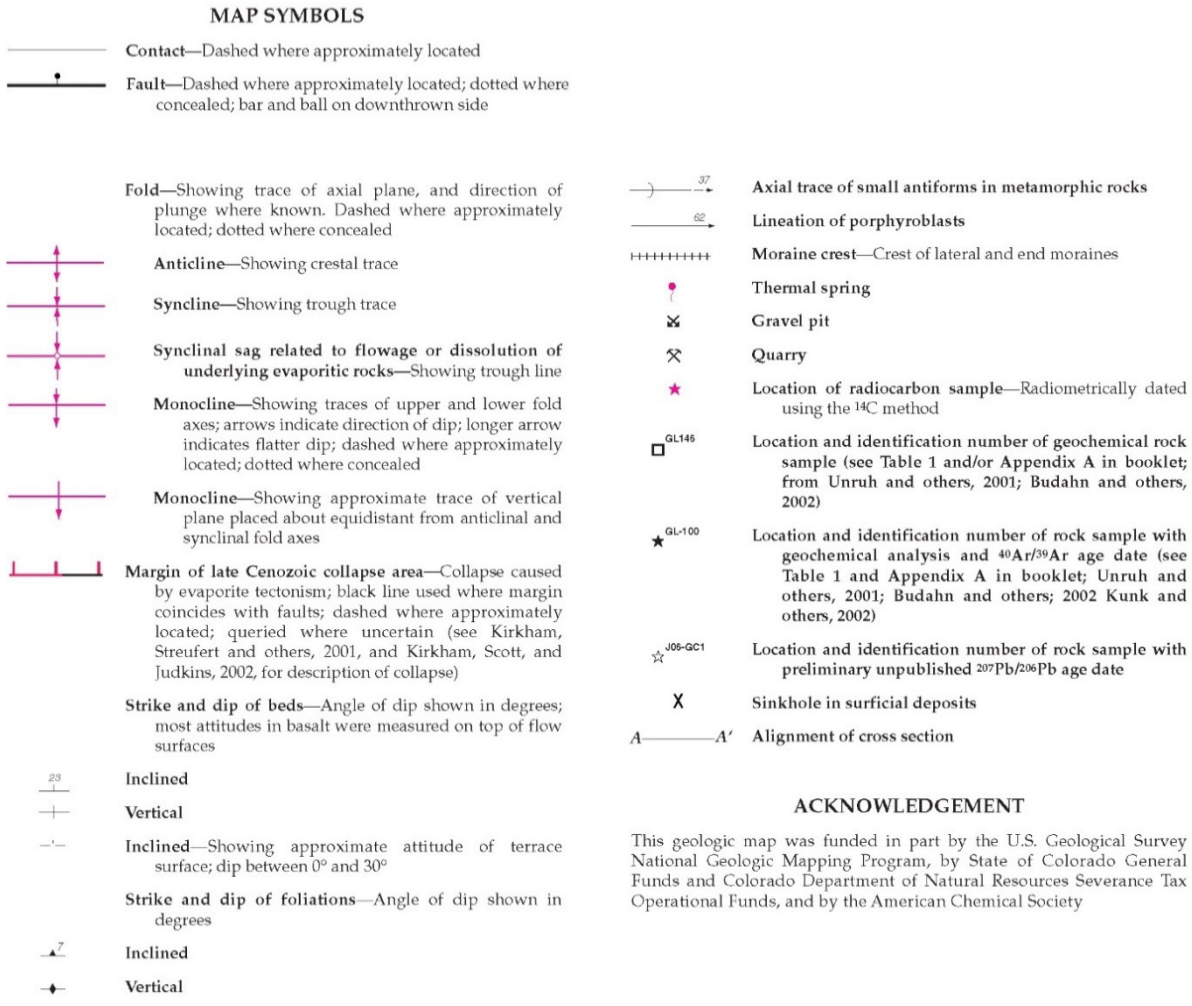


Figure 13-2 – Geologic Map Symbols

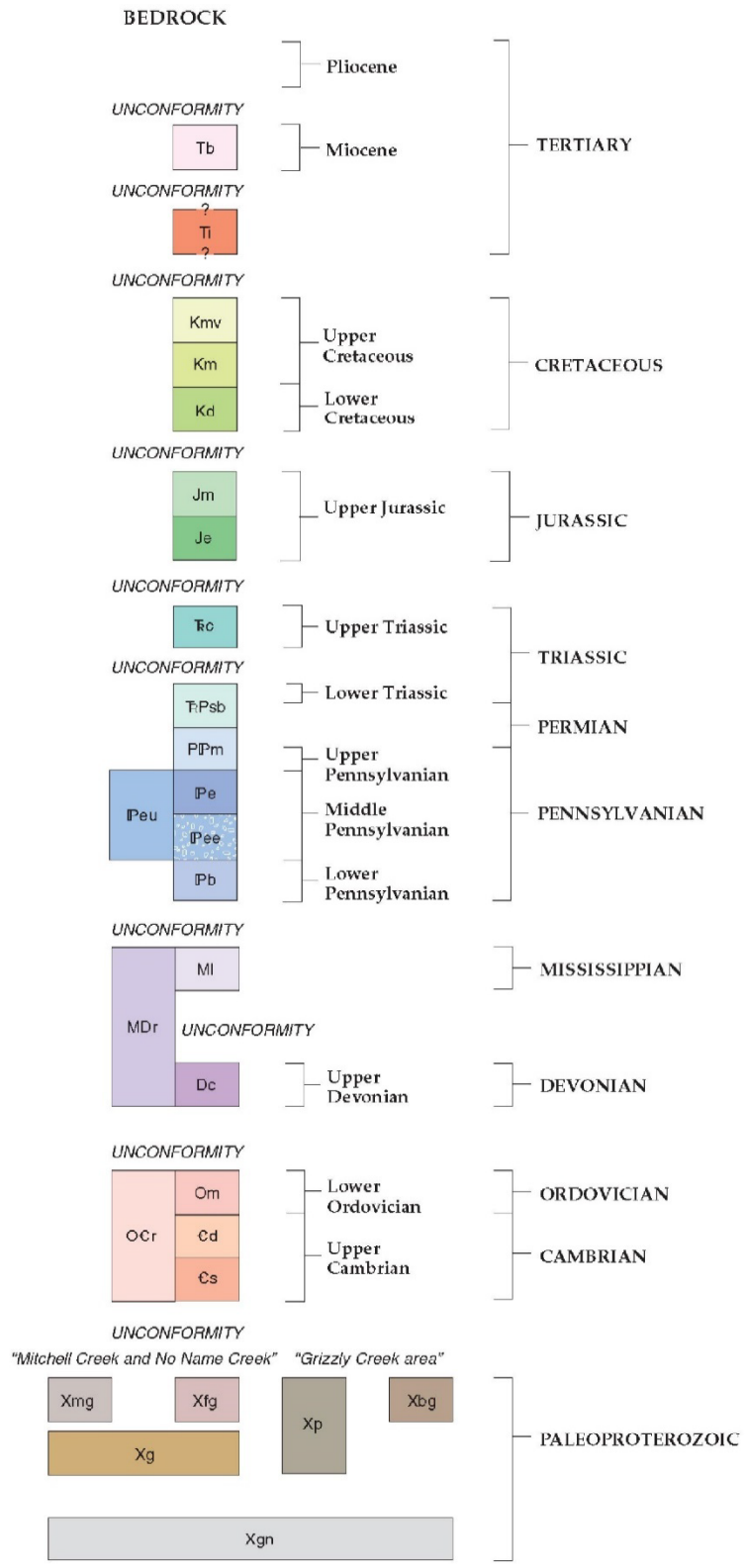


Figure 13-3 – Geologic Map Formations

CONDENSED DESCRIPTION OF MAP UNITS

The complete description of map units and references is in the accompanying booklet.

SURFICIAL DEPOSITS

HUMAN-MADE DEPOSITS

af — Artificial fill (latest Holocene)

ALLUVIAL DEPOSITS

Qa — **Stream-channel, flood-plain, and low-terrace deposits (Holocene and late Pleistocene)**—Mostly poorly sorted, clast-supported gravel in a sandy or silty matrix up to about 15 ft above modern rivers

Qsw — **Sheetwash deposits (Holocene and late Pleistocene)**—Gravelly sand, sandy silt, and clayey silt deposited on gentle hillslopes, in small basins, and in stream valleys

Qty — **Younger terrace alluvium (late Pleistocene)**—Mostly poorly sorted, clast-supported, occasionally bouldery, pebble and cobble gravel with a sand matrix. May include fine-grained overbank deposits. Underlies terraces about 19–56 ft above modern rivers

Qtm — **Intermediate terrace alluvium (late Pleistocene)**—Deposits texturally similar to younger terrace alluvium. Underlies terraces about 58–95 ft above modern rivers

Qto — **Older terrace alluvium (late middle Pleistocene)**—Deposits texturally similar to younger terrace alluvium. Underlies terraces about 110–160 ft above modern rivers

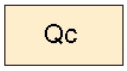
Qtt — **Oldest terrace alluvium (middle Pleistocene)**—Deposits texturally similar to younger terrace alluvium. Underlies a terrace west of Glenwood Springs airport about 220–360 ft above the Roaring Fork River

QTg — **High-level gravel (early Pleistocene or Pliocene)**—Includes a single, very poorly exposed deposit of rounded river gravel about 1,500 ft above the Colorado River near the north quarter-corner of sec. 7, T. 6 S., R. 88 W.

Figure 13-4 – Geologic Map Formation Legend

MASS-WASTING DEPOSITS

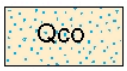
Recent landslide deposits (latest Holocene)—Includes active and recently active landslides with fresh morphological features. Heterogeneous unit consisting of unsorted, unstratified rock debris, gravel, sand, silt, and clay



Colluvium (Holocene and late Pleistocene)—Matrix- and clast-supported, pebble to boulder gravel in a sandy silt matrix. Locally fine grained

Talus (Holocene and late Pleistocene)—Angular, cobbly and bouldery rubble derived from bedrock outcrops and transported by rockfalls, rockslides, rock avalanches, and rock topples. Deposits marked by triangular pattern in No Name Creek indicate two very large, rapid rotational rockslides or rock topples

Landslide deposits (Holocene and Pleistocene)—Similar in texture to recent landslide deposits (Qlsr). Ranges in age from recently active landslides to long-inactive Pleistocene landslides



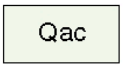
Older colluvium (Pleistocene)—Highly variable deposits texturally similar to colluvium (Qc), but generally not subject to future deposition

Older landslide deposits (Pleistocene and late Pliocene?)—Landslide deposits dissected by erosion and lacking distinctive landslide morphology. Similar in texture to recent landslide deposits (Qlsr)

Figure 13-5 – Geologic Map Formation Legend

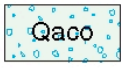
ALLUVIAL AND MASS-WASTING DEPOSITS

Younger debris-flow deposits (Holocene)—Poorly sorted to moderately well-sorted matrix- and clast-supported, pebble, boulder, and cobble gravel in a sandy silt or silty sand matrix. Distal fan areas are finer grained. Deposited on active fans



Alluvium and colluvium, undivided (Holocene and latest Pleistocene)—Moderately well-sorted to well-sorted, stratified, interbedded sand, pebbly sand, and sandy gravel to poorly sorted, unstratified or poorly stratified, clayey, silty sand, bouldery sand, and sandy silt

Intermediate debris-flow deposits (Holocene? and late Pleistocene)—Similiar in texture, lithology, and depositional environment to younger debris-flow deposits (Qdfy). Geomorphic character of original depositional surfaces are commonly recognizable, but the surfaces are 10 ft or more above active debris-flow channels



Older alluvium and colluvium, undivided (Pleistocene)—Deposits texturally similar to alluvium and colluvium, undivided (Qac), that underlie terraces and hillslopes above the floor of tributary valleys

Older debris-flow deposits (late, middle, and early? Pleis-tocene)—Remnants of long-inactive debris fans found on ridge lines, mesas, and valley floors 40–320 ft above adjacent streams. Similar in texture to younger debris-flow deposits (Qdfy)

Figure 13-6 – Geologic Map Formation Legend

GLACIAL DEPOSITS

Qm — **Morainal deposits (late and/or middle? Pleistocene)**—Deposits of gravel, sand, silt, and minor clay deposited in lateral, end, and ground moraines

LACUSTRINE DEPOSITS

Ql — **Lacustrine deposits**—Stratified deposits of medium- to dark-gray and reddish-brown, organic-rich, silty clay and silt, medium-red-brown, well-sorted sand, and volcanic ash deposited in Spring Valley

EOLIAN DEPOSITS

Qlo — **Loess (late and middle? Pleistocene)**—Slightly clayey, sandy silt and silty, very fine to fine sand deposited by wind on level to gently sloping surfaces. Usually unstratified, friable, and plastic or slightly plastic when wet

SINTER DEPOSITS

Qtu — **Tufa (Holocene and Pleistocene?)**—Low density, porous calcium carbonate deposits precipitated from mineral-charged spring water. A conventional radiocarbon age of 12,410 ± 60 ^{14}C years BP was obtained from peat interbedded with tufa that overlies younger terrace alluvium near Funston (D. Trimble, 1995, written commun.)

UNDIFFERENTIATED DEPOSITS

Q — **Undifferentiated surficial deposits (Quaternary)**—Shown only on cross sections

Figure 13-7 – Geologic Map Formation Legend

BEDROCK

Tb — **Basalt (Miocene)**—Multiple flows of basalt, basaltic andesite, and trachybasalt interbedded with fluvial and lacustrine sediments. Includes flows in compositional groups 1b, 2b, 4a, 5b, and 10a of Unruh and others (2001) and Budahn and others (2002). $^{40}Ar/^{39}Ar$ age dates range from 7.77 ± 0.05 Ma to 22.56 ± 0.13 Ma (Kunk and others, 2002)

Ti — **Porphyritic intrusion (Tertiary?)**—Brown to red-brown, fine-grained, intrusive porphyry with white plagioclase phenocrysts

Kmv — **Mesaverde Group (Upper Cretaceous)**—Shown only on cross section A–A'

Km — **Mancos Shale (Upper Cretaceous)**—Includes in ascending order: siliceous, dark-gray fissile shale possibly correlative to the Mowry Shale; interbedded calcareous, yellow-brown sandstone interbedded with dark-gray fissile shale (Juan Lopez member?); a calcareous shale zone equivalent to the Niobrara Formation, and a dominantly light- to dark-gray, sometimes bentonitic, fissile shale

Kd — **Dakota Sandstone (Lower Cretaceous)**—Light-gray to tan, medium- to very coarse-grained, quartzose sandstone and conglomeratic sandstone interbedded with carbonaceous siltstone, sandstone, and shale

Jm — **Morrison Formation (Upper Jurassic)**—Pale-green and maroon mudstone and shale and gray limestone. Thin beds of silty sandstone in lower part

Je — **Entrada Sandstone (Upper Jurassic)**—Light-gray to light-orange, cross-bedded sandstone. Medium to very fine grained and well sorted

TRc — **Chinle Formation (Upper Triassic)**—Thin, even bedded, dark-reddish-brown, orangish-red, and purplish-red, calcareous siltstone and mudstone with occasional thin lenses of light-purplish-red and gray limestone and limestone-pebble conglomerate

TRPsb — **State Bridge Formation (Lower Triassic? and Permian)**—Includes upper and lower members composed of pale-red, grayish-red, reddish-brown, and greenish-gray, micaceous siltstone, clayey siltstone, and minor sandstone that are separated by the South Canyon Creek Member, a prominent, thin bed of sandy dolomite and sandy limestone

Figure 13-8 – Geologic Map Formation Legend

Maroon Formation (Permian and Pennsylvanian)—Mainly reddish-brown sandstone, conglomerate, mudstone, siltstone, and claystone with minor, thin beds of gray limestone. Includes Schoolhouse Member at top of formation

Eagle Valley Formation (Middle Pennsylvanian)—Intertonguing sequence of Maroon Formation and Eagle Valley Evaporite

Eagle Valley Evaporite (Middle Pennsylvanian)—Evaporitic sequence of gypsum, halite, and anhydrite interbedded with mudstone, fine-grained sandstone, thin carbonate beds, and black shale. Commonly intensely folded, faulted, and plastically deformed

Eagle Valley Formation and Eagle Valley Evaporite, undivided (Middle Pennsylvanian)—Includes Eagle Valley Formation and Eagle Valley Evaporite where contact between units is not mappable

Belden Formation (Lower Pennsylvanian)—Medium-gray to black, calcareous shale and fossiliferous limestone with interbeds of fine-grained micaceous sandstone, gritstone, coaly shale, and gypsum

Leadville Limestone (Mississippian)—Gray to bluish-gray, coarse to finely crystalline limestone and dolomite. Abundant chert nodules in lower part of formation

Chaffee Group (Upper Devonian)—Includes in ascending order: **Parting Formation**—white to buff orthoquartzite, green shale, and gray dolomite; **Dyer Dolomite**—limestone and dolomite; and **Gilman Sandstone**—tan to yellow, fine-grained dolomitic sandstone

Mississippian/Devonian rocks-undivided (Mississippian and Upper Devonian)

Manitou Formation (Lower Ordovician)—Flat-pebble limestone conglomerate, brown and tan crystalline dolomite, and greenish-gray calcareous shale

Dotsero Formation (Upper Cambrian)—Thin-bedded, brown to tan sandy dolomite and dolomitic sandstone with abundant glauconite, and pinkish-light-gray to light-gray algal limestone

Sawatch Formation (Upper Cambrian)—White to buff, massive, medium-grained quartz arenite and arkosic quartz-pebble conglomerate. Includes dolomitic units in the middle part of the formation

Ordovician and Cambrian rocks, undivided (Upper Cambrian-Lower Ordovician)

Figure 13-9 – Geologic Map Formation Legend

PRECAMBRIAN ROCKS

Xp — **Pegmatite (Paleoproterozoic)**—Includes coarse- to very coarse-grained pink pegmatite composed chiefly of potassium feldspar, quartz, and plagioclase, and white pegmatite consisting of quartz, white plagioclase, muscovite, and garnet

Xmg — **Megacrystic granite (Paleoproterozoic)**—Has distinctly bimodal grain size with coarse-grained salt-and-pepper matrix composed of quartz, plagioclase, orthoclase, and biotite, and blocky tabular phenocrysts of orthoclase as much as 4 inches long. Preliminary $^{207}Pb/^{206}Pb$ age of 1,741 ± 10 Ma (unpublished data; sample J06-GC2)

Xfg — **Fine-grained granodiorite (Paleoproterozoic)**—Dark-pink to gray, fine- to medium-grained, equigranular granodiorite and granite with plagioclase, microcline, perthite, and quartz. Preliminary $^{207}Pb/^{206}Pb$ age of 1,743 ± 8 Ma (unpublished data; sample J06-GC1)

Xbg — **Biotite granite (Paleoproterozoic)**—Gray- and white-speckled, medium-grained granite consisting of sodium-rich plagioclase, microcline, perthite, quartz, and biotite

Xg — **Granite of Mitchell Creek (Paleoproterozoic)**—Light-red to pink, fine- to medium-grained, equigranular, foliated granite and quartz monzonite. Preliminary $^{207}Pb/^{206}Pb$ age of 1,763 ± 9 Ma (unpublished data; sample J06-GC4)

Xgn — **Mica schist and gneiss (Paleoproterozoic)**—Heterogeneous unit composed of various moderately to well-foliated schist and gneiss with quartz, potassium feldspar, plagioclase, biotite, and muscovite

Xu — **Paleoproterozoic rocks, undivided**—Shown only on cross sections

Figure 13-10 – Geologic Map Formation Legend

5. Mineralogy of Deposit

Chemically pure Leadville Limestone has been mined at the existing quarry and at other locations as metallurgical grade limestone. In general, the upper portions of the Leadville Limestone contain relatively pure calcite, with silica content increasing with depth. Lower levels of the Leadville Limestone shift to more dolomitic as Mg replaces Ca. Silica content increases and chert nodules appear in the lower levels of the Leadville Limestone. While the lower portions of the Leadville Limestone are not suitable for use as a metallurgical product due to elevated levels of silica, they are well suited for use in aggregate materials. The Limestone mined at the Mid-Continent Quarry will be marketed as either metallurgical or for use in aggregates.

6. Groundwater and Surface Water Systems

The water regime of The Mid-Continent Quarry area consists of general mountain runoff that flows into drainages along the east and west sides of the planned quarry. The surface water regime, which is bound principally by Oasis Creek to the west and Cascade Creek to the east, makes up the bulk of the hydrology for the Mid-Continent Limestone Quarry.

7. Groundwater

No aquifers have been identified within the boundary area of the Mid-Continent Limestone Quarry. The nearest location of subsurface groundwater is measured at a USGS well roughly ¼ mile southwest of the quarry entrance. Water levels were measured in the USGS well (SC00608904ACC) from 1973 to 1982at elevations between 6,138 and 6,156 feet. The mill level marks the lowest part of the quarry and is located at an elevation of 6,625 feet. No seeps or springs have been observed in the toe area of the Leadville Limestone deposit currently being mined at the Mid-Continent Quarry.

Groundwater information will be gathered at the Mid-Continent Quarry as part of the NEPA process. This data will allow for a comprehensive analysis of the quarry's potential impact on the groundwater regime in the area.

Aquifers

The Leadville Limestone, designated as aquifer 331LDVL in the United States Geological Survey (USGS) National Water Information System (NWIS), is a major regional aquifer of the Upper Colorado River Basin, including the Glenwood Springs area. The White River Plateau, north of the permit area, is an area of uplift formed during the Laramide Orogeny. The Leadville Limestone outcrops in a large portion of the White River Uplift, is pervasively fractured, and bears water that is recharged by snowmelt, rainfall, and streamflow. Carbonate rocks, limestone, and dolomite often have secondary permeability as a result of discontinuities such as fractures and joints or openings along bedding planes. These features may be enhanced by the dissolution of calcite or dolomite by circulating groundwater that is undersaturated with respect to these minerals. The resultant permeability may vary both vertically and horizontally and may range from essentially zero to infinite within solution cavities. Evidence that large quantities of water have moved through the Leadville Limestone includes current karst topography, abundant caves, residual soils, travertine deposits, solution -widened fractures, springs, and seeps. Large quantities of water enter the Leadville Limestone at the White River Plateau and move radially towards the south, west, and northwest away from the Plateau. The Belden Formation overlies the Leadville Limestone on the flanks of the White River Plateau, and acts as a confining layer for the Leadville aquifer. As a result, large springs issue from the lower half of the Leadville Limestone where it outcrops in the Glenwood Springs - Dotsero area, along the Rifle River, along the White River, and in other areas.

International treaties regarding the salinity levels of the Colorado River at the Imperial Dam, located where the river crosses the border into Mexico, led to studies in the 1980's that aimed to characterize natural point sources of salinity entering the Colorado River. Since the largest natural point source for salinity that enters the Upper Colorado River occurs in the Glenwood Springs – Dotsero Springs area, these springs were the subject of extensive hydrological studies by the United States Geological Survey (USGS). The USGS conducted the Regional Aquifer-System Analysis (RASA) in the early 1980's. The RASA investigated the hydrological characteristics of Paleozoic rocks in northwestern Colorado, including those in the Glenwood springs area. Extensive geochemical analysis of springs and seeps, along with pumping drawdown tests of wells, were conducted in order to fully characterize the sources of the many

springs and seeps in the Glenwood Springs area. A composite potentiometric surface map with approximate flow directions was created as part of the RASA (see Figure 17, Figure 18).

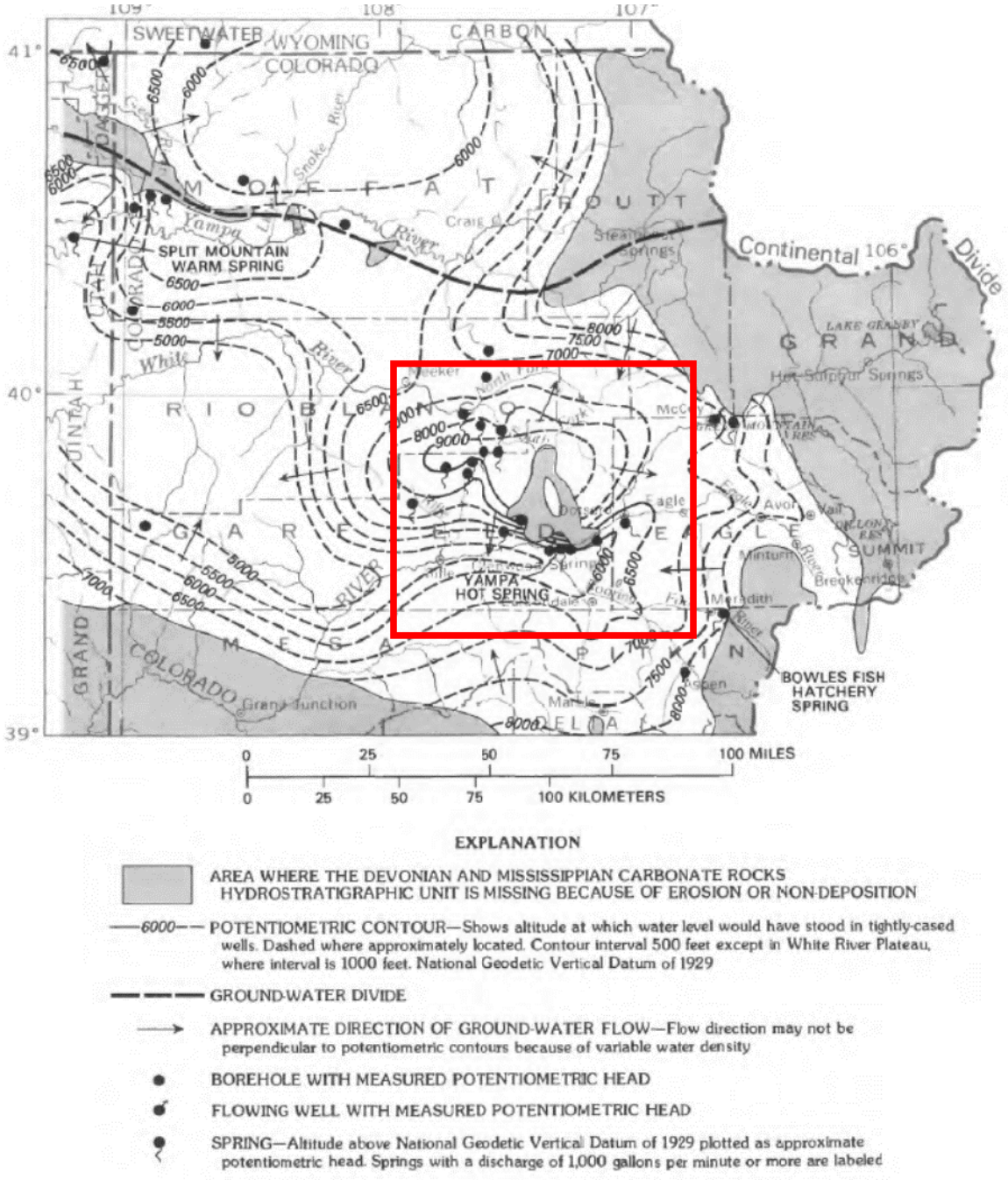


Figure 13- 11 Potentiometric contour map developed as part of the RASA showing elevation of water to be expected in a tightly encased well penetrating Devonian and Mississippian carbonate rocks. Grey shading indicates areas where the Devonian and Mississippian carbonate rocks are missing. Arrows indicate expected flow direction. Note the location of Glenwood

Springs and the Yampa Hot Spring. Groundwater recharge flows from the south and the southeast of Glenwood Springs to Supply the Yampa Hot Springs. Red box indicates approximate area enlarged in Figure 12(Geldon, 1989).). Center of red box roughly delineates the topographical high of the White River Plateau.

The potentiometric maps created as part the RASA indicate that groundwater is expected to flow radially away from the topographical high of the White Rive Plateau.

Locally, there are 12 hot springs and 6 seepage areas along both banks of the Colorado River on the northeastern and northwestern side of Glenwood Springs. These are supplied by the Leadville Limestone aquifer and range from seeps with a discharge of 2-3 gallons per minute to the Yampa Spring which discharges approximately 2,700 gallons per minute. The recharge source for the springs and seeps along the Colorado River in the Glenwood Springs area is a concern to the proposed quarry expansion and is further explored in the following section.

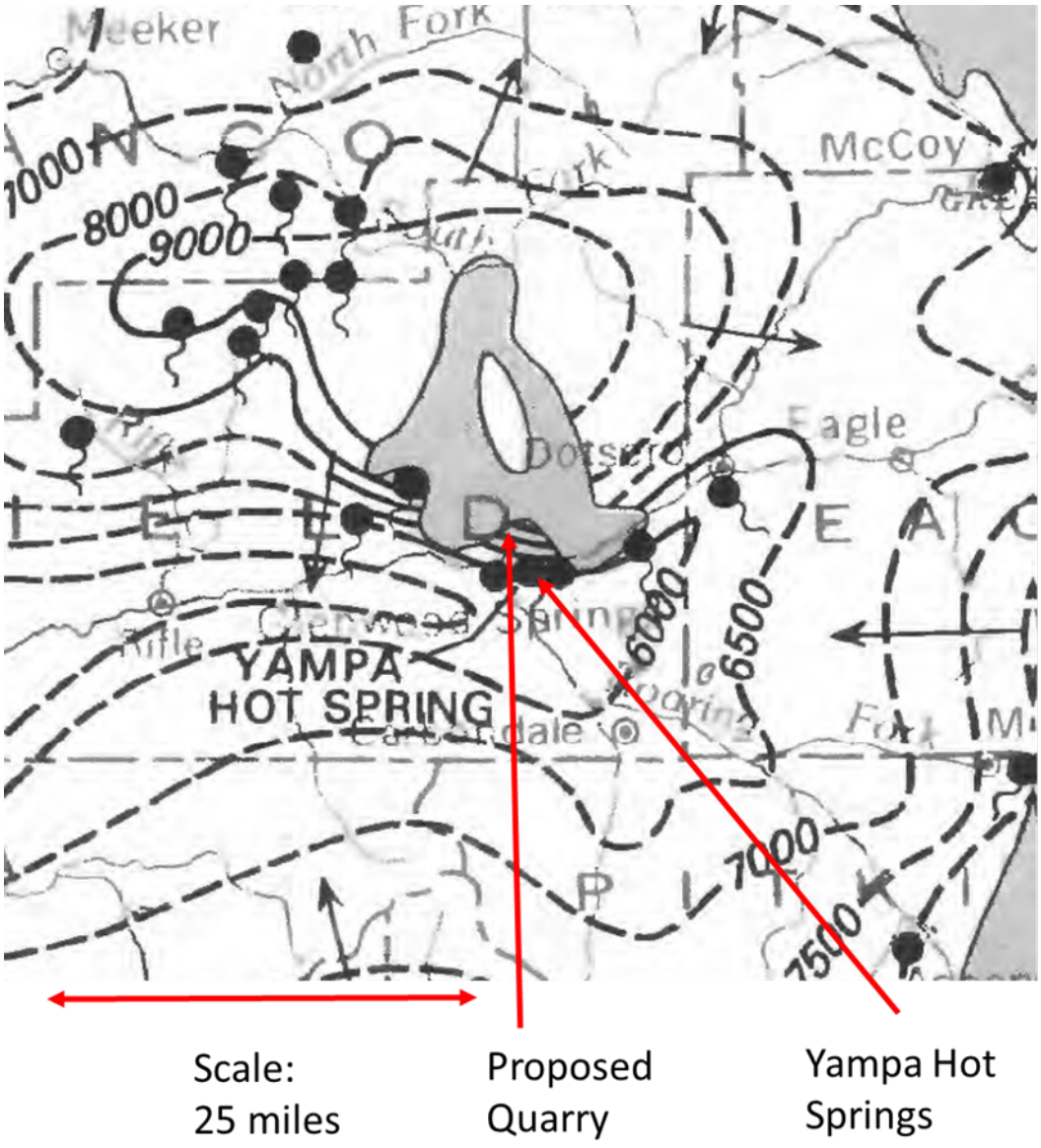


Figure 13- 12 Enlarged section of potentiometric map created as part of the RASA showing elevation of water to be expected in a tightly encased well penetrating Devonian and Mississippian carbonate rocks. Grey shading indicates areas where the Devonian and Mississippian carbonate rocks are missing. Black arrows indicate expected ground water flow direction. Note the location of Glenwood Springs, the approximate location of the proposed quarry expansion and the Yampa Hot Spring (red arrows). Groundwater recharge flows from the south and the southeast of Glenwood Springs to supply the Yampa Hot Springs and other springs and seeps along the Colorado River. Missing carbonate rocks north of the proposed quarry indicate a lack of hydrogeological connectivity between the White River Plateau and the springs and seeps along the Colorado River (Geldon, 1989).

Locally, groundwater would be expected to flow from the topographical highs of the Grand Hogback and Lookout Mountain, located southwest and southeast respectively, to the Glenwood Springs areas. Fractures and solution channels in the Dyer Dolomite, the Leadville Limestone, and the associated overburden act as conduits between river gravel discharge points near Glenwood Springs and source highlands on the Grand Hogback and Lookout Mountain. Geochemical analysis indicates that water produced by the seeps and springs along the Colorado River had at one point migrated through an evaporite, dissolving the gypsum and halite and creating a saline solution. This is consistent with a model of water flowing from recharge sources in the Grand Hogback and Lookout Mountains, through the Eagle Valley Evaporite, and discharging in gravel alluvium adjacent to the Leadville Limestone. Analysis of the temperature of the springs and seeps along the Colorado River also points towards the Grand Hogback and Lookout Mountain as recharge areas for the seeps and springs along the Colorado River. A geothermal gradient of 1.8°F per 100 feet was recorded at the Wright Well No. 1 during the RASA study. Assuming an initial recharge water temperature of 48° F, the mean air temperature in Glenwood Springs, 4,300 feet of overburden would be required to heat the water to a temperature of 126° F, the maximum recorded at the seeps and springs in Glenwood Springs. At Lookout Mountain, Paleozoic rocks above the Leadville Limestone are about 5,200 feet thick, which is sufficient to heat groundwater to the temperature seen at discharge. The overburden above the Leadville Limestone in the Grand Hogback is greater and, as such, requires the saline heated to be mixed with cool fresh water from another source in order to achieve the temperatures seen at the seeps and springs along the Colorado River in Glenwood Springs. Geldon, 1983, asserts that this source may be the White River Plateau but provides no definitive assessment. The fact that a large portion of the Devonian and Mississippian carbonate rocks are missing directly north of Glenwood Springs seems to indicate that the White River Plateau was not the source of the fresh water mixing with the hot saline waters from the Grand Hogback and Lookout Mountain.

Within the quarry site, there appears to be no significant ground water recharge areas, aquifers, springs, or seeps. While the material being quarried is within the Leadville Limestone formation, the hydro-geological connectivity, if one exists at all, between the targeted resource and the water bearing Leadville Limestone that supplies the hot springs and seeps along the Colorado

River northeast and northwest of Glenwood Springs is unclear. The Belden Shale does not exist continuously between the known hot springs locations along the Colorado River and the proposed quarry boundary, nor is the Belden Shale layer present over the Leadville Limestone formation within the proposed quarry boundary. While the Leadville Limestone may be an unconfined aquifer in the vicinity of the proposed quarry expansion, the lack of seeps or springs at the toe of the Leadville Limestone exposed at the current quarry operation would seem to preclude this. The West Glenwood Fault between the quarry and the hot springs along the Colorado River offsets the Leadville Limestone formation on the north and south sides of the fault. Faults are often good conduits for groundwater, and the presence of faults in the area will be thoroughly investigated in order to determine any possible paths for fluid. No springs, seeps, or other ground water sources are known to RMR at elevations close enough to the proposed quarry to represent nearby groundwater. Springs, seeps, or groundwater flows are also not present in the outcrop areas of the Leadville Limestone in Oasis Creek and Cascade Creek directly to the west and east of the proposed quarry area. As such there are no known aquifers that will interact with the proposed quarry expansion. the type of mining occurring at the Mid-Continent Quarry does not inject or add any hazardous material to the site or the underlying the geology of the area. No chemical processing is taking place onsite. The crushing and screening of limestone does not produce any potential groundwater pollutant.

8. Surface Water

Surface water in the area is predominantly comprised of the drainage down the face of the hillside that forms the boundary of the current and proposed areas of the quarry, located between Cascade and Oasis Creeks. The majority of the surface water drainage during the quarry's life will result from vegetated ground on both undisturbed and reclaimed areas. The active mining level and mill level are the primary areas of disturbance that will require surface water controls. Sediment ponds, on bench sumps, and stormwater control berms will be used to prevent the discharge of sediment laden waters. See Exhibit 5, Section 15 or the Stormwater Management Plan (SWMP) in Appendix 3 for additional system details.

The pipe conveyor route will be substantially revegetated following construction. During construction, hay bales, silt fence, and sediment control logs will be used to prevent the

discharge of sediment from the construction area. The source water protection plan developed for the City of Glenwood Springs in 2014 did not identify the currently operating quarry as a potential source of drinking water contamination for either of the primary sources of the City's drinking water, Grizzly Creek and No Name Creek. There is no indication that the proposed quarry would change this assessment.

9. Sanitation Facilities

The quarry will supply city water or bottled water for drinking purposes. Portable toilets will be used at the mill level and active mining level until more permanent facilities, including offices and a change house, can be installed. Permanent toilet and washing facilities will discharge into a wastewater holding tank (>3000 gallons) that will be emptied on a regular basis. Temporary and permanent wastewater and sanitation facilities will be serviced by a contractor.

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AIR QUALITY EXHIBIT 14

The operations of the Mid-Continent Limestone Quarry, as an aggregate material producer in hard rock, will generate air impacts in its immediate vicinity. To maintain good air quality in the area, RMR will monitor and control fugitive and point source emissions of criteria and hazardous air pollutants at the quarry site. Criteria pollutants include carbon monoxide, nitrogen oxides, particulate matter, total suspended particles (TSP), nitrous oxides, sulfur dioxide, and volatile organic compounds (VOCs).

Currently, the primary fugitive emissions from the quarry include PM-10, PM-2.5, and TSP. The expansion of the quarry to the north will not alter the primary sources or types of fugitive emissions. Potential sources of fugitive emissions associated with quarrying activities at the Mid-Continent Limestone Quarry include:

a) Topsoil Stripping
b) Topsoil, waste rock, and ore stockpiles.
c) Drilling and blasting
d) Material handling (loading of crusher/screener)
e) Processing
f) Haul roads throughout the quarry site.

The emission control measures proposed by RMR at each of these areas are described as follows.

1. Topsoil Stripping

Topsoil will be stripped incrementally from areas as needed so that the total stripped area is minimized at any one time. In addition, topsoil may be removed after a rain or moisture event to decrease the potential for dust creation.

2. Topsoil, Waste Rock, and Product Stockpiles

Topsoil stockpiles will be seeded at the earliest opportunity to ensure adequate vegetative cover. Adequate vegetative cover will minimize the erosion of any fugitive dust at the topsoil stockpiles. Every effort will be made to establish vegetative cover within one year of completion

of the stockpile. See Map C-2 for the initial topsoil stockpile location. Topsoil berms will be seeded in the same manner as stockpiles. Waste rock will typically be placed on the backslope and used as recontouring material as soon as it is removed. Once placed, recontouring material will be promptly covered with topsoil and revegetated to prevent any erosion of waste rock. Most product stockpiles will consist of materials with diameters large enough to prevent their transport by wind, thereby reducing the dust emitted from these locations.

3. Mining Level

General watering of the active mining level will mitigate dust from equipment traffic. Watering of the active mining level will be conducted using a water truck. This truck will be filled using either the waterline coming up the pipe conveyor corridor or the collected stormwater from the sump on the active mining level. The truck will then water the areas of the active mining level that have the potential for producing airborne particles. Watering may also be used to reduce dust generated by blasting.

4. Processing

The initial processing of material at the quarry will take place on the active mining level. Water sprays on the crusher and screener or non-water-based dust collection systems will minimize fugitive dust. Once material has undergone primary processing on the active mining level, it will be transported down to the mill level, via pipe conveyor, for further processing. The pipe conveyor completely encases the transported material in a cylindrical conveyor belt pipe as it travels down the slope. This prevents any interaction with the surrounding air and prevents dust emissions along the conveyor route. At the mill level, Water sprays or non-water-based dust collection systems will be used as the primary form of dust control. The enclosed mill currently onsite will continue to be used, and the dust from its operation will be controlled by its surrounding structure. Alternative BMPs, such as vacuum containment of the dust, may be introduced in the mill if necessary. Water used at the mill level will come from the utility water line serving the site or from water hauled to the site.

5. Roads Throughout the Quarry Site

Quarried material will be transported by haul road and conveyor at Mid-Continent Quarry. Primary haul roads on site will occur in two areas: the active mining level and the haul route from the mill level down Transfer Trail. Quarried material will not be transported via haul road from the active mining level to the mill level but will instead be moved by the previously mentioned pipe conveyor. Secondary roads will sometimes be built along the outslope of the active mining area to facilitate access to areas of the site for quarry related activities. These roads will be kept to a minimal width of approximately 15 feet and will be constructed with the intent of minimizing disturbance as much as possible. Many of these secondary roads will be removed by the progression of the quarry shortly after they are installed.

Primary haul roads will be watered regularly throughout the day by a water truck. Roads will be kept damp, but not overwatered. In addition to watering, primary roads may be treated with magnesium chloride to minimize dust generation when appropriate. Secondary roads will also be treated with water or magnesium chloride as needed.

The use of magnesium chloride serves to bind the upper one to three inches of ground together, thereby creating a hard surface that minimizes dust generation. Magnesium chloride is also very hygroscopic, which means it can absorb moisture out of the air, draw it to the road surface, and reduce dust generation.

Additional watering and other dust control measures may be implemented based on monitoring results. Such additional controls will likely occur during the summer when generation of dust is more common due to weather conditions (i.e., dry, hot, and windy), and may include the use of other chemical dust suppressants, the addition of larger rock to the running surface of the road, and reduced vehicle speeds.

Daily road maintenance will be performed by road graders and other equipment on site. Road surfaces will be kept free of large debris, rutting, and potholes. Where applicable, roads will be crowned to promote proper drainage from the road running surface. Where appropriate, roads

will be accompanied by ditching on one or both sides. Ditches will be routed to stormwater management features, as outlined in the SWMP.

6. Internal Combustion Engine Emissions

Emissions of criteria pollutants and hazardous air pollutants from generators are considered a minor source. Generator emissions are composed primarily of nitrogen oxides. Generators at the Mid-Continent Quarry will be temporary in nature, as utilities will be readily available throughout the quarry's life. The generators to be used on-site will meet strict New Source Performance Standards (NSPS). These generators incorporate modern, best-available control technology to limit emissions. In addition, RMR will utilize ultra-low sulfur content diesel fuel, containing less than 15 parts per million of sulfur, in all its generators and equipment.

SOCIOECONOMIC RESOURCES EXHIBIT 15

The Mid-Continent Limestone Quarry will measurably impact the local economy and generate a minimum direct annual impact of $22.5 million. It will employ approximately 50-80 people per day at peak production with additional contractors serving the site daily. The employees are expected to live in or near the surrounding communities of Glenwood Springs, Rifle, New Castle, Silt, and others. The quarry workforce will consist of experienced employees and newly-trained personnel from the local workforce. The average annual employee wages will range between $55,000 and $70,000 and will include benefits. Service providers and vendors in these communities will also benefit from providing utilities, fuel, equipment and parts, drilling and blasting contracting, facility construction and maintenance services, and any other goods or services required by the quarry and quarry personnel. Garfield County should see sales tax benefits with the creation of these jobs and the additional property taxes paid by RMR.

In support of the socioeconomic impact section of this Plan of Operations, an IMPLAN economic analysis is currently being performed by an outside contractor for the NEPA process.

1. Adventure Park

Glenwood Springs, CO is the nearest community to the Mid-Continent Limestone Quarry and, as such, will be the most directly affected by its presence. One of the attractions of Glenwood Springs, Glenwood Caverns Adventure Park, sits atop the mountain south of the quarry. This tourist attraction draws large numbers of people throughout the year. RMR has and will continue to work closely with the ownership and management of the Adventure Park to minimize negative impacts of the quarry on their business. Most visitors access the park from the south via a gondola system while employees and service contractors utilize Transfer Trail to access the park.

2. Cave and Karst Resources

In compliance with 43 CFR §3809.401(c)(1) and CRVFO-NSO-24, a geophysical resistivity survey is being conduct within the project area. The results of this study will be provided to the BLM for use in the NEPA analysis.

MONITORING PLANS EXHIBIT 16

Monitoring Program	*Monitoring Personnel*	*Sampling Parameters*	*Sampling Frequency*	*Monitoring Device Type*	*Monitoring Device Location*	*Field Analysis*	*Laboratory Analysis-RMR*	*Laboratory Analysis-Contractor*
Soil Stability	**Contractor**	Gully and rill presence	Same time as veg.	Visual and photographic review	Same as veg.	X		
Vegetation Interim	Contractor	Vegetation & total cover	1X per year, height of growing season	25-meter 50-point line intercept transect for plant cover with 2-point laser bar frame	3 representative locations within reclaimed unit(s)	X		
Vegetation Interim	Contractor	Photographs	1X per year, height of growing season	Camera	4 photographs of reclaimed unit looking north, east south & west from perimeter of area; 1 photograph of each vegetation cover line transect from start point; Photographs from each Key Observation Point	X		

Monitoring Program	*Monitoring Personnel*	*Sampling Parameters*	*Sampling Frequency*	*Monitoring Device Type*	*Monitoring Device Location*	*Field Analysis*	*Laboratory Analysis-RMR*	*Laboratory Analysis-Contractor*
Vegetation Final Liability	Contractor	Vegetation & total cover	1X per year, height of growing season	50-meter 100-point line intercept transect for plant cover with 2-point laser bar frame	3 representative locations within reclaimed unit & reference area(s)	X		
Vegetation Final Liability	Contractor	Species frequency	1X per year, height of growing season	100-square meter plot centered over cover transect	3 random locations within reclaimed unit	X		
Vegetation Final Liability	Contractor	Photographs	1X per year, height of growing season	Camera	4 photographs of reclaimed unit looking north, east south & west from perimeter of area; 1 photograph of each vegetation cover line transect from start point	X		

Monitoring Program	*Monitoring Personnel*	*Sampling Parameters*	*Sampling Frequency*	*Monitoring Device Type*	*Monitoring Device Location*	*Field Analysis*	*Laboratory Analysis-RMR*	*Laboratory Analysis-Contractor*
Noxious Weeds: Pre-disturbance Survey & Treatment	Contractor	Visual survey & treatment of infestations where present	During growing season and prior to disturbance	Camera: GPS marked photos & herbicide treatment reports	Varies each year based on presence or absence of infestations	X		
Noxious Weeds: Mining Phase Survey & Treatment	Contractor	Visual survey & treatment of infestations where present	1X per year in late spring	Camera: GPS marked photos & herbicide treatment reports	Varies each year based on presence or absence of infestations	X		
Noxious Weeds: Reclamation Phase Survey & Treatment	Contractor	Visual survey & treatment of infestations where present	2x per year: early spring & mid-summer	Camera: GPS marked photos & herbicide treatment reports	Varies each year based on presence or absence of infestations	X		
Surface Water	RMR (field) Contractor (lab)	See CDPHE discharge permit	Each discharge (minimum)	Sample bottles sent to lab	CDPHE stormwater discharge points	X		X
Groundwater	RMR (field) Contractor (lab)	BLM & DRMS required	Quarterly	Sample bottles set to lab	Locations TBD based on NEPA baseline study			X
Air Quality	Contractor	TSP, PM 10, & PM 2.5	Continuous or every sixth-day	Continuous monitor or 24-	Air sampling locations can be seen on Map C-7.			X

Monitoring Program	*Monitoring Personnel*	*Sampling Parameters*	*Sampling Frequency*	*Monitoring Device Type*	*Monitoring Device Location*	*Field Analysis*	*Laboratory Analysis-RMR*	*Laboratory Analysis-Contractor*
				hour collection jar				
Seismic	RMR personnel	Peak particle velocity	On demand (solar powered)	Instantel Micromate measuring PPV	Seismic monitors will be installed at the locations shown on Map C-2.		X	
Slope Stability	Contractor	Field measurements of exposed rock face; Stakes will be installed every five acres and surveyed	Annually	Surveyed stakes and field measurements	Varies	X		
Noise	RMR personnel	Db(A)	Monthly	A National Institute for Occupational Safety and Health (NIOSH) compliant noise level reader with an external microphone.	Decibel levels will be measured at the locations shown on Map C-2.	X		

Monitoring Program	*Analytical Testing Methods*	*Quality Control/ Assurance Procedures*	*Reporting Procedures (Who, what)*	*Procedures for Responding to Adverse Monitoring Results (trigger levels, response actions)*
Soil Stability	Description of identified soil conditions	Contractor report QA procedures	BLM-Soil stability report	Presence of rills and/or gullies; Identify source of erosion; Determine necessary earthwork; Regrade as needed; Report to BLM in annual report
Vegetation Interim	Descriptive statistics of cover data (mean, standard deviation) & sample adequacy calculations to show reliability of cover data	Daily data review to ensure cover samples are valid	BLM-Vegetation monitoring report with data & map; Qualitative evaluation of revegetation	Plant establishment failure or substandard vegetation cover for development stage; Prepare & submit action plan to BLM for approval; Implement action plan following receipt of BLM approval
Vegetation Interim	None (photographs of reclamation areas)	Review to ensure photograph quality & that required photographs have been taken prior to leaving sample location/monitoring unit	BLM-Annual vegetation monitoring report with data, map & photographs; Qualitative evaluation of revegetation	Not applicable

Monitoring Program	*Analytical Testing Methods*	*Quality Control/ Assurance Procedures*	*Reporting Procedures (Who, what)*	*Procedures for Responding to Adverse Monitoring Results (trigger levels, response actions)*
Vegetation Final Liability	Descriptive statistics of cover data (mean, standard deviation) & sample adequacy calculations to show reliability of cover data; Comparison of reclaimed and reference area cover values	Daily data review to ensure cover samples are valid	BLM-Annual vegetation monitoring report with data, map & photographs; Qualitative evaluation of revegetation	Substandard vegetation cover for development stage; Prepare & submit action plan to BLM for approval; Implement following receipt of BLM approval
Vegetation Final Liability	Calculate frequency for each plant species within each reclamation unit	Daily data review to ensure samples have been taken and identification of unknown plant species, if any	BLM-Annual vegetation monitoring report with data, map & photographs; Qualitative evaluation of revegetation	Substandard species diversity for development stage; Prepare & submit action plan to BLM for approval; Implement following receipt of BLM approval

Monitoring Program	*Analytical Testing Methods*	*Quality Control/ Assurance Procedures*	*Reporting Procedures (Who, what)*	*Procedures for Responding to Adverse Monitoring Results (trigger levels, response actions)*
Vegetation Final Liability	None	Review to ensure photograph quality & that required photographs have been taken prior to leaving sample location/monitoring unit	BLM-Annual vegetation monitoring report with data, map & photographs; Qualitative evaluation of revegetation	Not applicable
Noxious Weeds & Control Treatment: Pre-disturbance	Visual identification & verification with noxious weed literature/botanical keys as needed.	Weed species verification with noxious weed literature/botanical keys as needed. Review photograph quality & that required photographs have been taken prior to leaving sample location. Verify adequacy of GPS coordinates on photographs.	BLM, DRMS, & County: Annual Monitoring & treatment report	Weed management reports will include a description of monitoring methods used, noxious weed infestation locations, and control actions taken. If weed control management appears to be ineffective based on annual infestation monitoring, additional corrective actions will be proposed in the report for BLM review and approval.

Monitoring Program	*Analytical Testing Methods*	*Quality Control/ Assurance Procedures*	*Reporting Procedures (Who, what)*	*Procedures for Responding to Adverse Monitoring Results (trigger levels, response actions)*
Noxious Weeds Survey & Control Treatment: Mining Phase	Visual identification & verification with noxious weed literature/botanical keys as needed.	Weed species verification with noxious weed literature/botanical keys as needed. Review photograph quality & that required photographs have been taken prior to leaving sample location. Verify adequacy of GPS coordinates on photographs.	BLM, DRMS, & County: Annual Monitoring & treatment report	Weed management reports will include a description of monitoring methods used, noxious weed infestation locations, and control actions taken. If weed control management appears to be ineffective based on annual infestation monitoring, additional corrective actions will be proposed in the report for BLM review and approval.

Monitoring Program	*Analytical Testing Methods*	*Quality Control/ Assurance Procedures*	*Reporting Procedures (Who, what)*	*Procedures for Responding to Adverse Monitoring Results (trigger levels, response actions)*
Noxious Weeds Survey & Control Treatment: Reclamation Phase	Visual identification & verification with noxious weed literature/botanical keys as needed.	Weed species verification with noxious weed literature/botanical keys as needed. Review photograph quality & that required photographs have been taken prior to leaving sample location. Verify adequacy of GPS coordinates on photographs.	BLM, DRMS, & County: Spring & Fall Monitoring & treatment report	Weed management reports will include a description of monitoring methods used, noxious weed infestation locations, and control actions taken. If weed control management appears to be ineffective based on annual infestation monitoring, additional corrective actions will be proposed in the report for BLM review and approval.
Surface Water	EPA standards	Secondary personnel review in the field; EPA procedures for lab	BLM & CDPHE-quarterly or following discharge	Any sampling results showing an exceedance will be reported to the BLM within ten days of the results being available to RMR. In the event of an exceedance, a stormwater and container inspection will be conducted by an independent qualified professional.

Monitoring Program	*Analytical Testing Methods*	*Quality Control/ Assurance Procedures*	*Reporting Procedures (Who, what)*	*Procedures for Responding to Adverse Monitoring Results (trigger levels, response actions)*
Groundwater	EPA standards	Secondary personnel review in the field; EPA procedures for lab	BLM & CDPHE-quarterly	Any sampling results showing an exceedance will be reported to the BLM within ten days of the results being available to RMR. In the event of an exceedance, a stormwater and container inspection will be conducted by an independent qualified professional.

Monitoring Program	*Analytical Testing Methods*	*Quality Control/ Assurance Procedures*	*Reporting Procedures (Who, what)*	*Procedures for Responding to Adverse Monitoring Results (trigger levels, response actions)*
Air Quality	EPA standards for TSP, PM10, & PM2.5	Contractor managed	BLM & EPA every sixth day	Any measurement showing an exceedance of the pollutant thresholds established by CDPHE or the BLM for this site will be reported to the BLM within 30 days of exceedance or 10 days of lab result availability. In the event of an exceedance, watering and/or chemical treatment of active surfaces will be double in frequency until there is no exceedance for three consecutive samples

Monitoring Program	*Analytical Testing Methods*	*Quality Control/ Assurance Procedures*	*Reporting Procedures (Who, what)*	*Procedures for Responding to Adverse Monitoring Results (trigger levels, response actions)*
Seismic	Digital reader reporting	Secondary personnel review	BLM-Monthly	Any PPV measurement in excess of 1.25 inches/sec when within 300 feet of a blast, 1.00 inches/sec when between 300 and 5000 feet of a blast, or 0.75 inches/sec when over 5000 feet away from a blast will be reported to the BLM within 24 hours. In the event that of exceedance, blasting will cease until a blast design is determined that will prevent exceedance PPV measurements. This may include, but is not limited to, reducing the area shot per blast to reduce explosives used at a time, change in hole loading, change in hole size, changes to explosives used, or reduction in hole depth.

Monitoring Program	*Analytical Testing Methods*	*Quality Control/ Assurance Procedures*	*Reporting Procedures (Who, what)*	*Procedures for Responding to Adverse Monitoring Results (trigger levels, response actions)*
Slope Stability	None	Contractor internal QA	BLM-Annual report	Any measurement showing movement of more than 10 feet will be reported to the BLM within 24 hours. All earthmoving activity below the moving area will cease until the source of the instability is identified.
Noise		Secondary personnel review of noise readings	BLM-Monthly	In the event that measurements exceed state or federal noise limits, continuous noise readings will be taken for a 60-hour period at the exceedance location. If the exceedance is repeated during the continuous reading, operations that are identified as the likely source will be ceased until a barrier or other noise reducing alteration is made to the equipment or landscape within the quarry

3. Weed Monitoring

3.1 Weed Monitoring, Evaluation and Reporting

Information about noxious and nuisance weed infestations will be collected and processed annually. This information can be used to characterize weed infestations, document present treatments, evaluate weed treatment effectiveness and adaptively manage future treatment strategies. This information will be summarized in an annual report in conjunction with daily herbicide records and GPS treatment data that has been collected during the treatment season. Furthermore, the annual report will address observations and recommendations made during the treatment process and give a summarized analysis based on previous reporting, if available. This information can be useful in prioritizing areas when addressing future treatment operations. Annual weed management reports will be submitted to the BLM and DRMS no later than December 1 of each year. Weed management reports will include a description of monitoring methods used, noxious and nuisance weeds detected, and control actions taken. If weed control management appears to be ineffective based on annual infestation monitoring, additional corrective actions will be proposed in the report for BLM review and approval.

4. Vegetation Monitoring

Monitoring the germination and growth of vegetation on areas seeded with the temporary, stabilization, and permanent reclamation seed mixtures will be performed to ensure that adequate vegetation stands are established in a timely manner and are capable of meeting their intended purposes. Vegetation monitoring will be used to evaluate vegetation development and to adaptively manage ongoing and future revegetation operations.

Temporary and stabilization vegetation covers will be monitored and managed when they are seeded on areas that require vegetation performance over two or more growing seasons. This monitoring may be either a qualitative visual inspection or a quantitative inspection depending upon site-specific needs. These inspections will be documented in writing with appropriate supporting information (field notes, photographs, etc.).

Monitoring will be conducted to evaluate the development of permanent diverse vegetation communities on reclaimed lands. Monitoring will collect qualitative and quantitative data during

the reclamation liability period. Information will be used to track and demonstrate that the reclaimed plant community is capable of meeting final vegetation bond release requirements and supporting the designated post-mining land use. Two types of monitoring will be used to track permanent reclamation vegetation development including: interim monitoring and final liability release monitoring.

Key observation points will be used to monitor the effectiveness of the reclamation plan in creating suitable texture and color in the reclaimed plant community and preserving visual aesthetics. Photographs of reclaimed land will be taken annually from these points to document and assess the effectiveness of the reclamation plan. These photographs will be included in the annual monitoring report to the BLM. After reclamation activities have started RMR will select appropriate permanent photograph locations that will be suitable for this long-term monitoring.

4.1 Interim Monitoring

Interim monitoring will be conducted on permanently reclaimed lands starting in the second full growing season and will continue each year until final reclamation liability release monitoring commences (year three or later). Monitoring will be conducted during the growing season when most of the plant species in the reclaimed plant community have reached their maximum phenological development. Interim monitoring will identify substandard areas that require further management or operations to timely meet vegetation bond release requirements. Qualitative observation of plant health, vigor and species diversity will be noted. At RMR's discretion, limited quantitative data may be collected to better characterize developing reclaimed plant communities and assist in developing future vegetation operations and management.

Substandard areas will be inter-seeded or reseeded following the application of any corrective measures identified as being needed by interim monitoring. Management and environmental information for the adequate and inadequate areas will be noted, compared, and contrasted to determine if any adjustments are required in the reclamation program. The presence and distribution of noxious or controlled weed species will also be noted and mapped for management purposes.

4.2 Liability Release Monitoring

Final vegetation liability release monitoring will be conducted during the third or subsequent growing season. Qualitative observations of plant vigor, health, nutrition, and community development will be noted. Quantitative vegetation data will be collected to demonstrate that reclaimed vegetation meets the following requirements:

- Desirable cover is equal to or greater than 80% of representative reference area(s).
- Diversity approximates surrounding undisturbed areas.

Quantitative data will also be used to assist in the characterization of permanent reclamation communities for bond release purposes, to document their growth and development and evaluate performance of the plant species contained in the seed mixtures.

4.3 Vegetation Liability Release Standards & Monitoring Methods

A suitable reference area will be quantitatively monitored for comparison with the permanently reclaimed vegetation community. Appropriate reference sites will be assessed, selected, and characterized following Ecological Site Inventory (ESI) methods and standards, or an approved equivalent system. Reference sites will be approved by BLM prior to a permitted disturbance.

Reference areas will be monitored each year that final reclamation liability release monitoring is performed. Reference areas will be established before mining disturbance begins in the new mining area. Reference areas will be used to establish criteria for reclamation vegetation success. Sampling reference areas each year will compensate for variations in environmental conditions (e.g. rainfall, temperature, drought, etc.). Reference areas will be selected in locations that both effectively represented the desired vegetation community and are not expected to be disturbed by mining operations.

Data collected in each reference area will include:

- Cover measurements along a 25-meter transect at each sample point, as described above. Tree canopy cover will be included as a “first-hit”, if present, per BLM requirements.

- Frequency measurements at each sample point, as described above.

- Photographs of each sample transect, as described above.
- Photographs of the reference area from each cardinal direction, as described above.
- Visual assessment of any noxious weed infestations, as described above. (Ideally the reference areas will be free of noxious weed infestations.)
- Desirable species vigor observations, as described above.

Between 15 and 30 quantitative samples will be collected in each reference area yearly. The actual number of samples will be determined by calculating the number of samples needed to obtain statistical adequacy for cover measurements (i.e., one-sided "t" test with 80% confidence interval).

Reference area monitoring will be used to:

- Demonstrate that wildlife habitat uses have been restored;
- Demonstrate that minimum cover requirements have been met and support the release of reclamation liability;
- Adaptively manage ongoing reclamation practices; and
- Assist in development of site-specific post-mining land use levels and management plans.

Final bond release monitoring will include written and photographic documentation of vegetation conditions. Ecological Site Inventory methods and standards or an equivalent system will be used to select reference areas. Plant cover and frequency by species vegetation data will be taken using the monitoring methods described in *Monitoring Manual for Grassland, Shrubland, and Savanna Ecosystems*, Jeffrey E. Herrick, et. al.

Final bond release monitoring will be performed as described in this section. Reclaimed units and associated reference areas will be monitored at the height of the growing season (typically during August). Qualitative assessments of the reclaimed plant community will be made. If the permanently reclaimed site appears to have met requirements for reclamation liability release, then quantitative data will be collected. If the site doesn't appear to have met final reclamation

release criteria, this will be noted on the monitoring form and reported, and no additional data will be collected.

Qualitative assessments will include the following:

- Photographs will be taken of each reclaimed unit to be monitored. At least 4 photographs in each cardinal direction will be taken from the approximate center of the site. The location of the photographs will be recorded by GPS equipment.

- Visual assessment of noxious weed infestations will be made as described in the IWMP Plan contained in this document.

- Vigor of desirable species will be assessed according to BLM requirements including observing the size and color of plants and looking for the presence of new growth, flowers or seeds, litter from previous years' foliage, and seedlings.

- A visual assessment of erosion will be made including notation of gullying, head cutting, or rills. Photos and GPS points will be taken to document erosion problems, as necessary.

- If needed, recommendations for additional reclamation activities will be made (see reporting).

Quantitative measurements will include the following.

- Vegetative cover measurements will be taken using the line-point intercept method along three 25-meter transects in each reclaimed unit being monitored. One point-intercept will be recorded at every 0.5 meter along the transect, for a total of 50 points per transect. The cover type will be recorded for each first hit point as either plant species, standing dead, litter, bare, or rock (larger than ¼ inch). Data will be combined for all three transects for a total of 150 points per reclaimed unit. Multi-hit cover will be taken, with the first hit

being moved aside and subsequent "hits" being recorded down the ground level as described in the Monitoring Manual for Grassland, Shrubland and Savanna Ecosystems[5].

- Species frequency will be evaluated by observing and recording each plant species found within one meter on either side of the line cover transect.

Sample locations will be chosen at each site to represent the varying slopes, aspects, and vegetation conditions of the reclaimed unit. A GPS location will be recorded for each sample origin.

Quantitative and qualitative data will be compiled for analysis and reporting. Vegetative cover will be calculated for each sample to obtain percent cover of acceptable, undesirable, and total cover of all plant species. Non-vegetative cover including standing dead, litter, and rock will also be reported. Species richness (the number of species) for each reclaimed unit will be calculated, as well as the relative percent cover (absolute cover divided by total vegetation cover) of grasses, forbs, and shrubs.

Final monitoring will document that reclaimed areas will support the post-mining land uses, provide natural plant community succession and development, and be self-sustaining. Monitoring will demonstrate that seeded and other desirable plant species are established, that the vegetation community is capable of reproduction through seed production or vegetative propagation strategies, and that the site is adequately stabilized against excessive erosion.

Monitoring of permanently reclaimed vegetation communities will commence in the third or subsequent growing season when the condition of the vegetation visually indicates that it is ready for consideration for final liability release. This monitoring will continue until reclamation success criteria are met. Revegetation will be considered successful when:

1. Seeded species or desirable native perennial volunteer species on the reclaimed areas constitute at least 80% of the cover of the surrounding undisturbed area or reference area (CRVFO BMP MIN-62).

2. Forbs and shrubs should constitute at least 2% of the reclamation cover.
3. No noxious weeds on the state or county A or B list are present in the release area.
4. C list species are no more abundant than in adjacent undisturbed areas.
5. The site is adequately stable and excessive erosion isn't present.

Annual reclamation monitoring and weed reports will be submitted to the BLM and DRMS. Reclamation reports will include a description of monitoring methods used, vegetation composition and cover within each reclaimed habitat type, noxious weeds detected, and reclamation actions taken. RMR will consult with BLM prior to developing the first annual Reclamation Status Report to ensure that formatting and content meet the minimum requirements for this document.

If reclamation is not considered successful by either: 1) the third growing season after seeding or 2) the first time it is monitored for final liability release, additional reclamation activities may be required. When this occurs RMR will submit a plan to the BLM specifying corrective or augmentative measures to be performed to achieve reclamation goals. BLM will review, and if acceptable, approve this plan. After the plan is approved, RMR will implement the plan

4.4 Post-Closure Activities

After all disturbed area has been reclaimed RMR will conduct the following activities:

- Vegetation Monitoring-Performed annually by qualified individuals until revegetation standards are satisfied. If monitoring data demonstrates that revegetation is not establishing and growing satisfactorily, corrective action plans will be developed and submitted to the BLM for review and approval. Following receipt of approval from the BLM, RMR will implement the corrective action plan.
- Stability Monitoring-A yearly inspection will be performed in the spring each year to verify that reclaimed areas are stable and that soil erosion is adequately controlled. This will include reclaimed areas and their drainage channels. If monitoring identifies areas that are not adequately controlled against excessive erosion, corrective action plans will be developed and submitted to the BLM for review and approval. Following receipt of approval from the BLM, RMR will implement the corrective action plan.

- Water Treatment Structures-Quarterly inspections will be made of water treatment structures to verify that they are structurally sound and in good working order. If inspection identifies structural or functional problems, corrective action plans will be developed and submitted to the BLM for review and approval. Following receipt of approval from the BLM, RMR will implement the corrective action plan.

When problems are identified the past reclamation practices and methods used on the deficient area will be reviewed. The cause of the problem will be identified and then the corrective action plan will be formulated to address the causal conditions. RMR expects that the next higher level of reclamation methods will be used to correct the problem. For example, if an area is experiencing excessive soil erosion where cereal grain straw was mulched and tackified, it would be inter-seeded and a more robust form of mulch would be used to stabilize the area based on the severity of soil erosion (e.g., native hay, WoodStraw, or Hydromulch). Typically, it is anticipated that several types of corrective measures will be used to achieve desired results.

5. Slope Stability Monitoring

The slope stability monitoring plan addresses the 43 CFR 3809.401(b)(4) requirements in the following ways:

- Exposed hard rock faces and reclaimed soil slopes will be visually inspected by a contractor annually. Stakes will be installed once every five acres in reclaimed slopes and their GPS position tracked annually.
- QA/QC: Contractor reports will be signed off by a qualified geotechnical expert such as a registered professional engineer or geologist.
- Reports will be submitted to BLM annually
- Any slope movement of 10 feet or more that is measured will be reported within 24-hours.
- No earthmoving activity may take place below an exceeding slope movement (>10 feet of movement)
- Any hard rock feature identified as posing an imminent failure risk will be reported within 24 hours. Standard mining will stay at least 500 feet away from such a feature until it is mitigated.
- In the event of an identified slope stability exceedance or imminent failure risk, a slope stability plan will be assembled by a qualified geotechnical expert such as a registered professional engineer or geologist and provided to BLM for approval prior to implementation.
- All slope stability monitoring will continue during and after reclamation until any areas are released from Colorado Division of Reclamation, Mining, and Safety bond.

6. Noise Monitoring

The noise monitoring plan addresses the 43 CFR 3809.401(b)(4) requirements in the following ways:

- Decibel levels (db(A)) will be measured at the locations designated on Map C-7.
- Measurements will be taken monthly by quarry personnel with a handheld decibel meter
- Noise measurements will be taken during periods when all typical quarry equipment is in operation.
- Monitoring locations were selected based upon their proximity to public access points or their location between the quarry and other businesses, residential areas, or features of interest.
- A NIOSH compliant noise reader with an external microphone will be used
- QA/QC: Noise reader will be maintained in line with manufacturer's recommendations
- Reports will be submitted to BLM monthly with noise measurements
- If state or federal noise limits are exceeded, continuous measuring will be conducted over a 60-hour period to identify the exceedance source and allow for mitigation

7. Seismic Monitoring

The seismic monitoring plan addresses the 43 CFR 3809.401(b)(4) requirements in the following ways:

- Monitoring devices will be placed at designated locations as identified on Map C-7
- Monitoring locations were selected based upon their proximity to public access points or their location between the quarry and other businesses, residential areas, or features of interest.
- Monitors are designed to detect and record seismic events automatically. They will record peak particle velocity during events and output raw data logs for review and report. Retrieval of this data will be done by RMR personnel on either an instantaneous or daily basis.
- QA/QC: All monitoring devices will be maintained in line with manufacturer recommendations. Monitor outputs will be evaluated by a third party bi-annually to confirm that measurements accurately reflect site conditions.
- Monitors will meet or exceed International Society for Explosive Engineers standards for seismic monitoring devices
- RMR will provide a monthly summary report of the all monitoring data.
- Any PPV measurement in excess of 1.25 inches/sec when within 300 feet of a blast, 1.00 inches/sec when between 300 and 5000 feet of a blast, or 0.75 inches/sec when over 5000 feet away from a blast will be reported to the BLM within 24 hours.
- In the event of exceedance: blasting designs will be revised to reduce PPV.

8. Air Quality Monitoring

The Air Quality monitoring plan addresses the 43 CFR 3809.401(b)(4) requirements in the following ways:

- Monitoring devices will be placed at designated locations as identified on Map C-7
- Monitoring locations were selected based upon their proximity to public access points or their location between the quarry and other businesses, residential areas, or features of interest.
- TSP, PM 2.5, and PM 10 will be monitored either continuously or via 24-hour sampling every sixth day depending on the availability of line power
- QA/QC: All monitoring devices will be maintained in line with manufacturer recommendations. Sampling contractors will provide a QA/QC report with each results report.
- Analytical methods will be consistent with 40 CFR 50.
- RMR will provide an annual summary report of the air quality data gathered. If an exceedance is detected, RMR will inform the BLM within 30 days of the event or 10 days of the lab result determining an exceedance.
- Watering and/or chemical treatment of surfaces will double in frequency in the event of an exceedance until there is no exceedance for three consecutive samples.

RMR will maintain comply with all state and federal regulatory requirements related to air monitoring, in particular those instituted by the Colorado Department of Public Health and Environment, Air Pollution Control Division as part of Fugitive Dust permitting.

9. Surface Water Monitoring

Monitoring will be conducted at the outfalls shown on Map C-7. These outfalls will be sampled whenever the discharge following a storm event and in accordance with the approved CDPHE discharge permit for the site. Sample containers filled with stormwater will be sent to a licensed lab for analysis. All test results will be submitted on a quarterly basis to BLM or whenever sample results are reported to CDPHE. Any sampling results showing an exceedance will be reported to the BLM within ten days of the results being available to RMR. In the event of an exceedance, a stormwater and container inspection will be conducted by an independent qualified professional.

10. Groundwater Monitoring

Monitoring wells will be installed at the locations determined appropriate during baseline water data gathering. The approval of these well locations and the monitoring plan associated with them will be approved by the BLM outside of this plan of operations modification. The wells will be sampled in accordance with the schedule approved by the BLM for the baseline hydrology monitoring plan and will be tested for the constituents identified in that plan. Testing will be via sampled container and shipped to a licensed lab for analysis. All test results will be submitted to the BLM according to the approved monitoring plan.

RMR will provide a comprehensive groundwater monitoring plan once the baseline hydrology study is underway.

GEOTECHNICAL STABILITY EXHIBIT 17

A geotechnical analysis of the proposed quarry was conducted by Brierley and associates. See Appendix 4 for additional information.

ACCESS USE AND MAINTENANCE PLAN EXHIBIT 18

Access to the Mid-Continent Quarry will continue to be via Transfer Trail from Traver Trail in Glenwood Springs. Traffic utilizing Transfer Trail will include recreational vehicles, Glenwood Caverns personnel, semi-trucks, dump trucks, RMR employee vehicles, contractor vehicles, road maintenance equipment, and occasional mining equipment. Transfer Trail will be improved as part of the quarry expansion proposed in this modification to allow for a more efficient haul route from the quarry to Traver Trail. Details for the Transfer Trail improvements are in Appendix 2.

In addition to the road improvements to Transfer Trail, RMR will perform regular road maintenance on the road including grading, road repair, ditch cleaning, and berm maintenance. Additionally, a new public parking area will be constructed at the intersection of Transfer Trail and the two-track road that branches off Transfer Trail 1.56 miles from the main quarry gate (see Map C-2). This parking lot will be maintained by RMR at no cost to the public throughout the life of the quarry. The improvements and maintenance commitments RMR is proposing for Transfer Trail will provide a dramatically improved roadway for both quarry and recreational traffic.

1. Transfer Trail Traffic

Total traffic, including recreational traffic, on Transfer Trail is anticipated to average 400-500 round trips per day. Roughly 5-10% (20-50 round trips) of the traffic will be recreational, with 80-90% (320-450 round trips) being haul truck traffic, and 5-10% (20-50 round trips) being other quarry traffic. A detailed traffic study will be conducted as part of the NEPA analysis.

Trucks will only haul quarried material on Transfer Trail between the hours of 6am – 6pm. In addition to the running hour limitation, speed limitations will be applied to all quarry traffic using Transfer Trail. Speed limitations will stipulate a maximum speed limit between 10-15 miles per hour on all quarry traffic controlled by RMR, both entering and exiting the operation. Speed limits may vary based upon vehicle type. Signage will be used to remind drivers of the limitations. Speed limits will be set with three primary factors in mind. 1) The safety of recreational users and passenger vehicles on Transfer Trail. 2) The safety of wildlife on or near

Transfer Trail. 3) Limiting the amount of noise and dust each vehicle produces while traveling on Transfer Trail.

1.1 Internal Quarry Traffic

The majority of internal quarry traffic will consist of trucks entering and exiting the mill level through the main quarry gate from Transfer Trail to be loaded with product. This will account for roughly 320-450 round trips per day. Traffic between the mill level and the active mining level will average between 30-50 trips per day. This traffic will typically consist of vehicles used for employee transportation, equipment maintenance, road maintenance, and the delivery of parts and supplies. Traffic between the mill level and the active mining level will interact with other Transfer Trail traffic for approximately 8,200 feet between the main quarry gate and the new recreational parking lot 1.56 miles from the main quarry gate.

1.2 Recreational Traffic

Transfer Trail traffic will remain bi-directional during the life of the operation through the segments where mine traffic will be normally encountered. Recreational traffic will have access to Transfer Trail 24 hours a day except in the cases of temporary closure due to weather or blasting operations.

1.3 Existing Land Use Authorization Traffic

The access to existing BLM land use authorizations that may be affected by the proposed operation will be protected and replaced as needed. At the time of application, only the access to COC 18884 (communications tower) will be affected by the proposed quarry expansion. This access will be maintained during mining and replaced following mining.

The access is depicted on Maps C-1 and C-2, showing the pre -mine and post -mine conditions and route.

Figure 18-1 Transfer Trail and Quarry Traffic

The majority of quarry truck traffic will exist along the lower 5,600 -foot portion of Transfer Trail (Figure 18-1, green). This section Figure 18-1of Transfer Trail will contain haul trucks, light vehicles, contract trucks, and intermittent quarry related traffic. Light quarry traffic may be encountered for approximately 8,200 feet of roadway on the upper portion (Figure 18-1, blue) of Transfer Trail adjacent to the project. Beyond the aforementioned upper stretch of Transfer Trail, any recreational traffic will not encounter quarry vehicles or equipment during normal operations.

2. Transfer Trail Maintenance

Watering of the improved Transfer Trail will take place at least four times daily for dust control, except during days when natural moisture is present on the road. If additional dust control mitigations are determined to be needed, such as magnesium chloride application, they will be

implemented. Grading or blading of the road will take place multiple times per week. Road cover will be added as needed. Necessary repairs and improvements of the roadway will be identified by quarry staff as a part of daily inspections of Transfer Trail. All grading and structures on Transfer Trail will be maintained to specifications as needed based on inspections.

Stormwater controls such as ditches and culverts will be cleaned out a minimum of twice a year. Further maintenance activity will be implemented as determined by the daily inspections of Transfer Trail.

Mid-Continent Quarry access gates will be left open during all business hours.

3. Paving Maintenance

RMR is proposing the paving of the first 1,500 feet of Transfer Trail from the intersection of Transfer Trail and Traver Trail up towards the quarry entrance. Paving this section of road will reduce the amount of dust and noise near the residential area of Oasis Creek. This paved portion will be periodically cleaned using a street sweeper. Crack filling, patching, and replacement of damaged sections will be performed on an as needed basis by RMR.

4. Seasonal Use

Mid-Continent operations will be continuous throughout the year, with no off-season. Traffic on Transfer Trail may occur at any time. However, night shift traffic will be limited to employee vehicles, maintenance vehicles, parts deliveries, and other non-material transport traffic.

RMR realizes Transfer Trail is a popular access point to the Flattops for snowmobilers in the winter months. RMR is committed to maintaining winter access to this recreational area and to improving the safety of their access. RMR will perform snow plowing or snow blowing on Transfer Trail when needed throughout the snowy season. Snow removal will be performed during the early hours of the day to limit potential interaction with recreational traffic. RMR will plow the full width of the road from Traver Trail to the new recreational parking lot located 1.56 miles from the main quarry gate. RMR will also sand and/or salt the road as required to maintain a safe, non-slippery running surface for all traffic. RMR will install signage along Transfer Trail

to direct recreational users to safe parking areas and to prevent them from parking in non-designated areas.

APPENDIX 1 MINING CLAIMS

APPENDIX 2 TRANSFER TRAIL IMPROVEMENTS

Transfer Trail improvements will create a more efficient haul route and to improve safety on the portions of Transfer Trail where quarry traffic will interact with recreational traffic. Improvements will include road widening, creating a more uniform road grade, realigning a switchback, reducing the number of curves, increasing visibility, creating drainage routes and stormwater management structures, and improving the road's running surface.

All road improvements are planned to occur between the quarry main gate and the intersection of Transfer Trail and Traver Trail, or between the Saddle parking lot and the intersection of Transfer Trail and the two-track road that branches off Transfer Trail 1.56 miles from the main quarry gate. From the intersection with Traver Trail up to the first switch back the road will be straightened, some portions will be re-aligned to the north to allow for the construction of stormwater management features, and visibility will be significantly improved. The first 1,500 feet of Transfer Trail will be paved to reduce noise and dust pollution near the residential areas of Oasis Creek.

The stretch of road including the first switch back up to the main quarry gate will be realigned to create a consistent grade. The re-alignment would increase the radius of both switch back corners, creating smoother turns and maintaining bi-directional traffic through both corners. The green alignment in the figure below is an example of how this re-alignment could be performed.

The stretch of Transfer Trail between the Saddle parking lot and the new parking lot will be widened, regraded, and have stormwater management structures installed.

The other primary benefit of the Transfer Trail road improvement is the significant upgrade of stormwater management structures in the Transfer Trail corridor. Currently, the stormwater management structures in place are minimal and are not designed to handle rain events adequately. The primary reason for this inadequacy is the location of Transfer Trail in the bottom of the drainage instead of on a slope above the drainage bottom. The improvement plan for Transfer Trail calls for the relocation of the road out of the drainage bottom and onto the northwestern slope. This relocation and opening of the drainage bottom will allow for the creation of detention structures aimed at removing sediment from water flows prior to exiting the quarry disturbance area.

Transfer Trail will remain open during the improvement process. During the construction there will be times that Transfer Trail will be operated in a temporary single lane configuration to ensure the safety of crews and recreational traffic. When in a single lane configuration or when traffic may encounter construction equipment, RMR will use flaggers, radios, and signage to clearly indicate the status of the road and to maintain safe traffic patterns.

The improvement of Transfer Trail will begin at the intersection with Traver Trail and progress up Transfer Trail towards the quarry. This will allow the construction of stormwater management structures at the lowest point first, allowing for the treatment of stormwater as the construction advances. During all construction activities temporary sediment control measures will be used until the final stormwater management structures for that section have been constructed. These measures include hay bales, silt fences, and sediment control logs.

RMR will be following up this preliminary Transfer Trail improvement design with a more detailed engineered design. RMR will be acquiring both survey and geotechnical data for the Transfer Trail area when the snow melts in late spring 2019. The data will be used to produce a design that accurately represents current grades and topography. RMR will provide the BLM with updated cross sections showing the relation of the road and drainage improvements to the existing terrain.

Mid-Continent Quarry
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APPENDIX 3 SWMP AND SPCC PLANS

Note: The SWMP and SPCC Plan are pre-operational versions. Both documents will be revised throughout the life of the quarry to accurately represent as-built and on the ground specific.

APPENDIX 4 BRIERLEY REPORT

APPENDIX 5 ERO REPORT

APPENDIX 6 MAPS